

**ACADEMIC REGULATIONS,
COURSE STRUCTURE
AND
DETAILED SYLLABUS**

for

**B.Tech Four Year Degree Course
(A-20)**

in

**ELECTRONICS AND COMPUTER ENGINEERING
(ECM)**

(Applicable for the batches admitted from 2020-2021)



SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY

(An Autonomous Institution approved by UGC and affiliated to JNTUH)

(Accredited by NAAC with 'A' Grade and Accredited by NBA of AICTE)

Yamnampet, Ghatkesar, Malkajigiri Medchal District -501 301.

SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY
(An Autonomous Institution)

DEPARTMENT OF
ELECTRONICS AND COMPUTER ENGINEERING (ECM)

PROGRAM OBJECTIVES

ECM Ethos– To solve modern engineering problems with combined knowledge of hardware and software

The courses structure of ECM is arranged such that students learn the basic and continue to advance subjects in an ordered set of prerequisites. The first two years of the ECM brings the physical, analytical, computational and communication approaches required as foundation of engineering through courses in Mathematics, Physics, Computer languages (C, C++, Java), Digital Circuit Design, Database Management, English and Technical Seminars. Many of these courses include weekly labs in which students can utilize state-of the art lab facilities to simulate and solve interesting problem.

The III and IV years of the ECM study focuses on the concepts and techniques used in the design and development of advanced hardware and software systems. In addition, students will be provided with elaborate choices of elective streams (minor stream) to select based on their liking. Also, a generous allotment of open electives is included to permit student gather interdisciplinary knowledge. These synergetic efforts are made to ensure our students gain comprehensive knowledge around their core area of study and be successful in career of their choice.

Further, the program curriculum is designed by surveying the latest skills in demand for the areas of Electronics and Computer. After completing this program our graduates strive to be high achievers, responsible and thoughtful engineers contributing to society.

VISION

To emerge as a premier centre in Electronics and Computer engineering with focus on human values and professional ethics

MISSION

1. To prepare Electronics and Computer Engineering graduates to be a life- long learner with competence in basic sciences, engineering & professional core, interdisciplinary subjects, so that they can have professional career or to pursue higher studies.
2. Developing liaison with Academia, R & D institutions, software and electronics Industries for exposure of students to the practical aspects in engineering and solution of the industry oriented and societal problems, entrepreneurial pursuit and project management.
3. Inculcating interpersonal skills, team work, professional ethics, IPR and regulatory issues in students to improve their employability and promoting leadership in changing global environment
4. To continuously engage in research and development activities and to promote scientific temper in the graduates.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1. Graduates will have strong foundation in fundamentals of basic sciences, mathematics, Engineering sciences and technology with abilities to understand societal problems
2. Graduates will have successful professional career by demonstrating good scientific and engineering breadth to comprehend the problems using modern tools , conduct experiments, analyze the results and design novel products and solutions to the real life problems.
3. Graduates will be motivated to achieve academic excellence and promote entrepreneurship and skills in project and finance management, pursue research to develop life – long learning in a world of constantly evolving technology
4. Graduates will be trained in human values, Professional ethics and Intellectual Property related issues in broader environmental and social context and sustainable development, communication skills, team work skills, leadership and multidisciplinary approach.

MAPPING

PEOs	Mission of the Department			
	M1	M2	M3	M4
1	3	2		
2	2	3		2
3	3	3		1
4		2	3	

PROGRAMME OUTCOMES (PO s)

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in Independent and life-long learning in the broadest context of technological change.

**ACADEMIC REGULATIONS
FOR B.TECH. REGULAR STUDENTS
WITH EFFECT FROM
THE ACADEMIC YEAR 2020-21
(A-20)**

1.0 Under-Graduate Degree Programme in Engineering & Technology (E&T)

- 1.1 SNIST offers a 4-year (8 semesters) **Bachelor of Technology** (B. Tech.) degree programme, under Choice Based Credit System (CBCS) with effect from the academic year 2020-21 in the following branches of Engineering.

Sl. No.	Branch
1.	Civil Engineering
2.	Electrical and Electronics Engineering
3.	Mechanical Engineering
4.	Electronics and Communication Engineering
5.	Computer Science and Engineering
6.	Information Technology
7.	Electronics and Computer Engineering

1.2. Credits (Semester system for B. Tech courses)

The existing credit system of giving one credit for a lecture hour/ tutorial hour per week and giving 0.5 credit for every hour of practical and drawing shall be continued in these regulations also.

2.0 Eligibility for admission

- 2.1 Admission to the Under Graduate courses shall be made either on the basis of the rank of the candidate in entrance test conducted by the Telangana State Government (EAMCET) or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time. However, admissions under Management / NRI Category shall be made on the relevant orders issued by the Govt. of Telangana from time to time.

- 2.2 The medium of instruction for the entire Under Graduate programme of study in E&T will be **English** only.

3.0 B. Tech. Programme structure

- 3.1 A student after securing admission shall pursue the Under Graduate programme in B. Tech. in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B. Tech course. However, the student can take two more years for appearing the examinations to clear the backlog subjects.

In the First year it is structured to provide **45 credits** and the credits in II, III and IV years should not exceed **119 credits** as per AICTE model curriculum for the B. Tech. programme. Each student shall secure **164 credits** (with CGPA ≥ 5) required for the completion of the Under Graduate programme and Award of B. Tech degree.

Each student shall secure **164 total credits** (with CGPA ≥ 5) for the completion of the Under Graduate programme for the award of the B.Tech. degree. However, any revision made in this regard and approved by the Academic Council of the college and by Parent University shall be implemented from the date of the revision.

3.2 UGC/AICTE specified definitions/ descriptions are adopted appropriately for various terms and abbreviations stated below.

3.2.1 Semester scheme

Each Under Graduate programme is of 4 academic years (8 semesters) with the academic year being divided into two semesters of 22 weeks (90 instructional days) each, each semester having - ‘Continuous Internal Evaluation (CIE)’ and ‘Semester End Examination (SEE)’.

Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated curriculum / course structure as suggested by AICTE are followed.

3.2.2 Credit courses

- A student in a semester has to earn credits which shall be assigned to each subject/ course in an L: T: P: C (lecture periods: tutorial periods: practical periods: credits) structure based on the following general pattern.
- One credit for one hour/ week offered in the entire semester for theory lecture (L) / Tutorial (T) courses.
- One credit for two hours/ week offered in the entire semester for laboratory/ practical (P) courses.
- The orientation course recommended by AICTE in the model curriculum is offered for 3 weeks and Cyber Security in III year as mandatory course.
- Environmental Engineering is offered mandatory course for B. Tech Mechanical Engineering and ECE students in II year.
- However, these courses will be reflected in the Memo of Marks, the grading will be awarded below, with some total of 100 marks with CIE for 30 marks and SEE for 70 marks.

% of Marks Secured in a Subject/Course	Letter Grade
Greater than or equal to 90%	O (Outstanding)
80 and less than 90%	A+ (Excellent)
70 and less than 80%	A (Very Good)
60 and less than 70%	B+(Good)
50 and less than 60%	B (Average)
40 and less than 50%	C (Pass)
Below 40%	F (FAIL)
Absent	Ab

- For mandatory courses i.e., **Orientation Course** for B. Tech I year students to be taught for one week in I semester with Two Units and remaining Four Units in B. Tech. I year II semester and **Cyber Security** is offered as mandatory course for all the students of Civil, ME,EEE and will not have credits, but evaluation will be done as per the above table. A student cannot obtain degree unless he / she completes all the mandatory courses.

3.2.3 Subject Course Classification

All subjects / courses offered for the Under Graduate programme in E&T (B. Tech. Degree programmes) are broadly classified as follows. The Institution has followed all the guidelines issued by AICTE/UGC.

The groups of the subjects shall be as given in the table hereunder along with the credits suggested by AICTE. efforts are made by individual departments to make up the total credits equal to 164.

Sl. No.	Category	Suggested Breakup of Credits (Total 160)	CSE	ECE	CED	EEE	ME	IT	ECM
1	Humanities and social sciences including Management courses	12*	14	14	11	13	13	14	13
2	Basic Science including Mathematics courses	25*	22	23	29	30	24	22	26
3	Engineering Science courses including workshop, drawing, basic electrical /electronics mechanical course as well as various computer courses offered for Non – IT branches	24*	29	28	31	25	28	29	28
4	Professional core courses	48*	59	59	51	61	62	59	59
5	Professional Elective courses (five courses)relevant to chosen specialization / branch	18*	15	15	15	15	15	15	15
6	Open Electives(3 courses) offered by any other departments / MBA department **	18*	6	6	6	6	6	6	6
7	Project work, seminar and internship in industry or elsewhere	15*	19	19	21	14	16	19	17
8	Mandatory courses (Environmental Sciences, Induction training, Indian constitution, Essence of Indian Traditional Knowledge)	(Non-credit)	(Non-credit)	(Non-credit)	(Non-credit)	(Non-credit)	(Non-credit)	(Non-credit)	(Non-credit)
	Total	160*	164	164	164	164	164	164	164

The Joint Board of Studies and Academic Council of the institution has approved the total number of credits to be 164. The various groups of subjects mentioned above shall have credits suggested above with minor variations.

4.0 Course registration

- 4.1 A 'faculty advisor or counselor' shall be assigned to a group of 20 students, who will advise student about the under graduate programme, its course structure and curriculum, choice/option for Professional and open Electives based on their employment potential / further studies.
- 4.2 The student will progress semester after semester as the Institute is following cohort system to satisfying the conditions of promotion to the next semester.
- 4.3 **In the present system there shall be five subjects in each professional elective stream and three subjects in open elective stream.** A student can opt for a stream of professional/ open electives which should be submitted to the faculty Advisor/ Counselor and copy of it to the Examination Section through the Head of the department. A copy of it will be retained with the Head of the department/ faculty Advisor/ Counselor and the student.
- 4.4. **The student can take one extra subject in each semester and can complete the program in 3 ½ years but original degree will be issued along with his / her batch mates after 4 years.**
- 4.5. **If a student acquires 20 credits extra than the required credits as per the regulations he will be awarded honors.**
- 4.6 The purpose of offering Elective Streams in both Professional and Open Electives is to facilitate the students to have a minor specialization based on their interest, so that they will have multi disciplinary exposure. Hence, a student is to take a stream of Electives in either in Professional / Open Elective. He shall not be permitted to opt for other elective subjects in other streams in subsequent semesters.
- 4.7 Dropping of Electives may be permitted, only after obtaining prior approval from the faculty advisor / counselor, **'within a period of 15 days** from the beginning of the current semester.

5.0 Subjects / courses to be offered

- 5.1 A typical section (or class) nominal strength for each semester shall be 60.
- 5.2 A subject / course may be offered to the students, **only if** a minimum of **30 students** opt for it. The maximum strength of a section is limited to 80.

6.0 Attendance requirements:

- 6.1 A student shall be eligible to appear for the semester end examinations, if student acquires a minimum of 75% of attendance in aggregate of all the subjects / courses (excluding attendance in mandatory courses, Internship during II year, NCC / NSO and NSS) for that semester.
- 6.2 Shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.
- 6.3 A stipulated fee shall be payable towards condoning of shortage of attendance as decided by finance committee of SNIST from time to time.
- 6.4 Shortage of attendance below 65% in aggregate shall in **NO CASE** be condoned.
- 6.5 **Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester.**

They get detained and their admission for that semester shall stand cancelled.

They will not be promoted to the next semester. They may seek re-admission for all those subjects registered in that semester in which student was detained, by seeking re-admission into that semester as and when offered; in case if there are any professional electives and / or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category. He will be governed by the new regulations in which he takes re-admission.

6.6 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same semester.

7.0 Academic requirements

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no.6.

7.1 **A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject / course, if student secures not less than 35% marks (24 out of 70 marks) in the semester end examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing 'C' grade or above in that subject / course.**

7.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to group projects, seminar, comprehensive test, viva-voce and major project. If a student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them.

The student would be treated as failed, if student

- (i) does not complete all the mandatory courses offered during the course
- (ii) does not submit a report on internship, group project, major project, or does not make a presentation of the same before the evaluation committee as per schedule, or
- (iii) does not present the seminar as required in the I year and II year or
- (iv) secures less than 40% marks in comprehensive test and seminar/ comprehensive test and viva-voce / group project/major project evaluations.

Student may reappear once for each of the above evaluations, when they are scheduled again; if student fails in such 'one re-appearance' evaluation also, student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.3 Promotion Rules based upon credits

S. No.	Promotion	Conditions to be fulfilled
1	First year First Semester to Second Semester	Regular course of study of first year first semester and should have satisfied the minimum requirement of attendance to appear I year I semester.
2	First year to second year first semester	i. Regular course of study of first year First and second semesters. ii. Must have secured at least 50% of credits (22) upto first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	II Year I Semester to II Semester	Regular course of study of second year first semester.

4	Second year to third year first semester	<ul style="list-style-type: none"> i. Regular course of study of First and second semesters of second year. ii. Must have secured at least 60% of credits (54) upto second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	<ul style="list-style-type: none"> i. Regular course of study of third year second semester. ii. Must have secured 60% of credits (79) up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

7.4 A student (i) shall attend for all courses / subjects covering 164 credits as specified and listed in the course structure, (ii) fulfils all the attendance and academic requirements for 164 credits, (iii) earn all 164 credits by securing SGPA ≥ 5.0 (in each semester), and CGPA (at the end of each successive semester) ≥ 5.0 , (iv) **passes all the mandatory courses**, to successfully complete the under graduate programme. The performance of the student in these 164 credits shall be taken into account for the calculation of 'the final CGPA (at the end of under graduate programme), and shall be indicated in the grade card of IV year II semester.

7.5 If a student registers for some more 'extra subjects' (in the parent department or other departments / branches of engineering) other than those listed subjects as specified in the course structure of his Department, the performances in those 'extra subjects' will not be taken into account while calculating the SGPA and CGPA. For such 'extra subjects' registered, Percentage (%) of marks and letter grade alone will be indicated in the grade card as a performance measure, subject to completion of the attendance and academic requirements as stated in the regulations 6 and 7.1 to 7.4 above.

7.6 A student eligible to appear in the semester end examination for any subject / course, but absent from it or failed (thereby failing to secure 'C' grade or above) has to reappear for that subject/course in the supplementary examination as and when conducted. In such cases, CIE assessed earlier for that subject / course will be carried over, and added to the marks obtained in the supplementary examination for evaluating performance in that subject.

7.7 A student **detained in a semester due to shortage of attendance, may be re-admitted when the same semester is offered in the subsequent academic years for the fulfillment of academic requirements.**

The academic regulations under which student has been readmitted shall be applicable. However, no grade allotments or SGPA / CGPA calculations will be done for the entire semester in which student has been detained.

7.8 A student detained **due to lack of credits, will be promoted to the next academic year only after acquiring the required credits as per academic regulations.**

The academic regulations shall be applicable to a student whatever they are in force at the time of re-admission.

8.0 **Evaluation - Distribution and weightage of marks**

- 8.1 The performance of a student in each semester shall be evaluated subject-wise for a maximum of 100 marks for a theory and 100 marks for every practical subject with 30 marks Continuous Internal Evaluations (CIE) and 70 marks for Semester End Examinations (SEE)

Summer Break: Internship-I and Internship-II will be organized during summer vacation of II-II and III-II and evaluation of the same will be carried out during lab examinations of III-I and IV-I.

In addition, there will be Group Project-I in III year I semester, Group Project-II in III year II semester, and Group Project-III in IV year I semester, Major project in IV year II semester will be evaluated for 100 marks.

The pattern of continuous internal evaluation for Internship Project and Group Project is given below:

Sl. No	Description	Marks
1	Abstract, Design, implementation and Presentation in front of Project Review Committee consisting of HoD, Senior faculty and Internal guides (Average)	15 marks
2	Report	05 marks
3	Evaluation by Internal Guide	10 marks
	Total sessional marks	30 marks

Semester end examination - 70 marks

Pattern of external evaluation for Internship Project and Group Project.

Sl. No	Description	Marks
1	Final report	10 marks
2	Presentation	10 marks
3	Demonstration/defence of project	50 marks
	Total sessional marks	70 marks

Pattern of continuous internal evaluation for Major Project in IV year II semester is as follows:

Sl. No	Description	Marks
1	Progress of Project work and the corresponding interim report as evaluated by Project Review Committee at the end of 6 weeks	5 marks
2	Seminar at the end of 6 weeks	5 marks
3	Progress of Project work as evaluated by Project Review Committee at the end of 11 weeks	5 marks
4	Seminar at the end of 11 weeks	5 marks
5	Evaluation by Project Review Committee at the end of 15 weeks and Final Project Report	5 marks
6	Final presentation and defense of project	5 marks
	Total	30 marks

Pattern of External Evaluation for Major project - 70 Marks

Sl. No	Description	Marks
1	Final Project Report	10 marks
2	Presentation	20 marks
3	Demonstration / Defense of Project before committee	40 marks
4	TOTAL	70 marks

8.2 For all the other theory and lab subjects the distribution of marks shall be 30 for Continuous Internal Evaluation (CIE) and 70 for the Semester End-Examination (SEE).

8.3 Theory Subjects

8.3.1 Pattern for Continuous Internal Evaluation (CIE) 30 marks

The following procedure is to be adopted for awarding internal marks of 30 for all the B. Tech. students from the Academic Year 2020-2021

The distribution of marks for continuous internal evaluation (30 marks) is shown below. Average of two Mid Tests will be taken for final award of marks.

a)	Part – A of Mid Test will have 10 questions	5 marks
b)	Part – B of Mid Test will have 4 questions (1 from each unit and 4th question from any one unit or combination) and student has to answer 3 questions	15 marks
c)	Part – C Mid Test Question Paper Will have 3 questions – One from each unit taken from assignment questions. Student has to answer 1 question out of 3 questions	3 marks
d)	Assignment– I three questions from each unit (1,2,3 unit) – total of 9 questions to be submitted before first mid test. Similarly assignment – II: will have three questions from each unit (4, 5, 6 units) total of 9 questions will be submitted before Mid Test II and average of two assignments will be considered.	2 marks
e)	Attendance *	3 marks
f)	Class notes	2 marks
	Total	30 marks

* Three marks are awarded for each theory subject for the students who put in attendance in a graded manner as given below:

S. No.	Attendance Range	Marks Awarded
1.	65 % and above but less than 75%	1
2.	75% and above and less than 85%	2
3.	85% and above	3

Marks for attendance shall be added to each subject based on average of attendance of all subjects put together.

If any candidate is absent in any subject or mid-term examination, this student wishes to improve performance, a **third mid-test** will be conducted for that student by the Institution in the entire syllabus, on the same day of Semester End Examination (SEE) for 2¹/₂ hours. That result will be treated as III mid

test and average of better two of (mid test I,II,III) will be considered. III mid test will have Part-A (compulsory) and Part-B with essay type questions and three out of four questions are to be answered.

b) Pattern for External Examinations - (70 marks)

- There shall be external examination in every theory course and consists of two parts (Part-A & Part-B). The total time duration for this semester end examination will be 3 hours.
- **Part-A** shall have 20 marks, which is compulsory. It will have 10 short questions set with 2 marks each. There shall be atleast one question to each of the six units and two questions from units 1,2,3 and two questions from unit 4,5,6 and number of questions from any unit shall not exceed two.
- **Part-B** of the question paper shall have essay type questions for 50 marks and shall have 8 questions out of which any 5 are to be answered. At least one question must appear from each Unit. Seventh question must have 2 to 3 bits taken from 1st, 2nd, and 3rd units and 8th question also with 2 to 3 bits taken from 4th, 5th and 6th units, such that not more than 2 questions shall be from any one unit. All the questions carry equal marks.

8.4 Pattern of Evaluation for Lab subjects - (100 marks)

- 8.4.1 For practical subjects there shall be a continuous evaluation during the semester for 30 sessional marks and 70 marks for semester end examination. Out of the 30 marks for Continuous Internal Evaluation, the distribution of marks is as follows

S. No	Item	Marks
1.	Day to Day work	05 marks
2.	Final Record and viva	09 marks
3.	Average of two tests including viva	05 marks
4.	Lab Based Project Report viva and demo	08 marks
5.	Attendance	03 marks
Total		30 marks

- 8.4.2 The semester end examination for 70 marks for the lab subjects shall be conducted by an external examiner and an internal examiner appointed by the Chief Superintendent of Examinations of the college. The marks are distributed as follows:

S. No	Item	Marks
1.	Procedure to experiment and Tabulation	10 marks
2.	Conduct of experiment, observation, Calculation	30 marks
3.	Results including graphs, discussions and conclusion	20 marks
4.	Viva voce and Record	10 marks
Total		70 marks

8.4.3 In case computer based examinations

S. No	Item	Marks
1.	Flow chart and algorithms	10 marks
2.	Program writing and execution	30 marks
3.	Result and conclusions	20 marks
4.	Viva voce and Record	10 marks
Total		70 marks

- 8.5 For the subject having design and / or drawing, (such as Engineering Drawing and Machine Drawing), the distribution shall be 30 marks for internal evaluation (10 marks for day-to-day work including drawing, 3 marks for home assignment work, 12 marks for average of two internal tests and 2 marks for class notes 3 marks for attendance) and 70 marks for end semester end examination.

There shall be two internal tests in a Semester and the average of the two shall be considered for the award of marks for internal tests.

Third test facility can be availed as mentioned above (8.3.1 (i) (a) and (b))

8.6. Technical Seminar

There shall be a technical seminar evaluated for 100 marks from I year I semester to II year II Semester. The evaluation is purely internal and will be conducted as follows:

Sl.No	Description	Marks
1	Literature survey, topic and content	10
2	Presentation including PPT	10
3	Seminar Notes	05
4	Interaction with audience after presentation	05
5	Final Report 3 copies	10
6	Class room participation	05
7	Punctuality in giving seminar as per Scheduled time and date	10
8	Mid Semester Viva (on the seminar topics completed up to the end of 9 th week)	15
9	End Semester Viva	30
	Total	100 Marks

Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

8.7 Comprehensive Test and Viva-voce:

Comprehensive test and Viva Voce	The subjects studied in the Semester concerned related to branches concerned and for placements
B.Tech I year I semester	I semester
B.Tech I year II semester	I and II semester
B.Tech II year I semester	I, II and III semester
B.Tech II year II semester	I, II, III and IV semester
B.Tech III year I semester	I, II, III, IV and V semester
B.Tech III year II semester	I, II, III, IV, V and VI semester
B.Tech IV year I semester	I, II, III, IV, V, VI and VII semester

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

Allocation of marks :

*Comprehensive Test	: 70 marks
**Viva Voce	: 30 marks
Total	: 100 marks

*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 30 marks.

Total marks for Comprehensive Test will be 70.

The total sessional marks in this subject of Comprehensive Test and Viva Voce will be : 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

- 8.8 The laboratory records and internal test papers shall be preserved in the respective departments as per the college norms and shall be produced to the Committee of the college or any external agency like AICTE, NAAC, JNTUH, NBA etc., as and when the same are called for.
- 8.9. There shall be a Internship 1 and Internship 2, in an Industry of their specialization. Students will register for this immediately after II year II semester end examination and III year II semester examinations and pursue it during summer vacation. Internship 1 and Internship 2 shall be submitted as a project report and presented before the committee in III year I semester and IV year I semester along with lab examination. This project report will be evaluated for 30 internal marks and 70 external marks. The committee consists of an external examiner, Head of the Department, Supervisor of the Internship project and Senior Faculty Member of the Department.
- 8.10 The laboratory marks and the internal marks awarded by the college are subject to scrutiny and scaled down by the Departmental committees wherever necessary. In such cases, the internal and laboratory marks awarded by the department will be referred to a committee. The committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendation of the committee is final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the college rules and produced before the visiting committees as and when they are asked for.
- 8.11. For mandatory courses like orientation course, cyber security, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in sum total of continuous internal evaluation and external examination for passing the subject / course. These marks will be graded as per table given in 3.2.2.

9.0 Grading procedure

9.1 Marks will be awarded to indicate the performance of student in each theory subject, laboratory / practicals, seminar, Group Project 1,2,3, in the Major project and Comprehensive Test and Viva.

Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.

9.2 As a measure of the performance of student, a 10-point absolute grading system using the following letter grades (as per UGC / AICTE guidelines) and corresponding percentage of marks shall be followed:

% of Marks Secured in a Subject / Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points (GP)
Greater than or equal to 90%	O (Outstanding)	10
80% and less than 90%	A+ (Excellent)	9
70% and less than 80%	A (Very Good)	8
60% and less than 70%	B+ (Good)	7
50% and less than 60%	B (Average)	6
40% and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

9.3 A student obtaining 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

9.4 A student who has not appeared for examination in any subject, 'Ab' grade will be allocated in that subject, and student shall be considered 'failed'. Student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered.

9.5 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

9.6 A student earns grade point (GP) in each subject / course, on the basis of the letter grade secured in that subject / course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

Credit points (CP) = grade point (GP) x credits For a course

9.7 The student passes the subject / course only when **GP is not less than 5 (i.e. 'C' grade or above)**

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (CP) secured from all subjects / courses registered in a semester, by the total number of credits

registered during that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as

$$SGPA = \left\{ \sum_{i=1}^N C_i G_i \right\} / \left\{ \sum_{i=1}^N C_i \right\} \dots \text{For each semester}$$

(i.e., upto and inclusive of S semesters, S 2),

where 'N' is the **total** number of subjects (as specifically required and listed under the course structure of the parent department) the student has '**registered**' i.e., from the 1st semester onwards upto and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account the subjects from 1 to 8 semesters), C_j is the number of credits allotted to the Jth subjects and G_j represents the grade points (GP) corresponding to the letter grade awarded for that Jth subject.

After registration and completion of the first year first semester, SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA

Course / Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

$$SGPA = 152/21 = 7.24$$

Illustration of calculation of CGPA:

Course / Subject	Credits	Letter Grade	Grade Points	Credit points
I				
Course 1	4	A	8	4 x 8 = 32
Course 2	4	A	9	4 x 9 = 36
Course 3	4	B	6	4 x 6 = 24
Course 4	3	O	10	3 x 10 = 30
Course 5	3	B	7	3 x 7 = 21
Course 6	3	A	8	3 x 8 = 24
I				
Course 7	4	B	7	4 x 7 = 28
Course 8	4	O	10	4 x 10 = 40
Course 9	4	A	8	4 x 8 = 32
Course 10	3	B	6	3 x 6 = 18
Course 11	3	C	5	3 x 5 = 15
Course 12	3	A	9	3 x 9 = 27
Total Credits	= 42			Total Credit Points = 327

$$\text{CGPA} = 327/42 = 7.79$$

9.9 For merit ranking or comparison purposes or any other listing, **only** the ‘**rounded off**’ values of the CGPAs will be used.

9.10 For calculations listed in regulations 9.6 to 9.9, performance in failed subjects/ courses (securing **F** grade) will also be taken into account, and the credits of such subjects/courses will also be included in the multiplications and summations.

After passing the failed subject(s) newly secured letter grades will be taken into account for calculation of SGPA and CGPA.

However, mandatory courses will not be taken into consideration.

10.0 Passing standards

10.1 A student shall be declared successful or ‘passed’ in a semester, if student secures a $\text{GP} \geq 5$ (‘C’ grade or above) in every subject/course in that semester (i.e. when student gets SGPA 5.00 at the end of that particular semester); and a student shall be declared successful or ‘passed’ in the entire under graduate programme, only when gets a CGPA 5.00 for the award of the degree as required.

10.2 After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

11.0 Declaration of results

11.1 Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

11.2 For final percentage of formula may be used.

12.0 Award of degree marks equivalent to the computed final CGPA, the following
% of Marks = (final CGPA – 0.5) x 10

12.1 A student who registers for all the specified subjects/ courses as listed in the course structure and secures the total number of credits (with $\text{CGPA} \geq 5.0$), within 8 academic years from the date of commencement of the first academic year, shall be declared to have ‘**qualified**’ for the award of the B.Tech. degree in the chosen branch of Engineering as selected at the time of admission.

12.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

12.3 Students with final CGPA (at the end of the under graduate programme) 8.00 and above, and fulfilling the following conditions -

- (i) Should have passed all the subjects/courses in ‘**first appearance**’ within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.
- (ii) Should have secured a $\text{CGPA} \geq 8.00$, at the end of each of semesters, starting from first year first semester onwards.
- (iii) Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in ‘**FIRST CLASS WITH DISTINCTION**’, otherwise **FIRST CLASS** only.

- 12.4 Students with final CGPA (at the end of the under graduate programme) ≥ 6.5 but < 8.00 , shall be placed in '**FIRST CLASS**'.
- 12.5 Students with final CGPA (at the end of the under graduate programme) ≥ 5.5 but < 6.5 , shall be placed in '**SECOND CLASS**'.
- 12.6 All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the under graduate programme) ≥ 5 but < 5.5 , shall be placed in '**pass class**'.
- 12.7 A student with final CGPA (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.
- 12.8 Students fulfilling the conditions listed under item 12.3 alone will be eligible for award of '**university rank**' and '**gold medal**'.

13.0 Withholding of results

- 13.1 If the student has not paid the fees to the university / college at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

14.0 Transitory regulations

- 14.1 A student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the degree programme, may be considered eligible for readmission to the same subjects / courses (or equivalent subjects/ courses, as the case may be), and same professional electives / open electives (or from set/category of electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the date of commencement of student's first year first semester).

A student admitted in one academic regulation and he is getting readmission in some other academic regulations , the college has to offer substitute / additional subjects based on the comparison of two academic regulations. The details of substitute / additional subjects offered with the recommendations of board of studies of the concerned branch has to be given from time to time. The student will be governed by the academic regulations at the time of re-admission.

15.0 Student transfers

- 15.1 There shall be no branch transfers after the completion of admission process.
- 15.2 The students seeking transfer to Sreenidhi Institute of Science and Technology (SNIST) from various other Universities / institutions have to pass the failed subjects which are equivalent to the subjects of SNIST, and also pass the subjects of SNIST which the students have not studied at the earlier institution.
- Further, though the students have passed some of the subjects at the earlier semesters of SNIST, the students have to study substitute subjects in SNIST and get sessional marks by attending 3rd mid test and paying requisite fee as per the rules.
- 15.3 The transferred students from other Universities/ institutions to SNIST who are on rolls to be provided one chance to write the CIE (internal marks) in the failed subjects and /or subjects not studied as per the clearance letter issued by the Institution.

- 15.4 The autonomous affiliated colleges have to provide one chance to write the internal examinations in the failed subjects and /or subjects not studied, to the students transferred from other universities / institutions to SNIST who are on rolls, as per the clearance (equivalence) letter issued by the University.
- 16.0 **Scope**
- 16.1 The academic regulations should be read as a whole, for the purpose of any interpretation.
- 16.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final and binding.
- 16.3 The Institution may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the date notified by the Institution.

**Academic Regulations for B.Tech.
(LATERAL ENTRY SCHEME)
w.e.f the AY 2021-22**

1. **Eligibility for award of B. Tech. Degree (LES)**
The Lateral Entry Scheme (LES) students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years failing which he will forfeit the seat.
2. The student shall register and secure for all the credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) as per the regulations for the award of B.Tech. degree. **Out of the total credits secured, the student can avail exemption up to 6 credits**, that is, one open elective subject and one professional elective subject or two professional elective subjects for B.Tech programme to improve the performance of the Grade point average.
3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech. However, the student can take **two more** years for appearing the examinations.
4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).
5. **Promotion rules based on credits**

S.	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 27 credits out of 45 credits i.e., 60% of credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.
4	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 52 credits out of 87 credits i.e., 60% of credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

6. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

MALPRACTICE RULES
DISCIPLINARY ACTION FOR MIS-CONDUCT OF STUDENTS DURING EXAMINATIONS

	Nature of Malpractice/ Mis-conduct of the conduct	Punishment
	If the student:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the student is to be cancelled and sent to the university.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and UG major project) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation
		of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4.	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the chief superintendent/assistant – superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
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8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.
9.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared including practical examinations and UG major project of that semester/year examinations.

12. If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the university for further action to punishment award suitable.

Malpractices identified by squad or special invigilators

1. Punishments to the students as per the above guidelines.
2. Punishment for institutions: (if the squad reports that the college is encouraging malpractices)
 - a. A show cause notice shall be issued to the college.
 - b. Impose a suitable fine on the college.
 - c. Shifting the examination centre from the college to another college for a specific period of not less than one year.

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## ECM (A20 Regulation) Course Structure

### B.Tech. I Year I Semester

| S.No.        | Course Category | Dept Course | Course Code | Name of the Course                                                                              | L         | T        | P         | C         | Max. Marks                                                     |            |
|--------------|-----------------|-------------|-------------|-------------------------------------------------------------------------------------------------|-----------|----------|-----------|-----------|----------------------------------------------------------------|------------|
|              |                 |             |             |                                                                                                 |           |          |           |           | Int.                                                           | Ext.       |
| 1            | BS              | S&H         | 8HC07       | Engineering Physics                                                                             | 3         | 1        | 0         | 4         | 30                                                             | 70         |
| 2            | ES              | IT          | 8FC01       | Problem Solving using C                                                                         | 3         | 0        | 0         | 3         | 30                                                             | 70         |
| 3            | ES              | EEE         | 8AC42       | Electric Circuits and Networks Analysis                                                         | 2         | 1        | 0         | 3         | 30                                                             | 70         |
| 4            | BS              | S&H         | 8HC10       | Linear Algebra and Calculus                                                                     | 2         | 1        | 0         | 3         | 30                                                             | 70         |
| 5            | HS              | S&H         | 8HC02       | Written Communication Skills                                                                    | 1         | 0        | 0         | 1         | 30                                                             | 70         |
| 6            | ES              | MECH        | 8BC02       | Engineering Graphics                                                                            | 1         | 0        | 4         | 3         | 30                                                             | 70         |
| 7            | BS              | S&H         | 8HC66       | Engineering Physics Lab                                                                         | 0         | 0        | 2         | 1         | 30                                                             | 70         |
| 8            | ES              | IT          | 8FC61       | Problem Solving using C Lab                                                                     | 0         | 0        | 2         | 1         | 30                                                             | 70         |
| 9            | ES              | EEE         | 8AC61       | Electrical Circuits and Networks Analysis Lab                                                   | 0         | 0        | 2         | 1         | 30                                                             | 70         |
| 10           | HS              | S&H         | 8HC62       | Written Communication Skills Lab                                                                | 0         | 0        | 2         | 1         | 30                                                             | 70         |
| 11           | PC              | IT          | 8F173       | IT Workshop                                                                                     | 0         | 0        | 2         | 1         | 30                                                             | 70         |
| 12           | PS              | ECM         | 8D183       | Comprehensive Test and Viva Voce- I<br>[2 Mids (Viva) and End Semester (Test and Viva) = 30+70] | 1         | 0        | 0         | 1         | 30                                                             | 70         |
| 13           | PS              | ECM         | 8D191       | Technical Seminar - I                                                                           | 1         | 0        | 0         | 1         | 100                                                            | --         |
| 14           | HS              | S&H         | 8HC18       | Orientation                                                                                     | 1         | 0        | 0         | 0         | Marks and Grade will be given at the end of I year II semester |            |
| <b>Total</b> |                 |             |             |                                                                                                 | <b>17</b> | <b>3</b> | <b>14</b> | <b>24</b> | <b>460</b>                                                     | <b>840</b> |

### B.Tech. I Year II Semester

| S.No.        | Course Category | Dept Course | Course Code | Name of the Course                                                                               | L         | T        | P        | C         | Max. Marks       |            |
|--------------|-----------------|-------------|-------------|--------------------------------------------------------------------------------------------------|-----------|----------|----------|-----------|------------------|------------|
|              |                 |             |             |                                                                                                  |           |          |          |           | Int.             | Ext.       |
| 1            | BS              | S&H         | 8HC04       | Engineering Chemistry                                                                            | 4         | 0        | 0        | 4         | 30               | 70         |
| 2            | ES              | CSE         | 8EC01       | Data Structures and C++                                                                          | 3         | 0        | 0        | 3         | 30               | 70         |
| 3            | ES              | MECH        | 8BC01       | Workshop/Manufacturing Processes                                                                 | 1         | 0        | 0        | 1         | 30               | 70         |
| 4            | HS              | S&H         | 8HC01       | Oral Communication Skills                                                                        | 1         | 0        | 0        | 1         | 30               | 70         |
| 5            | BS              | S&H         | 8HC13       | Differential Calculus and Numerical Methods                                                      | 2         | 1        | 0        | 3         | 30               | 70         |
| 6            | BS              | S&H         | 8HC08       | Basic Mathematics, Analysis and Reasoning                                                        | 2         | 1        | 0        | 3         | 30               | 70         |
| 7            | ES              | MECH        | 8BC61       | Workshop/Manufacturing Processes Lab                                                             | 0         | 0        | 2        | 1         | 30               | 70         |
| 8            | BS              | S&H         | 8HC64       | Engineering Chemistry Lab                                                                        | 0         | 0        | 2        | 1         | 30               | 70         |
| 9            | HS              | S&H         | 8HC61       | Oral Communications Skills lab                                                                   | 0         | 0        | 2        | 1         | 30               | 70         |
| 10           | ES              | CSE         | 8EC61       | Data Structures (C/ C++) Lab                                                                     | 0         | 0        | 2        | 1         | 30               | 70         |
| 11           | PS              | ECM         | 8D284       | Comprehensive Test and Viva Voce- II<br>[2 Mids (Viva) and End Semester (Test and Viva) = 30+70] | 1         | 0        | 0        | 1         | 30               | 70         |
| 12           | PS              | ECM         | 8D292       | Technical Seminar - II                                                                           | 1         | 0        | 0        | 1         | 100              | --         |
| 13           | HS              | S&H         | 8HC18       | Orientation                                                                                      | 2         | 0        | 0        | 0         | 30               | 70         |
|              |                 |             |             |                                                                                                  |           |          |          |           | Grade Evaluation |            |
| <b>Total</b> |                 |             |             |                                                                                                  | <b>15</b> | <b>2</b> | <b>8</b> | <b>21</b> | <b>460</b>       | <b>840</b> |

**Total Credits: 45**

**B.Tech II Year I Semester**

| S. No.         | Course Category | Dept Course | Course Code | Subject                                                                                        | L         | T        | P/D      | C         | Max. Marks       |            |
|----------------|-----------------|-------------|-------------|------------------------------------------------------------------------------------------------|-----------|----------|----------|-----------|------------------|------------|
|                |                 |             |             |                                                                                                |           |          |          |           | Int.             | Ext.       |
| 1              | PC              | ECM         | 8D301       | Discrete Structure and Graph Theory                                                            | 2         | 0        | 0        | 2         | 30               | 70         |
| 2              | ES              | ECM         | 8D309       | Python and Shell Programming                                                                   | 2         | 0        | 0        | 2         | 30               | 70         |
| 3              | PC              | ECE         | 8CC01       | Electronic Devices and Circuits                                                                | 3         | 0        | 0        | 3         | 30               | 70         |
| 4              | PC              | ECE         | 8CC02       | Digital Logic Design                                                                           | 2         | 0        | 0        | 2         | 30               | 70         |
| 5              | PC              | ECE         | 8CC03       | Signals and Systems                                                                            | 3         | 0        | 0        | 3         | 30               | 70         |
| 6              | PC              | ECM         | 8D310       | Software Engineering                                                                           | 2         | 0        | 0        | 2         | 30               | 70         |
| 7              | HS              | SMS         | 8ZC01       | Economics, Accountancy and Management Science                                                  | 2         | 0        | 0        | 2         | 30               | 70         |
| 8              | HS              | S&H         | 8HC05       | Environmental Science and Ecology                                                              | 2         | 0        | 0        | 2         | 30               | 70         |
|                |                 |             |             |                                                                                                |           |          |          |           | Grade Evaluation |            |
| 9              | ES              | ECM         | 8D361       | Python and Shell Programming Lab                                                               | 0         | 0        | 2        | 1         | 30               | 70         |
| 10             | PC              | ECE         | 8CC71       | Electronic Devices and Circuits Lab                                                            | 0         | 0        | 2        | 1         | 30               | 70         |
| 11             | PS              | ECM         | 8D385       | Comprehensive Test and Viva Voce- III [2 Mids (Viva) and End Semester (Test and Viva) = 30+70] | 1         | 0        | 0        | 1         | 30               | 70         |
| 12             | PS              | ECM         | 8D393       | Technical Seminar - III                                                                        | 1         | 0        | 0        | 1         | 100              | --         |
| <b>Total :</b> |                 |             |             |                                                                                                | <b>20</b> | <b>0</b> | <b>4</b> | <b>22</b> | <b>430</b>       | <b>770</b> |

**B.Tech II Year II Semester**

| S. No.         | Course Category | Dept Course | Course Code | Subject                                                                                                                                                   | L         | T        | P/D      | C         | Max. Marks |            |  |  |
|----------------|-----------------|-------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|----------|-----------|------------|------------|--|--|
|                |                 |             |             |                                                                                                                                                           |           |          |          |           | Int.       | Ext.       |  |  |
| 1              | BS              | S&H         | 8HC16       | Probability and Statistics                                                                                                                                | 2         | 1        | 0        | 3         | 30         | 70         |  |  |
| 2              | PC              | CSE         | 8EC02       | Object Oriented Programming through Java                                                                                                                  | 2         | 1        | 0        | 3         | 30         | 70         |  |  |
| 3              | PC              | ECM         | 8D403       | Computer Organization and Operating Systems                                                                                                               | 2         | 0        | 0        | 2         | 30         | 70         |  |  |
| 4              | PC              | CSE         | 8EC03       | Database Management Systems                                                                                                                               | 2         | 1        | 0        | 3         | 30         | 70         |  |  |
| 5              | PC              | ECM         | 8D414       | Analog and Pulse Circuits                                                                                                                                 | 2         | 0        | 0        | 2         | 30         | 70         |  |  |
| 6              | HS              | S&H         | 8HC03       | Soft Skills                                                                                                                                               | 1         | 0        | 0        | 1         | 30         | 70         |  |  |
| 7              | HS              | S&H         | 8HC17       | Universal Human Values                                                                                                                                    | 2         | 1        | 0        | 3         | 30         | 70         |  |  |
| 8              | HS              | S&H         | 8HC63       | Soft Skills Lab                                                                                                                                           | 0         | 0        | 2        | 1         | 30         | 70         |  |  |
| 9              | PC              | ECM         | 8D463       | Analog and Pulse Circuits Lab                                                                                                                             | 0         | 0        | 2        | 1         | 30         | 70         |  |  |
| 10             | PC              | CSE         | 8EC63       | Database Management Systems Lab                                                                                                                           | 0         | 0        | 2        | 1         | 30         | 70         |  |  |
| 11             | PC              | CSE         | 8EC62       | Object Oriented Programming through Java Lab                                                                                                              | 0         | 0        | 2        | 1         | 30         | 70         |  |  |
| 12             | PS              | ECM         | 8D486       | Comprehensive Test and Viva Voce- IV [2 Mids (Viva) and End Semester (Test and Viva) = 30+70]                                                             | 1         | 0        | 0        | 1         | 30         | 70         |  |  |
| 13             | PS              | ECM         | 8D494       | Technical Seminar - IV                                                                                                                                    | 1         | 0        | 0        | 1         | 100        | --         |  |  |
| 14             | PS              | ECM         | 8D580       | Summer Break - Internship-I (4 weeks) : Evaluation will be done along with 3-1 courses (2 Internal Reviews (30 M) and External Evaluation (70M) in 3 – I) |           |          |          |           |            |            |  |  |
| <b>Total :</b> |                 |             |             |                                                                                                                                                           | <b>15</b> | <b>4</b> | <b>8</b> | <b>23</b> | <b>460</b> | <b>840</b> |  |  |

Total Credits: 45

**B.Tech III Year I Semester**

| S. No          | Course Category | Dept. Course | Course Code | Subject                                  | L         | T        | P/D      | C         | Max. Marks |            |
|----------------|-----------------|--------------|-------------|------------------------------------------|-----------|----------|----------|-----------|------------|------------|
|                |                 |              |             |                                          |           |          |          |           | Int.       | Ext.       |
| 1              | PE              |              |             | <b>Professional Elective - I</b>         | 3         | 0        | 0        | 3         | 30         | 70         |
| 2              | PC              | IT           | 8FC05       | Design and Analysis of Algorithms        | 2         | 1        | 0        | 3         | 30         | 70         |
| 3              | PC              | ECE          | 8CC06       | Analog and Digital Communications        | 2         | 1        | 0        | 3         | 30         | 70         |
| 4              | PC              | ECE          | 8CC07       | IC Applications                          | 2         | 0        | 0        | 2         | 30         | 70         |
| 5              | ES              | ECM          | 8D504       | Data Communication and Computer Networks | 2         | 0        | 0        | 2         | 30         | 70         |
| 6              | PC              | IT           | 8FC06       | Information Security                     | 3         | 0        | 0        | 3         | 30         | 70         |
| 7              | PC              | IT           | 8FC65       | Information Security Lab                 | 0         | 0        | 2        | 1         | 30         | 70         |
| 8              | PC              | ECE          | 8CC76       | IC Applications Lab                      | 0         | 0        | 2        | 1         | 30         | 70         |
| 9              | PC              | CSE          | 8EC77       | Web Technologies Lab                     | 0         | 0        | 2        | 1         | 30         | 70         |
| 10             | PS              | ECM          | 8D580       | Summer Industry Internship - I           | 0         | 0        | 0        | 1         | 30         | 70         |
| <b>Total :</b> |                 |              |             |                                          | <b>14</b> | <b>2</b> | <b>6</b> | <b>20</b> | <b>300</b> | <b>700</b> |

**B.Tech III Year II Semester**

| S. No.        | Course Category | Dept. Course | Course Code | Subject                                                                                                                                        | L         | T        | P/D       | C         | Max. Marks |            |
|---------------|-----------------|--------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|-----------|-----------|------------|------------|
|               |                 |              |             |                                                                                                                                                |           |          |           |           | Int.       | Ext.       |
| 1             | OE              |              |             | <b>Open Elective - I</b>                                                                                                                       | 2         | 0        | 0         | 2         | 30         | 70         |
| 2             | PE              |              |             | <b>Professional Elective – II</b>                                                                                                              | 3         | 0        | 0         | 3         | 30         | 70         |
| 3             | PC              | ECM          | 8DC05       | Microprocessors and Microcontrollers                                                                                                           | 3         | 0        | 0         | 3         | 30         | 70         |
| 4             | PC              | ECE          | 8CC09       | Digital Signal Processing                                                                                                                      | 3         | 0        | 0         | 3         | 30         | 70         |
| 5             | PC              | ECM          | 8D602       | Automata and Compiler Design                                                                                                                   | 2         | 0        | 0         | 2         | 30         | 70         |
| 6             | ES              | IT           | 8FC08       | Cyber Security and Cyber Laws                                                                                                                  | 3         | 0        | 0         | 3         | 30         | 70         |
| 7             | PC              | ECM          | 8DC66       | Microprocessors and Microcontrollers Lab                                                                                                       | 0         | 0        | 2         | 1         | 30         | 70         |
| 8             | PC              | ECM          | 8D664       | Signal Processing and Communication Lab                                                                                                        | 0         | 0        | 2         | 1         | 30         | 70         |
| 9             | PC              | ECM          | 8D665       | Automata and Compiler Design Lab                                                                                                               | 0         | 0        | 4         | 2         | 30         | 70         |
| 10            | PS              | ECM          | 8D677       | Group Project                                                                                                                                  | 0         | 0        | 2         | 1         | 30         | 70         |
| 11            | PS              | ECM          | 8D688       | Comprehensive Viva Voce-V                                                                                                                      | 1         | 0        | 0         | 1         | 30         | 70         |
| 12            | PS              | ECM          | 8D781       | Summer Industry Internship-II Evaluation will be done along with 4-1 courses (2 Internal Reviews (30M) and External Evaluation (70M) in 4 – I) |           |          |           |           |            |            |
| <b>Total:</b> |                 |              |             |                                                                                                                                                | <b>17</b> | <b>0</b> | <b>10</b> | <b>22</b> | <b>330</b> | <b>770</b> |

**Total Credits: 42**

**B.Tech IV Year I Semester**

| S. No.        | Course Category | Dept. Course | Course Code | Subject                                              | L         | T        | P/D      | C         | Max. Marks |            |
|---------------|-----------------|--------------|-------------|------------------------------------------------------|-----------|----------|----------|-----------|------------|------------|
|               |                 |              |             |                                                      |           |          |          |           | Int.       | Ext.       |
| 1             | OE              |              |             | <b>Open Elective- II</b>                             | 2         | 0        | 0        | 2         | 30         | 70         |
| 2             | PE              |              |             | <b>Professional Elective-III</b>                     | 3         | 0        | 0        | 3         | 30         | 70         |
| 3             | PE              |              |             | <b>Professional Elective – IV</b>                    | 3         | 0        | 0        | 3         | 30         | 70         |
| 4             | PC              | ECM          | 8D706       | Embedded and Real Time Systems                       | 3         | 0        | 0        | 3         | 30         | 70         |
| 5             | PC              | ECM          | 8D707       | VLSI Design                                          | 3         | 0        | 0        | 3         | 30         | 70         |
| 6             | PC              | ECM          | 8D715       | Principles and Techniques of Artificial Intelligence | 2         | 1        | 0        | 3         | 30         | 70         |
| 7             | PC              | ECM          | 8DC67       | Embedded Systems Lab                                 | 0         | 0        | 2        | 1         | 30         | 70         |
| 8             | PC              | ECM          | 8DC68       | VLSI Lab                                             | 0         | 0        | 2        | 1         | 30         | 70         |
| 9             | ES              | ECM          | 8DC69       | Artificial Intelligence and Machine Learning Lab     | 0         | 0        | 4        | 2         | 30         | 70         |
| 10            | PS              | ECM          | 8D781       | Summer Industry Internship – II                      | -         | -        | -        | 1         | 30         | 70         |
| <b>Total:</b> |                 |              |             |                                                      | <b>16</b> | <b>1</b> | <b>8</b> | <b>22</b> | <b>300</b> | <b>700</b> |

**B.Tech IV Year II Semester**

| S. No         | Course Category | Dept. Course | Course Code | Subject                        | L        | T        | P/D       | C         | Max. Marks |            |
|---------------|-----------------|--------------|-------------|--------------------------------|----------|----------|-----------|-----------|------------|------------|
|               |                 |              |             |                                |          |          |           |           | Int.       | Ext.       |
| 1             | PE              |              |             | <b>Professional Elective-V</b> | 3        | 0        | 0         | 3         | 30         | 70         |
| 2             | OE              |              |             | <b>Open Elective-III</b>       | 2        | 0        | 0         | 2         | 30         | 70         |
| 3             | PS              | ECM          | 8D879       | Major Project                  | -        | -        | 10        | 5         | 30         | 70         |
| <b>Total:</b> |                 |              |             |                                | <b>5</b> | <b>0</b> | <b>10</b> | <b>10</b> | <b>90</b>  | <b>210</b> |

**Note:** All End Examinations (Theory and Practical) are of **Three** hours duration.

**T – Tutorial**

**L- Theory**

**P/D – Practical/Drawing**

**C- Credits**

**Int. – Internal Exam**

**Ext. – External Exam**

**Course code Definitions**

BS- Basic Science Courses

ES- Engineering Science Courses

HS- Humanities and Social Sciences including Management courses

PC-ECM Professional core courses

PE –ECM Professional Elective courses

OE- Open Elective courses

PS- Summer Industry Internship, Projects, Comprehensive Viva Voce, technical Seminars

**Total Credits: 30**

**B. TECH ECM A20 REGULATION COURSE STRUCTURE  
PROFESSIONAL ELECTIVE STREAMS**

| Professional Elective Streams    | Professional Elective – I (3-1)          | Professional Elective – II (3-2)                     | Professional Elective – III (4-1)                          | Professional Elective – IV (4-1)                       | Professional Elective – V (4-2)     |
|----------------------------------|------------------------------------------|------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------|-------------------------------------|
| Network Security (CSE Board)     | Semantic Web and Social Networks (8EC11) | Advanced Computer Networks (8EC12)                   | Block Chain Technologies/ Database Security (8EC13/ 8EC21) | Information Security, Management and Standards (8EC14) | Mobile Computing (8EC15)            |
| Data Science (CSE Board)         | Introduction to Data Science (8EC16)     | Machine Learning (8EC17)                             | Big Data Analytics (8EC18)                                 | Business Intelligence (8EC19)                          | Cloud Computing (8EC20)             |
| Advanced Technologies (IT Board) | Computer Graphics (8FC17)                | Image Processing / C# .NET Framework (8FC18 / 8FC26) | Computer Vision (8FC19)                                    | Augmented Reality and Virtual Reality (8FC20)          | Internet of Things (IoT) (8DC44)    |
| VLSI (ECE Board)                 | Digital Design Through Verilog (8C517)   | Analog and Mixed Signal Design (8C623)               | VLSI Physical Design (8C729)                               | Design Verification using System Verilog (8C735)       | Low Power VLSI Design (8C841)       |
| Embedded System (ECE Board)      | Advanced Computer Architecture (8C518)   | Embedded C Programming (8C624)                       | Embedded System Design using ARM (8C730)                   | Embedded Real Time Operating Systems (8C736)           | System on Chip Architecture (8C842) |

**OPEN ELECTIVES STREAMS**

| Open Elective Streams          | III-Year II-Semester / (Open Elective – I)                | IV -Year I-Semester / (Open Elective – II)                         | IV-Year II-Semester / (Open Elective – III)          |
|--------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------|------------------------------------------------------|
| Entrepreneurship Stream        | Basics of Entrepreneurship (8ZC22)                        | Advanced Entrepreneurship (8ZC23)                                  | Product and Services (8ZC24)                         |
| Social Sciences Stream         | Basics of Indian Economy (8ZC25)                          | Basics of Polity (8ZC26)                                           | Indian History, Culture and Geography (8ZC27)        |
| Finance Stream                 | Banking Operations, Insurance and Risk Management (8ZC05) | Entrepreneurship Project Management and Structured Finance (8ZC19) | Financial Institutions, Markets and Services (8ZC15) |
| Mechanical                     | Introduction to Additive Manufacturing Processes (8BC51)  | Principles of Operations Research (8BC52)                          | Principals of Automation and Robotics (8BC53)        |
| Electrical                     | Control System Engineering (8AC46)                        | Fundamentals of Measurements and Instrumentation (8AC44)           | Fundamentals of Renewable Energy Sources (8AC45)     |
| Innovation and Design Thinking | Design literacy and Design Thinking (8ZC08)               | Co-Creation and Product Design (8ZC09)                             | Entrepreneurship and Business Design (8ZC10)         |

|   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | b | c | d | e | f | g | h | i | j | k | l |
| X |   | X |   |   |   |   | X |   |   |   |   |

**Syllabus for B. Tech I Year I semester**  
**Electronics and Computer Engineering**  
**ENGINEERING PHYSICS**  
**(Common to CSE, IT & ECM)**

Code: 8HC07

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
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**Course Objectives**

- Explain about the Quantum Mechanics to understand wave particle duality, necessity of quantum mechanics to explore the behavior of sub atomic particles. Schrodinger's Time Independent Wave Equation, Physical Significance of the Wave Function – Application of Schrodinger wave equation.
- To understand the basic concepts of normal light, Laser and its applications and to know about the fiber optics, principle (TIR), Numerical Aperture, Types of optical Fibers, Step index and graded index Fibers, attenuation in optical fibers. Applications: optical fiber communication system, fiber optic sensors, medical endoscopy.
- To study the concepts of magnetism and superconductivity, Bohr magneton, Hysteresis nature, domain structure, Meissner effect, types of superconductors, BCS theory and applications of superconductors.
- To understand the concepts of dielectrics, polarizations and its types, internal fields, Clausius-Mossotti equation, Frequency and temperature effect on dielectrics and its applications – Piezo-electricity, Pyro-electricity and ferro-electricity.
- To know about the semiconductors, types, carrier concentration, Thermistor, Hall effect and also to understand the concept of PN-junction, I-V Characteristics, LED, Solar Cell and Photo diode.
- To discuss about the nano-technology, preparation techniques and characterization (XRD, SEM & TEM), CNTs and to know about the fundamentals of radioactivity and its applications.

**Course Outcomes**

After completing the course, students are able to

- Differentiate the wave and particle, de-Broglie matter waves-its experimental evidence, Schrodinger's wave concept and its application for a particle in one dimension box.
- Explain about emission, its types, laser principle, types, working and its applications and to reveals about TIR principle, optical fiber-types and signal propagation, attenuation, communication system and applications of optical fibers (sensors and medical endoscopy)
- Reveals about the magnetism-its origin and types, Hysteresis, domain theory, Anti-ferro and ferri-magnetism, Superconductivity, experimental facts, theoretical analysis, types of superconductors and its applications.
- Explain the basic concepts of dielectric materials, polarization and its types, local fields, frequency and temperature effect on dielectrics and their applications (piezo, ferro and Pyro electricity).
- Explain semiconductor behavior, types, carrier concentration, Hall effect, Thermistor, demonstrate and analyze semiconductor devices like a PN-junction, I-V characteristics, LED, solar cell, photo diode and their applications.
- Summarize nano & bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods (physical & chemical), analysis the techniques like XRD, SEM, TEM and also to understand the radioactivity, fusion & fission, alpha, beta and gamma rays decay and its applications.

**Unit:1****Wave nature of particles, Schrodinger equation and its application**

Waves and Particles, de Broglie Hypothesis, Matter waves, Davisson and Germer's Experiment, G.P. Thomson Experiment, Heisenberg's Uncertainty Principle, Schrodinger's Time Independent Wave Equation – Physical Significance of the Wave Function – Application of Schrodinger wave equation - Particle in One Dimensional Potential Box.

**Unit:2****Lasers and Fiber Optics****Lasers:**

Characteristics of LASER, Spontaneous and Stimulated Emission of Radiation, Einstein's Coefficients and their significance. Meta-stable State, Pumping, Population Inversion. Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers.

**Fiber optics:**

Principle and construction of optical fiber, Acceptance Angle and Numerical Aperture. Based on refractive index profile classification of Optical Fibers: Single mode & Multimode mode Step index fibers, Single mode & Multimode mode graded index fibers. Attenuation in Optical Fibers (scattering, absorption and bending losses) Applications: Optical Fiber communication system, Fiber Optic Sensors and Medical Endoscopy.

**Unit:3****Magnetic and Superconducting materials****Magnetic Materials:**

Permeability, Field Intensity, Magnetic Induction, Magnetization, Magnetic Susceptibility, Origin of Magnetic Moment, Bohr Magneton. Hysteresis behavior of Ferro Magnetic materials based on Domain theory. Hard and Soft Magnetic Materials, Properties of Anti-Ferro and Ferri Magnetic Materials and their applications,

**Super conducting Materials:**

Effect of Magnetic Field, Critical current density, Meissner effect, Type-I and Type-II superconductors, BCS theory, applications of superconductors.

**Unit:4****Dielectric materials**

Electric Dipole, Dipole Moment, Dielectric Constant, Electric Susceptibility, Electronic and Ionic polarizability (Quantitative) Orientation Polarization (Qualitative), Internal fields in Solids, Clausius - Mossotti equation, Frequency and temperature effect on Dielectrics (Qualitative), Applications - Piezo-electricity, Pyro-electricity and Ferro-electricity.

**Unit:5****Semiconductors and Semiconductor devices****Semiconductors:**

Fermi Level in Intrinsic and Extrinsic Semiconductors. Carrier concentration of Intrinsic Semiconductor. Carrier concentration of Extrinsic Semiconductor (qualitative). Direct & Indirect Band Gap Semiconductors: Thermistor and Hall Effect in semiconductors.

**Semiconductor devices:**

Formation of a PN Junction and working of a PN Junction diode, Energy band Diagram of open circuited PN Diode, I-V Characteristics of PN Junction diode. Applications: LED, Solar Cell and Photo diode.

**Unit:6****Nanotechnology and Nuclear Energy****Nanotechnology:**

Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication, Sol-gel, Precipitation, Chemical vapor Deposition(CVD); Top-down Fabrication; Thermal evaporation, Ball Milling, Characterization of Nano materials (XRD&TEM), carbon nano tubes(CNTs), Applications of Nano Materials.

**Nuclear Energy:**

Mass Defect, binding energy, Nuclear fission, Nuclear fusion. Radioactivity:  $\alpha$ ,  $\beta$ ,  $\gamma$  rays decay, Geiger-Muller counter. Introduction of nuclear power plant.

**Text Books:**

1.B.K. Pandey & S. Chaturvedi Engineering Physics, Cengage Learning

**Reference Books:**

1. P K Palanisamy, Engineering Physics, Sitech Publications
2. Charles Kittel, Introduction to Solid State Physics, John Wiley Publisher
3. A.S. Vasudeva , Modern engineering Physics, S Chand
4. Dekker, Solid State Physics
5. Dr.M.N. Avadhanulu, Engineering Physics, S Chand
6. Dekker, Solid State Physics
7. Halliday and Resnick, Physics
8. S.O. Pillai, Solid State Physics
9. A. Ghatak - Optics



**Syllabus for B. Tech I Year I semester  
Electronics and Computer Engineering  
PROBLEM SOLVING USING C  
(Common to all branches)**

Code: 8FC01

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Course Objectives**

- To acquire problem solving skills
- To be able to develop flowcharts
- To understand structured programming concepts
- To be able to write programs in C Language

**Course Outcomes:****After completion of this course student will learn**

1. To formulate simple algorithms for arithmetic, logical problems and to translate the algorithms to programs (in C language)
2. To test and execute the programs and correct syntax and logical errors, to implement conditional branching, iteration and recursion
3. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
4. To use arrays, pointers and structures to formulate algorithms and programs.
5. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
6. To apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.

**UNIT I**

**Introduction to Programming:** Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)

**Idea of Algorithm:** steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples.

From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code

**UNIT II**

**History of C language, Characteristics of C language, Structure of C Language, C Tokens**

Arithmetic expressions, Operator Precedence & **Associativity**

Conditional Branching and Loops

Writing and evaluation of conditionals and consequent branching and **Jumping Constructs**

**Pretest and Post test**, Iteration and loops (3 lectures)

**UNIT III**

**Function:** Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference, **Storage Classes**

**Recursion:** Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

**Macros** – Definition, comparison with functions.

**UNIT IV**

**Arrays:** Arrays (1-D, 2-D), Character arrays **Ragged Arrays and Dynamic Arrays**

Basic Algorithms Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required) Quick sort or Merge sort.

#### **UNIT V**

Pointers Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notation of linked list (no implementation) **Dynamic Memory allocation Functions.**

**Strings: String Handling Functions.**

#### **UNIT VI**

Structure: Structures, Defining structures and Array of Structures,

**Nested Structures enum, typedef**

File handling (only if time is available, otherwise should be done as part of the lab)

**File Handling Functions, File Modes, File Operations**

#### **Suggested Text Books**

- (i) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- (ii) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill Suggested

#### **Reference Books**

- (i) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

|   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| a | b | c | d | e | f | g | h | i | j | k | l | m |
| x | x |   |   | x |   |   |   |   |   |   |   |   |

**Syllabus for B. Tech I Year I semester**  
**Electronics and Computer Engineering**  
**ELECTRIC CIRCUITS AND NETWORKS ANALYSIS**  
**(Common to ECE (I-II) & ECM (I-I))**

**Code: 8AC42**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| <b>2</b> | <b>1</b> | <b>0</b>   | <b>3</b> |

**Course Objective:**

*To learn the fundamentals and applications of circuits and networks.*

**Course outcomes:**

1. Understand the principle of different methods of electrical circuit reduction.
2. Understand the principle of single phase A.C circuits.
3. Understand the principle of magnetic circuits.
4. Understand the principles of network theorems along with its applications.
5. Understand the principle two port networks along with its applications.
6. Understand the principle of transients with both DC and AC excitation.

**UNIT – I: INTRODUCTION TO ELECTRICAL CIRCUITS:**

Circuit concept, R-L-C parameters, Voltage and current sources, Independent and dependent sources, Source transformation, Kirchoff's laws, Network reduction techniques, series, parallel, series – parallel, Star- to-delta and Delta-to-star transformation, Mesh Analysis, Nodal analysis, Super mesh, Super node concept.

**Applications:** For finding of voltage and current of different points of OPAMP circuit.

**UNIT – II: SINGLE PHASE A.C. CIRCUITS:**

R.M.S and Average values, Form factor for different periodic wave forms, Steady state Analysis of R, L and C (in series, parallel and series-parallel combinations) with sinusoidal excitation.

Resonance in series and parallel circuits, Concept of band width and Q factor.

**APPLICATIONS:** tuning of a channel in radio receiver.

**UNIT – III MAGNETIC CIRCUITS:**

Basic terms in Magnetic Circuits, Comparison between electric and magnetic circuits, Composite magnetic circuit, Analysis of series, parallel magnetic circuits, Faraday's Laws of electromagnetic induction, Concept of self and mutual inductance, Dot convention, Co-efficient of coupling.

**APPLICATIONS:** working of transformer and dc machines.

**UNIT – IV: NETWORK THEOREMS:**

Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer and Millman's Theorems - statements and problems solving using dependent and independent sources with D.C. excitation.

**Applications:** For finding of voltage and current of different points of OPAMP circuits.

**UNIT – V: TWO-PORT NETWORKS:**

Z,Y, ABCD and h-parameters, Conversion of one parameter to another parameter, Condition for reciprocity and symmetry, two port network connections in series, parallel and cascaded configurations, Problem solving.

**APPLICATIONS:** analysis of electrical transmission network.

**UNIT – VI: TRANSIENT ANALYSIS:**

Transient response of R-L, R-C, R-L-C series circuits with D.C. and A.C excitations, Initial conditions, Solution using differential equation approach and Laplace transform methods of solutions.

**APPLICATIONS:** transientanalysis of electrical machines.

**TEXT BOOKS:**

1. Engineering Circuit Analysis – William Hayt and Jack E Kemmerly, McGraw Hill 5<sup>th</sup> Edition, 1993.
2. Circuits & Networks – M.S. Sukhija, K.N. Nagasarkar, Oxford University Press, 2<sup>nd</sup> edition.

**REFERENCES:**

1. Network Analysis - M.E. Vanvalkenberg, 3<sup>rd</sup> edition, PHI.
2. Circuit theory (Analysis & Synthesis) – A.Chakravarthy, Dhanpath Rai & Co., 6<sup>th</sup> edition.  
Circuits & Networks – A.Sudhakar and Shyamamohan S.Palli, Tata McGraw Hill, 3<sup>rd</sup> edition.

|   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|
| a | b | c | d | e | f | g | h | i | j | k | l |
| H | M | M |   |   |   |   |   |   |   | L |   |

**Syllabus for B. Tech I Year I semester**  
**Electronics and Computer Engineering**  
**LINEAR ALGEBRA AND CALCULUS**  
 (Common to CSE, IT & ECM)

**Code: 8HC10**

L    T    P/D    C  
 2    1    0    3

*Pre Requisites: Mathematics Knowledge at Pre-University Level.*

*Course Objectives: To make the students to understand and expected to learn*

1. Basic operation of matrices and about the linear system and some analytical methods for solution.
2. Concept of Eigen value and Eigen vector- properties and applications for orthogonal transformation.
3. Dependence and independence of vectors, basis, linear transformation.
4. Basic concepts of Inner product spaces.
5. Mean value theorems and their applications to the given functions, series expansions of a function using Taylor's theorem.
6. Special functions such as Beta & Gamma functions and their properties, evaluation of improper integrals and the applications of definite integrals.

*Course Outcomes: After the course completion, the students will be able to*

1. Check the consistency or inconsistency of a linear system and also solve real time problems.
2. Calculate the Eigen values and Eigen vectors of a matrix and their application for orthogonal transformation.
3. Identify the dependence and independence of vectors and solve the problems on basis.
4. Solve problems on Inner product spaces.
5. Verify the mean value theorems and also express the given function in series form using Taylor's theorem.
6. Solve the problems using special functions; evaluate surface areas and volumes of revolutions.

### *Syllabus*

#### **UNIT- I: Matrices-1**

Symmetric, skew-symmetric and orthogonal matrices. Inverse of a matrix by Gauss Jordan method, rank of a matrix: System of linear equations- Rank method/ Gauss Elimination method.

#### **UNIT- II: Matrices-2**

Hermitian and Skew-Hermitian, Unitary matrices. Eigen values, Eigenvectors, Cayley - Hamilton Theorem (without proof) and its applications in finding higher powers of a matrix and inverse, Diagonalization of a matrix.

#### **UNIT- III: Vector spaces**

Vector Space, linear dependence/Independence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank-nullity theorem (without proof).

#### **UNIT-IV: Inner product spaces:**

Inner product spaces (Definition and Examples), Gram-Schmidt orthogonalization process (without proof) and finding orthonormal basis, orthogonal complements.

#### **UNIT - V: Calculus-1**

Rolle's Theorem and Mean value theorems (Statements and Geometrical Interpretations without proofs); Taylor's and Maclaurin's theorems (without proof) and its applications in evaluating definite integrals.

#### **UNIT - VI: Calculus-2**

Beta and Gamma functions and their properties; Evaluation of improper integrals, Applications of definite integrals to evaluate surface areas and volumes of revolutions.

#### **Text Books**

1. P. Sivaramakrishna Das and C.Vijayakumari, Mathematics-I (calculus, Differential Equations and Linear Algebra), Pearson Publications

**Reference Books**

- (i) Engineering Mathematics, Srimanta Pal, OXFORD university press
- (ii) B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 35<sup>th</sup> Edition, 2000.
- (iii) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- (iv) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
- (v) V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
- (vi) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

|   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I | J | K | L |
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**Syllabus for B. Tech I Year I semester**  
**Electronics and Computer Engineering**  
**WRITTEN COMMUNICATION SKILLS**  
 (Common to all branches)

**Subject Code: 8HC02**

L    T    P/D    C  
 1    0    0    1

**Course Objectives:**

**To enable students to:**

- upgrade their knowledge of basic writing skills, writing cohesive paragraphs and effective letters.
- differentiate between confusing words, learn correct spellings and have a sound grip over the use of phrasal verbs.
- master the techniques of reading passages and comprehend them.
- understand the nuances of technical communication and apply it in their academic and professional career.
- acquaint themselves with the concept of soft skills, having the right attitude towards their education, career and life in general.
- learn the importance of building a strong resume.

| Units                                          | Theory (1 per week)                                                                                                                                                                                                                                  | No. of Periods | Lab (2 per week) CS LAB                                                                                                                                                                         | No. of Periods |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>1. Elements of effective writing skills</b> | 1.1 Use of appropriate words and phrases<br>1.2 Sentence structures<br>1.3 Vocabulary: Synonyms – Antonyms<br>Homophones, Homonyms, Homographs, words often confused, One - word substitutes, Idioms and Phrases<br>1.4 Avoid discriminatory writing | 1<br>1<br>1    | Exercises on<br>• Words often Confused<br>• Synonyms – Antonyms<br>• Identifying Homophones, Homonyms, Homographs<br>• words often confused<br>• One - word substitutes<br>• Idioms and Phrases | 4              |
| <b>2. Professional writing skills</b>          | 2.1 Paragraph writing<br>2.2 Letter writing (language to be used in a formal letter)<br>2.3 Leave letter, letter of apology, complaint letters, enquiry letters with replies<br>2.4 e-correspondence                                                 | 1<br>1         | Practice exercises on<br>• Paragraph Writing using hints/guided Paragraphs<br>• Writing different types of letters<br>• Learning e-correspondence                                               | 6              |
| <b>3. Reading Comprehension</b>                | 3.1 Prediction techniques, Skimming and Scanning<br>3.2 Literal Comprehension<br>3.3 Evaluative Comprehension<br>3.4 Inferential Comprehension                                                                                                       | 1<br>1<br>1    | Practice sessions on<br>• Using passages for skimming and scanning<br>• Reading Comprehension using different techniques                                                                        | 6              |

|                                                   |                                                                                                                                                                                                       |                                  |                                                                                                                                                                                                                                                  |          |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>4. Report Writing</b>                          | 4.1 Significance, types, steps, formats of a report<br>4.2 Detailed analysis of manuscript of a report<br>4.3 Language and structure to be used in a formal report<br>4.4 model reports – assignments | <b>1</b><br><b>1</b><br><b>1</b> | <ul style="list-style-type: none"> <li>• Practice Writing reports and reviewing technical Articles</li> <li>• formal expressions, technical vocabulary, active voice and passive voice, introduction, body and conclusion of a report</li> </ul> | <b>6</b> |
| <b>5. Resume Writing &amp; Cover Letter</b>       | 5.1 Types, purpose and design of Résumé<br>5.2 Differences among Bio-data, Curriculum Vitaé and Résumé<br>5.3 Methods to build a winning Résumé<br>5.4 Writing an effective Cover Letter              | <b>1</b><br><b>1</b><br><b>1</b> | Practice exercises on <ul style="list-style-type: none"> <li>• Resume Building</li> <li>• Drafting cover letters</li> </ul>                                                                                                                      | <b>6</b> |
| <b>6. Technical Communication and Soft Skills</b> | 6.1 Technical vocabulary<br>6.2 Review of technical articles<br>6.3 Technical research paper writing<br>6.4 Attitude Vs Behavior in professional circles                                              | <b>1</b><br><b>1</b>             | Practice exercises on <ul style="list-style-type: none"> <li>• Technical vocabulary</li> <li>• Writing articles and research papers</li> <li>• Activities based on Soft skills</li> <li>• Developing attitude and behavior</li> </ul>            | <b>4</b> |

**Text book :** Compiled by the faculty of English (for internal circulation only).

**Reference books:**           \* English for Professionals by S.S.Prabhakar Rao       \* English for Technical Communication by K.R.Lakshminarayana

- English for Business Communication by Dr.T.Farhathullah
- Professional Communication by Alok Jain, Pravin S.R.Bhatia and A.M.Sheikh
- Business Communication, Principles to Practice- Monipally.
- Advanced Technical Communication: Kavita Tyagi and Padma Mistri



**Syllabus for B. Tech I Year I semester  
Electronics and Computer Engineering  
ENGINEERING GRAPHICS  
(Common to all branches)**

**Code: 8BC02**

| L | T | P/D | C |
|---|---|-----|---|
| 1 | 0 | 4   | 3 |

**Course objectives:**

- 1: To teach students the basic principles of Engineering graphics and instruments used
- 2: To introduce the concept of projections in drawing and its applications for simple drawing entities
- 3: To impart the knowledge of various types of solids and their projections in different position wrt principle planes
- 4: To teach the concept of sections of solids and their applications
- 5: To develop a clear understanding of the basic principles involved in three dimensional Engineering drawings.
- 6: To train the students for the extraction of multiple views from a solid model using AutoCAD

**Course outcomes**

After completing this course, the student will able to:

- 1) Get familiar to use the instruments to solve the engineering problem and draw various type of curves used in engineering
- 2) Understand and Implement Orthographic projections and draw projections of simple drawing entities such as points Lines, and Planes
- 3) Draw projections of different types of regular solids in various positions wrt principal planes of projection
- 4) Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections.
- 5) Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views
- 6) Understand from basic sketching through 2D and 3-D solid modeling using computer aided design (CAD) software

**UNIT – I**

Introduction to Engineering Drawing: Drawing Instruments and their uses, types of lines, Lettering, Dimensioning-Terms & notations, placing of dimensions, general rules of dimensioning.

Curves used in Engineering Practice and their Constructions:

Conic Sections including Rectangular Hyperbola - General method, Cycloid and Involute of circles

Scales: Reducing, Enlarging and Full Scales, types of scales, Construction of plain scales and diagonal scales only-simple problems

**UNIT – II**

Orthographic Projection: Principles of Projection – Methods of projection, First angle and third angle projections, Projections of Points, Projections of straight lines –line inclined to one plane and line inclined to both reference planes

**UNIT –III**

Projections of regular Planes: types of planes, plane inclined to one reference plane, Oblique planes

Projections of regular Solids: types of solids, Projections of: Prisms, Cylinders, Pyramids, Cones – simple position and axis inclined to one plane only

**UNIT –IV**

Sections and sectional views of Solids: Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

Development of Surfaces: Methods of development, Development of lateral Surfaces of Right Regular Solids – Prisms, Cylinders, Pyramids, Cones and their sections.

**UNIT – V**

Isometric Projection: Meaning, Isometric axes, lines and planes, Isometric Scale – Isometric drawing or View – Isometric drawing of planes and simple solids such as prisms, pyramids, cylinder, cone

**UNIT –VI**

Conversion of isometric views to orthographic views of simple objects.

Overview of Computer Graphics(Demonstration only): Demonstrating features of the CAD software - The Menu System, Toolbars, Dialog boxes and windows, Drawing entities - lines, circles, arcs etc and editing commands, Dimensioning of objects, 2 D drawings-simple exercises, 3D wire-frame and shaded solids- Commands, Boolean operations.

**Text Book:**

Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House (In First-angle Projection Method)

**Reference Books:**

- 1) Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
- 2) Agrawal B. &Agrawal C. M. (2012), Engineering Graphics, TMH Publication
- 3) AUTOCAD Software Theory and User Manuals

|   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|
| a | b | c | d | e | f | g | h | i | j | k | l |
| X |   | X |   |   |   |   |   |   |   |   |   |

**Syllabus for B. Tech I Year I semester**  
**Electronics and Computer Engineering**  
**ENGINEERING PHYSICS LAB**  
**(Common to CSE, IT & ECM)**

Code: 8HC66

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 0 | 0 | 2   | 1 |

**Course Objectives**

- Understand the concept of photo electric effect using photo voltaic cell.
- Discuss the dispersive power of prism-minimum deviation method.
- Discussion of diffraction pattern using the grating – LASER.
- To study the concepts (numerical aperture) of an optical fiber.
- To explain about magnetic induction, Biot-Savart principle.
- Study the frequency of AC mains using Sonometer.
- Explaining about the electrical resonance by using the LCR circuit.
- To understand the rigidity modulus, periodicity.
- To discuss the energy gap ( $E_g$ ) of a semiconductor diode.
- To study the LED characteristics and forward resistance.
- To know the time constant of RC circuit.
- To understand about the ionizing radiation by using the Geiger–Muller counter.

**Course Outcomes**

After completing the experiment, students are able to

- Understand the concepts of photo electric effect, importance, photo current, colour filters, optical sensors.
- Know about the light properties-dispersion, prism, spectrometer and minimum deviation arrangement.
- Recognize the difference between the interference and diffraction, grating, laser characteristics.
- Analyze the concepts of fiber optics, fundamentals, numerical aperture its importance, attenuation in fiber and applications.
- Understand and search to apply the fundamentals of magnetic induction, Ampere's law, Oersted's law and the Biot-Savart law.
- Know the difference between AC and DC fundamentals, Magnetostriction, resonance, air column vibrations.
- Analyze the LCR circuit combination, parallel, series electrical resonance, inductance, reactance, capacitance and electrical and electronic fundamentals.
- Summarize the fundamentals of modulus-types, stress, strain, elasticity, plasticity and Hook's law.
- Analyze the concept a semiconductors, types, calculation of energy gap of a semiconductor diode and importance.
- Analyze the difference between normal diode, LED, forward bias, reverse bias, I-V characteristics, direct and indirect band gap semiconductors.
- Characterize the RC network, time constant, capacitor functioning and its application.
- Understand the concept of radiation, ionizing radiation, radiological protection and inverse square law.

**List of Experiments**

- 1. Photo voltaic cell:**  
-Determination of Planck's constant by using photo voltaic cell.
- 2. Dispersive power:**  
-Calculation of dispersive power of a given material of prism by using Spectrometer.
- 3. Diffraction Grating:**  
-Determination of wavelength of a given laser source of light by using diffraction grating.
- 4. Numerical Aperture:**  
-Determination of a Numerical Aperture (NA) of an optical fiber.
- 5. Stewart-Gee's Experiment:**  
-Determination of magnetic induction flux density along the axis of a current carrying circular coil using Stewart and Gee's experiment.
- 6. Sonometer:**  
-Calculating the frequency of AC supply by using the Sonometer.
- 7. LCR Circuit:**  
-Study of series and parallel resonance of an LCR circuit – Electrical devices.
- 8. Torsional pendulum:**  
-Determination of rigidity modulus of a given wire material using the Torsional pendulum.
- 9. Energy Gap:**  
-Determination of the energy gap ( $E_g$ ) of a given semiconductor.
- 10. Light Emitting Diode:**  
-Studying the LED characteristics and calculating the forward resistance of it.
- 11. RC Circuit:**  
-Determination of time constant of an RC-circuit.
- 12. Geiger-Muller Counter:**  
-Studying the characteristics of Geiger–Muller counter and verifying the inverse square law -  
Nuclear physics

**NOTE:** Any **TEN** of the above experiments are to be conducted.

**Syllabus for B. Tech I Year I semester  
Electronics and Computer Engineering  
PROBLEM SOLVING USING C LAB  
(Common to all branches)**

Code: 8FC61

| L | T | P/D | C |
|---|---|-----|---|
| 0 | 0 | 2   | 1 |

**Course Objectives:**

- To be able to understand the fundamentals of programming in C Language
- To be able to write, compile and debug programs in C
- To be able to formulate problems and implement in C.
- To be able to effectively choose programming components
- To solve computing problems in real-world.

**Course Outcomes:****After completion of this course student will learn**

1. To formulate the algorithms for simple problems
2. To translate given algorithms to a working and correct program
3. To be able to correct syntax errors as reported by the compilers
4. To be able to identify and correct logical errors encountered at run time
5. To be able to write iterative as well as recursive programs
6. To be able to represent data in arrays, strings and structures and manipulate them through a program
7. To be able to declare pointers of different types and use them in defining self referential structures.
8. To be able to create, read and write to and from simple text files.

**[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]**

**1. Unit I (Cycle 1)**

1. Write an algorithm for converting a given Celsius temperature to its equivalent Fahrenheit temperature and draw a flowchart.
2. Write an algorithm to find the largest of three given numbers and draw a flowchart.
3. Write an algorithm and draw a flowchart for finding the roots and nature of roots of a quadratic equation, given its coefficients.
4. Write an algorithm and flowchart for finding the first n Fibonacci numbers, give n.

**2. Unit II (Cycle 2)**

1. Write an algorithm, flowchart, and C program for:
2. Finding the area and circumference of a circle of given radius.
3. Finding the volume of a sphere of given radius.
4. Finding the lateral surface area of a right circular cone of given base radius and height.
5. Finding selling price of an item, given its cost price and profit percent.
6. Finding the interest on a given principal for a given period of time at a given rate of per year.
7. Write a C program to display all the sizes of data types in C.
8. Write a C program to display a given decimal integer into an equivalent octal number and hexadecimal number using %o and %x in printf function.

**3. Unit II (Cycle 3)**

1. Write a C program to find the roots and nature of the roots of a quadratic equation, given its coefficients.
2. Write a C program for finding the largest of three given numbers.
3. A salesman gets a commission of 5% on the sales he makes if his sales is below Rs.5000/- and a commission of 8% on the sales that exceeds Rs.5000/- together with Rs.250/-. Write an algorithm or a flowchart and develop C program for computing the commission of the salesman, given his sales.
4. Write a C Program to demonstrate Marcos.

**4. Unit III (Cycle 4)**

1. Write three C programs to print a multiplication table for a given number using while, do-while, and for loops.
2. Write a C program to compute the sum of:
3.  $1+x+x^2+x^3+\dots+x^n$ , given x and n.
4.  $1! + 2! + 3! + \dots + n!$ , given n.
5.  $1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10! + \dots$  to n terms where the  $n^{\text{th}}$  term becomes less than 0.0001.

**5. Unit III (Cycle 5)**

1. Write a C program in the menu driven style to perform the operations +, -, \*, /, % between two given integers.
2. Write a C program to find the largest and the least of some numbers given by the user.
3. Write a C program to find the sum of the digits of a positive integer.

**6. Unit III (Cycle 6)**

1. Write C functions for the following:
  - a) A function that takes an integer n as argument and returns 1 if it is a prime number and 0 otherwise.
  - b) A function that takes a real number x and a positive integer n as arguments and returns  $x^n$ .
  - c) A function that takes a positive integer n as an argument and returns the  $n^{\text{th}}$  Fibonacci number.
2. Using recursion write C functions for the following:
  - a) Factorial of a non-negative integer n.
  - b) Number of combinations of n things taken r at a time.
  - c) Greatest Common Divisor of two integers.
  - d) Least Common Multiple of two integers.

**7. Unit III (Cycle 7)**

- a. Write a menu driven style program to compute the above functions (cycle 6) on the choice of the function given by the user.
- b. Define macros for the following and use them to find sum of the squares of the minimum and maximum of two given numbers.
  - a) Larger of two numbers.
  - b) Smaller of two numbers.
  - c) Sum of the squares of two numbers.
- c. Write a program to generate Pascal's triangle.
- d. Write a program to count the number of letters, words, and lines in a given text.

**8. Unit IV (Cycle 8)**

1. Write a program to store the numbers given by the user in an array, and then to find the mean, deviations of the given values from the mean, and variance.
2. Write a C program to initially store user given numbers in an array, display them and then to insert a given number at a given location and to delete a number at a given location.
3. Write a program to store user given numbers in an array and find the locations of minimum and maximum values in the array and swap them and display the resulting array.

**9. Unit IV (Cycle 9)**

1. Write a C program to implement the operations of matrices – addition, subtraction, multiplication.
2. Write a program to find whether a given matrix is symmetric, lower triangular, upper triangular, diagonal, scalar, or unit matrix.

**10. Unit V (Cycle 10)**

1. Write a function to swap two numbers.

2. Write a function to compute area and circumference of a circle, having area and circumference as pointer arguments and radius as an ordinary argument.

**11. Unit VI (Cycle 11)**

1. Define a structure for complex number. Write functions on complex numbers (addition, subtraction, absolute value, multiplication, division, complex conjugate) and implement them in a menu driven style.
2. Define a structure point. Write a program to find the distance between two points.
3. Define a structure student having members roll no., name, class, section, marks. Create an array of 10 students give the data and find the average marks, section-wise.

**12. Unit VI (Cycle 12)**

1. Write a program to:
  - a. Create a file by the name given by the user or by command line argument and add the text given by the user to that file.
  - b. Open the file created above and display the contents of the file.
  - c. Copy a file into some other file, file names given by the user or by command line arguments.
  - d. Append a user mentioned file to another file.
  - e. Reverse the first n characters of a file.

**Syllabus for B. Tech I Year I semester  
Electronics and Computer Engineering  
ELECTRICAL CIRCUITS AND NETWORKS ANALYSIS LAB  
Common to (ECM I Year I SEM) (EEE &ECE I Year II SEM)  
(Any TEN Experiments to be conducted)**

**Code: 8AC61**

| L | T | P/D | C |
|---|---|-----|---|
| 0 | 0 | 2   | 1 |

**Course Objective:**

*To learn the fundamentals and applications of circuits and networks.*

**Course outcomes:**

1. To get better understanding of all concepts studied in theory.
2. To get better understanding of applications.

**List of Experiments**

1. Verification Thevenin's Theorem and Norton's Theorem
2. Verification of Maximum Power Transfer Theorem
3. Verification of Superposition Theorem
4. Verification of Compensation Theorem
5. Verification of Reciprocity Theorem and Millmann's Theorem
6. Finding resonant frequency in Series and Parallel circuits
7. Determination of Self Inductance, Mutual Inductance and Coefficient of coupling
8. Calculation of Z and Y Parameters
9. Construction of current locus diagram for RL and RC circuit
10. Mesh and Nodal Analysis by simulation
11. Determination of Average value and RMS value of a complex wave
12. Determination of parameters of a coil.
13. Determination of Time constant of RL and RC series circuit.



|   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I | J | K | L |
|   |   |   |   |   |   |   | X | X | X |   | X |

**Syllabus for B. Tech I Year I semester**  
**Electronics and Computer Engineering**  
**WRITTEN COMMUNICATION SKILLS LAB**  
**(Common to all branches)**

**Subject Code: 8HC62**

L    T    P/D    C  
0    0    2    1

**Course Objectives:**

**To enable students to:**

- upgrade their knowledge of basic writing skills, writing cohesive paragraphs and effective letters.
- differentiate between confusing words, learn correct spellings and have a sound grip over the use of phrasal verbs.
- master the techniques of reading passages and comprehend them.
- understand the nuances of technical communication and apply it in their academic and professional career.
- acquaint themselves with the concept of soft skills, having the right attitude towards their education, career and life in general.
- learn the importance of building a strong resume.

| Units                                          | Theory (1 per week)                                                                                                                                                                                                                                  | No. of Periods | Lab (2 per week) CS LAB                                                                                                                                                                         | No. of Periods |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>1. Elements of effective writing skills</b> | 1.1 Use of appropriate words and phrases<br>1.2 Sentence structures<br>1.3 Vocabulary: Synonyms – Antonyms<br>Homophones, Homonyms, Homographs, words often confused, One - word substitutes, Idioms and Phrases<br>1.4 Avoid discriminatory writing | 1<br>1<br>1    | Exercises on<br>• Words often Confused<br>• Synonyms – Antonyms<br>• Identifying Homophones, Homonyms, Homographs<br>• words often confused<br>• One - word substitutes<br>• Idioms and Phrases | 4              |
| <b>2. Professional writing skills</b>          | 2.1 Paragraph writing<br>2.2 Letter writing (language to be used in a formal letter)<br>2.3 Leave letter, letter of apology, complaint letters, enquiry letters with replies<br>2.4 e-correspondence                                                 | 1<br>1         | Practice exercises on<br>• Paragraph Writing using hints/guided Paragraphs<br>• Writing different types of letters<br>• Learning e-correspondence                                               | 6              |
| <b>3. Reading Comprehension</b>                | 3.1 Prediction techniques, Skimming and Scanning<br>3.2 Literal Comprehension<br>3.3 Evaluative Comprehension<br>3.4 Inferential Comprehension                                                                                                       | 1<br>1<br>1    | Practice sessions on<br>• Using passages for skimming and scanning<br>• Reading Comprehension using different techniques                                                                        | 6              |

|                                                   |                                                                                                                                                                                                       |             |                                                                                                                                                                                                                                                  |   |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| <b>4. Report Writing</b>                          | 4.1 Significance, types, steps, formats of a report<br>4.2 Detailed analysis of manuscript of a report<br>4.3 Language and structure to be used in a formal report<br>4.4 model reports – assignments | 1<br>1<br>1 | <ul style="list-style-type: none"> <li>• Practice Writing reports and reviewing technical Articles</li> <li>• formal expressions, technical vocabulary, active voice and passive voice, introduction, body and conclusion of a report</li> </ul> | 6 |
| <b>5. Resume Writing &amp; Cover Letter</b>       | 5.1 Types, purpose and design of Résumé<br>5.2 Differences among Bio-data, Curriculum Vitae and Résumé<br>5.3 Methods to build a winning Résumé<br>5.4 Writing an effective Cover Letter              | 1<br>1<br>1 | Practice exercises on <ul style="list-style-type: none"> <li>• Resume Building</li> <li>• Drafting cover letters</li> </ul>                                                                                                                      | 6 |
| <b>6. Technical Communication and Soft Skills</b> | 6.1 Technical vocabulary<br>6.2 Review of technical articles<br>6.3 Technical research paper writing<br>6.4 Attitude Vs Behavior in professional circles                                              | 1<br>1      | Practice exercises on <ul style="list-style-type: none"> <li>• Technical vocabulary</li> <li>• Writing articles and research papers</li> <li>• Activities based on Soft skills</li> <li>• Developing attitude and behavior</li> </ul>            | 4 |

**Text book :** Compiled by the faculty of English (for internal circulation only).

**Reference books:** \* English for Professionals by S.S.Prabhakar Rao \* English for Technical Communication by K.R.Lakshminarayana

- English for Business Communication by Dr.T.Farhathullah
- Professional Communication by Alok Jain, Pravin S.R.Bhatia and A.M.Sheikh
- Business Communication, Principles to Practice- Monipally.
- Advanced Technical Communication: Kavita Tyagi and Padma Mistri

**Syllabus for B. Tech I Year I semester  
Electronics and Computer Engineering  
IT WORKSHOP**

**Code: 8F173**

| L | T | P/D | C |
|---|---|-----|---|
| 0 | 0 | 2   | 1 |

**Course Outcomes:**

- 1 Identify peripherals of a computer, describe types of Operating System, Install computer with dual boot operating systems.
- 2 Assembling and Disassemble system.
- 3 Install and use Microsoft Windows 7 for programming and application development .
- 4 Install linux and install applications in Linux and windows.
- 5 Trouble Software and hardware problems along with setting configurations for computer security settings and application software of the system.
- 6 Describe Cyber ethics.

Introduction & Description of exercises, processes and procedures with PPT

**Week1:**

**Introduction to Computer:** Identify the peripherals of a computer, components/peripherals in a CPU & its functions. Introduction to the types of Operating System, Install computer with dual boot operating system (Windows, Linux with PowerPoint presentation). Comparison of types of OS in different platform.

**Week 2:** Assembling and Disassembling Practicals

**Week 3:**

**Introduction to Microsoft Windows 7:** Software and data, Components of Desktop, Working with windows

**Week 4:**

**Getting Started with Microsoft Windows 7:** Using the Start Menu, Obtaining Help on Windows, Changing Setting, Using Applications in Windows, Shutting Down Windows

**Week 5:**

Introduction to Linux Operating system, Linux Commands, DOS commands

**Week 6:**

Install computer applications in Linux and windows.

Software and hardware trouble shoot, personal computer security settings and application software of the system.

**Cyber Ethics:** Access websites and email, effectively and securely browse (bank sites, https WebPages) and share the data, categories of websites (.com, .in, .edu, .org).

**TEXT BOOK:**

“Comdex Information Technology Course Kit” by Vikas Gupta, Dreamtech Press

**Syllabus for B. Tech I Year I semester  
Electronics and Computer Engineering  
COMPREHENSIVE TEST AND VIVA VOCE- I  
(Common to all branches)**

**Code: 8D183**

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
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**Course Objective:**

*Evaluate, Comprehend and Assess the concepts and knowledge gained in the Core Courses of 1<sup>st</sup> year 1<sup>st</sup> Semester*

**Course Outcomes:** After completing this course, the student will be able to

1. Comprehend the concepts in the Core Courses of 1<sup>st</sup> year 1<sup>st</sup> Semester
2. Assess technical knowledge to face interviews.
3. Exhibit lifelong learning skills to pursue higher studies or professional practice.

| Comprehensive Test and Viva Voce | The subjects studied in the Semester concerned related to branches concerned and for placements |
|----------------------------------|-------------------------------------------------------------------------------------------------|
| B.Tech I year I semester         | I semester                                                                                      |
| B.Tech I year II semester        | I and II semester                                                                               |
| B.Tech II year I semester        | I, II and III semester                                                                          |
| B.Tech II year II semester       | I, II, III and IV semester                                                                      |
| B.Tech III year I semester       | I, II, III, IV and V semester                                                                   |
| B.Tech III year II semester      | I, II, III, IV, V and VI semester                                                               |
| B.Tech IV year I semester        | I, II, III, IV, V, VI and VII semester                                                          |

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

**Allocation of marks:**

|                     |             |
|---------------------|-------------|
| *Comprehensive Test | : 70 marks  |
| **Viva Voce         | : 30 marks  |
| Total               | : 100 marks |

\*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 20 marks.

End Semester Examination for Comprehensive Test will be taken for 50 marks.

Total marks for Comprehensive Test will be 70.

\*\*Average of best two of Mid Tests of Mid – I, Mid – II and Mid - III for Viva Voce will be taken for 10 marks.

End Semester Examination for Comprehensive Viva Voce shall be evaluated for 20 marks.

The total for Viva Voce will be 30.

Thus the total sessional marks in this subject of Comprehensive Test and Viva Voce will be: 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

**Syllabus for B. Tech I Year I semester  
Electronics and Computer Engineering  
TECHNICAL SEMINAR - I  
(Common to all branches)**

**Code: 8D191**

| L | T | P/D | C |
|---|---|-----|---|
| 1 | 0 | 0   | 1 |

**Course Objective:**

*Develop ability to be a public speaker. Learn the importance of delivering seminars for demonstrating oratory and develop interview facing skills.*

**Course Outcomes:** After completing this course, the student will be able to

1. Identify current general, political and technology related topics.
2. Arrange and present seminar in a effective manner
3. Collect, survey and organize content in presentable manner
4. Demonstrate oratory skills with the aid of Power Point Presentations
5. Exhibit interview facing skills and team leading qualities

**Procedure :**

1. Seminar in-charges shall highlight the significance of technical seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot/week.
5. Progress of the seminars need to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for technical seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

There shall be a technical seminar evaluated for 100 marks each from I year I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

| Sl. No | Description                                                                               | Marks            |
|--------|-------------------------------------------------------------------------------------------|------------------|
| 1      | Literature survey, topic and content                                                      | 10               |
| 2      | Presentation including PPT                                                                | 10               |
| 3      | Seminar Notes                                                                             | 05               |
| 4      | Interaction with audience after presentation                                              | 05               |
| 5      | Final Report 3 copies                                                                     | 10               |
| 6      | Class room participation                                                                  | 05               |
| 7      | Punctuality in giving seminar as per Scheduled time and date                              | 10               |
| 8      | Mid Semester Viva (on the seminar topics completed up to the end of 9 <sup>th</sup> week) | 15               |
| 9      | End Semester Viva                                                                         | 30               |
|        | <b>Total</b>                                                                              | <b>100 Marks</b> |

Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

|   |   |   |   |   |   |   |   |   |    |    |    |
|---|---|---|---|---|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|   |   |   |   |   | M |   | H |   | M  |    | H  |

**Syllabus for B. Tech I Year I semester  
Electronics and Computer Engineering**

**ORIENTATION  
(Common to all branches)**

**Code: 8HC18**

**L T P/D C**  
**1 0 0 0**

**Course Objectives:**

*This introductory course input is intended*

- *To help the students appreciate the essential 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.*
- *To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.*
- *To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature. Thus, this course is intended to provide a much needed orientational input in value education to the young enquiring minds.*

**Course Outcomes:** *At the end of this course, the student will be able to*

1. *Learns Being a human, understands human values and purpose of education*
2. *Understands the importance of different harmony levels needed. Understand Self and being in the current moment are the sources of happiness.*
3. *Improves Learning capabilities and communication skills.*
4. *Improves Personality Development and Life Skills*
5. *Understands and appreciate the importance of personality development and yoga for a holistic life.*
6. *Understands the essence and Values and Social responsibilities for successful life.*

| <b>Unit</b>                                                                                                             | <b>Name of the Module</b>                                                                                                                                                                                    | <b>Number of Periods</b> |
|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <b>a) Orientation Course for B. Tech I year I semester Students – 3 weeks duration covering the following Two Units</b> |                                                                                                                                                                                                              |                          |
| I                                                                                                                       | Universal Human Values – Introduction                                                                                                                                                                        | 8                        |
| II                                                                                                                      | Universal Human Values – Relationships                                                                                                                                                                       | 8                        |
| <b>b) Orientation Course for B. Tech I year II semester Students –covering the following Four Units</b>                 |                                                                                                                                                                                                              |                          |
| III                                                                                                                     | Improving Learning Capabilities (ILC) - Basic Skills of Learning                                                                                                                                             | 12                       |
| IV                                                                                                                      | Improving Learning Capabilities (ILC)- Personality Development and Life Skills                                                                                                                               | 12                       |
| V                                                                                                                       | Literature, Proficiency Modules(PM) in English, Health, Yoga & Diet, Co-Curricular & Extracurricular activities                                                                                              | 12                       |
| VI                                                                                                                      | Lectures by Eminent Persons on Science, Technology & Environment, Research, Innovation & Patents, Local Visit to Village and City including Hi-tech City. Feedback on last but one day of Orientation Course | 12                       |
| <b>Total Number of Periods</b>                                                                                          |                                                                                                                                                                                                              | <b>64</b>                |

**Unit - I****Universal Human Values**

**Introduction** -Self – Exploration, Basic human aspirations, Need for a holistic perspective, Role of Education, Understanding Happiness, Understanding the human being – Self and Body.

**Unit - II****Universal Human Values**

**Relationships**-Understanding Relationship –Trust and Respect. Harmony in the Society, Natural Environment, Participation in nature Harmony in nature/existence.

**Unit - III****Improving Learning Capabilities-Basic Skills of Learning**

Principles of Learning, Study Skills & E-Learning, Listening Skills, Effective Reading and Reviewing, Reading Comprehension, Textbook Reading Strategies, Test taking strategies, Introduction to Soft Skills and Employability Skills, Interpersonal skills.

**Unit - IV****Improving Learning Capabilities-Personality Development and Life Skills**

Goal Setting, Motivation, Time Management, Positive Attitude, Decision Making, Building Self-confidence, Attributes of a Good Personality, Memory Management, Characteristics of a successful student, Responsibilities of Students in shaping themselves, Morals, Ethics & Values, Difference between Studying in a Professional College and High School / Junior College

**Unit - V****Literature, Proficiency Modules (PM) in English, Health, Yoga & Diet, Co-Curricular & Extracurricular activities**

**Literature** -History of human civilization, Indian civilization, Indus valley civilization and culture, history of religions, the basic tenets of Christianity, Islam, Hinduism, Buddhism, Jainism, Sikkim and Judaism, Indian culture and values.

**Proficiency Modules in English** - Strategies to improve proficiency in English skills(L/S/R/W), Exercises based on Remedial grammar, Exercises on Remedial Vocabulary

**Health**- Dimensions of Health, Basic activities of daily living, Instrumental activities of daily living, Types of Health, Factors affecting health

**Yoga** - Introduction to Yoga, Kinds of Yoga, Pranayama and Dhyana (Meditation)

**Diet**- Balanced Diet, Components of Diet, Health Eating Pyramid.

**Co-curricular and Extra Curricular activities****Unit - VI****Lectures by Eminent Persons, Research, Innovation & Patents and Local Visit**

**Lectures by Eminent Persons** on Science, Technology & Environment,

**Innovations R&D and Entrepreneurship**-Sreenidhi HUB, Basics of Innovation, Entrepreneurship and Intellectual Property Rights (IPR )

**Local Visit** to Village and City including Hi-tech City.

**Feedback on last but one day of Orientation Course**

**Text Books:**

1. RR Gaur, R Sangal, GP Bangaria, 2009, A Foundation Course in Value Education (English).

**Reference Books:**

1. Yoga, Food and Health (by Swami Guru PremanandaSaraswati)

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**Syllabus for B. Tech I Year II semester**  
**Electronics and Computer Engineering**  
**ENGINEERING CHEMISTRY**  
**(Common to EEE, ME, IT & ECM)**

**Code: 8HC04**

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 4 | 0 | 0   | 4 |

**Course Objectives:**

1. To understand microscopic chemistry in terms of atomic and molecular orbitals
2. To learn the preparation and applications of commercial polymers and lubricant materials
3. To learn the industrial problems caused by water and municipal water treatment
4. To acquire knowledge about different types of batteries and their working mechanism
5. To develop the concepts and types of corrosion, control methods and protective coatings
6. To learn the chemical reactions that are used in the synthesis of drug molecules

**Course Outcomes**

After completion of the course, the student will be able to:

1. Understand and analyse microscopic chemistry in terms of atomic orbitals, molecular orbitals and intermolecular forces.
2. Identify and differentiate polymers, thermoplastic, thermosetting plastics and various lubricants.
3. Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
4. Understand and interpret the important fundamental concepts of electrochemistry and solve the problems related to batteries.
5. Differentiate the types of corrosion and methods used to prevent the corrosion, surface coating techniques
6. Learn and implement synthesis of drug molecules and learn fundamentals of analytical techniques like electronic, vibrational and rotational spectroscopy.

**UNIT - I**

**Atomic and molecular structure (6L)**

Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics ( $F_2$ ,  $Cl_2$ ,  $CO$ ,  $NO$ ). Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

**UNIT - II**

**Plastics and Lubricants (8L)**

**Plastics: Polymerization**-Addition and Condensation polymerization, Plastics – Thermosetting and Thermoplastics, preparation, properties and **engineering applications of plastics:** PVC, Teflon, Bakelite. Fibers: Nylon 6,6 and Dacron.

Rubbers – natural and artificial rubber, vulcanization of natural rubber, Buna-S, Buna-N and their **engineering applications.** Fabricated Reinforcing Polymers- **engineering applications**

**Lubricants:** Definition, classification and function of lubricants, Types of lubrication and mechanisms – Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants – Viscosity, flash and fire point, cloud and pour point and acid value. **Engineering applications.**

**UNIT - III**

**Water Technology (8L)**

- (a) **Introduction:** - Hardness of water – types of hardness (temporary and permanent), calculation of hardness- Numerical problems. Estimation of hardness of water by EDTA Method.



- (b) **Water for Industrial purpose:** Food, sugar, textile, paper and pharma industries, water for steam making characteristics of boiler feed water, boiler troubles- scale and sludge & Carry over (priming & foaming), boiler corrosion, caustic embrittlement.
- (c) **Water Treatment:** Internal conditioning- phosphate, carbonate & calgon conditioning. External Treatment: Ion-exchange process. Desalination-reverse osmosis. Municipal water treatment- sedimentation, coagulation, filtration, disinfection-chlorination, ozonization. **Engineering applications: Methodology and working of mineral water plant for drinking purpose.**

#### UNIT - IV

##### Electrochemistry (8L)

Conductance – conductors (metallic and electrolytic), types of conductance – specific, equivalent and molar conductance – effect of dilution on conductance.

Free energy and emf, cell potentials, electrode potential (oxidation and reduction). Types of electrodes - redox electrode (quinhydrone electrode), metal – metal insoluble salt electrode and Ion selective electrode. Cell notation and cell reaction – Nernst equation and applications. **Engineering Applications.**

**Batteries :** Types of batteries

- Primary batteries – Leclanche cell (dry cell), Lithium cell
- Secondary batteries (Accumulators) – Lead acid battery, Lithium-ion battery
- Fuel cells-  $H_2 - O_2$  fuel cell and  $MeOH - O_2$  fuel cell-advantages and applications.

**Engineering applications – future water powered car, Hydrogen production and storage.**

#### UNIT - V

##### Corrosion and Surface treatment (8L)

Corrosion – basic concepts – types of corrosion, chemical, electrochemical corrosion (absorption of  $O_2$  and evolution of  $H_2$ ) -factors affecting the rate of corrosion.

**Cathodic protection** – sacrificial anodic protection and impressed current cathodic protection method.

##### Surface treatment

Mechanical surface treatment and coatings, casehardening and surface coating, thermal spraying, vapour deposition, Ion implantation, Diffusion coating.

Methods of metallic coatings-hot dipping (tinning and galvanizing), metal cladding (Al cladding), electroplating (copper plating) and electroless plating (nickel plating), electroforming, ceramic, organic and diamond coating

#### UNIT-VI

##### Organic reactions and drug molecules (5L)

Introduction: reactions involving substitution ( $S_N1$ ,  $S_N2$ ) addition to double bond ( $C=C$ ), elimination ( $E^1$  and  $E^2$ ), oxidation (using  $KMnO_4$ ,  $CrO_3$ ), reduction (Hydrogenation by  $Ni/H_2$ ,  $Pd/C$ )

**Drugs:** Definition, classification structure and applications of commonly used drug molecules- paracetamol, aspirin, ibuprofen and diphenhydramine (Benadryl)

Principles of spectroscopy and selection rules: Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules-**Applications.**

#### TEXT BOOKS:

- Engineering Chemistry: PK Jain & MK Jain, Dhanapathrai Publications (2018)
- Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020)

#### REFERENCE BOOKS:

- Textbook of Engineering Chemistry: Jaya Shree Anireddy, Wiley Publications (2019)
- Engineering Chemistry: by & B.Rama Devi, Prsanta Rath & Ch. Venkata Ramana Reddy, Cengage Publications (2018)
- Engineering Chemistry: Shashi Chawla, Dhanapathrai Publications (2019)
- Textbook of Engineering Chemistry: SS Dara, SS Umare S. Chand Publications (2004)

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| H | M | M |   |   |   |   |   |   |    |    |    |

**Syllabus for B. Tech I Year II semester  
Electronics and Computer Engineering  
DATA STRUCTURES AND C++  
(Common to all branches)**

**Code: 8EC01**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b>   | <b>3</b> |

**Course Objective:**

1. Understand the concepts of Abstract data Type, linear data structures such as stacks, queues and lists and their applications.
2. Comprehend different nonlinear data structures such as trees and graphs and analyze their time complexities.
3. Understand object-oriented programming and advanced C++ concepts and be able to write programs with C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, Templates etc.

**Course Outcomes:**

- 1 Explain Abstract data type, stack and Queues with their applications
- 2 Write programs on Singly linked lists, doubly linked lists, Circular list and explain their operations.
- 3 Explain concepts of Trees, AVL Trees and Graphs with examples and applications.
- 4 Describe and solve problems of searching and sorting and evaluate the time complexity of each algorithm.
- 5 Explain concepts of OOPs and implement programs using objects, classes, constructors and destructors.
- 6 Explain and apply concepts of oops, write programs implementing functions, operator overloading and inheritance.

**UNIT I:**

Introduction to data structures: Abstract data type (ADT), Stacks, Queues and Circular queues and their implementation with arrays.

Applications of Stack: infix to post fix conversion, postfix expression evaluation.

Applications of Queues.

**UNIT II:**

Singly linked lists, Advantages of Linked lists over Arrays, Doubly linked lists, Circular list and their operations, representing stacks and queues with Linked lists.

**UNIT III:**

Trees- Binary trees, terminology, representation, traversals. AVL trees, AVL tree operations: Insertion, deletion and searching. Graphs- terminology, representation, graph traversals (DFS and BFS).

**UNIT IV:**

Searching – Searching: Linear and binary search methods. Sorting:

Quick sort, Merge sort.

Performance analysis of Searching and Sorting Algorithms. Heaps: Introduction, Min Heap, Max Heap, Operations on Heaps, Heap Sort. Hashing: Hash Table, Hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing.

**UNIT V:**

Introduction to C++ programming-object oriented programming concepts, Structured Vs OOP. Classes and objects-class definition, Objects, class scope and accessing members, Constructors-default constructor, parameterized constructor, copy constructor. Destructor.

**UNIT VI:**

Static class members, this pointer, friend functions, Dynamic memory management with operators new and delete. Overloading-function overloading, Operator overloading, restrictions on operator overloading, overloading unary and binary operators, templates, inheritance: single, multiple and multi level inheritance.

**TEXT BOOKS:**

1. Data Structures and C++ by Reema Thareja
2. Data Structure through C by Yashavant Kanetkar. The complete reference C++ By HerbSchildt.

**REFERENCES:**

1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. Data Structures and Algorithms. Addison Wesley,1983.
2. Data Structures using c Aaron M.Tenenbaum , Yedidyah Langsam,Moshe JAugenstein.
3. Introduction to Data Structures in C ByKamtane
4. Data Structures, A pseudocode Approach with C by Richard F. Gilberg and Behrouz A. Forouzan.

**Syllabus for B. Tech I Year II semester  
Electronics and Computer Engineering  
WORKSHOP/MANUFACTURING PROCESSES  
(Common to all branches)**

**Code: 8BC01**

| L | T | P/D | C |
|---|---|-----|---|
| 1 | 0 | 0   | 1 |

**Course Objectives:**

Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

**COURSE OUTCOMES:**

- To understand various basic tools to perform simple joints using metal and wood.
- To understand the principle of various electrical and electronic appliances and their applications.
- To understand the manufacturing process of welding, casting and tin smithy and their applications.
- To understand the operation of basic as well as advanced machines used for fabrication of Metals, Plastics and Glass.

**Unit-I**

Fitting & Power Tools : Fitting Tools- Marking and Measuring tools, Cutting tool, Finishing tools-etc- basic Fitting operations, Safe working practices

Introduction to power tools- Power Hacksaw, Drill, Grinder ,etc.

**Unit-II**

Electrical & Electronics Appliances: Introduction, wires and wires sizes, wiring boards, common house wiring methods, symbols and house hold electrical appliances.

**Unit-III**

Carpentry: Introduction-Timber, Wood joints- Lap, dovetail, Tools- Marking tools, Cutting tool, Finishing tools-etc- basic carpentry operations, Wood turning lathe

**Unit-IV**

Plastic molding & Glass Cutting: Types of Plastics, Processing of Plastics: Injection moulding and Blow moulding. Introduction to Glass materials and physical properties -Cutting tools.

**Unit-V**

Casting: Importance, Advantages and limitations, Pattern, Sand Casting – Casting terms, Procedure, Applications, Die Casting– Principle and Applications,

Metal joining - Various methods of Joining, Welding - Types of Welding - Weld joints, Arc welding – Principle, Coated electrode, arc welding equipment, Applications, Resistance Spot welding, Soldering and Brazing

Sheet Metal Operations - Punching, Blanking

**Unit-VI**

Machining: meaning, Advantages and Drawbacks, Basic concepts of machine tool, chips and cutting tool, Principle of Lathe, Drilling, and Grinding, CNC machine tools - Advantages, parts of a CNC system, Additive manufacturing – Need, principles of SLS, FDM methods

**Text Books:**

- 1) HajraChoudhury S.K., HajraChoudhury A.K. and Nirjhar Roy S.K.,
- 2) Elements of Workshop Technology”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

**Reference Books:**

Rao P.N., “Manufacturing Technology”, Vol. I and Vol. II, TataMcGrawHill House, 2017.

|   |   |   |   |   |   |   |   |   |   |   |   |
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**Syllabus for B. Tech I Year II semester**  
**Electronics and Computer Engineering**  
**ORAL COMMUNICATION SKILLS**  
 (Common to all branches)

**Subject Code: 8HC01**

L    T    P/D    C  
 1    0    0    1

**Course Objectives:**

**To enable students to:**

- enhance oral communication skills
- develop the skill of speaking effectively
- get introduced basics of soft skills and enhance their confidence levels and etiquette
- learn to make formal presentations both online and offline.
- Improve their reading skills by applying different strategies of reading
- understand the nuances and learn the art of group discussion

| Units                                               | Theory (1 per week)                                                                                                                                                                                                | No. of Periods | Lab (2 per week) CALL LAB                                                                                                                           | No. of Periods |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>1. Introduction to Oral Communication Skills</b> | 1.1. Importance and need for general and technical Communication<br>1.2 Barriers to effective communication<br>1.3 Self introduction, introducing and greeting others<br>1.4 Techniques to enrich vocabulary power | 1<br>1<br>1    | Practice sessions on<br>• Self-introduction, introducing others and greetings<br>• Sharing experiences, anecdotes and story telling                 | 6              |
| <b>2. Effective Speaking Skills</b>                 | 2.1 Use of cohesive devices<br>2.2 Achieving confidence, clarity and fluency in speaking<br>2.3 Body language: eye contact, facial expression, gestures, posture and body movements<br>2.4 Speech etiquette        | 1<br>1<br>1    | Practice sessions on<br>• Confidence boosting<br>• Asking for and Giving Directions<br>• Discussions and Role Plays on different types of Etiquette | 4              |
| <b>3. Activities on listening and speaking</b>      | 3.1 Soft Skills<br>3.2 Listening to structured talks<br>3.3 Strategies to improve speaking skills<br>3.4 JAM sessions                                                                                              | 1<br>1         | Practice exercises on<br>• Situational Dialogues<br>• JAM/Extempore/ Impromptu                                                                      | 6              |
| <b>4. Presentation Skills</b>                       | 4.1 Nature and importance of presentation skills<br>4.2 Planning, preparing and organizing a presentation<br>4.3 Making an effective online presentation<br>4.4 Storytelling: Nuances of delivery                  | 1<br>2<br>1    | Practice sessions on<br>• Formal Presentations                                                                                                      | 6              |

|                                 |                                                                                                                                                                                                     |                      |                                                                                                                                                                              |          |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>5. Reading Comprehension</b> | 5.1 Reading comprehension Techniques<br>5.2 Study Skills<br>5.3 Note making<br>5.4 Reading passages from a book for practice                                                                        | <b>1</b><br><b>1</b> | Practice sessions on <ul style="list-style-type: none"> <li>• Reading comprehension</li> <li>• Reading from simple and difficult passages from articles and books</li> </ul> | <b>6</b> |
| <b>6. Group Discussion</b>      | 6.1 Importance of Group Discussion<br>6.2 Characteristics of successful group discussions<br>6.3 Techniques for individual contribution in a group discussion<br>6.4 Group discussions for practice | <b>1</b><br><b>1</b> | Practice sessions on <ul style="list-style-type: none"> <li>• Group Discussion</li> </ul>                                                                                    | <b>4</b> |

**Text Book:** Compiled by the faculty of Sreenidhi (for internal circulation only)

- Suggested Readings:** \* SPOKEN ENGLISH A Self-Learning Guide to Conversation Practice by V Sasikumar P. V. Dhamija
- English for Professionals by S.S.Prabhakar Rao
  - English for Business Communication by Dr.T.Farhathullah
  - Professional Communication by Alok Jain, Pravin S.R.Bhatia and A.M.Sheikh
  - Objective English : Pearson's Publications
  - Word Power Made Easy: Norman Lewis
  - Business Communication Strategies : Monipally.

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**Syllabus for B. Tech I Year II semester**  
**Electronics and Computer Engineering**  
**DIFFERENTIAL CALCULUS AND NUMERICAL METHODS**  
**(Common to CSE, IT, ECM)**

**Code: 8HC13**

**L T P/D C**  
**2 1 0 3**

**Pre Requisites:** Linear Algebra and Calculus

**Courses Objectives:** *The students are expected to learn*

1. Various analytical methods to solve first order first degree ordinary differential equations.
2. Methods to solve higher order ordinary differential equations.
3. Concepts of Maxima and Minima of functions of two variables and Gradient, divergence and Curl.
4. Methods to solve algebraic and transcendental equations with the help of numerical methods also some numerical integration methods.
5. Finite differences, interpolating methods.
6. Numerical methods to find the solution of first order differential equations.

**Course outcomes:** *After learning the contents of this paper the student must be able to*

- i. Find the solutions of first order first degree and not of first degree differential equations and their applications such as Newton's law of cooling, Natural growth and decay.
- ii. Identify and solve higher order ordinary differential equations with constant coefficients using some standard methods and also their applications in LCR circuits.
- iii. Evaluate the maxima and minima of functions of two variables and find the Gradient, Divergence and Curl.
- iv. Solve algebraic and transcendental equations with the help of numerical methods also able to solve problems using numerical integration methods.
- v. Solve problems using Finite differences and interpolating methods.
- vi. Solve first order differential equations using numerical methods.

### Syllabus

**Unit I: First order ordinary differential equations: (8 L)**

Exact, equations reduced to exact; linear and Bernoulli's equations, Newton's Law of Cooling, Law of natural Growth/Decay.

**Unit II: Ordinary Differential equations of higher order: (10 L)**

Higher order linear differential equations with constant coefficients-Standard types of finding P.I, method of variation of parameters, Cauchy-Euler equation.

**Unit III: Multi Variable Calculus: (10 L)**

Limit, Continuity and Partial Differentiation, Jacobian, Functional Dependence, Maxima and minima, Lagrange method of multipliers; Gradient, directional derivatives; Concepts of divergence and curl with physical significance

**Unit IV: Solutions of Algebraic and Transcendental Equations & Numerical Integration: (10 L)**

Solution of Algebraic and Transcendental equations- Bisection method, Newton-Raphson Method. Newton-Cotes Quadrature Formula, Trapezoidal rule – Simpson's 1/3 rule – Simpson's 3/8 rule.

**Unit V: Interpolation: (10 L)**

Finite differences- Numerical Differentiation - Newton's formulae for interpolation (without proofs)- Gauss Central Difference Formulae (without proofs), Lagrange's Interpolation formula for unevenly spaced points.

**Unit VI: Numerical Solutions of Ordinary Differential Equations: (10 L)**

Numerical solutions to first order ordinary differential equations – Taylor’s series method, Euler’s method, Modified Euler’s Method, Picard’s method, Runge-Kutta method of fourth order.

**Text Books**

- (i) Advanced Engineering Mathematics, S.R.K. Iyengar and R.K.Jain, Narosa Publication.

**Reference Books**

- (i) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000
- (ii) S. S. Sastry, Introductory methods of numerical analysis. PHI, 4<sup>th</sup> Edition, 2005.
- (iii) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- (iv) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
- (v) Engineering Mathematics, Ravish R. Singh, McGraw Hill Education



**Syllabus for B. Tech I Year II semester**  
**Electronics and Computer Engineering**  
**BASIC MATHEMATICS, ANALYSIS AND REASONING**  
**(Common to all branches)**

Code: 8HC08

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 1 | 0   | 3 |

*Pre Requisites: Nil*

**Course objectives:** *By learning Quantitative Aptitude and Logical Reasoning, a student can answer general problems in his everyday life within a short time with the help of quicker methods. Also it improves the certain skills of a student such as numerical and logical ability, mental capacity and also in sharpening minds. This course is very much useful for competitive examinations.*

**Course Outcomes:** *After completion of this course students will be able to solve, the questions given on testing divisibility, HCF and LCM, averages, percentage and profit and loss, ratio and proportion simple and compound interest, time and work, time and distance and etc. Also able to solve the questions given on series completion and analogy, odd one out and coding and decoding, blood relations, directions and Arithmetical reasoning, Venn diagrams, cubes and dice, clocks and calendar.*

### Syllabus

**Unit I:** Number System: Test for Divisibility, Test of prime number, Division and Remainders – HCF and LCM of Numbers – Fractions and Decimals-Vedic Mathematics-Average-Problems on Ages- Problems on Numbers- Ratio and Proportion.

**Unit II:** Percentage – Profit, Loss and Discount – Partnership and Share-Simple Interest - Compound Interest. Time and Work- Pipes and Cisterns-Time and Distance- Problems on Trains- Boats and Streams, Allegation or Mixtures.

**Unit III:** Mensuration: Area of Plane Figures, Volume and Surface Area of Solid Figures.  
 Data Interpretation: Tabulation, Bar Graphs, Pie Charts, Line Graphs-Logarithms-Permutation and Combination-Probability-Linear Equations-Quadratic Equations-Surds and Indices-Coordinate geometry.

**Unit-IV:** Series Completion: Number Series, Alphabet Series, Alpha – Numeric Series.  
 Analogy: Completing the Analogous Pair, Simple Analogy, Choosing the Analogous pair, Double Analogy, Word Analogy, and Number Analogy.  
 Classification: Word Classification, Number Classification and Letter Classification.  
 Coding & Decoding: Letter Coding, Number Coding, Matrix Coding, Substitution, Deciphering Message Word Codes, Jumbled Coding. Crypt arithmetic-Inequalities-Input Output Tracing

**Unit-V:** Blood Relations– Direction sense test- Number, Ranking & Time Sequence Test –Mathematical Operations-Arithmetical Reasoning. Puzzle Test: Classification Type Questions, Seating Arrangements, Comparison Type Questions, Sequential Order of Things, Selection Based on Given Conditions, Family Based Puzzles, Jumbled Problems.

**Unit –VI:** Logical Venn Diagrams –Cubes and Dice – Analytical Reasoning-Assertions and Reason-Logical Deductions-Syllogism -Statement and Arguments-Statement and Conclusions-Clocks & Calendar-Data Sufficiency.

**Text Books:**

1. Quantitative Aptitude by R.S.Agarwal
2. Verbal and Non Verbal Reasoning by R.S.Agarwal.

**Syllabus for B. Tech I Year II semester  
Electronics and Computer Engineering  
WORKSHOP/MANUFACTURING PROCESSES LAB  
(Common to all branches)**

**Code: 8BC61**

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 0 | 0 | 2   | 1 |

**COURSE OBJECTIVES:**

- 1) To know the different popular manufacturing process
- 2) To gain a good basic working knowledge required for the production of various engineering products
- 3) To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field
- 4) To identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances

**COURSE OUTCOMES:** After completion of the course, the student will be able to:

- CO-1: Use various types of conventional manufacturing Processes  
 CO-2: Manufacture components from wood, MS flat, GI Sheet etc. – hands on experience  
 CO-3: manufacturing of components by machining like shafts, holes & threaded holes, surface finishing of components etc.  
 CO-4: Produce small devices / products /appliances by assembling different components

**LIST OF EXPERIMENTS**

| S.No | Trades                           | Experiment name                                                                                                                              |
|------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Fitting Shop                     | 1. Preparation of T-Shape Work piece<br>2. Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding.             |
| 2    | Carpentry                        | 3. Cross Half Lap joint<br>4. Half Lap Dovetail joint                                                                                        |
| 3    | Electrical & Electronics         | 5. One lamp one switch<br>6. Stair case wiring                                                                                               |
| 4    | Welding ( Arc & Gas) & Soldering | 7. Practice of Lap and Butt joint by Arc welding Demonstration: Gaswelding, Resistance welding& Soldering                                    |
| 5    | Casting                          | 8. Preparation of mould cavityusing solid pattern<br>9. Preparation of mould cavityusing split patternDemonstration: pouring of molten metal |
| 6    | Tin Smithy                       | 10. Preparation of Rectangular Tray<br>11. Preparation of Square box                                                                         |
| 7    | Machine Shop                     | Turning, Drilling and grinding operations on Lathe, Drilling and grinding machines                                                           |
| 8    | Plastic molding & Glass Cutting  | 12 a) Injection Moulding<br>b) Glass Cutting with hand tools                                                                                 |
| 9    | Domestic Appliances              | Study of internal components & circuit of appliances such as Fans, Mixers, Air blower, Iron box, Rice cooker, Emergency light etc.,          |
| 10   | Lab project                      | Making various components and / or assembling the components which can be useful in domestic / engineering applications                      |

**Syllabus for B. Tech I Year II semester  
Electronics and Computer Engineering  
ENGINEERING CHEMISTRY LAB  
(Common to EEE, ME, IT and ECM)**

**Code: 8HC64**

| L | T | P/D | C |
|---|---|-----|---|
| 0 | 0 | 2   | 1 |

**Course Objectives:**

*The student will be able to learn:*

1. To preparation of Inorganic compounds
2. To determine surface tension of a liquid
3. To determine viscosity of lubricant
4. To determine acid value of an oil
5. To estimate hardness of water
6. To analyze the amount of chloride content
7. To determine cell constant and conductance of solutions
8. To determine redox potential and emf of solutions
9. To determine the rate constant of acid
10. To synthesize a polymer (Thiakol rubber / Urea-Farmaldehyde resin)
11. To synthesize a drug- Aspirin
12. To estimate of  $Mn^{+7}$  by Colorimetry method

**Course Outcomes**

*After completion of the course, the student will be able to learn:*

1. Preparation of Inorganic compounds
2. Determination surface tension of a liquid
3. Determination viscosity of lubricant
4. Determination acid value of an oil
5. Estimation hardness of water
6. Analysis the amount of chloride content
7. Determination of cell constant and conductance of solutions
8. Determination of redox potential and emf of solutions
9. Determination of the rate constant of acid
10. Synthesis of a polymer (Thiakol rubber / Urea-Farmaldehyde resin)
11. Synthesis of a drug- Aspirin
12. Estimation of  $Mn^{+7}$  by Colorimetry method

**List of Experiments**

1. Preparation of coordination complex NiDMG Complex
2. Determination of surface tension
3. Determination of viscosity
4. Saponification/acid value of an oil
5. Ion exchange column for removal of hardness of water / Estimation of Hardness of water by EDTA Method
6. Determination of chloride content of water
7. Determination of cell constant and conductance of solutions (HCl Vs NaOH / Mixture of acid Vs Strong base)
8. Potentiometry - determination of redox potential and emf ( $FeSO_4$  Vs  $KMNO_4$  / HCl Vs NaOH)
9. Determination of the rate constant of acid catalyzed hydrolysis of methylacetete
10. Synthesis of a polymer- Thiakol rubber / Urea-Farmaldehyde resin
11. Synthesis of a drug- Aspirin
12. Estimation of  $Mn^{+7}$  by Colorimetry method

|   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H | I | J | K | L |
|   |   |   |   |   |   |   | X | X | X |   | X |

**Syllabus for B. Tech I Year II semester**  
**Electronics and Computer Engineering**  
**ORAL COMMUNICATION SKILLS**  
 (Common to all branches)

**Subject Code: 8HC61**

L    T    P/D    C  
 0    0    2    1

**Course Objectives:**

**To enable students to:**

- enhance oral communication skills
- develop the skill of speaking effectively
- get introduced basics of soft skills and enhance their confidence levels and etiquette
- learn to make formal presentations both online and offline.
- Improve their reading skills by applying different strategies of reading
- understand the nuances and learn the art of group discussion

| Units                                               | Theory (1 per week)                                                                                                                                                                                                | No. of Periods | Lab (2 per week) CALL LAB                                                                                                                           | No. of Periods |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>1. Introduction to Oral Communication Skills</b> | 1.1. Importance and need for general and technical Communication<br>1.5 Barriers to effective communication<br>1.6 Self introduction, introducing and greeting others<br>1.7 Techniques to enrich vocabulary power | 1<br>1<br>1    | Practice sessions on<br>• Self-introduction, introducing others and greetings<br>• Sharing experiences, anecdotes and story telling                 | 6              |
| <b>2. Effective Speaking Skills</b>                 | 2.1 Use of cohesive devices<br>2.2 Achieving confidence, clarity and fluency in speaking<br>2.3 Body language: eye contact, facial expression, gestures, posture and body movements<br>2.4 Speech etiquette        | 1<br>1<br>1    | Practice sessions on<br>• Confidence boosting<br>• Asking for and Giving Directions<br>• Discussions and Role Plays on different types of Etiquette | 4              |
| <b>3. Activities on listening and speaking</b>      | 3.1 Soft Skills<br>3.2 Listening to structured talks<br>3.3 Strategies to improve speaking skills<br>3.4 JAM sessions                                                                                              | 1<br>1         | Practice exercises on<br>• Situational Dialogues<br>• JAM/Extempore/ Impromptu                                                                      | 6              |
| <b>4. Presentation Skills</b>                       | 4.1 Nature and importance of presentation skills<br>4.2 Planning, preparing and organizing a presentation<br>4.3 Making an effective online presentation<br>4.4 Storytelling: Nuances of delivery                  | 1<br>2<br>1    | Practice sessions on<br>• Formal Presentations                                                                                                      | 6              |

|                                 |                                                                                                                                                                                                     |                      |                                                                                                                                                                              |          |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>5. Reading Comprehension</b> | 5.1 Reading comprehension Techniques<br>5.2 Study Skills<br>5.3 Note making<br>5.4 Reading passages from a book for practice                                                                        | <b>1</b><br><b>1</b> | Practice sessions on <ul style="list-style-type: none"> <li>• Reading comprehension</li> <li>• Reading from simple and difficult passages from articles and books</li> </ul> | <b>6</b> |
| <b>6. Group Discussion</b>      | 6.1 Importance of Group Discussion<br>6.2 Characteristics of successful group discussions<br>6.3 Techniques for individual contribution in a group discussion<br>6.4 Group discussions for practice | <b>1</b><br><b>1</b> | Practice sessions on <ul style="list-style-type: none"> <li>• Group Discussion</li> </ul>                                                                                    | <b>4</b> |

**Text Book:** Compiled by the faculty of Sreenidhi (for internal circulation only)

- Suggested Readings:** \* SPOKEN ENGLISH A Self-Learning Guide to Conversation Practice by V Sasikumar P. V. Dhamija
- English for Professionals by S.S.Prabhakar Rao
  - English for Business Communication by Dr.T.Farhathullah
  - Professional Communication by Alok Jain, Pravin S.R.Bhatia and A.M.Sheikh
  - Objective English : Pearson's Publications
  - Word Power Made Easy: Norman Lewis
  - Business Communication Strategies : Monipally.

|   |   |   |   |   |   |   |   |   |    |    |    |
|---|---|---|---|---|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|   |   | H |   |   |   |   |   |   |    |    |    |

**Syllabus for B. Tech I Year II semester  
Electronics and Computer Engineering  
DATA STRUCTURES (C/ C++) LAB  
(Common to all branches)**

**Code: 8EC61**

**L T P/D C**  
**0 0 2 1**

**Course objective:**

*Understand the data structures: simple and complex and use them to write the programs for implementing searching, sorting, expression evaluations. Understand the applications that use the particular data structure and its significance in the development of operating systems and the softwares . Understand the object-oriented programming concepts of C++.*

**Course Outcomes:**

- 1 Write programs to implement Stacks, Queues and circularqueues.
- 2 Write programs using tree traversals. Inorder, preorder and postorder.
- 3 Write Programs on searching, sorting and hashingoperations.
- 4 Write programs on Binarytrees
- 5 Write programs in C++ to implement classes and operatoroverloading.

**UNIT –I:**

1. Write a C program that implement stack and its operations usingarrays
2. Write a C program that implement Queue and its operations usingarrays.
3. Write a C program that implement Circular Queue and its operations usingarrays.
4. Write a C program that uses Stack operations to perform thefollowing
  - i) Converting infix expression into postfixexpression
  - ii) Evaluating the postfixexpression

**UNIT –II:**

5. Write a C program that uses functions to perform the following operations on singly linkedlist:
  - i) Creation ii) Insertion iii) Deletion iv) Traversal
6. Write a C program using functions to perform the following operations on circular singly linkedlist:
  - i) Creation ii) Insertion iii) Deletion iv) Traversal
7. Write a C program that uses functions to perform the following operations on doubly linkedlist:
  - i) Creation ii) Insertion iii) Deletion iv) Traversal in bothways
8. Write a C program to implement operations on the following Data Structures Using Singly linkedlist:
  - i) Stack ii) Queue

**UNIT- III**

9. Write a C program that uses functions to perform thefollowing:
  - i) Creating a Binary Tree ofintegers
  - ii) Traversing the above binary tree in preorder, in order and postorder.

**UNIT- IV**

10. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list ofintegers:
  - i) Linearsearch
  - ii) Binarysearch
11. Write C programs that implement the following sorting methods to sort a given list of integers in

ascendingorder:

i) Bubblesort      ii) Insertion sort      iii) SelectionSort

12. Write C programs that implement the following sorting methods to sort a given list of integers in ascendingorder:

i) Quick sort      ii) Merge sort      iii) Heap Sort

13. Write a C Program to implement Separate Chaining using Hashing. Include Insertion, Deletion and Display of the Elements.

#### **UNIT –V**

14. Write a C++ program to read and display the details of student class with data members as name, rollno and 3 subjects' marks.

15. Write a C++ program to implement all types of constructors.

#### **UNIT VI**

16. Write a C++ program to implement operator overloading for addition of two complex numbers.

**Syllabus for B. Tech I Year II semester**  
**Electronics and Computer Engineering**  
**COMPREHENSIVE TEST AND VIVA VOCE- II**  
**(Common to all branches)**

Code: 8D284

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 1 | 0 | 0   | 1 |

**Course Objective:**

*Evaluate, Comprehend and Assess the concepts and knowledge gained in the Core Courses of 1<sup>st</sup> year 1<sup>st</sup> Semester*

**Course Outcomes:** After completing this course, the student will be able to

1. Comprehend the concepts in the Core Courses of 1<sup>st</sup> year 1<sup>st</sup> Semester
2. Assess technical knowledge to face interviews.
3. Exhibit lifelong learning skills to pursue higher studies or professional practice.

| Comprehensive Test and Viva Voce | The subjects studied in the Semester concerned related to branches concerned and for placements |
|----------------------------------|-------------------------------------------------------------------------------------------------|
| B.Tech I year I semester         | I semester                                                                                      |
| B.Tech I year II semester        | I and II semester                                                                               |
| B.Tech II year I semester        | I, II and III semester                                                                          |
| B.Tech II year II semester       | I, II, III and IV semester                                                                      |
| B.Tech III year I semester       | I, II, III, IV and V semester                                                                   |
| B.Tech III year II semester      | I, II, III, IV, V and VI semester                                                               |
| B.Tech IV year I semester        | I, II, III, IV, V, VI and VII semester                                                          |

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

**Allocation of marks:**

|                     |             |
|---------------------|-------------|
| *Comprehensive Test | : 70 marks  |
| **Viva Voce         | : 30 marks  |
| Total               | : 100 marks |

\*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 20 marks.

End Semester Examination for Comprehensive Test will be taken for 50 marks.

Total marks for Comprehensive Test will be 70.

\*\*Average of best two of Mid Tests of Mid – I, Mid – II and Mid - III for Viva Voce will be taken for 10 marks.

End Semester Examination for Comprehensive Viva Voce shall be evaluated for 20 marks.

The total for Viva Voce will be 30.

Thus the total sessional marks in this subject of Comprehensive Test and Viva Voce will be: 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

**Syllabus for B. Tech I Year II semester**



**Electronics and Computer Engineering**  
**TECHNICAL SEMINAR - II**  
 (Common to all branches)

Code: 8D292

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 1 | 0 | 0   | 1 |

**Course Objective:**

*Develop ability to be a public speaker. Learn the importance of delivering seminars for demonstrating oratory and develop interview facing skills.*

**Course Outcomes:** After completing this course, the student will be able to

1. Identify current general, political and technology related topics.
2. Arrange and present seminar in a effective manner
3. Collect, survey and organize content in presentable manner
4. Demonstrate oratory skills with the aid of Power Point Presentations
5. Exhibit interview facing skills and team leading qualities

**Procedure :**

1. Seminar in-charges shall highlight the significance of technical seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot/week.
5. Progress of the seminars need to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for technical seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

There shall be a technical seminar evaluated for 100 marks each from I year I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

| Sl. No | Description                                                                               | Marks            |
|--------|-------------------------------------------------------------------------------------------|------------------|
| 1      | Literature survey, topic and content                                                      | 10               |
| 2      | Presentation including PPT                                                                | 10               |
| 3      | Seminar Notes                                                                             | 05               |
| 4      | Interaction with audience after presentation                                              | 05               |
| 5      | Final Report 3 copies                                                                     | 10               |
| 6      | Class room participation                                                                  | 05               |
| 7      | Punctuality in giving seminar as per Scheduled time and date                              | 10               |
| 8      | Mid Semester Viva (on the seminar topics completed up to the end of 9 <sup>th</sup> week) | 15               |
| 9      | End Semester Viva                                                                         | 30               |
|        | <b>Total</b>                                                                              | <b>100 Marks</b> |

Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

**Syllabus for B. Tech I Year II semester  
Electronics and Computer Engineering  
ORIENTATION  
(Common to all branches)**

Code: 8HC18

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 2 | 0 | 0   | 0 |

**Course Objectives:**

*This introductory course input is intended*

- *To help the students appreciate the essential 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.*
- *To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.*
- *To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature. Thus, this course is intended to provide a much needed orientational input in value education to the young enquiring minds.*

**Course Outcomes:** *At the end of this course, the student will be able to*

1. *Learns Being a human, understands human values and purpose of education*
2. *Understands the importance of different harmony levels needed. Understand Self and being in the current moment are the sources of happiness.*
3. *Improves Learning capabilities and communication skills.*
4. *Improves Personality Development and Life Skills*
5. *Understands and appreciate the importance of personality development and yoga for a holistic life.*
6. *Understands the essence and Values and Social responsibilities for successful life.*

| Unit                                                                                                                    | Name of the Module                                                                                                                                                                                           | Number of Periods |
|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>c) Orientation Course for B. Tech I year I semester Students – 3 weeks duration covering the following Two Units</b> |                                                                                                                                                                                                              |                   |
| I                                                                                                                       | Universal Human Values – Introduction                                                                                                                                                                        | 8                 |
| II                                                                                                                      | Universal Human Values – Relationships                                                                                                                                                                       | 8                 |
| <b>d) Orientation Course for B. Tech I year II semester Students –covering the following Four Units</b>                 |                                                                                                                                                                                                              |                   |
| III                                                                                                                     | Improving Learning Capabilities (ILC) - Basic Skills of Learning                                                                                                                                             | 12                |
| IV                                                                                                                      | Improving Learning Capabilities (ILC)- Personality Development and Life Skills                                                                                                                               | 12                |
| V                                                                                                                       | Literature, Proficiency Modules(PM) in English, Health, Yoga & Diet, Co-Curricular & Extracurricular activities                                                                                              | 12                |
| VI                                                                                                                      | Lectures by Eminent Persons on Science, Technology & Environment, Research, Innovation & Patents, Local Visit to Village and City including Hi-tech City. Feedback on last but one day of Orientation Course | 12                |
| <b>Total Number of Periods</b>                                                                                          |                                                                                                                                                                                                              | <b>64</b>         |

**Unit - I****Universal Human Values**

**Introduction** -Self – Exploration, Basic human aspirations, Need for a holistic perspective, Role of Education, Understanding Happiness, Understanding the human being – Self and Body.

**Unit - II****Universal Human Values**

**Relationships**-Understanding Relationship –Trust and Respect. Harmony in the Society, Natural Environment, Participation in nature Harmony in nature/existence.

**Unit - III****Improving Learning Capabilities-Basic Skills of Learning**

Principles of Learning, Study Skills & E-Learning, Listening Skills, Effective Reading and Reviewing, Reading Comprehension, Textbook Reading Strategies, Test taking strategies, Introduction to Soft Skills and Employability Skills, Interpersonal skills.

**Unit - IV****Improving Learning Capabilities-Personality Development and Life Skills**

Goal Setting, Motivation, Time Management, Positive Attitude, Decision Making, Building Self-confidence, Attributes of a Good Personality, Memory Management, Characteristics of a successful student, Responsibilities of Students in shaping themselves, Morals, Ethics & Values, Difference between Studying in a Professional College and High School / Junior College

**Unit - V****Literature, Proficiency Modules (PM) in English, Health, Yoga & Diet, Co-Curricular & Extracurricular activities**

**Literature** -History of human civilization, Indian civilization, Indus valley civilization and culture, history of religions, the basic tenets of Christianity, Islam, Hinduism, Buddhism, Jainism, Sikkim and Judaism, Indian culture and values.

**Proficiency Modules in English** - Strategies to improve proficiency in English skills(L/S/R/W), Exercises based on Remedial grammar, Exercises on Remedial Vocabulary

**Health**- Dimensions of Health, Basic activities of daily living, Instrumental activities of daily living, Types of Health, Factors affecting health

**Yoga** - Introduction to Yoga, Kinds of Yoga, Pranayama and Dhyana (Meditation)

**Diet**- Balanced Diet, Components of Diet, Health Eating Pyramid.

**Co-curricular and Extra Curricular activities****Unit - VI****Lectures by Eminent Persons, Research, Innovation & Patents and Local Visit**

**Lectures by Eminent Persons** on Science, Technology & Environment,

**Innovations R&D and Entrepreneurship**-Sreenidhi HUB, Basics of Innovation, Entrepreneurship and Intellectual Property Rights (IPR )

**Local Visit** to Village and City including Hi-tech City.

**Feedback on last but one day of Orientation Course**

**Text Books:**

1. RR Gaur, R Sangal, GP Bangaria, 2009, A Foundation Course in Value Education (English).

**Reference Books:**

1. Yoga, Food and Health (by Swami Guru PremanandaSaraswati)

**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
DISCRETE STRUCTURE AND GRAPH THEORY**

Code: 8D301

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objectives:** *In this course the student will learn*

- *Statements and their truth value and constructing truth tables*
- *The use of Universal and Existential quantifiers to describe predicates*
- *Different algebraic structures and their use in mathematics.*
- *To solve problems by permutations and combinations. Study of pigeonhole principle and inclusion exclusion principles.*
- *To solve various recurrence relations by using different techniques.*
- *The basics of graph theory, different ways of traversing the graph and different types of graphs and circuits*

**Course Outcomes:** *After completing this course, student should be able to*

- 1 *Describe Connectives, Normal Forms and Theory of Inference with suitable examples.*
- 2 *Solve problems with Predicate Calculus and generate inferences.*
- 3 *Solve and explain Relations and Ordering problems and solve problems of Lattices.*
- 4 *Distinguish algebraic systems like semi-groups, monoids and groups and apply concepts of Combinatorics for solving problems*
- 5 *Solve problems with recurrence relations.*
- 6 *Explain and apply concepts of Euler's Formula, Multigraphs, Euler's Circuits, Hamiltonian graph and Chromatic Numbers for solving problems.*

**UNIT – I**

**Propositional Logic:** Statement and notations, Connectives, Well-formed Formulas, Truth Tables, Tautology, Equivalence, Implication, Arguments, Normal forms, Proof by contradiction, Conditional Proof

**Applications:** Useful in Switching theory and logic design, Digital Logic design

**UNIT-II**

**First order logic:** Predicates, Quantifiers, Free and Bound variables, Rules of inference, Consistency, Automatic Theorem Proving.

**Applications:** Useful for Artificial Intelligence

**UNIT – III**

**Relations:** Properties of Binary Relations, Equivalence, transitive closure, Compatibility & Partial Ordering Relations, Hasse Diagrams, lattices, Boolean algebra. Functions: Inverse function, composition of functions, Recursive functions, Lattice and its properties.

**Algebraic structures:** Algebraic systems, Examples and general properties, Semi groups and Monoids. Groups, Subgroups, Homomorphisms, Isomorphisms

**Applications:** Useful for writing queries Data Base Management systems, Computer Networks.

**UNIT –IV**

**Elementary Combinatorics:** Basics of counting, Combinations & Permutations with and without repetitions, Constrained repetitions. Binomial coefficients, Binomial, Multinomial theorms, Euler function, Derangemants, Principle of inclusion and exclusion, Pigeon hole principle and its applications.

**Applications:** Useful for Computer Networks, Machine Learning, Data Mining, Theory of Computations

**UNIT V**

**Recurrence relations:** Generating functions. Function of sequences, Calculating the coefficient of generating functions. Recurrence relations, Solving recurrence relations by substitution and generating functions. Characteristic roots. Solution of Inhomogeneous recurrence relations.

**Applications:** Useful and Can improve the Computer Programming skills

**UNIT VI**

**Graph Theory:** Basic concepts, Representation of Graph, DFS, BFS, Spanning trees, Planar graphs, coloring, Isomorphism and subgraphs, Multi graphs and Euler Circuits, Hamiltonian graphs, Chromatic numbers, connectivity, cut vertices, cut edges, Matchinga and coverings, independent sets.

**Applications:** Design of Algorithms, Computer Networks

**TEXT BOOKS :**

1. Elements of Discrete mathematics – A computer Oriented Approach- C L Liu, D P Mohapatra. Third Edition, Tata McGraw Hill.
2. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker, PHI.
3. Discrete mathematics with applications to computer science, J.P.Tremblay and R.Manohar, TMH

**REFERENCES :**

1. Discrete and Combinational Mathematics- An Applied Introduction-5<sup>th</sup> Edition – Ralph. P.Grimaldi.Pearson Education
2. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition.TMH.
3. Discrete Mathematical structures Theory and application-Malik & Sen, Cengage.

**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
PYTHON AND SHELL PROGRAMMING**

Code: 8D309

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objectives: The Students can able to**

1. Learn the python scripting basics, conditional statements and functions
2. Learn and practice string manipulation, lists, modules and exception handling
3. Learn and practice OOP concept in Python
4. Learn commands, text processing, backup and disk utilities
5. Understand and implement data management commands and tools
6. Learn the shell scripts for day to day operations in organizations

**Course Outcomes: At the end of this course the student can able to:**

1. Gains exposure towards Python versions and their specifications
2. Build programs using primitive data types and write applications that include functions, modules, packages along with respective exceptional handling mechanism
3. Writes applications using OO features of Python and also handle files
4. Understand and use the commands for text process, files management in the real time environment
5. Develop the commands for data management
6. Write shell scripts for the real time applications

**Unit I: Introduction to Python programming**

History and Introduction to python language, setting up python and working with python syntax, Data types and operators, Conditional and Control statements, Basic input-output operations, Functions, Types of functions, Anonymous functions, global and local variables

**Unit II:****String Manipulation:** Accessing Strings, Basic Operations, String slices, Function and Methods**Lists:** Accessing list, Operations, working with lists; **Tuple:** Accessing tuples, Operations, working;**Dictionaries:** Accessing and working with dictionaries, Properties; **Modules:** Importing module, Math module, Random module, Packages; **Exception Handling:** Exception Handling, Except clause, Try? Finally clause, User Defined Exceptions**Unit-III:****Python–OOP concept:** Class and object, Attributes, Inheritance, Overloading Overriding, Data hiding;**Regular expressions:** Match function, Search function, Matching VS Searching, Modifiers Patterns.**Files and Directories:** File Handling, working with File Structure, Directories, Handling Directories**Unit IV: Introduction to Unix**

architecture, Features of Unix, Unix utilities – process utilities, disk utilities, networking commands, text processing utilities and backup utilities; Introduction to unix file system, vi editor, file handling utilities, security by file permissions

**Unit V:****Grep:** Operation, grep Family, Searching for File Content**Sed:** Scripts, Operation, Addresses, commands, Applications, grep and sed**awk:** Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User defined Functions, Using System commands in awk, Applications, awk and grep, sed and awk.**Unit VI: Working with the Bash Shell:**

Shell responsibilities, pipes and input redirection, output redirection, here documents, running a shell script, shell as a programming language, shell metacharacters, filename substitution, shell variables,

command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, Shell script examples, functions, debugging shell scripts.

**Text Book:**

1. [Apress]-Beginning Python. From Novice to Professional, 2nd ed. - [Hetland] (2008)
2. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg, Thomson

**Reference books:**

1. Introduction to Computation and Programming using Python, Revised and Expanded Edition, John V. Guttag, The MIT Press.
2. Programming Python, Fourth Edition by Mark Lutz, O'Reilly
3. Python Programming using problem solving approach, Reema Thareja, Oxford Higher Education
4. Your Unix the ultimate guide, Sumitabha Das, TMH. 2nd Edition

**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
ELECTRONIC DEVICES AND CIRCUITS**

**Code: 8CC01**

L    T    P/D    C  
3    0    0    3

**Course Objectives**

- To provide the learners a comprehensive understanding of electronic Components like Diodes, Transistors, Field Effect transistors and their applications.
- To maintain the right blend of theory and practice in analyzing and designing of Amplifiers and Oscillators.

**Course Outcomes**

*After studying this course, the students will be able to*

- [CO1] Demonstrate the concepts of pn Diode, Zener Diode, Bipolar Junction Transistor, Field Effect Transistor and their characteristics.
- [CO2] Design and Analyze the Amplifier circuits using BJT and FET.
- [CO3] Classify and characterize the Feed Back amplifiers and design various Oscillator circuits.
- [CO4] Understand the Basic regulator circuits and voltage multipliers.

**Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes**

|                 | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO1 1 | PO1 2 | PSO 1 | PSO 2 | PSO 3 |
|-----------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| CO1             | 2    | 2    | 2    |      |      |      |      |      |      |       |       | 1     | 3     |       | 1     |
| CO2             | 3    | 3    | 3    |      |      |      |      |      |      |       |       | 1     | 3     |       | 1     |
| CO3             | 3    | 3    | 3    |      |      |      |      |      |      |       |       | 1     | 3     |       | 1     |
| CO4             | 3    | 3    | 3    |      |      |      |      |      |      |       |       | 1     | 3     |       | 1     |
| Overall mapping | 3    | 3    | 3    |      |      |      |      |      |      |       |       | 1     | 3     |       | 1     |

**UNIT-I**

**PN JUNCTION DIODE: [CO1][T1][Lecture hrs – 10]**

P-N Junction diode characteristics and applications under forward & reverse bias. Transition capacitance and Diffusion capacitance. Break down of junctions (Avalanche Break Down and Zener Break down). Zener Diode Characteristics.

P-N junction diode as a Rectifier :Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Analysis of Rectifier circuits without and with filters (Inductor and Capacitor Filters ).

**UNIT- II**

**BIPOLAR JUNCTION TRANSISTOR:[CO1][T1][Lecture hrs – 10]**

Fundamentals of BJT & Operation, Minority carrier profiles. I/P and O/P Characteristics CB, CE and CC configurations. Transistor as a switch. Switching characteristics (Rise time, Fall time, Delay Time and Storage time), Design of transistor as switch. Problems on transistor switch. BJT Biasing Methods & Stabilization. - Fixed Bias, Collector to Base Bias, Voltage Divider Bias and Problems, Concept of Thermal runaway in BJT.

**UNIT-III**

**Small signal & High frequency analysis of BJT:[CO2][T1][Lecture hrs – 8]**

Small signal Low frequency Model of BJT, h-parameter representation – Exact analysis of .CE Amplifier. Approximate analysis of CE, CB and CC Amplifiers. Concept of Multistage amplifier - N-stage cascaded amplifier, equivalent circuits, Frequency response of single & two stage RC coupled Amplifier, Analysis at Low and High frequencies.

Hybrid  $\pi$  model – relationship between high frequency parameters and h- parameters,  $\beta$  cut off Frequency (common Emitter short circuit Current gain), Millers Theorem.

**UNIT-IV**



**FIELD EFFECT TRANSISTOR:[CO1][CO2][T1]** [Lecture hrs – 9]

Construction & Working of JFET, JFET characteristics, FET Parameters, Construction & Working of MOSFET, MOSFET characteristics,(Enhancement and depletion mode); Comparison of JFET & MOSFET

Biasing of JFET - Self bias and fixed bias. Small signal Analysis of common source, common drain and common gate amplifier configurations

**UNIT- V [CO3] [T1]**[Lecture hrs – 8]**FEED BACK AMPLIFIERS**

Fundamentals-classification- Characteristics of feedback Amplifier effect of feedback in voltage series, voltage shunt, current series and current shunt amplifiers. Problems

**OSCILLATORS**

Classification of Oscillators. Condition for Oscillations. RC Phase shift Oscillator , Wein bridge oscillator- Hartley oscillator, Colpitts oscillator, Quartz crystal Oscillator,

**UNIT-VI****VOLTAGE REGULATORS:[CO4][T1][T2]**[Lecture hrs – 9]

Classification of Voltage Regulators - Basic regulator circuit: Zener, Transistor Based: Shunt and Series Voltage regulators. Protection Circuits: Current limiting, Short circuit protection. Specifications of Voltage regulator, Voltage multipliers. Switching Regulators – (boost up, step down (buck) & Flyback)

**Text Books**

- [T1] Electronic Devices and Circuits-J.Millman, C.C.Halkias and satyabrathajit Tata McGraw Hill,2 Ed. 2007
- [T2] Electronic Devices AND Circuits-R.L.Boylestad&LouisNashelsky, Pearson/Prentice Hall, 9th edition, 2006.

**References**

- [R1] Electronic circuit analysis-K.Lal Kisshore,2004,BSP
- [R2] Electronic Devices and Circuits by S.Salivahanan and N.Suresh Kumar, Tata Mc Graw Hill Publications
- [R3] Electronic Devices and Circuits by Sanjeev Guptha,Dhapat Rai Publications.
- [R4] Electronic Devices and Circuits – K.LalKishore, 2 ed., 2005, BSP

**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
DIGITAL LOGIC DESIGN  
(Common to ECE/EEM/EEE)**

**Code: 8CC02**

**L T P/D C**  
**2 0 0 2**

**COURSE OBJECTIVES:**

- To learn the different numbering systems, Boolean functions and design of Combinational circuits
- To learn design of Sequential Circuits, design using PLDs and digital controllers using Algorithmic State machines

**COURSE OUTCOMES:**

After completing this course, the students will have demonstrated

- [CO1]. An ability to understand number systems and apply the rules of Boolean algebra and K-maps to simplify Boolean expressions.
- [CO2]. An ability to design MSI combinational circuits such as full adders, multiplexers, decoders, encoders. Code converters.
- [CO3]. An ability to design basic memory units (latches and flip-flops) and sequential circuits such as counters and registers
- [CO4]. An ability to design digital design using PLD's such as ROM's, PLA's, PALs and digital controllers using Algorithmic State Machine Charts.

**Mapping of Course Outcomes with Program Outcomes and Program specific outcomes**

|             | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO1<br>0 | PO1<br>1 | PO1<br>2 | PSO<br>1 | PSO<br>2 | PSO<br>3 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|----------|----------|----------|
| CO1         | 3   | 3   | 2   | 2   | 3   |     |     |     | 2   | 2        |          | 2        | 3        | 3        | 2        |
| CO2         | 3   | 3   | 3   | 2   | 3   |     |     |     | 2   | 2        |          | 2        | 3        | 3        | 2        |
| CO3         | 3   | 3   | 3   | 2   | 3   |     |     |     | 2   | 2        |          | 2        | 3        | 3        | 2        |
| CO4         | 3   | 3   | 2   | 2   | 3   |     |     |     | 2   | 2        |          | 2        | 3        | 2        | 2        |
| Over<br>all | 3   | 3   | 3   | 2   | 3   |     |     |     | 2   | 2        |          | 2        | 3        | 3        | 2        |

**UNIT – I**[Lecture hrs – 9]

**Number System:** Binary, decimal, octal, hexa decimal, weighted and un-weighted codes.

**Boolean Algebra:** Axiomatic definition of Boolean algebra, Binary operators, postulates of and theorems. Boolean addition, subtraction, 1's complement, 2's complement. Switching functions, Canonical forms and Standard forms, Simplification of switching functions using theorems.

**UNIT – II**[Lecture hrs – 8]

**Logic gates:** Basic gates and universal gates.

**Minimization of Switching Functions:** simplification rules, Karnaugh map method, Prime implicants, don't care combinations, Minimal SOP and POS forms, Quine-McCluskey Tabular Method, Prime Implicant chart.

Application: Design of a Basic Calculator Using Logic Gates.

**UNIT – III**[Lecture hrs – 9]

**Combinational Logic Design:**

Single output and multiple output combinational logic circuit design, AND-OR, OR-AND, and NAND/NOR realizations, Exclusive-OR and Equivalence functions, Binary adders/subtractors, Encoder, Decoder, Multiplexer, Demultiplexer, MUX realization of switching functions, Parity bit generator, Code-converters, Concepts of threshold logic and threshold gates.

Applications: Application of Decoder in Seven Segment Display, application of Encoders in Servomotors.

**UNIT - IV** [Lecture hrs – 9]**Sequential Circuits-1:**

Classification of sequential circuits (Synchronous, Asynchronous Pulse mode, and Level mode with examples). Basic flip-flops-Triggering and excitation tables. Conversion of flip-flops.

Applications: Application of SR Flip Flop in Switch Debounce Circuit.

**UNIT – V**[Lecture hrs – 9]**Sequential Circuits-2:**

The sequential circuit model, Asynchronous counters, Design of simple synchronous sequential circuits such as counters (Design of modulo-N counter, Ring counter, twisted ring counter) and Shift registers

Applications: Design of 1010 sequence detector, Design of Digital Clock using Counters

**UNIT – VI**[Lecture hrs – 9]**Programmable Logic Devices:**

Basic PLD's-ROM, PROM, PLA, and PLD Realization of Switching functions using PLDs. Algorithmic State Machines: State machines and state diagrams.

Applications: Design of a Weighing machine and Binary multiplier.

**Text Books:**

[T1]. Morris Mano-,Digital design –PHI, 2nd Edition.

[T2]. ZviKohavi and Niraj K Jha -Switching & Finite Automata theory – Cambridge, 3rd Edition.

**References:**

[R1]. Fletcher -An Engineering Approach to Digital Design – PHI.

[R2]. Fundamentals of Logic Design, Roth, Kenny, Seventh Edition, Cengage Learning

[R3]. R.P.Jain-Switching Theory and Logic Design- TMH Edition,2003.

[R4]. CVS Rao -Switching Theory and Logic Design –Pearson Education, 2005

**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
SIGNALS AND SYSTEMS  
(Common to ECE/ECM)**

**Code: 8CC03**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b>   | <b>3</b> |

*Pre Requisites: Mathematics-Integration, Differentiation and basic representation of Laplace & Z Transforms*

**Course Objectives :**

- To study the concepts of signals and systems their characterization in the Time as well as frequency domains
- To know the importance of sampling theorem and various sampling methods to convert continuous time signals into discrete time signals

**COURSE OUTCOMES:**

*After studying this course, the students will be able to*

- i. *Understand the concepts of signals, comparison of signals, orthogonal signal space and Apply the orthogonality properties to understand the Fourier methods of signal analysis- Fouries series and Fourier Transforms.*
- ii. *Understand the concepts of systems, their characterization in the Time as well as Transformed domains and apply the mathematical tools, such as Convolution, Correlation and the Laplace transform to analyze signals and systems.*
- iii. *Determine the sampling frequency for any low pass and band pass signals applying the sampling theorem.*
- iv. *Distinguish between continuous and Discrete time signals and systems. Apply the concepts of Z-Transforms in the analysis of DT signals and systems.*

**Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes**

|          | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1 | PSO 2 | PSO 3 |
|----------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| CO1      | 3    | 3    | 3    | 3    | 3    |      |      |      | 3    | 2     |       | 3     | 3     | 3     | 3     |
| CO2      | 3    | 3    | 3    | 3    | 3    |      |      |      | 3    | 2     |       | 3     | 3     | 3     | 3     |
| CO3      | 3    | 3    | 3    | 3    | 3    |      |      |      | 3    | 2     |       | 3     | 3     | 3     | 3     |
| CO4      | 3    | 3    | 3    | 3    | 3    |      |      |      | 3    | 2     |       | 3     | 3     | 3     | 3     |
| Overa ll | 3    | 3    | 3    | 3    | 3    |      |      |      | 3    | 2     |       | 3     | 3     | 3     | 3     |

**UNIT I**[Lecture hrs – 9]

**Signals:** Signals. Classification of Signals. Even, Odd, Periodic. Non-periodic. Energy and Power Signals. Exponential and Sinusoidal Signals. Concepts of Impulse Function. Unit Step Function. Signum Function. [T1, T2]

**Signal Analysis** - Analogy between Vectors and Signals. Orthogonal Signal Space. Signal Approximation using Orthogonal Functions. Mean Square Error. Closed or Complete Set of Orthogonal Functions. Orthogonality in Complex Functions. [T1, T2]

**Applications: The concepts of orthogonality find applications in DSP, DIP, DC, Design of experiments and so on.**

**UNIT-II**[Lecture hrs – 10]

**Fourier Representation of Continuous Time Signals**

**Periodic Signals-** Fourier Series, Dirichlet’s Conditions. Trigonometric. Exponential Fourier series. Fourier Spectrum.[T2]

**Non- Periodic Signals** - Fourier Transforms. Fourier Transform of Arbitrary Signal. Standard Signals. Fourier Transform of Periodic Signals. Properties of Fourier Transforms. Fourier Transforms Involving Impulse and Signum Function Introduction to Hilbert Transform. [T1, T2]

**Applications: Knowledge of signal bandwidth is necessary in the design of a filter; in the determination of the carrier frequency and also the sampling frequency and analog communication.**

**UNIT-III**[Lecture hrs – 11]

**Signal Transmission through Linear Systems**

Systems. Classification of Systems. Linear System. Impulse Response (IR) of a Linear System. Linear Time Invariant (LTI) System. Linear Time Variant (LTV) System. Transfer Function of a LTI System. Filter Characteristics of Linear Systems. Distortion Less Transmission Through a System. Signal Bandwidth. System Bandwidth. Ideal LPF, HPF and BPF Characteristics. Causality and Poly-Wiener Criterion for Physical Realization. Relationship between Bandwidth and Rise Time.[T2]

**Applications: The concept of system bandwidth is applied in the design of a practical filter or system.**

**UNIT-IV**[Lecture hrs – 11]

**Convolution and Correlation of Signals**

Concept of Convolution in Time Domain and Frequency Domain. Graphical Representation of Convolution. Convolution Properties. Cross Correlation and Auto Correlation of Functions. Properties of Correlation Function, Relation between Convolution and Correlation. Energy Density Spectrum, Parseval's Theorem, Power density spectrum, Detection of periodic signals in the presence of Noise by Auto and Cross Correlations.[T2]

**Laplace Transforms** - Review of Laplace Transforms. Partial Fraction Expansion. Inverse Laplace Transform. Concept of Region of Convergence (ROC) for Laplace Transforms. Constraints on ROC for Various Classes of Signals. Properties of LT. Initial and final value theorems, Relation between LT and FT of a Signal. Laplace Transform of Certain Signals using Waveform Synthesis. Laplace Transform of Periodic Signals.[T1, T2]

**Applications: These math tools are required in the design, analysis and implementation of various filters, LT signals and systems.**

**UNIT-V**[Lecture hrs – 9]

**Sampling**

Sampling Theorem. Graphical and Analytical Proof for Band Limited Signals. Impulse (Ideal) Sampling. Natural (Chopped) Sampling and Flat Top(S&H) Sampling. Reconstruction of Signal from its Samples. Effect of Under Sampling. Aliasing. Introduction to Band Pass Sampling.[T1, T2]

**Applications: Sampling techniques are applied in the conversion of analog to digital conversion**

**UNIT-VI**[Lecture hrs – 8]

**Z-Transforms**

Fundamental Difference between Continuous and Discrete Time Signals. Discrete Time Signal Representation using Complex Exponential and Sinusoidal Components. Periodicity of Discrete Time using Complex Exponential Signal. Concept of Z- Transform of a Discrete Sequence. Distinction Between Laplace, Fourier and Z Transforms. Region of Convergence in Z-Transform. Constraints on ROC for Various Classes of Signals. Inverse Z-Transform. Properties of Z-Transforms. Initial and final value theorems. Introduction to Discrete Time Systems. [T2]

**Applications: Analysis and Synthesis of DT signals and systems.**

**Text Books**

1. Signals, Systems and Communications- B. P. Lathi, BSPublications.
2. Signals and Systems – Anand Kumar, 2<sup>nd</sup> Edition, PHI Publications.

**References**

1. Signals & Systems – Simon Haykin and Van Veen, 2<sup>nd</sup> Edition, WileyPublications.
2. Signal processing and Linear Syystems - B. P. Lathi, BSPublications.
3. Signals & Systems -A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2<sup>nd</sup>Edn, PHI Publications.
4. Linear Systems and Signal Processing - B. P. Lathi, Oxford University Press.

**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
SOFTWARE ENGINEERING**

Code: 8D310

| L | T | P/D | C |
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**Course Objectives:** In this course the student will learn about

- (i) The concepts of Software Engineering, various process and system models.
- (ii) Software requirements in an engineering perspective.
- (iii) Various system models and design engineering.
- (iv) The concepts of object oriented design and approaches to software testing strategies.
- (v) Metrics for products, risk management.
- (vi) Quality management.

**Course Outcomes:** After completing this course, student should be able to

- (i) Apply process models in real world software products.
- (ii) Classify software requirement specification document.
- (iii) Design system models and user interface.
- (iv) Evaluate test strategies for various softwares.
- (v) Describe product metrics, risks.
- (vi) Understand the quality management.

**UNIT – I: Introduction to Software Engineering:** Evolving role of software, Changing Nature of Software, Software myths.

**A Generic view of process:** Software engineering – A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

**Process Models:** The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

**Applications:** Word processing, Spread sheets, Computer Graphics, multimedia, Database management, Entertainment, Personal & business, Financial applications, Insulin pump, Aerospace Engineering

**UNIT – II: Software Requirements:** Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

**Requirements engineering process:** Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

**Applications:** Developing Software Requirement Specification document for an application

**UNIT - III: System models:** Context Models, Behavioral models, Data models, Object models, structured methods.

**Design Engineering:** Design process and Design quality, Design concepts, and the design model.

**Creating an architectural design:** Software architecture, Data design, Architectural styles and patterns, Architectural Design.

**Applications:** Implementing Microwave Oven, Context model for ATM machine, Insulin Pump

**UNIT – IV: Object-Oriented Design:** Objects and object classes, An Object-Oriented design process, Design evolution, UML-Introduction to Unified Modeling Language, UML diagrams.

**Performing User Interface design:** Golden rules, User Interface analysis and design, interface analysis, interface design steps, Design evaluation.

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

**Applications:** Object Model for an application such as Library, Implementing testing strategy on cash counter in malls and in softwares.

**UNIT – V: Product Metrics:** Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

**Metrics for Process and Products:** Software Measurement, Metrics for software quality.

**Risk Management:** Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

**Applications:** Calculating SLOC and metrics for a software.

**UNIT – VI: Quality Management:** Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

**Applications:** Applied in rating a software or an organization

**TEXT BOOKS:**

1. Software Engineering, Practitioner's Approach – Roger S. Pressman, 6<sup>th</sup> Edition, McGraw Hill International Edition.
2. Software Engineering – Sommerville, 7<sup>th</sup> Edition, Pearson education.

**REFERENCES:**

1. Software Engineering – K K Agarwal and Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach – James F Peters, Witold Pedrycz, John Wiley.
3. Systems Analysis and Design – Shely Cashman Rosenlatt, Thomson Publications.
4. Software Engineering principles and practice – Waman S Jawadekar, McGraw Hill Companies



**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
ECONOMICS, ACCOUNTANCY AND MANAGEMENT SCIENCE**

Code: 8ZC01

| L | T | P/D | C |
|---|---|-----|---|
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**Course Objectives:**

- To understand the basics of Managerial Economics at Micro level, Demand analysis and production analysis in particular.
- To understand cost concept, Revenues and Market structure
- To understand and identify various basic concepts of Accounting, Double entry system and Book keeping.
- To understand the concepts of Capital expenditure, Revenue expenditure and Final accounts.
- To make student understand the basics of Management, its principles and various functions performed in organization.
- To make student learn about various personality traits, perception, attitudes of individuals working in organization.

**UNIT-1****INTRODUCTION TO MANAGERIAL ECONOMICS:**

Definition, Nature and scope of Managerial Economics, consumer's Equilibrium. Theory of Demand, Demand function, Determinants, exceptions - Price Elasticity of Demand and Demand forecasting. Theory of supply, Production function and Economies of scale.

**UNIT- 2****INTRODUCTION TO COST, REVENUE AND MARKET STRUCTURE:**

Cost Analysis, types of costs, Revenue Analysis, Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems). Market structures: Types of competition, Features of Perfect competition, Monopoly, Monopolistic Competition and oligopolistic competition.

**UNIT-3****INTRODUCTION TO FINANCIAL ACCOUNTING:**

Meaning and Definition of Accounting, principles of Accounting, Double-Entry system of Accounting, Book Keeping, introduction to Journal, Ledger and its types, Introduction to Trial balance, problems and solutions of trial balance.

**UNIT-4****INTRODUCTION TO FINAL ACCOUNTS:**

Introduction to Final Accounts, Concepts of classifications of Revenue and Capital expenditures, Final accounts: Trading account, Profit and Loss Account, Balance sheet, Problems and solutions of Final accounts with adjustments.

**UNIT-5****INTRODUCTION TO MANAGEMENT:**

Management- Definitions, Fayol's principles of Management, Levels of Management, functions of management. Planning: types of planning, planning process; Organizing: Organizational Design and structure, staffing; Directing; Controlling: Basic control process.

**UNIT-6**

**INTRODUCTION TO ORGANIZATIONAL BEHAVIOR:** Definition, Nature and Scope, Perception – Perceptual selectivity and organization, Personality and Attitudes, Determinants of personality Formation of Attitudes-, Perceptual Distortions Attribution analysis Attribution theories, Johari Window and Transactional Analysis.

**Essential Readings:**

1. A R Aryasri: Managerial Economics, Tata Mc Graw Hill
2. A R Aryasri: Management Science, Tata Mc Graw Hill

**Suggested Readings:**

1. S A Siddiqui & A S Siddiqui, Managerial Economics & Financial Analysis, New Age
2. Accountancy – I Tulasian Tata Mcgraw Hill Co
3. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005

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**Syllabus for B. Tech II Year I semester**  
**Electronics and Computer Engineering**  
**ENVIRONMENTAL SCIENCE AND ECOLOGY**  
**(Common to EEE, ME, IT and ECM)**

**Code: 8HC05**

**L T P/D C**  
**2 0 0 2**

**Course Objectives:**

1. To understand structure and function of ecosystem
2. To learn classification and uses of natural resources
3. To learn about Understanding the impacts of developmental activities and mitigation measures.
4. To know the source, causes and preventive methods of pollution
5. To understand the importance of ecological balance for sustainable development.
6. To understand the environmental policies and regulations

**Course Outcomes**

After completion of the course, the student will be able to:

1. Understand about ecosystem and energy flow among the organisms.
2. Know the resources available, use of them and overexploitation of the resources in the nature.
3. Learn the value, use and value of biodiversity.
4. Understand the causes and effect of pollution and implement measures in control of pollution.
5. Understand the sustainable development and implement green technology for sustainable development.
6. Learn and implement policy to protect the environment.

**UNIT-I Ecosystems:** Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity.

**UNIT-II Natural Resources:** Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source.

**UNIT-III Biodiversity and Biotic Resources:** Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

**UNIT-IV Environmental Pollution and Control Technologies:** Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants. Acid rain-Threshold limit values of chemicals present in environment, Global warming, Ozone layer depletion, Water pollution: Sources and types of pollution. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Sewage water Treatment, Kyoto protocol, and Montréal Protocol.

**UNIT-V Sustainable development and Green Technology:** Concept of sustainable development, threats to sustainability population and its explosion, Crazy consumerism, over- exploitation of resources, strategies for achieving sustainable development environmental education, conservation of resources, urban sprawl sustainable cities and sustainable communities, human health , role of IT in Environment,

Environmental Ethics, Environmental Economic – Concept of Green Building, Clean Development Mechanism ( CDM ).

**UNIT-VI Environmental Policy, Legislation & Environment Impact Assessment:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

**TEXT BOOKS:**

1. Perspectives in *Environmental Studies*: **Kaushik** A. and **Kaushik**, C.P. New Age International (P) Ltd. (2008)

**REFERENCE BOOKS:**

1. Environmental Studies by Erach Bharucha, 2005 University Press.
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
5. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
6. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
PYTHON AND SHELL PROGRAMMING LAB**

Code: 8D361

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**Course Objectives**

Students will try to learn

- Basics of Python programming, Decision Making and Functions in Python, Object Oriented Programming using Python.

**Course outcomes**

At the end of this course, student is able to

1. Install and run the Python interpreter, Create and execute Python programs.
2. Apply the best features of mathematics, engineering and natural sciences to program real life problems.
3. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python, Express different Decision Making statements and Functions, Interpret Object oriented programming in Python.
4. Understand and summarize different File handling operations, explain how to design GUI Applications in Python.

**Week -1:**

1. Use a web browser to go to the Python website <http://python.org>. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
2. Start the Python interpreter and type help() to start the online help utility.
3. Start Python interpreter and use it as Calculator.
4. If you run a 10 kilometer race in 43 minutes 30 seconds, what is your average time per mile? What is your average speed in miles per hour? (Hint: there are 1.61 kilometers in a mile).
5. Suppose the cover price of a book is \$24.95, but bookstores get a 40% discount. Shipping costs \$3 for the first copy and 75 cents for each additional copy. What is the total wholesale cost for 60 copies?

**Week -2:**

6. A function object is a value you can assign to a variable or pass as an argument. For example, do\_twice is a function that takes a function object as an argument and calls it twice:

```
def do_twice(f):
    f()
    f()
```

Here's an example that uses do\_twice to call a function named print\_spam twice.

```
def print_spam():
    print 'spam'
do_twice(print_spam)
```

- a. Type this example into a script and test it.
- b. Modify do\_twice so that it takes two arguments, a function object and a value, and calls the function twice, passing the value as an argument.
- c. Write a more general version of print\_spam, called print\_twice, that takes a string as a parameter and prints it twice.
- d. Use the modified version of do\_twice to call print\_twice twice, passing 'spam' as an argument.

7. Write a function that draws a grid like the following:

```
+-----+-----+
|         |         |
|         |         |
|         |         |
+-----+-----+
|         |         |
|         |         |
|         |         |
+-----+-----+
```

**Hint:** to print more than one value on a line, you can print a comma-separated sequence.

10. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.  
 11. Write a function called is\_palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

#### Week-4:

12. Write a function called is\_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.  
 13. Write a function called has\_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.  
 14. Write a function called remove\_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.

#### Week-5:

15. If there are 23 students in your class, what are the chances that two of you have the same birthday? You can estimate this probability by generating random samples of 23 birthdays and checking for matches.  
 Hint: you can generate random birthdays with the randint function in the random module.  
 16. How does a module source code file become a module object?  
 17. Why might you have to set your PYTHONPATH environment variable?

#### Week-6:

18.  
 a. Write a function called draw\_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.  
 b. Add an attribute named color to your Rectangle objects and modify draw\_rectangle so that it uses the color attribute as the fill color.  
 c. Write a function called draw\_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.  
 d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw\_circle that draws circles on the canvas.

#### Week-7:

19. Write a Python code to merge two given file contents into third file.  
 20. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.

#### Week-8:

21. Import numpy, Plotpy and Scipy and explore their functionalities.  
 22. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

**Weeks – 9, 10, 11 and 12:**

1. Unix Commands Practice (ls, cat, awk, pipe, grep, chmod, chgrp, etc.. & vi editor commands)
2. Write a shell script that accepts a filename, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
3. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
4. Write a shell script that displays all the files in the current directory to which the user has read, write and execute permissions.
5. Write a shell script that receives any number of filenames as arguments, checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file the number of lines on it is also reported.
6. Write a shell script that accepts a list of filenames as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
7. Write a shell script to list all of the directory files in a directory.
8. Write a shell script to find factorial of a given integer.
9. Write a shell script to find the G.C.D of two integers.
10. Write a shell script to generate a multiplication table.
11. Write a shell script that copies multiple files to a directory.
12. Write a shell script (small calculator) that adds, subtracts, multiplies and divides the given two integers. There are two division options: one returns the quotient and the other returns remainder. The script requires 3 arguments: The operation to be used and two integer numbers. The options are add (-a), subtract (-s), multiply (-m), quotient (-c) and remainder (-r).
13. Write a shell script to reverse the rows and columns of a matrix.
14. Write a sed command that deletes the first character in each line in a file.
15. Write sed command that deletes the character before the last character in each line a file.
16. Write a sed command that swaps the first and second words in each line of a file.
17. Write an awk script to count the number of lines in a file that do not contain vowels.
18. Write an awk script to find the number of characters, words and lines in a file.
19. Write an awk script that reads a file of which each line has 5 fields – ID, NAME, MARKS1, MARKS2, MARKS3 and finds out the average for each student. Print out the average marks with appropriate messages.
20. ls -l command produces long listing of files. Write an awk script 1) To print the selected fields (Ex:size and name of the files) from the file listing. 2) To print the size of all files and number of files.

**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
ELECTRONIC DEVICES AND CIRCUITS LAB  
(Common to ECE/ECM/EEE)**

**Code: 8CC71**

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**Course Objectives:**

*This course introduces the characteristics and applications of semiconductor devices; emphasis is placed on characteristics and testing practically to strengthen the knowledge.*

**Course Outcomes:**

*After studying this course, the students will be able to*

1. *Understand color coding, operations on Diode, BJT, FET and other electronic components.*
2. *Correlate theoretical concepts with practical implementation.*
3. *Apply the knowledge of Diodes, Capacitors and Transistors for the realization of rectifiers, regulators, amplifiers and Oscillator circuits.*
4. *Adapt effective Communication, presentation and report writing skills*

**Mapping of Course Outcomes with Program Outcomes and Program specific outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     | 3   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 2    |
| CO2     | 3   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 2    |
| CO3     | 3   | 2   | 2   | 2   | 2   |     |     |     |     |      | 1    | 2    |      | 3    |      |
| CO4     |     |     |     |     |     |     |     |     | 2   | 1    |      |      |      |      |      |
| Overall | 3   | 3   | 3   | 3   | 3   |     |     |     | 2   | 1    | 1    | 2    | 3    | 3    | 2    |

**PART A****Electronic Workshop Practice (in 3 lab sessions):**

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Bread Boards.
2. Identification and Specifications of Active Devices like Diodes, BJTs and JFETs.
3. Study and operation of
  - Digital Multimeters
  - Function Generator
  - Regulated Power Supplies
  - Soldering
  - SMD components

**PART B****(For Laboratory examination – Minimum of 10 experiments)**

1. Study and Operation of CRO: Oscilloscope, CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger Pulse, delay line, probes for CRO, Measurement of amplitude and frequency. Time Period measurement, Lissajous patterns.
2. Determination of Cut-in Voltage, Forward and Reverse resistances of PN Junction diode using V-I Characteristics.
3. Zener diode characteristics and Zener as voltage Regulator.
4. Input and output characteristics of BJT in CB Configuration.
5. Input and output characteristics of BJT in CE Configuration.
6. Half wave rectifier with and without filters.
7. Full wave rectifier (Center trapped and Bridge) with and without filters.
8. Drain and Transfer characteristics of FET in CS Configuration.
9. Common Emitter Amplifier Characteristics
10. Common Collector Amplifier Characteristics (Emitter Follower).
11. FET amplifier (Common Source).
12. RC Phase Shift Oscillator.



**Major Equipment required for Laboratories:**

1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters
5. Electronic Components

**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
COMPREHENSIVE TEST AND VIVA VOCE- III  
(Common to all branches)**

Code: 8D385

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**Course Objective:**

*Evaluate, Comprehend and Assess the concepts and knowledge gained in the Core Courses of 1<sup>st</sup> year 1<sup>st</sup> Semester*

**Course Outcomes:** After completing this course, the student will be able to

1. Comprehend the concepts in the Core Courses of 1<sup>st</sup> year 1<sup>st</sup> Semester
2. Assess technical knowledge to face interviews.
3. Exhibit lifelong learning skills to pursue higher studies or professional practice.

| Comprehensive Test and Viva Voce | The subjects studied in the Semester concerned related to branches concerned and for placements |
|----------------------------------|-------------------------------------------------------------------------------------------------|
| B.Tech I year I semester         | I semester                                                                                      |
| B.Tech I year II semester        | I and II semester                                                                               |
| B.Tech II year I semester        | I, II and III semester                                                                          |
| B.Tech II year II semester       | I, II, III and IV semester                                                                      |
| B.Tech III year I semester       | I, II, III, IV and V semester                                                                   |
| B.Tech III year II semester      | I, II, III, IV, V and VI semester                                                               |
| B.Tech IV year I semester        | I, II, III, IV, V, VI and VII semester                                                          |

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

**Allocation of marks:**

|                     |             |
|---------------------|-------------|
| *Comprehensive Test | : 70 marks  |
| **Viva Voce         | : 30 marks  |
| Total               | : 100 marks |

\*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 20 marks.

End Semester Examination for Comprehensive Test will be taken for 50 marks.

Total marks for Comprehensive Test will be 70.

\*\*Average of best two of Mid Tests of Mid – I, Mid – II and Mid - III for Viva Voce will be taken for 10 marks.

End Semester Examination for Comprehensive Viva Voce shall be evaluated for 20 marks.

The total for Viva Voce will be 30.

Thus the total sessional marks in this subject of Comprehensive Test and Viva Voce will be: 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

**Syllabus for B. Tech II Year I semester  
Electronics and Computer Engineering  
TECHNICAL SEMINAR - III  
(Common to all branches)**

Code: 8D393

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**Course Objective:**

*Develop ability to be a public speaker. Learn the importance of delivering seminars for demonstrating oratory and develop interview facing skills.*

**Course Outcomes:** After completing this course, the student will be able to

1. Identify current general, political and technology related topics.
2. Arrange and present seminar in a effective manner
3. Collect, survey and organize content in presentable manner
4. Demonstrate oratory skills with the aid of Power Point Presentations
5. Exhibit interview facing skills and team leading qualities

**Procedure :**

1. Seminar in-charges shall highlight the significance of technical seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot/week.
5. Progress of the seminars need to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for technical seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

There shall be a technical seminar evaluated for 100 marks each from I year I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

| Sl. No | Description                                                                               | Marks            |
|--------|-------------------------------------------------------------------------------------------|------------------|
| 1      | Literature survey, topic and content                                                      | 10               |
| 2      | Presentation including PPT                                                                | 10               |
| 3      | Seminar Notes                                                                             | 05               |
| 4      | Interaction with audience after presentation                                              | 05               |
| 5      | Final Report 3 copies                                                                     | 10               |
| 6      | Class room participation                                                                  | 05               |
| 7      | Punctuality in giving seminar as per Scheduled time and date                              | 10               |
| 8      | Mid Semester Viva (on the seminar topics completed up to the end of 9 <sup>th</sup> week) | 15               |
| 9      | End Semester Viva                                                                         | 30               |
|        | <b>Total</b>                                                                              | <b>100 Marks</b> |

Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

|   |   |   |   |   |   |   |   |   |   |   |   |
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**Syllabus for B. Tech II Year II semester  
Electronics and Computer Engineering  
PROBABILITY AND STATISTICS  
(Common to CSE, IT, ECM & EEE)**

**Code: 8HC16**

|   |   |     |   |
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**Pre Requisites:** Mathematics Knowledge at Pre-University Level

**Course Objectives:** To make the students to understand and expected to learn

1. Concepts of the probability, types of random variables and probability distributions.
2. Sampling distributions and their properties, concepts on estimation.
3. Concepts on testing the hypothesis concerning to large samples.
4. Different kinds of tests related to small samples and tests concerned to small size samples and goodness of fit and independence of attributes using chi-square distribution.
5. Preliminaries of basic statistics also correlation.
6. Method of least squares and regression.

**Course Outcomes:** After the course completion the students will able to

- i. Solve the random variable problems and probability distributions.
- ii. Estimate the parameters and solve the problems using central limit theorem.
- iii. Test the hypothesis related to samples concerning to the means and proportions of large size samples.
- iv. Apply and solve the problems using t-test, Chi-square test also testing the hypothesis problems on small size samples, goodness of fit and independence of attributes.
- v. Solve the problems on measures of central tendency, Correlation and regression models

### Syllabus

**UNIT-I: Random Variables and Probability Distributions:**

Conditional probability, Multiplication theorem, Baye's Theorem (without Proof). Random variables – Discrete and Continuous, Probability Mass and Density functions, Expectation and Variance. Probability Distributions: Binomial, Poisson and Normal Distributions.

**UNIT-II: Sampling Distributions and Estimation:**

Populations and Samples, Sampling distribution of the Mean ( $\sigma$  - known and unknown), Sums and Differences, Central limit theorem. Estimation: Point Estimation and Interval Estimation concerning Means for Large Samples.

**UNIT-III: Tests of Hypothesis for Large Samples:**

Tests of Hypothesis, Type-I and Type-II Errors, Hypothesis testing concerning one mean and two means and test of hypothesis concerning to one Proportion and difference of proportions.

**UNIT-IV: Tests of Hypothesis for Small Samples:**

Student t-test, Hypothesis testing concerning one mean and two Means, F-test and  $\chi^2$  test-Goodness of fit, Independence of Attributes.

**UNIT-V: Basic Statistics and Correlation: (10L)**

Measures of Central tendency: Moments, skewness and kurtosis – Types of correlation, coefficient of correlation, Properties. Methods of finding the coefficient of correlation, Scatter diagram, direct method, Spearman's rank correlation, Karl Pearson's formula.

**UNIT-VI: Curve fitting and Regression: (10L)**

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Types of Regression, linear regression, multiple regressions.

**Text Books:**

1. Miller and Freund's, Probability and Statistics for Engineers, 8<sup>th</sup> Edition, Pearson Educations.
2. SCHAUM'S outlines: Probability and Statistics, Murray R. Spiegel, John Schiller, R. Alu Srinivasan, Mc Graw Hill publishers.

**Reference Books:**

1. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11<sup>th</sup> Reprint, 2010.
2. Probability and Statistics, T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham, M.V.S.S.N. Prasad, S. Chand Publications.
3. A.Ross, A First Course in Probability, 6<sup>th</sup> Ed., Pearson Education India, 2002.
4. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics For Engineers & Scientists, 9<sup>th</sup> Ed. Pearson Publishers.
3. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

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|---|---|---|---|---|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| H |   | H |   |   |   |   |   |   |    |    |    |

**Syllabus for B. Tech II Year II semester**  
**Electronics and Computer Engineering**  
**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**  
**(Common to CSE, IT and ECM)**

**Code: 8EC02**

**L T P/D C**  
**2 1 0 3**

**Course Objective :**

*Understand the concepts of Object oriented programming principles of Java. Write the programs and execute using OOP Principles such as garbage collection, overloading methods, constructors, recursion, string handling, String Tokenizer, inheritance and its types, packages, multithreading and threads.*

**Course Outcomes:**

*At the end of this course, the student will be able to*

- 1 Describe fundamentals of JAVA, its Classes, and Objects and write simple programs using constructors.
- 2 Explain and write programs using inheritance, interface and packages.
- 3 Explain and write programs using Packages, I/O Stream and collections.
- 4 Describe and write programs to implement Exception handling and Multithreading.
- 5 Describe and write programs using AWT, Swings and develop applications using event handling.
- 6 Describe and develop applications using Applets and develop client server programs using networking concepts.

**UNIT I**

History of Java, Java buzzwords, datatypes, variables, simple java program, scope and life time of variables, operators, expressions, control statements, type conversion and costing, arrays, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, recursion, string handling, String Tokenizer.

Applications: Basic operations on the bank account of a customer.

**UNIT II**

Inheritance –Definition, single inheritance, benefits of inheritance, Member access rules, super class, polymorphism- method overriding, Dynamic method dispatch, using final with inheritance, abstract classes, Base class/object.

Interfaces: definition, variables and methods in interfaces, differences between classes and interfaces, usage of implements and extends keyword, interfaces, uses of interfaces, packages Applications: Extending the banking operations to the loan applicants.

**UNIT III**

Packages: Definition, types of packages, Creating and importing a user defined package. Introduction to I/O programming: Data Input Stream, Data Output Stream, File Input Stream, File Output Stream, Buffered Reader.

Collections: interfaces, Implementation classes, and Algorithms (such as sorting and searching).

Applications: Searching for a string in the text. PNR status check, students' result sorting.

**UNIT IV**

Exception handling -exception definition, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Multi-Threading: Thread definition, types of multitasking, uses of multitasking, thread life cycle, creating threads using Thread class and Runnable interface, synchronizing threads, daemon thread.

Applications: Illegal entry handling in the registration form. (Example: entering incorrect intermediate hall-ticket number in EAMCET Registration form)

**UNIT V**

Advantages of GUI over CUI ,The AWT class hierarchy, Introduction to Swings, Swings Elements:- JComponent, JFrame, user interface components- JLabels, JButton, JScrollbar, text components, check box, check box groups, choices, lists panels – scrollpane, menubar, graphics, layout, managers – boarder, grid, flow, card and grid bag.

Event handling: Delegation event model, closing a Frame, mouse and keyboard events, Adapter classes.

Applications: developing calculator, developing feedback form, developing bio data.

**UNIT VI**

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Applications: Developing of simple advertisements.

Networking – Basics of network programming, addresses, ports, sockets, simple client server program, multiple clients, sending file from server to client.

Applications: One to one Chat application

**TEXT BOOKS:**

1. Java; the complete reference, 6th edition, Herbert Schildt, TMH.
2. Introduction to Java programming 6th edition, Y. Daniel Liang, Pearson education.

**REFERENCES:**

1. Core Java 2, Vol 1, Fundamentals, Cay. S. Horstmann and Gary Cornell, seventh Edition, Pearson Education.
2. Core Java 2, Vol 2, Advanced Features, Cay. S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education

**Syllabus for B. Tech II Year II semester  
Electronics and Computer Engineering  
COMPUTER ORGANIZATION AND OPERATING SYSTEMS**

Code: 8D403

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

*Course Objectives: The course objectives are*

- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To study the hierarchical memory system including cache memories and virtual memory.
- To demonstrate the knowledge of functions of operating system memory management scheduling, file system and interface, distributed systems, security and dead locks.
- To implement a significant portion of an Operating System.

*Course Outcomes: Upon completion of the course, students will have thorough knowledge about:*

- Basic structure of a digital computer
- Arithmetic operations of binary number system
- The organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.
- Operating system functions, types, system calls.
- Memory management techniques and dead lock avoidance
- Operating systems file system implementation and its interface.

**UNIT - I**

**Basic Structure of Computers:** Computer Types, Basic OPERATIONAL Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi Computers, Data Representation, Fixed Point Representation, Floating – Point Representation.

**Register Transfer Language and Micro Operations:** Register Transfer Language, Bus and Memory Transfers, Arithmetic and Logic Micro Operations, Role of Interrupt Service Routines, Instruction Formats, Addressing Modes

**UNIT - II**

**Operating Systems Overview:** Overview of Computer Operating Systems Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating Systems Structures - Operating System Services and Systems Calls, System Programs, Operating Systems Generation.

**UNIT - III**

**Concepts and types of Semiconductor Memories -** RAM, Read Only Memories, Cache Memory – Cache mapping algorithms – Performance considerations – Virtual Memory – Need and Algorithms Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing

**UNIT - IV**

**Hardware Control:** Control Memory, Address Sequencing, Microprogram Examples, Design of Control Unit, Hard Wired Control, Microprogrammed Control, Sample circuit design using hardwired and microprogrammed control

**UNIT - V**

**Input-Output Organization:** Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer Modes, Priority Interrupt, Direct Memory Access, Input – Output Processor (IOP), Serial Communication; Introduction to Peripheral Components, Interconnect (PCI) Bus



**UNIT - VI**

**File System Interface**

**Principles of Deadlock:** System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Concept of a File, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection, Allocation Methods, Free-Space Management.

**TEXT BOOKS:**

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.
2. Computer Systems Architecture – M. Moris Mano, 3rd Edition, Pearson
3. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 8<sup>th</sup> Edition, John Wiley.

**REFERENCE BOOKS:**

1. Computer Organization and Architecture – William Stallings 6<sup>th</sup> Edition, Pearson
2. Structured Computer Organization – Andrew S. Tanenbaum, 4<sup>th</sup> Edition PHI
3. Fundamentals of Computer Organization and Design – Sivaraama Dandamudi Springer Int. Edition.

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|---|---|---|---|---|---|---|---|---|----|----|----|
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**Syllabus for B. Tech II Year II semester  
 Electronics and Computer Engineering  
 DATABASE MANAGEMENT SYSTEMS  
 (Common to CSE, IT & ECM)**

**Code: 8EC03**

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**Course Objective :**

*To understand the different issues involved in the design and implementation of a database system. Study the physical and logical database designs, database modeling, relational, hierarchical, and network models and to understand and use data manipulation language to query, update, and manage a database. Develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency and design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.*

**Course Outcomes:**

- 1 *Comprehend importance, significance, models, Database languages, architecture and design of Data Base Systems.*
- 2 *Design Relational Models and apply Integrity Constraints, Querying fundamentals, Logical data base Design and Views of databases along with application of Relational Algebra.*
- 3 *Apply queries in SQL Query using Nested Queries Set, Comparison Operators, Aggregative Operators, Logical connectivity's with Joins statements and develop applications.*
- 4 *Eliminate data redundancy through normal forms.*
- 5 *Ensure ACID properties and Serializability in Transaction management and Database Recovery.*
- 6 *Use different External Storage Organization techniques and apply Indexing in databases to enhance system performance.*

**UNIT I: Data Base Systems:** Data Vs Information, Data base System Applications, data base System VS file System – View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor.

Data base design and ER diagrams – Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Data Modeling checklist.

Application- ER diagram for a college

**UNIT II:** Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus.

Application - Student database design.

**UNIT III:** Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers, Embedded SQL.

Application - working with Aviation company database.

**UNIT IV:** Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Multi valued Dependencies – FORTH Normal Form.

Application - Faculty Evaluation Report.

**UNIT V:** Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity, Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage.

Application - Production Management System.

**UNIT VI:** Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

Application – Creating B+ tree on Instructor File.

**TEXT BOOKS:**

1. Data base System Concepts, Silberschatz, Korth, McGraw hill, Vedition.
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rdEdition
3. Database Management Systems, Peter Rob, A.Ananda Rao,Carlos Coronel ,CENGAGE Learning

**REFERENCES:**

1. Data base Systems design, Implementation, and Management, Peter Rob and Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate PearsonEducation
3. Introduction to Database Systems, C.J.Date PearsonEducation

**Syllabus for B. Tech II Year II semester  
Electronics and Computer Engineering  
ANALOG AND PULSE CIRCUITS**

**Code: 8D414**

**L    T    P/D    C**  
**2    0    0    2**

**Course Objectives :**

To understand the basic functioning and applications of the basic building blocks of analog electronic circuits - amplifiers and oscillators.

**COURSE OUTCOMES :**

After studying this course, the students will be able to

1. Distinguish between small and large signal amplifiers.
2. Analyze and Design tuned and RF amplifiers .
3. Understand linear and non-linear wave shaping methods.
4. Understand analyze and design various types of multivibrators, their analysis, designing and applications
5. Explain different sweep generators and their applications.
6. Analyze various types of Logic gates and Sampling gates.

**Mapping of Course Outcomes with Program Outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     | 3   | 3   | 2   | 2   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 2    |
| CO2     | 3   | 3   | 3   | 2   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 2    |
| CO3     | 3   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 2    |
| CO4     | 3   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 2    |
| CO5     | 3   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 2    |
| C06     | 3   | 3   | 2   | 2   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 2    |
| Overall | 3   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 2    |

**UNIT I**

**POWER AMPLIFIERS**

Classification of Power Amplifiers - Class A, B, AB & C power amplifiers –push pull configuration, complementary symmetry circuits, Distortion in Amplifiers. Harmonic distortion and Crossover Distortion in Power Amplifiers– Conversion efficiency and relative performance.

**Applications: Design of Noise Power amplifier**

**UNIT II**

**TUNED AMPLIFIERS**

Introduction to Tuned Amplifiers, Q-Factor. single tuned capacitive coupled amplifier, tapped single tuned capacitance coupled amplifier, single tuned inductively coupled amplifier, stagger tuning, synchronous tuned Amplifier.

**Applications: Design RF Tuned amplifier.**

**UNIT III**

**WAVE SHAPING – Linear and Non-linear:**

RC high pass, low pass circuit response for sinusoidal, step, pulse, square, ramp & exponential inputs- Differentiator –Integrator. RL, Diode clippers- Transistor clipper- clipping at two independent levels – Emitter coupled clipper- comparator– Applications of voltage comparators.

Clamping operation – clamping with source, diode resistances- clamping circuits theorem- practical clamping circuits.

**UNIT IV****MULTIVIBRATORS:**

Stable states of Bistable Multivibrator A fixed bias transistor Bistable Multivibrator -A self-biased transistor Bistable Multivibrator - commutating capacitor – Unsymmetric triggering of Bistable Multivibrator - triggering through a unilateral device- symmetrical triggering – Schmitt trigger circuit.

General operation of monostable multivibrator, collector coupled monostable multivibrator - wave forms of collector coupled monostable multivibrator - Emitter coupled monostable multivibrator - triggering of monostable multivibrator. Astable multivibrator, collector coupled Astable multivibrator -Emitter coupled Astable multivibrator. Designing of Bistable, Monostable and Astable Multivibrators.

**Applications: DESIGN OF FUNCTION GENERATOR**

**UNIT V****TIME BASE GENERATORS:**

General features of time base signals-sweep circuit using a transistor switch-UJT,UJT characteristics, UJT as a sweep circuit, - General considerations & principles of Miller & Boot strap time base generators- the transistor miller time base- the transistor, Boot strap time base generator- A simple current sweep transistor current time base generator.

**UNIT VI****SAMPLING and LOGIC GATES:**

Basic operating principle unidirectional, Bidirectional sampling gates using diodes, transistors- reduction of pedestal effect and sampling oscilloscope.

**LOGIC GATES:** Digital operation of a system- OR, AND, NOT, NAND & NOR gates- DTL Logic– RTL Logic, TTL logic – comparison.

**Text Books:**

1. Integrated electronics-J.Millman and C.C.Halkias, MC Graw –Hill-1972
2. Pulse digital and switching wave forms-J. Millman and H. Taub, Tata McGraw-Hill, New Delhi,2001.
3. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002.

**References:**

1. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.
2. Wave Generation and Shaping - L. Strauss
3. Electronic Circuit Analysis-K.Lal Kishore, 2004, BSP

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**Syllabus for B. Tech II Year II semester  
Electronics and Computer Engineering  
SOFT SKILLS**

Code: 8HC03

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**Course objectives:**

1. To enable students to make self-assessment and know the importance of certain soft skills and team spirit
2. Know their emotional quotient which guides their thinking, behavior and helps them manage stress efficiently.
3. Equip themselves with the prerequisites, and relevant techniques to effectively attend corporate interviews.

**Course Outcomes:** After completion of the course, the student will be able to:

1. Assess themselves using SWOT analysis.
2. Appraise the importance of certain soft skills like time management and goal setting.
3. Improve their verbal ability to handle the competitive exams.
4. Enhance their team skills and design thinking capabilities for effective problem solving and decision making.
5. Know their emotional quotient which guides their thinking, behavior and helps them manage stress efficiently.
6. Equip themselves with the prerequisites, and relevant techniques to effectively attend corporate interviews.

| Units                            | Tutorial (1 per week)                                                                                                                                                                                                       | No. of Periods   | Lab (2 per week)                                                                                                                                                                     | No. of Periods |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>1. Know Yourself</b>          | 1.1 Importance of knowing yourself<br>1.2 SWOT / SWOC Analysis<br>1.3 SWOT / SWOC Grid                                                                                                                                      | 1<br>1           | Practice exercises on<br>• Self-Analysis<br>• Questionnaire,<br>• SWOT Practice                                                                                                      | 4              |
| <b>2. Organising Oneself</b>     | 2.1 Developing positive outlook towards life<br>2.2 Time management<br>2.3 Goal Setting                                                                                                                                     | 1<br>1           | Practice activities on<br>• Managing time<br>• Goal Setting                                                                                                                          | 4              |
| <b>3. Verbal Aptitude</b>        | 3.1 Reading Comprehension:<br>Strategies to comprehend difficult passages from a book; SQ3R (survey, question, read, recite, and review)<br>3.2 Word Analogies<br>3.3 Spotting Errors<br>3.4 Sentence Completion / Sentence | 1<br>1<br>1<br>1 | Practice exercises on<br>• Reading from difficult passages from books<br>• Word analogies<br>• Spotting Errors<br>• Sentence Completion / Sentence Equivalence                       | 8              |
| <b>4. Skills to Excel</b>        | 4.1 Team work and Team Dynamics - Collaboration and Leadership<br>4.2 Decision Making, Design Thinking<br>4.3 Critical thinking and Creative Problem Solving.                                                               | 1<br>1<br>1      | Practice activities on<br>• Team building activities<br>• Practice Activities, Case Studies and Group Discussions on decision making and problem solving, creativity and innovation. | 6              |
| <b>5. Self-Management Skills</b> | 5.1 Emotional Intelligence<br>5.2 Stress Management                                                                                                                                                                         | 1<br>1           | Practice activities on<br>• Case Studies and Group Discussions on managing stress and enhancing emotional intelligence.                                                              | 4              |

|                            |                                                           |          |                 |          |
|----------------------------|-----------------------------------------------------------|----------|-----------------|----------|
| <b>6. Interview Skills</b> | 6.1 Interview Skills: Meaning and Purpose of an Interview | <b>1</b> | Mock Interviews | <b>6</b> |
|                            | 6.2 Types of interviews; Interview Preparation techniques | <b>1</b> |                 |          |
|                            | 6.3 Dress code at an interview                            | <b>1</b> |                 |          |
|                            | 6.4 FAQs in HR Interview                                  |          |                 |          |

**Text Book:** SOFT SKILLS – Dr. K. Alex, S. Chand publications

**Suggested Readings:** \* SOFT SKILLS – Meenakshi Raman ; \* Word Power made Easy – Norman Lewis ; \* Objective English - Pearson's Publications ; \* Skill Sutras- Jayashree Mohanraj \* The Power of Soft Skills – Robert A. Johnson ; \* Soft Skills for Everyone – Jeff Butterfield

**Syllabus for B. Tech II Year II semester  
Electronics and Computer Engineering  
UNIVERSAL HUMAN VALUES**

Code: 8HC17

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**Human Values Courses:** This course also discusses their role in their family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course named as “H-102 Universal Human Values 2: Understanding Harmony” is designed which may be covered in their III or IV semester. During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.

**OBJECTIVE:** *The objective of the course is four fold:*

1. *Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.*
2. *Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence*
3. *Strengthening of self-reflection.*
4. *Development of commitment and courage to act.*

**COURSE TOPICS:** The course has 28 lectures and 14 practice sessions in 6 modules:

**Module 1: Course Introduction** - Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration—what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

**Module 2: Understanding Harmony in the Human Being** - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
8. Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility
9. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.



**Module 3: Understanding Harmony in the Family and Society-**

## Harmony in Human-Human Relationship

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

**Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
21. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

**Module 5: Implications of the above Holistic Understanding**

22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

**Module 6: Harmony on Professional Ethics**

25. Competence in professional ethics:
  - a. Ability to utilize the professional competence for augmenting universal human order
  - b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
  - c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order:
  - a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
  - b. At the level of society: as mutually enriching institutions and organizations
28. Sum up.
 

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. to discuss the conduct as an engineer or scientist etc.

**READINGS:**

**Text Book**

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010 3.

**Reference Books**

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004. 3.The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

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**Syllabus for B. Tech II Year II semester**  
**Electronics and Computer Engineering**  
**SOFT SKILLS LAB**

Code: 8HC63

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**Course objectives:**

4. To enable students to make self-assessment and know the importance of certain soft skills and team spirit
5. Know their emotional quotient which guides their thinking, behavior and helps them manage stress efficiently.
6. Equip themselves with the prerequisites, and relevant techniques to effectively attend corporate interviews.

**Course Outcomes:** After completion of the course, the student will be able to:

7. Assess themselves using SWOT analysis.
8. Appraise the importance of certain soft skills like time management and goal setting.
9. Improve their verbal ability to handle the competitive exams.
10. Enhance their team skills and design thinking capabilities for effective problem solving and decision making.
11. Know their emotional quotient which guides their thinking, behavior and helps them manage stress efficiently.
12. Equip themselves with the prerequisites, and relevant techniques to effectively attend corporate interviews.

| Units                            | Tutorial (1 per week)                                                                                                                                                                                                       | No. of Periods   | Lab (2 per week)                                                                                                                                                                     | No. of Periods |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>1. Know Yourself</b>          | 1.4 Importance of knowing yourself<br>1.5 SWOT / SWOC Analysis<br>1.6 SWOT / SWOC Grid                                                                                                                                      | 1<br>1           | Practice exercises on<br>• Self-Analysis<br>• Questionnaire,<br>• SWOT Practice                                                                                                      | 4              |
| <b>2. Organising Oneself</b>     | 2.1 Developing positive outlook towards life<br>2.2 Time management<br>2.3 Goal Setting                                                                                                                                     | 1<br>1           | Practice activities on<br>• Managing time<br>• Goal Setting                                                                                                                          | 4              |
| <b>3. Verbal Aptitude</b>        | 3.1 Reading Comprehension:<br>Strategies to comprehend difficult passages from a book; SQ3R (survey, question, read, recite, and review)<br>3.2 Word Analogies<br>3.3 Spotting Errors<br>3.4 Sentence Completion / Sentence | 1<br>1<br>1<br>1 | Practice exercises on<br>• Reading from difficult passages from books<br>• Word analogies<br>• Spotting Errors<br>• Sentence Completion / Sentence Equivalence                       | 8              |
| <b>4. Skills to Excel</b>        | 4.1 Team work and Team Dynamics - Collaboration and Leadership<br>4.2 Decision Making, Design Thinking<br>4.3 Critical thinking and Creative Problem Solving.                                                               | 1<br>1<br>1      | Practice activities on<br>• Team building activities<br>• Practice Activities, Case Studies and Group Discussions on decision making and problem solving, creativity and innovation. | 6              |
| <b>5. Self-Management Skills</b> | 5.1 Emotional Intelligence<br>5.2 Stress Management                                                                                                                                                                         | 1<br>1           | Practice activities on<br>• Case Studies and Group Discussions on managing stress and enhancing emotional intelligence.                                                              | 4              |

|                            |                                                           |          |                 |          |
|----------------------------|-----------------------------------------------------------|----------|-----------------|----------|
| <b>6. Interview Skills</b> | 6.1 Interview Skills: Meaning and Purpose of an Interview | <b>1</b> | Mock Interviews | <b>6</b> |
|                            | 6.2 Types of interviews; Interview Preparation techniques | <b>1</b> |                 |          |
|                            | 6.3 Dress code at an interview                            | <b>1</b> |                 |          |
|                            | 6.4 FAQs in HR Interview                                  |          |                 |          |

**Text Book:** SOFT SKILLS – Dr. K. Alex, S. Chand publications

**Suggested Readings:** \* SOFT SKILLS – Meenakshi Raman ; \* Word Power made Easy – Norman Lewis ; \* Objective English - Pearson’s Publications ; \* Skill Sutras- Jayashree Mohanraj \* The Power of Soft Skills – Robert A. Johnson ; \* Soft Skills for Everyone – Jeff Butterfield

**Syllabus for B. Tech II Year II semester  
Electronics and Computer Engineering  
ANALOG AND PULSE CIRCUITS LAB**

Code: 8D463

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*Course Objectives: To prepare students to practice the design and analysis of any Analog electronics circuit.*

**Course Outcomes:**

*At the end of the laboratory course, the students will be able to*

1. To understand the design and working of various linear and non-linear wave shaping circuits.
2. To demonstrate the working principle of various multivibrators.
3. To verify the functionalities of various logic gates.
4. To perform and verify the BJT/ FET and feedback amplifiers.
5. To perform and verify the working of oscillators and voltage regulators.
6. To perform laboratory experiment to verify the conversion efficiency of various power amplifiers.

**Mapping of Course Outcomes with Program Outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     | 3   |     | 3   |     | 3   |     |     |     | 2   |      |      | 2    | 2    | 3    | 2    |
| CO2     | 3   |     | 3   |     | 3   |     |     |     | 2   |      |      | 2    | 2    | 3    | 2    |
| CO3     | 2   |     | 3   |     | 3   |     |     |     | 2   |      |      | 2    | 2    | 3    | 2    |
| CO4     | 3   |     | 3   |     | 3   |     |     |     | 2   |      |      | 2    | 2    | 3    | 2    |
| CO5     | 2   |     | 3   |     | 3   |     |     |     | 2   |      |      | 2    | 2    | 3    | 2    |
| CO6     | 3   |     | 3   |     | 3   |     |     |     | 2   |      |      | 2    | 2    | 3    | 2    |
| Overall | 3   |     | 3   |     | 3   |     |     |     | 2   |      |      | 2    | 2    | 3    | 2    |

**Syllabus Content:****Part-A: Hardware based experiments**

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers. clampers.
3. UJT Relaxation Oscillator
4. Astable and monostable Multivibrator.
5. Bistable Multivibrator.
6. Study of Logic Gates with discrete components.

**Part-B: Software Simulation based experiments (Multisim OR Pspice OR Tina Pro Or Equivalent Simulation Software)**

1. Common Emitter and Common Source amplifier
2. Voltage shunt and Feedback Amplifier
3. Cascade Amplifier (CE+CE, CE+CC)
4. RC Phase Shift Oscillator using Transistors
5. Class- A and Class-B Complementary Symmetry Power Amplifier
6. Series and Shunt Voltage Regulator.

|   |   |   |   |   |   |   |   |   |    |    |    |
|---|---|---|---|---|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|   | H | H |   |   |   |   |   |   |    |    |    |

**Syllabus for B. Tech II Year II semester  
Electronics and Computer Engineering  
DATABASE MANAGEMENT SYSTEMS LAB**

**Code: 8EC63**

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 0 | 0 | 2   | 1 |

**Course objective:**

*Design the optimal queries using structured and unstructured query languages like SQL and PL/SQL by making use of control structures, cursors, triggers and functions/procedures.*

**Course Outcomes :**

*At the end of this course, the student will be able to*

- 1 Create tables for a database and apply Queries using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
- 2 Write Queries using Aggregate functions such as [COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING], Conversion functions and use string functions for a given application.
- 3 Explain and write programs using PL/SQL programs using exceptions, COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
- 4 Develop programs using WHILE LOOPS, FOR LOOPS, nested loops using BUILT-IN Exceptions and write Procedures.
- 5 Write Programs for stored functions invoke functions in SQL Statement and write Programs for package specification.
- 6 Describe and write programs using features of CURSORS and its variables.
- 7 Develop Programs implementing Triggers.

**Exercises:**

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.  
Example: - Select the roll number and name of the student who secured fourth rank in the class.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries using Conversion functions (to\_char, to\_number and to\_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next\_day, add\_months, last\_day, months\_between, least, greatest, trunc, round, to\_char, to\_date)
5. i) Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
- i) Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.
8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9. Program development using creation of stored functions, invoke functions in SQL Statement and write complex functions.
10. Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.
11. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE

CURRENT of clause and CURSOR variables.

12. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers.
13. Queries using SQL-INJECTION: AND/OR Attack, Comments Attack, String Concatenation Attack, UNION Injection Attack

**TEXT BOOKS:**

- 1) ORACLE PL/SQL by example. Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rd Edition
- 2) ORACLE DATA BASE LOG PL/SQL Programming SCOTT URMAN, Tata Mc- Graw Hill.
- 3) SQL and PL/SQL for Oracle 10g, Black Book, Dr. P. S. Deshpande.

**Syllabus for B. Tech II Year II semester  
Electronics and Computer Engineering  
OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB  
(Common to CSE, IT and ECM)**

**Code: 8EC62**

| L | T | P/D | C |
|---|---|-----|---|
| 0 | 0 | 2   | 1 |

**Course objective :**

*Understand, design and execute the programs involving concepts of Java and object oriented programming principles.*

**Course Outcomes:**

*At the end of this course, the student will be able to*

- 1 Write programs to generate Prime numbers, Roots of quadratic equation and Fibonacciserries.
- 2 Write small application such as bankingsystem.
- 3 Write programs on operator, function overloading and dynamic methoddispatch.
- 4 Write programs to implement interface andpackages.
- 5 Explain and write programs to implementthreads.
- 6 Write programs to implement applets and eventhandling.
- 7 Write an application to implement client and serverscenario.

**List of Programs:**

1. A) Write a program to print prime numbers up to a given number.  
B) Write a program to print roots of a quadratic equation  $ax^2+bx+c=0$ .  
C) Write a program to print Fibonacci sequence up to a given number.
  
2. A) Define a class to represent a bank account and include the following members  
Instance variables:  
(i) Name of depositor (ii) Account No (iii) Type of account  
(iv) Balance amount in the account  
  
Instance Methods:  
To assign instance variables (Constructors-Zero argument and parameterized)  
1. To deposit an amount  
2. To withdraw amount after checking the balance  
(iv) To display name and address  
Define ExecuteAccount class in which define main method to test above class.  
B) In the above account class, maintain the total no. of account holders present in the bank and also define a method to display it. Change the main method appropriately.  
C) In main method of ExecuteAccount class, define an array to handle five accounts.  
D) In Account class constructor, demonstrate the use of "this" keyword.  
E) Modify the constructor to read data from keyboard.  
F) Overload the method deposit() method (one with argument and another without argument)  
G) In Account class, define set and get methods for each instance variable.

**Example:**

For account no variable, define the methods  
getAccountNo() and setAccountNo(int accno)

In each and every method of Account class, reading data from and writing data to instance variables should be done through these variables.

3. A) Define Resister class in which we define the following members:  
Instance variables:  
resistance  
Instance Methods:



giveData():To assign data to the resistance variable  
 displayData(): To display data in the resistance variable  
 constructors

Define subclasses for the Resistor class called SeriesCircuit and ParallelCircuit in which define methods : calculateSeriesResistance( ) and calculateParallelResistance() respectively.Both the methods should take two Resistor objects as arguments and return Resistor object as result.In main method , define another class called ResistorExecute to test the aboveclass.

B) Modify the above two methods which should accept array of Resistor objects as argument and return Resistor object as result.

4. A) Write a program to demonstrate methodoverriding.
- B) Write a program to demonstrate the uses of “super” keyword (threeuses)
- C) Write a program to demonstrate dynamic method dispatch (i.e .Dynamic polymorphism).

5. A) Write a program to check whether the given string is palindrome ornot.
- B) Write a program for sorting a given list of names in ascendingorder.
- C) Write a program to count the no. of words in a giventext.

6. A) Define an interface “GeomtricShape” with methods area( ) and perimeter( ) (Both method’s return type and parameter list should be void and emptyrespectively.

Define classes like Triangle, Rectangle and Circle implementing the “GeometricShape” interface and also define “ExecuteMain” class in which include main method to test the above class

B) Define a package with name “sortapp” in which declare an interface “SortInterface” with method sort( ) whose return type and parameter list should be void and empty.Define “subsortapp” as subpackage of “sortapp” package in which define class “SortImpl” implementing “SortInterface” in which sort() method should print a message linear sort is used.

Define a package “searchingapp” in which declare an interface “SearchInterface” with search( ) method whose return type and parameter list should be void and empty respectively. Define “searchingimpl” package in which define a “SearchImpl” class implementing “SearchInterface” defined in “searchingapp” package in which define a search( ) method which should print a message linear search isused.

Define a class ExecutePackage with main method using the above packages(classes and its methods). Use ArrayList class of Collections Framework to and use algorithms to search and sort the elemnt of an array.

7) Modify the withdraw() method of Account class such that this method should throw “InsufficientFundException” if the account holder tries to withdraw an amount that leads to condition where current balance becomes less than minimum balance otherwise allow the account holder to withdraw and update the balance accordingly.

8.A) Define two threads such that one thread should print even numbers and another thread should print oddnumbers.

- B) Modify the Account class to implement thread synchronizationconcept.
- C) Define two threads such that one thread should read a line of text from text file and another thread should write that line of text to another file. (Thread communicationexample).
- D) Write a program to implement threadpriority.

9. Design the user screen as follows and handle the eventsappropriately.

Add Window First  
 Number Second  
 Number Result

10) Write a program to simulate aacalculator

- 11) Write a Java program for handling mouse events and keyevents.
- 12) a) Write a program for handling windowevents.  
b) Develop an applet that displays a simple message.
- 13) Develop a client that sends data to the server and also develop a server that sends data to the client (two-waycommunication)
- 14) Develop a client/server application in which client read a file name from keyboard and send the file name to the server, and server will read the file name from client and send the file contents to theclient.

**Syllabus for B. Tech II Year II semester  
Electronics and Computer Engineering  
COMPREHENSIVE TEST AND VIVA VOCE- IV  
(Common to all branches)**

Code: 8D486

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 1 | 0 | 0   | 1 |

**Course Objective:**

*Evaluate, Comprehend and Assess the concepts and knowledge gained in the Core Courses of 1<sup>st</sup> year 1<sup>st</sup> Semester*

**Course Outcomes:** After completing this course, the student will be able to

1. Comprehend the concepts in the Core Courses of 1<sup>st</sup> year 1<sup>st</sup> Semester
2. Assess technical knowledge to face interviews.
3. Exhibit lifelong learning skills to pursue higher studies or professional practice.

| Comprehensive Test and Viva Voce | The subjects studied in the Semester concerned related to branches concerned and for placements |
|----------------------------------|-------------------------------------------------------------------------------------------------|
| B.Tech I year I semester         | I semester                                                                                      |
| B.Tech I year II semester        | I and II semester                                                                               |
| B.Tech II year I semester        | I, II and III semester                                                                          |
| B.Tech II year II semester       | I, II, III and IV semester                                                                      |
| B.Tech III year I semester       | I, II, III, IV and V semester                                                                   |
| B.Tech III year II semester      | I, II, III, IV, V and VI semester                                                               |
| B.Tech IV year I semester        | I, II, III, IV, V, VI and VII semester                                                          |

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

**Allocation of marks:**

|                     |             |
|---------------------|-------------|
| *Comprehensive Test | : 70 marks  |
| **Viva Voce         | : 30 marks  |
| Total               | : 100 marks |

\*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 20 marks.

End Semester Examination for Comprehensive Test will be taken for 50 marks.

Total marks for Comprehensive Test will be 70.

\*\*Average of best two of Mid Tests of Mid – I, Mid – II and Mid - III for Viva Voce will be taken for 10 marks.

End Semester Examination for Comprehensive Viva Voce shall be evaluated for 20 marks.

The total for Viva Voce will be 30.

Thus the total sessional marks in this subject of Comprehensive Test and Viva Voce will be: 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

**Syllabus for B. Tech II Year II semester  
Electronics and Computer Engineering  
TECHNICAL SEMINAR - IV  
(Common to all branches)**

Code: 8D494

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 1 | 0 | 0   | 1 |

**Course Objective:**

*Develop ability to be a public speaker. Learn the importance of delivering seminars for demonstrating oratory and develop interview facing skills.*

**Course Outcomes:** After completing this course, the student will be able to

1. Identify current general, political and technology related topics.
2. Arrange and present seminar in a effective manner
3. Collect, survey and organize content in presentable manner
4. Demonstrate oratory skills with the aid of Power Point Presentations
5. Exhibit interview facing skills and team leading qualities

**Procedure :**

1. Seminar in-charges shall highlight the significance of technical seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot/week.
5. Progress of the seminars need to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for technical seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

There shall be a technical seminar evaluated for 100 marks each from I year I Semester to II year II Semester. The evaluation is purely internal and will be as follows:

| Sl. No | Description                                                                               | Marks            |
|--------|-------------------------------------------------------------------------------------------|------------------|
| 1      | Literature survey, topic and content                                                      | 10               |
| 2      | Presentation including PPT                                                                | 10               |
| 3      | Seminar Notes                                                                             | 05               |
| 4      | Interaction with audience after presentation                                              | 05               |
| 5      | Final Report 3 copies                                                                     | 10               |
| 6      | Class room participation                                                                  | 05               |
| 7      | Punctuality in giving seminar as per Scheduled time and date                              | 10               |
| 8      | Mid Semester Viva (on the seminar topics completed up to the end of 9 <sup>th</sup> week) | 15               |
| 9      | End Semester Viva                                                                         | 30               |
|        | <b>Total</b>                                                                              | <b>100 Marks</b> |

Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

|       |   |   |   |   |   |   |   |   |   |    |    |    |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|
| PO's  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Level | H | H | M | M |   |   |   |   |   |    |    |    |

H: High, M: Medium, L: Low Correlation

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
DESIGN AND ANALYSIS OF ALGORITHMS**

**Code: 8FC05**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| 2        | 1        | 0          | 3        |

**Prerequisite :** Data Structures and C++**Course Objectives:**

1. To provide a solid foundation in algorithm design and analysis, specifically, the student learning outcomes include: Basic knowledge of graph and matching algorithms.
2. Ability to understand and design algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch and bound.

**Course Outcomes:**

After completion of the course, the student will be able to

1. Analyze worst-case running times of algorithms using asymptotic analysis.
2. Synthesize divide and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
3. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
4. Comprehend the concept of dynamic programming algorithms, their applications and analyze them.
5. Analyze the Backtracking and Branch and Bound algorithms and also identify the scenarios for its applicability.
6. Comprehend the concept of P and NP Problems and its usage in the applications.

**UNIT I**

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis.

Applications: Designing optimal solution with respect to time for a problem.

**UNIT II**

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

Applications: PNR number Search, sorting the google search results.

**UNIT III**

Greedy method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Applications: Allocation of funds/resources based on the priority in the computer systems.

**UNIT IV**

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

Applications: Routing Algorithms in the computer networking

**UNIT V**

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.  
Applications: Undo in MS-Word, Games

#### **UNIT VI**

Introduction to NP-Hard and NP-Complete problems: Basic concepts of nondeterministic algorithms, Definitions of NP-Hard and NP-Complete classes, Modular Arithmetic.  
Applications: Performance evaluation in the dynamic systems.

#### **TEXT BOOKS:**

1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekharam, Galgotia publications Pvt. Ltd.
2. Algorithm Design: Foundations, Analysis and Internet examples, M.T.Goodrich and R.Tomassia, Johnwiley and sons.

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
ANALOG AND DIGITAL COMMUNICATIONS**

**Code: 8CC06**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| 2        | 1        | 0          | 3        |

*Prerequisite: Probability theory and Stochastic Processes*

**Course Objectives:**

- To develop ability to analyze system requirements of analog and digital communication systems.
- To understand the generation, detection of various analog and digital modulation techniques.
- To acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
- To understand the concepts of baseband transmissions, source coding and channel coding.

**Course Outcomes:** Upon completing this course, the student will be able to

- Analyze and design of various continuous wave and angle modulation and demodulation techniques
- Understand the effect of noise present in continuous wave and angle modulation techniques.
- Attain the knowledge about AM, FM Transmitters and Receivers
- Analyze and design the various Pulse Modulation Techniques.
- Understand the concepts of Digital Modulation Techniques and Baseband transmission, source coding and channel coding.

**Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes**

|                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1             | 3   | 3   | 3   | 3   | 1   | 2   |     | 2   | 1   | 1    | 1    | 3    | 3    | 3    | 3    |
| CO2             | 3   | 3   | 3   | 3   | 2   | 2   |     | 2   | 1   | 1    | 1    | 3    | 3    | 3    | 2    |
| CO3             | 3   | 3   | 3   | 3   | 3   | 2   |     |     | 1   |      | 1    | 2    | 2    | 3    | 2    |
| CO4             | 3   | 2   | 2   | 2   | 2   | 2   | 2   | 2   | 1   | 1    | 1    | 2    | 2    | 3    | 3    |
| Overall mapping | 3   | 3   | 3   | 3   | 2   | 2   | 1   | 2   | 1   | 1    | 1    | 3    | 3    | 3    | 3    |

**UNIT – I [Lecture hrs – 9]**

**Amplitude Modulation**

Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, principle of Vestigial side band modulation.

**Applications: AM transmitter system**

**UNIT –II [Lecture hrs – 9]**

**Angle Modulation**

Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Signal- Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.

**Applications: Design of a 88-108 MHz FM system using FDM**

**UNIT - III****Transmitters**

Classification of Transmitters, AM Transmitters, FM Transmitters

**Receivers**

Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.

**Applications: Design of an AM transmitter system.**

**UNIT - IV****Pulse Modulation**

Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM.

**Pulse Code Modulation**

PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

**Applications: Design of E1 and T1 digital-carrier systems**

**UNIT - V****Digital Modulation Techniques**

ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non-Coherent FSK Detector, BPSK- Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM.

**Baseband Transmission and Optimal Reception of Digital Signal**

A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams.

**Applications: Design of MODEM for voice transmission**

**Unit-VI:****SOURCE CODING**

Introduction, advantages, Shannon's theorem for Channel capacity, Huffman code, Shannon-Fano coding, bandwidth –S/N trade off.

**CHANNEL CODING**

Introduction - types of errors, redundancy, detection vs correction, forward error correction versus retransmission; linear block codes, error detection and correction capabilities of linear block codes, Hamming code, cyclic codes: encoding, syndrome calculation, decoding, CRC codes – hardware realization; convolutional codes: encoding using state, tree and trellis diagrams, decoding using Viterbi algorithm

**APPLICATIONS: Design of channel coding for 3G**

**TEXTBOOKS:**

1. Analog and Digital Communications – Simon Haykin, John Wiley, 2005.
2. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5<sup>th</sup> Edition, 2009, PHI.

**REFERENCE BOOKS:**

1. Principles of Communication Systems - Herbert Taub, Donald L Schilling, GoutamSaha, 3<sup>rd</sup> Edition, McGraw-Hill, 2008.
2. Electronic Communications – Dennis Roddy and John Coolean , 4<sup>th</sup> Edition , PEA, 2004
3. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004 Analog and Digital Communication – K. Sam Shanmugam, Willey,20



**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
IC APPLICATIONS  
(Common to ECE, EEE and ECM)**

**Code: 8CC07**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| 2        | 0        | 0          | 2        |

**Course Objectives**

- To maintain the right blend of theory and practice in analyzing and designing a wide variety of applications using IC 741 op-amps
- To acquaint the learners with a wide variety of IC logic families, and their applications.

**Course Outcomes**

*After studying this course, the students will be able to*

- [CO5] Demonstrate the concepts of Differential Amplifier and Operational Amplifier and their characteristics.
- [CO6] Design the basic circuits using IC 741 op-amp.
- [CO7] Explore, design and analyze active filters, timers, oscillators, voltage controlled oscillator DACs and ADCs, and IC regulators.
- [CO8] Classify and characterize the TTL/ECL/CMOS Logic Families and design of various logic gates using them.

**Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes**

|                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1             |     | 2   | 2   |     |     |     |     |     |     |      |      | 2    | 3    |      | 2    |
| CO2             | 2   | 3   | 3   | 3   |     |     |     |     |     |      |      | 2    | 3    |      | 3    |
| CO3             | 2   | 3   | 3   | 3   |     |     |     |     |     |      |      | 3    | 3    |      | 3    |
| CO4             |     | 2   | 3   | 3   | 2   |     |     |     |     |      |      | 3    | 3    | 2    | 3    |
| Overall mapping | 2   | 3   | 3   | 3   | 2   |     |     |     |     |      |      | 3    | 3    | 2    | 3    |

**UNIT – I** [Lecture hrs – 9]

**OPAMP & ITS CHARACTERISTICS [T1] [CO1]**

Differential Amplifiers and its Characteristics.Op-Amp Block Diagram, Ideal OP-AMP Characteristics, DC and AC Characteristics.741 Op-Amp and its Features and Characteristics. Parameters Measurement: Offset Voltage and Current, Slew Rate and CMRR. Frequency Compensation.

**UNIT – II** [Lecture hrs – 9]

**BASIC APPLICATIONS OF OP-AMPS [T1] [CO2]**

Adder/Subtractor, Difference Amplifier, Instrumentation Amplifier, Differentiator, Integrator, V/I & I/V Converters, Comparators, Multivibrators, Square and Triangular Waveform Generators, Clippers, Clampers, Peak Detector, S/H circuit.

**UNIT – III** [Lecture hrs – 9]

**FILTERS, TIMERS & PLLs [T1] [CO3]**

Filters:Introduction, Butterworth Filters- First and Second Order Active Filters- LPF, HPF, BPF, BRF. Introduction to 555 Timer, Functional Block, 555 timers as Monostable and AstableMultivibrators and Applications, Schmitt Trigger. Voltage Controlled Oscillator (IC 566), Phase Locked Loop.

**Applications: Design of visitors counter using 555 timer.**

**UNIT – IV** [Lecture hrs – 9]

**OSCILLATORS, D/A AND A/D CONVERTERS, IC REGULATORS [T1] [CO3]**

Oscillators: Introduction, Design and Analysis of Wein Bridge, RC Phase shift Oscillators using op-amp. D/A Converters: Introduction, Characteristic Parameters, R-2R Ladder, Weighted Resistor, Inverter R-2R

type D/A Converter, A/D Converters: Introduction, Characteristic Parameters, Counter Type, Dual Slope, Successive Approximation and Flash types A/D Converters, IC REGULATORS: Three terminal voltage regulators 7805, 7809, 7912, IC 723.

**UNIT – V** [Lecture hrs – 9]

**LOGIC FAMILIES [T2] [CO4]**

Classification of IC Logic Families, Multi emitter transistor logic. Standard TTL NAND & NOR Gate- Analysis & TTL Open Collector Outputs ,Tristate TTL. Unsaturated logic- ECL logic family ,ECL Inverter/Buffer, ECL NOR/OR logic. Electrical characteristics of logic gates.

**UNIT – VI** [Lecture hrs – 9]

**MOS& CMOS LOGIC FAMILY [T2] [CO4]**

NMOS & PMOS logic- Logic gates implementation, Passive pull up & active pull up .CMOS logic family- Design of logic gates and Boolean functions. CMOS Open Drain and Tristate Outputs. Comparison of Various Logic Families.IC interfacing, TTL driving CMOS & CMOS driving TTL.

**Applications: Design of 4x1 MUX using CMOS**

**Text Books**

- [T1]D. Roy Chowdhary, Linear Integrated Circuits , New Age Publications (P) Ltd, 2nd Edition, 2003.
- [T2]John F. Wakerly, Digital Design Principles & Practices, PHI/ Pearson Education Asia, 3rd Ed., 2005.

**References**

- [R1] Ramakanth A. Gayakwad, Op-Amps & Linear ICs, PHI, 1987.
- [R2] Sergio Franco, Design with Operational Amplifiers & Analog Integrated Circuits, McGraw Hill, 1988.
- [R3] R.F. Coughlin & Fredrick Driscoll, Operational Amplifiers & Linear Integrated Circuits, PHI, 6th Edition.
- [R4] K. Lal Kishore, Linear Integrated Circuit Application, Pearson Educations, 2005.

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
DATA COMMUNICATION AND COMPUTER NETWORKS**

**Code: 8D504**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objective:** In this course the student will learn about

- (i) Data Communications & Networks in Network models
- (ii) The OSI model & functionalities of each layer in detail.

**Course Outcomes:** After completing this course, student should be able to

- (i) Identify & summarize the functionalities of each layer in the OSI model.
- (ii) Implement Error detection & Error correction techniques.
- (iii) Develop Network layer routing algorithms.
- (iv) Design a mechanism which can detect, prevent or recover from a security attack.
- (v) Implementation of Hierarchical routing and subnets-routing algorithm.
- (vi) Protocols of transport layer and application layer.

**UNIT – I:** Introduction to Data Communications; Networks, the Internet, Protocols and standards, Network models: layered tasks, the OSI model, Layers in the OSI model, TCP/IP Protocol suite, OSI Vs. TCP, Addressing.

**UNIT – II:** Physical layer and media: Data and signals: Analog and digital, periodic analog signals, digital signals, Transmission impairment, Data rate limits, Performance.  
Bandwidth utilization: Multiplexing and Spreadin: Multiplexing, De-multiplexing Spread spectrum

**UNIT – III:** Transmission media: Guided media, and unguided media Switching: Circuit-switched networks, Datagram networks, Virtual-circuit networks, Structure of a switch.

**UNIT – IV:** Data link layer: error detection and correction; Introduction, Block coding, Linear block codes, Cyclic codes, Checksum Data link control: Framing, Flow and error control, Protocols, Noiseless channels, Noisy channels, HDLC, Point – to – point protocol

**UNIT – V: Network Layer:** Routing Algorithms: Non-adaptive and Adaptive; **Static Routing** -Shortest path routing, Flooding, **Dynamic Routing** – Distance vector routing, Link-state routing, Hierarchical routing, Broad castrouting, Multi castrouting, Routing for mobile hosts. Congestion- Congestion Control Algorithms, General Principles, Congestion prevention policies.

**UNIT –VI: Transport Layer:** Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol. **Application Layer** – Domain name system, SNMP, Electronic Mail, Multi Media.

**Network Security** – Security Concepts, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Feistal Cipher Structure.

**TEXT BOOKS:**

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

**REFERENCES:**

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson
3. Cryptography and Network Security, William Stallings, Fourth edition.

|       |   |   |   |   |   |   |   |   |   |    |    |    |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|
| PO    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Level | M | M |   |   |   | H |   | H |   |    |    |    |

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
INFORMATION SECURITY**

**Code: 8FC06**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| 3        | 0        | 0          | 3        |

**Prerequisite : Nil**

**Course Objectives:**

1. To learn the fundamental concepts of security attacks, security services.
2. To apply conventional cryptographic techniques in order to do encryption.
3. To apply Public key cryptography techniques in order to do encryption.
4. To learn IP security Architecture and its role in security framework.
5. To apply SSL and TLS for Web Security. To design and develop Intrusion Detection Systems and Firewall.

**Course Outcomes:**

At the end of this course, the student will be able to

1. Understand the fundamental concepts of Security Attacks and security standards with the model for network Security.
2. Review and analyze conventional cryptographic techniques and authentication
3. Review and analyze public cryptographic techniques and outline the concepts of Kerberos and email privacy
4. Recognize architecture, key management and header formats of Ipsec
5. Outline the various web security threats and protocols
6. Understand Intrusion Detection System and Design principles of Firewalls

**UNIT – I:** Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs.

**UNIT – II:** Conventional Encryption Principles, Conventional encryption algorithms: DES, TDES, AES, cipher block modes of operation, location of encryption devices, key distribution, Approaches of Message Authentication, Secure Hash Functions: SHA1 and HMAC.

**UNIT – III:** Public key cryptography principles, public key cryptography algorithms: RSA, DIFFIE HELL MAN, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service. Email privacy: Pretty Good Privacy (PGP) and S/MIME.

**UNIT – IV:** IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

**UNIT – V:** Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Intruders, Viruses and related threats

**UNIT – VI:** Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

**TEXT BOOKS:**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education, 4<sup>th</sup> Edition.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permech, wiley Dreamtech

**REFERENCE BOOKS:**

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
4. Principles of Information Security, Whitman, Thomson.
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.

|       |   |   |   |   |   |   |   |   |   |    |    |    |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|
| PO    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Level | M | M |   |   | M | H |   | H |   |    |    |    |

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
INFORMATION SECURITY LAB**

**Code: 8FC65**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| <b>0</b> | <b>0</b> | <b>2</b>   | <b>1</b> |

**Prerequisite :** Nil

**Course Objectives:**

1. Learn the fundamental of information security principles and services offered to secure the data.
2. Apply conventional cryptographic techniques in order to do encryption.
3. Apply Public key cryptography techniques in order to do encryption.

**Course Outcomes:**

At the end of this course, the student will be able to  
Understanding of Symmetric Encryption Algorithms, Asymmetric Encryption Algorithms, Hash and Key Exchange, Digital Signature and Digital Envelope, Demonstration of NS3 Tool

**List of Programs**

1. Implement Substitution Cipher.
2. Implement Transposition Cipher.
3. Implement DES
  - (a) Generate Cipher text for the given Plaintext.
  - (b) Retrieve the Plaintext from the given Cipher text.
4. Implement Diffie Hellman Algorithm and generate Secret Key.
5. Implement RSA algorithm
  - (a) Generate Public key and Private key pair
  - (b) Generate Cipher text for the Plaintext
  - (c) Obtain the Plaintext from the Cipher text
6. Implement Hash Algorithm.
7. Generate Digital Signature
8. Implement Digital Envelope.
9. Installation of NS3.
10. Demonstration of NS3.
11. Executing simple projects in NS3.

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
IC APPLICATIONS LAB**  
(Common to ECE, EEE and ECM)

**Code: 8CC76**

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 0 | 0 | 2   | 1 |

**Prerequisites:** EDC, DLD, DLD Lab, ECNA.

**Course Objectives:**

The objectives of this course are

- To Design and analyze the various circuits and systems using IC 741 Op-Amp.
- To Design and analyze the various circuits and systems using Analog ICs.

**Course Outcomes:** After studying this course, the students will be able to

- To explore the operating modes of IC 741 OP-AMP.
- To design applications using 741 Op-Amp
- To understand and implement applications using 555 Timers
- To design D to A converters and IC voltage regulators
- 

**Mapping of Course Outcomes with Program Outcomes and Program specific outcomes**

|     | i | ii | iii | iii | iv | v | vi | vii | viii | ix | x | xi | xii | PSO1 | PSO2 | PSO3 |
|-----|---|----|-----|-----|----|---|----|-----|------|----|---|----|-----|------|------|------|
| CO1 | 3 | 2  | 2   | 2   | 2  |   |    |     |      |    |   |    | 2   | 3    | 2    |      |
| CO2 | 3 | 2  | 2   | 2   | 2  |   |    |     |      |    |   |    | 2   | 3    | 2    |      |
| CO3 | 3 | 2  | 2   | 2   | 2  |   |    |     |      |    |   |    | 2   | 3    | 2    |      |
| CO4 | 3 | 2  | 2   | 2   | 2  |   |    |     |      |    |   |    | 2   | 3    | 2    |      |

**Syllabus Content**

**Design and testing of**

1. OP AMP Modes(-ve feedback) – Inverting, Non inverting, Differential amp, Unity gain.
2. OP AMP Applications – Adders, Subtractor.
3. OP AMP Applications – Comparator Circuits.
4. OP AMP Applications – Clipper Circuits.
5. Square wave generator using OP AMP
6. Triangular wave generator using OP AMP
7. Active Filter Applications – LPF, HPF (first order)
8. Oscillators-RC phase shift, Wein bridge.
9. IC 555 Timer – Monostable
10. IC 555 Timer -Astable
11. 4 bit DAC using OP AMP.
12. IC 723 voltage regulator

|              |          |          |          |          |          |          |          |          |          |           |           |           |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| <b>PO</b>    | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> | <b>11</b> | <b>12</b> |
| <b>Level</b> | <b>M</b> | <b>M</b> | <b>H</b> | <b>L</b> | <b>H</b> |          |          |          | <b>M</b> |           |           | <b>M</b>  |

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
WEB TECHNOLOGIES LAB**

**Code: 8EC77**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| <b>0</b> | <b>0</b> | <b>2</b>   | <b>1</b> |

**Prerequisite: Object Oriented Programming through Java Lab**

**Course Objectives:**

Implement programs using HTML tags, Java scripts along with Event Handling. Implement scripts using XML, DOM parser, and SAX parser for project development. Also, the student should understand and implement the MVC architecture applications.

**Course Outcomes:**

At the end of this course, the student will be able to

1. Demonstrate the use of HTML tags and be able to design web pages. Develop dynamic programs involving Java scripts, popup windows in JavaScript along Event Handling.
2. Develop scripts using XML and XSLT and read XML documents using parsers, DOM parser, and SAX parser. Develop JSON files and access them via HTML pages.
3. Implement Angular with Expressions, Filters, Directives, Controller, and Modules.
4. Develop a Single Page Application with implementation of Scope and Form.
5. Implement Java servlets using Apache Tomcat Server for User authentications
6. Develop an application in PHP with Database connectivity.

**Hardware and Software required:**

1. A working computer system with either Windows or Linux
2. A web browser either Microsoft Edge or Firefox or Chrome
3. Visual Studio IDE or Eclipse IDE
4. XML editor like Altova Xml-spy [www.Altova.com/XMLSpy – free] ,Stylusstudio , etc.,
5. Tomcat web server and Apache web server
6. XAMPP for PHP and Database programs JVM (Java virtual machine) must be installed on your system

**Week-1:**

1. Create a web page with advanced layouts and positioning with CSS and HTML.
2. Design a website with different methods of embedding CSS in a web page.
3. Create a static web page which displays your personal details. (Hint: CSS3 and HTML5)
4. Create a web page through which the user can enter his / her details to become an authenticated user of that page.

**Week-2:**

1. Create a web page that shows different methods of embedding JavaScript with validation.
2. Create a web page with rollover menus. Rollover menus should be created using JavaScript.
3. Create a simple calculator, which can perform the basic arithmetic operations.

**Week-3:**

1. Write an XML file which will display the Book information which includes the following:
  - 1) Title of the book
  - 2) Author Name
  - 3) ISBN number
  - 4) Publisher name
  - 5) Edition



## 6) Price

- Write a Document Type Definition (DTD) or XML Schema Definition (XSD) to validate the above XML file.

**Week-4:**

- Prepare a JSON file with Student information and display the content in HTML Table format.

**Week-5:**

- Prepare a program that displays the name that we feed in the ng-init directive.
- AngularJS expression can contain arithmetic operators which will produce the result based on the type of operands
- Program for AngularJS expression can contain variables declared via ng-init directive.
- Return the names that contain the letter "i".
- Type a letter in the input field, and the list will shrink/grow depending on the match.
- By using ng-click directive on the table headers, we can run a function that changes the sorting order of the array.
- Creating a custom myFormat filter will format every other character to uppercase.

**Week-6:**

- Program to implement any 5 directives from ng-app, ng-init, ng-model, ng-controller, ng-bind, ng-repeat, ng-show, ng-readonly, ng-disabled, ng-if, ng-click.
- Demonstrates by attaching properties to the \$scope object inside a controller and then displaying property value in HTML.
- Program to handle click events of a button.
- Program to create the "message" property is defined inside myController, so it will only be available to div1 and div2 but not div3 and div4. The same way, message property defined inside another Controller will only be available to div4. The div3 element does not come under any controller, so "message" property will be null or undefined.
- Program to implement complex and nested controllers
- Create a module using controllers

**Week-7:**

- Prepare an angular Student information form
- Prepare a program to implement Scope & Directives, \$apply and \$watch

**Week-8:**

- Write a program for Single Page Application (SPA) using angular.

**Week-9:**

- Install APACHE TOMCAT web server and while installation, assign port number 8181. Make sure that this port is available i.e., no other process is using this port.
- Write a servlet program to print welcome messages on the browser.
- Develop a web application to pass the parameters from the HTML page and display them using servlet.

**Week-10:**

- Develop a web application using servlet to perform Session Tracking with hidden form fields, cookies and url-rewriting and http sessions. (Files to developed- Html, Java, Web.xml)
- Write a servlet using the Request Dispatcher class. Develop a web application using servlet to perform the user Authentication:
  - Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following:
    - Create a Cookie and add these four user id's and passwords to this Cookie.
    - Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user (i.e., user-name and password match) you should welcome him by name(user-name) else you should display “ You are not an authenticated user “.

Use init-parameters to do this. Store the user-names and passwords in the webinf.xml and access them in the servlet by using the getInit Parameters() method.

B. Authenticate the user when he submits the login form using the username and password from the database.

**Week-11:**

1. Write a PHP to test the database connection
2. Write a php to create a Table.

**Week-12:**

1. Write a PHP to insert values form HTML to database(registration Page)
2. Write a PHP to insert values to a Database.
3. Write a PHP to select values from a database table.
4. Write a PHP to update existing records of a database table.
5. Write a PHP to validate user login

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
SUMMER INDUSTRY INTERNSHIP - I**

Code: 8D580

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 0 | 0 | 0   | 1 |

**Course Objective:**

To enhance the knowledge on selecting a project learn related tools and enhance programming and communication skills for employability.

**Pre-Requisites:** All Courses till this semester

**Course Outcomes:**

*At the end of this course, the student will be able to*

- Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
- Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
- Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
- Improve their communicative skills and team skills largely improve.
- Work as an individual and in a team.

A group project shall be carried out by a group of students consisting of 2 to 3 in number in third year first semester. This work shall be carried out under the guidance of the faculty assigned as internal guide and shall involve design, fabrication, software development or any other significant activity. This can be of interdisciplinary nature also.

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external

**The internal evaluation shall consist of: 30 Marks**

| Sl. No | Description                                                                                                                                            | Marks           |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 1      | Abstract, Design, implementation and Presentation in front of Project Review Committee consisting of HoD, Senior faculty and Internal guides (Average) | 15 marks        |
| 2      | Report                                                                                                                                                 | 05 marks        |
| 3      | Evaluation by Internal Guide                                                                                                                           | 10 marks        |
|        | <b>Total sessional marks</b>                                                                                                                           | <b>30 marks</b> |

**The internal evaluation shall consist of: 70 Marks**

| Sl. No | Description                      | Marks           |
|--------|----------------------------------|-----------------|
| 1      | Final report                     | 10 marks        |
| 2      | Presentation                     | 10 marks        |
| 3      | Demonstration/defence of project | 50 marks        |
|        | <b>Total sessional marks</b>     | <b>70 marks</b> |

The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the supervisor.

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
SEMANTIC WEB AND SOCIAL NETWORKS  
(Professional Elective – I)**

**Code: 8EC11**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Prerequisite:** Nil**Course Objectives:**

*Understand Web Intelligence and Ontology. Learn basics of Semantic web, its representation issues and Social Network Analysis.*

**Course Outcomes:**

*At the end of this course the student will be able to*

1. *Appraise the role of the Web, its need and Intelligence.*
2. *Outline the concepts of Machine Intelligence Ontology, Inference engines, Software Agents, Berners-Lee www and Semantic Road Map.*
3. *Conceptualize Knowledge Representation for the Semantic Web with Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML and XML Schema.*
4. *Apply Ontology Engineering using Ontology Development Tools/ Methods, Ontology Libraries, Ontology Mapping, Logic and Inference Engines.*
5. *Illustrate Semantic Web Applications, Services and Technology.*
6. *Apply Social Network Analysis, Semantic web networks analysis and describe Building of Semantic Web Applications with social network features.*

**UNIT I Web Intelligence:** Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web

**UNIT II Machine Intelligence:** Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

**UNIT III Knowledge Representation for the Semantic Web:** Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML, XML/XML Schema.

**UNIT IV Ontology Engineering:** Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

**UNIT V Semantic Web Applications, Services and Technology:** Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

**UNIT VI Social Network Analysis and Semantic web:** Development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

**TEXT BOOKS:**

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

**REFERENCES:**

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, RudiStuder, PaulWarren, John Wiley&Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers (Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD.
5. A Semantic Web Primer, G. Antoniou and V. Harmelen, PHI.

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
INTRODUCTION TO DATA SCIENCE  
(Professional Elective – I)**

**Code: 8EC16**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

*Prerequisite: Python Programming, Probability and Statistics*

**COURSE OBJECTIVES:**

1. Learn concepts, techniques and tools they need to deal with various facets of data science practice, including data collection and integration
2. Exploring data analysis, predictive modeling, descriptive modeling, data product creation, evaluation, and effective communication
3. Understand the basic knowledge of algorithms and reasonable programming experience and some familiarity with basic linear algebra and basic probability and statistics
4. Identify the importance of recommendation systems and data visualization techniques

**COURSE OUTCOMES:**

*After completion of the course, the student should be able to*

1. Understand basic terms related to Big Data, Data Science and Analysis of Data. Learn Statistical Inference, Probability Distributions and Fitting a model
2. Implement Data analysis techniques for solving practical problems.
3. Perform Data analysis on variety of data using R
4. Exercise appropriate manipulation techniques on lists and vectors using operators in R. Comprehend the significance and use the iterative programming and functions in R
5. Learn and describe the various Dimensionality Reduction techniques available
6. Apply the suitable visualization techniques to output analytical results.

**UNIT-I: INTRODUCTION**

Data Science Introduction - Big Data and Data Science hype – and getting past the hype - Datafication - Current landscape of perspectives - Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model – Over fitting. (Text Book-1)

**Basics of R:** Introduction, R-Environment Setup, Programming with R, Basic Data Types (Text Book-4)

**UNIT-II DATA TYPES & COLLECTION:**

**Types of Data:** Attributes and Measurement, Attribute Definition, The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute (Pg.No:22-29, Text Book-2), Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes (Pg. No. 39-44, Ref Book-1)

Types of Data Sets, General Characteristics of Data Sets, Record Data, Transaction or Market Basket Data, The Data Matrix, The Sparse Data Matrix, Graph Based Data, Graph- Based Data, Ordered Data. Handling Non-Record Data, Data Quality, Measurement and Data Collection Issues, Precision, Bias and Accuracy. (Pg. No. 29-39, Text Book-2)

**UNIT-III**

**Vectors:** Creating and Naming Vectors, Vector Arithmetic, Vector Subsetting,

**Matrices:** Creating and Naming Matrices, Matrix Subsetting, Arrays, Class.

**Factors and Data Frames:** Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, Subsetting of Data Frames, Extending Data Frames, Sorting Data Frames.

**Lists:** Introduction, Creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors (Text Book-4)

#### UNIT-IV

**Conditionals and Control Flow:** Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements.

**Iterative Programming in R:** Introduction, While Loop, For Loop, Looping Over List.

**Functions in R:** Introduction, Writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R. (Text Book -4)

**UNIT-V: DIMENSIONALITY REDUCTION** Eigenvalues and Eigenvectors of Symmetric Matrices, Definitions, Computing Eigenvalues and Eigenvectors, The Matrix of Eigenvectors, Principal-Component Analysis, An Illustrative Example, Using Eigenvectors for Dimensionality Reduction, Singular-Value Decomposition, Definition of SVD, Interpretation of SVD, Dimensionality Reduction Using SVD (Pg. No.405-422, Text Book-3)

#### UNIT-VI: DATA VISUALIZATION

**Data Visualization:** Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations. (Pg. No. 56-64, Ref. Book -1)

**Charts and Graphs:** Introduction, Pie Chart: Chart Legend, Bar Chart, Box Plot, Histogram, Line Graph: Multiple Lines in Line Graph, Scatter Plot. (Text Book-4)

#### TEXT BOOKS:

1. Doing Data Science, Straight Talk From The Frontline. Cathy O’Neil and Rachel Schutt, O’Reilly, 2014
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education Inc.
3. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, Mining of Massive Datasets, Cambridge University Press
4. K G Srinivas, G M Siddesh, “Statistical programming in R”, Oxford Publications.

#### REFERENCE BOOKS:

1. Han, Jiawei, Jian Pei, and Micheline Kamber, “Data mining: concepts and techniques”, 3 rd Edition, Elsevier, 2011.
2. Brain S. Everitt, “A Handbook of Statistical Analysis Using R”, Second Edition, 4 LLC, 2014.
3. Dalgaard, Peter, “Introductory statistics with R”, Springer Science & Business Media, 2008.
4. Paul Teetor, “R Cookbook, O’Reilly, 2011.

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
COMPUTER GRAPHICS  
(Professional Elective – I)**

**Code: 8FC17**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Course Objectives:**

1. Various Input and Out Put devices and various Out Put Primitive Algorithms
2. Filled Area Primitive Algorithms and 2-D geometrical transformations
3. 2-D Viewing and clipping Algorithms
4. 3-D Object Representation and 3-D geometrical Transformations
5. 3-D Viewing and visible surface detection methods
6. Computer Animation languages

**Course Outcomes:**

At the end of this course, the student will be able to

1. Understand fundamental terms in Computer Graphics, various visible surface determination algorithms and midpoint and line segment analysis.
2. Explore 2D graphics and algorithms including: line drawing, polygon filling, clipping, and transformations.
3. Apply functions 2D viewing and apply clipping algorithms.
4. Understand the concepts and techniques used in 3D computer graphics, including viewing transformations, hierarchical modeling, color, lighting and texture mapping.
5. Apply single and multiple 3-D viewing techniques like viewing coordinates etc and also back-face detection, depth-buffer, and scan-line methods.
6. Analyze the animation production pipeline and Produce a short animation.

**Unit-1:** Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices. Output primitives : Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms, Applications.

**Unit-2:** Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms 2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

**Unit- 3:** 2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland – Hodgeman polygon clipping algorithm

**UNIT-4:** 3-D Object Representation: Polygon surfaces, quadric surfaces, spline representation, Bezier curve and B-Spline curves, polygon rendering methods. 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

**UNIT-5:** 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

**UNIT-6:** Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications. (p.nos 604- 16 of text book -1, chapter 21 of text book-2).



**TEXT BOOKS:**

1. “Computer Graphics C version”, Donald Hearn and M.Pauline Baker, Pearson Education.
2. “Computer Graphics Principles & practice”, second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

**REFERENCE BOOKS:**

1. “Computer Graphics”, second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.
2. “Computer Graphics Second edition”, Zhigand xiang, Roy Plastock, Schaum’s outlines, Tata Mc-Graw hill edition.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
4. “Principles of Interactive Computer Graphics”, Neuman and Sproul, TMH.
5. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
6. Computer Graphics, Steven Harrington, TMH

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
DIGITAL DESIGN THROUGH VERILOG  
(Professional Elective – I)**

**Code: 8C517**

**L T P/D C**  
**3 0 0 3**

Prerequisites: STLD, Programming concepts of any language

Course Objectives:

The objectives of this course are

- To introduce syntax, lexical conventions, data types and memory related to Verilog HDL.
- To design, test and implementation of the digital hardware using various modeling styles.
- To design digital systems using FSM modeling.

Course Outcomes: After studying this course, the students will be able to

|     |                                                                                 |
|-----|---------------------------------------------------------------------------------|
| CO1 | Understand levels of design description, concurrency, simulation and synthesis. |
| CO2 | Apply language constructs, data types, operators available in verilog HDL.      |
| CO3 | Design combinational logic and sequential logic in gate level modeling.         |
| CO4 | Explain Gate and Switch level modeling.                                         |
| CO5 | Use system tasks, functions and UDPs.                                           |
| CO6 | Demonstrate SM charts and realize digital design using SM charts.               |

| CO  | Digital Design Through Verilog (7C615)                                          | PO 1 | PO 2     | PO 3     | PO 4     | PO 5     | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12    | PSO 1    | PSO 2    | PSO 3 |
|-----|---------------------------------------------------------------------------------|------|----------|----------|----------|----------|------|------|------|------|-------|-------|----------|----------|----------|-------|
| CO1 | Understand levels of design description, concurrency, simulation and synthesis. |      |          | 2        |          |          |      |      |      |      |       |       | 1        | 1        |          |       |
| CO2 | Apply language constructs, data types, operators available in verilog HDL.      |      | 1        |          |          | 2        |      |      |      |      |       |       |          | 1        | 2        |       |
| CO3 | Design combinational logic and sequential logic in gate level modeling.         |      | 1        | 3        |          |          |      |      |      |      |       |       |          | 2        |          |       |
| CO4 | Explain Gate and Switch level modeling.                                         |      | 2        | 3        | 3        | 2        |      |      |      |      |       |       |          | 1        | 2        |       |
| CO5 | Use system tasks, functions and UDPs.                                           |      |          | 1        | 2        | 3        |      |      |      |      |       |       |          | 2        | 3        |       |
| CO6 | Demonstrate SM charts and realize digital design using SM charts.               |      | 3        | 3        | 3        | 1        |      |      |      |      |       |       | 1        | 3        | 1        |       |
| CO  | <b>Overall</b>                                                                  |      | <b>2</b> | <b>2</b> | <b>3</b> | <b>2</b> |      |      |      |      |       |       | <b>1</b> | <b>2</b> | <b>2</b> |       |

Syllabus Content**UNIT I**

**INTRODUCTION TO VERILOG HDL:** Verilog HDL, Levels of Design Description, Concurrency, System Tasks, Simulation and Synthesis, Functional Verification.

**LANGUAGE CONSTRUCTS AND CONVENTIONS:** Introduction, Keywords, Identifiers, White Space, Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators. Verilog Module structure, Test bench module- Net types, Strengths and Contention Resolution, Delays.

**UNIT-II**

**MODELING AT DATA FLOW LEVEL:** Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

**BEHAVIORAL MODELING:** Introduction, Initial Construct, Always Construct, Assignments with delays, Blocking and Non blocking Assignments - Examples, Wait construct, Multiple Always Blocks, Design at Behavioral Level constructs- Case statements, *if* and *if-else*, repeat, for loop, while loop, forever loop. Other constructs- assign-deassign, disable, force-release.

**UNIT-III**

**GATE LEVEL MODELING:** Introduction, Gate Primitives- Illustrative Examples, Tri-State Gates, Design of Basic Circuits using Instantiation of Gate Primitives- Half, Full and Parallel Adders, Decoders, Multiplexers. Design of Flip-flops with Gate Primitives.

**SWITCH LEVEL MODELING:** Introduction, Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Trireg Nets-Examples.

**UNIT-IV**

**SYSTEM TASKS, FUNCTIONS, AND COMPILER DIRECTIVES:** Introduction, Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Compiler Directives, Hierarchical Access, User- Defined Primitives (UDP).

**UNIT-V**

**COMPONENT TEST AND VERIFICATION:** Test bench – combinational circuit testing, sequential circuit testing, test bench techniques, design verification, assertion verification.

**UNIT-VI**

**DIGITAL SYSTEM DESIGN AND VERIFICATION:** FSM Design (Moore and Mealy Machines) – Vending Machine design and verification, Derivation and Realization of Algorithmic State Machine Chart Design and Verification examples - Binary Multiplier, Dice game. Other design examples - RAM (Single & DualPort), UART Design.

**TEXT BOOKS**

1. T.R. Padmanabhan and B. Bala Tripura Sundari, Design through Verilog HDL – WSE, 2004 IEEE Press.
2. Charles H Roth, Digital Systems Design using VHDL , Jr. Thomson Publications, 2004.
3. Samir Palnitkar, Verilog HDL , 2nd Edition, Pearson Education, 2009

## REFERENCES

1. Sunggu Lee, Advanced Digital Logic Design using Verilog, State machines and Synthesis for FPGAs, - Cengage Learning
2. Stephen. Brown and ZvonkoVranesic, Fundamentals of Logic Design with Verilog, TMH, 2005.
3. J. Bhaskar, A Verilog Premier, BSP, 2003.
4. Michael D. Ciletti, Advanced Digital Design with Verilog HDL, PHI, 2005.
5. Sunggu Lee, Digital Logic Design using Verilog, State machine and synthesis for FPGA, Cengage Learning, 2009.

**Syllabus for B. Tech III Year I semester  
Electronics and Computer Engineering  
ADVANCED COMPUTER ARCHITECTURE  
(Professional Elective – I)**

**Code: 8C518**

**L T P/D C**  
**3 0 0 3**

**Course Objectives:** Students will learn about

1. Various basic computer architectures, data representations and instruction sets.
2. Arithmetic unit, control unit and efficient computation using pipelining
3. Memory organization and optimization
4. I/O Communications and interfaces

**Course Outcomes:** After completing this course, student should be able to

1. To analyze the internal architecture of the computer
2. Understand the different data types and instruction set, of the computer
3. Understand the memory structure of the computer and learn CISC & RISC.
4. Understand processor structure and function and know the input output interfacing

| CO        | COMPUTER ORGANIZATION AND ARCHITECTURE (7DC11)                                    | PO 1     | PO 2     | PO 3     | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO1 2 | PSO 1    | PSO 2 | PSO 3 |
|-----------|-----------------------------------------------------------------------------------|----------|----------|----------|------|------|------|------|------|------|-------|-------|-------|----------|-------|-------|
| CO 1      | To analyze the internal architecture of the computer                              | 1        | 1        |          |      |      |      |      |      |      |       |       |       | 1        |       |       |
| CO 2      | Understand the different data types and instruction set, of the computer          | 2        | 2        | 2        |      |      |      |      |      |      |       |       |       | 2        |       |       |
| CO 3      | Understand the memory structure of the computer and learn CISC & RISC             | 2        | 2        | 2        |      |      |      |      |      |      |       |       |       | 2        |       |       |
| CO 4      | Understand processor structure and function and know the input output interfacing | 2        | 2        | 2        |      |      |      |      |      |      |       |       |       | 2        |       |       |
| <b>CO</b> |                                                                                   | <b>2</b> | <b>2</b> | <b>2</b> |      |      |      |      |      |      |       |       |       | <b>2</b> |       |       |

**Unit – I**

**Introduction:** Organization and Architecture, Structure and Function – Computer Evolution -Brief history of computers – Designing for performance.

**Computer System:** Components, Function – Interconnection Structures – Bus interconnection – PCI.

**Unit – II**

**Instruction Set:** Characteristics – Operand Types – Operation Types – Addressing Modes – Instruction formats

**CPU:** Computer Arithmetic operations: ALU – Integer Representation and Arithmetic – Floating Point Representation and Arithmetic.

**Unit – III**

**Computer Memory System Overview** - Cache Memory Principles - Elements of Cache Design

**Internal Memory** - Semiconductor Main Memory - Error Correction - Advanced Dram Organization

**External Memory** - Magnetic Disk – Raid

**Unit – IV**

Characteristics of CISC and RISC

**Control unit:** Micro–Operations – Control of Processors – Hardwired Implementation.

**Micro Programmed Control:** Basic concepts – Control Memory - Microinstruction Sequencing – Conditional branching – Mapping of instruction – Microinstruction Execution – Microprogram Example

**Unit – V**

**Processor Structure and Function** - Processor Organization - Register Organization - Instruction Cycle - Instruction Pipelining - Instruction Execution Characteristics - The Use of a Large Register File - Compiler-Based Register Optimization - Reduced Instruction Set Architecture - RISC Pipelining

**Unit – VI**

**Input/Output** - External Devices - I/O Modules - Programmed I/O - Interrupt - Driven I/O - Direct Memory Access - I/O Channels and Processors.

**TEXT BOOKS:**

1. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Prentice Hall, 9<sup>th</sup> Edition, 2013
2. John P.Hayes, “Computer Architecture and Organization”, Tata McGraw Hill, 3<sup>rd</sup> Edition, 2002.

**REFERENCES:**

1. Patterson, D. A., and Hennessy, J. L., “Computer Organization and Design: The Hardware/Software Interface”, Morgan Kaufmann Publishers, 4<sup>th</sup> Edition, 2008.
2. D.A.GodseA.P.Godse, Computer Architecture & Organization, Technical Publications, 2007.
3. Carl Hamacher, ZvonkoVranesic and SafwatZaky, “Computer Organization”, Tata McGraw Hill, 5<sup>th</sup> Edition, 2002.
4. Morris Mano, “ Computer Systems Architecture “, 3<sup>rd</sup> Edition, Pearson PHI Publication, 1993

**Syllabus for B. Tech III Year II semester**  
**Electronics and Computer Engineering**  
**MICROPROCESSORS AND MICROCONTROLLERS**  
**(Common to ECM, ECE & EEE)**

Code: 8DC05

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Course Objectives:** In this course the student will learn

1. The microprocessor and microcontroller architecture, instructions set and procedures of programming.
2. Understand the assembly language programs, pin diagram and timing diagrams for 8086 & 8051.
3. Understand and practice the interfacing related applications of 8255 with 8086 and serial communication.
4. Learn the usage of multiple interrupts of 8051, USART architecture, RS232.

**Course Outcomes:** After completing this course, Students will be able to

1. Understanding the concepts of 8086 Architecture
2. Understanding the concepts of Instruction set & developing skills in writing assembly language programs.
3. Ability to interface keyboard, stepper motor ADC, DAC to 8086 using 8255
4. Understanding the concepts of 8051 Architecture
5. Exploring the concepts of instruction set of 8051
6. Ability to interface LED, LCD, Keyboard DAC, ADC with 8051

**UNIT – I: Architecture of 8086 Microprocessor:** Memory segmentation, BIU and EU. General purpose registers. 8086 flag register and function of 8086 Flags. Pin diagram of 8086-Minimum mode and maximum mode of operation. Timing Diagram.

**UNIT – II: Instruction set of 8086:** Addressing modes of 8086. Assembler directives. Simple programs, procedures, and macros. Assembly language programs involving logical, Branch & Call instructions, sorting, evaluation of arithmetic expressions, string manipulation. Introduction to DOS and BIOS interrupts.

**Applications: Design of an 8-bit Calculator**

**UNIT – III: Interfacing with 8086:** Interfacing with RAMs, ROMs along with the explanation of timing diagrams. 8255 PPI – various modes of operation. Interfacing with key boards, ADCs, and DACs Stepper Motor .Interrupt structure of 8086. Vector interrupt table. Interrupt service routines. 8259 PIC Architecture and interfacing cascading of interrupt controller and its importance.

**Applications: Interfacing of a Temperature sensor with 8086**

**UNIT – IV: The 8051 Architecture:** Architecture of 8051 Micro controller, Memory Organization. Special Function Registers. Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

**UNIT – V: Instruction set of 8051:** Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Simple programs. Programs based on Timer Interrupts, External Hardware Interrupts ,Serial communication interrupts Timers and counters..

**UNIT – VI: Applications of 8051:** Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs. Interfacing with DACs, Concept of Multiple Interrupts.

**TEXT BOOKS :**

1. Advanced microprocessor & Peripherals - A.K.Ray&K.M.Bhurchandi, TMH, 2000.
2. Microprocessors and interfacing – Douglas V. Hall, TMH, 2<sup>nd</sup> Edition, 1999.
3. 8051 Microcontroller–Kenneth J. Ayala, Penram International/ Thomson, 3<sup>rd</sup> Edition, 2005.
4. The 8051 Microcontroller And Embedded Systems Using Assembly And C – Mazidi, Pearson Education India,2<sup>nd</sup> edition, 2008.

**REFERENCES :**

1. Microcomputer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2<sup>nd</sup> Edition.
2. 8051 Micro Controllers and Embedded Systems – Dr. Rajiv Kapadia, Jaico Publishers.



**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
DIGITAL SIGNAL PROCESSING**

**Code: 8CC09**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b>   | <b>3</b> |

**Course objectives:** To develop skills for analyzing and synthesizing algorithms and systems that process discrete time signals, with emphasis on realization and implementation.

**Course outcomes:**

1. Distinguish between CT and DT signals and systems and understand the growing need of DSP and study the concepts of discrete time signals and systems.
2. Represent periodic DT signals as a Fourier series; non-periodic DT signals as a Fourier Transform and use a powerful mathematical tool called DFT.
3. Compute the Fourier Transform of DT signals using the FFT algorithms.
4. Realize a digital IIR filter in several forms and structures for a given transfer function  $H(z)$  and can design IIR filter as per specifications.
5. Design of digital FIR filters by several methods as per the given specifications and can realize FIR Filter
6. Understand the need and implement the multirate sampling techniques.

**Mapping of Course Outcomes with Program Outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     | 2   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    |      |
| CO2     | 2   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO3     | 1   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO4     | 2   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO5     | 1   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 3    |
| CO6     | 1   | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 3    |
| Overall |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    | 3    |

**UNIT I : INTRODUCTION:**

Introduction to Digital Signal Processing: Discrete time signals & sequences, Periodicity, linear shift invariant systems, stability, and causality, Linear constant coefficient difference equations, Block diagram representation of linear constant-coefficient difference equations, Frequency domain representation of discrete time signals and systems.

**Applications: Contents form the foundation for DSP.**

**UNIT II : DISCRETE FOURIER TRANSFORM:**

Discrete Fourier series representation of periodic sequences, Discrete-Time Fourier Transform (DTFT), Discrete Fourier transform (DFT): Properties of DFT, Relation between Z-transform and DFT, Convolution: Linear and circular convolutions, Overlap add and Overlap save methods, Computation of DFT.

**Applications: Analysis of DT signals-Periodic and Aperiodic.**

**UNIT III : FAST FOURIER TRANSFORMS:**

Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

**Applications: Design of spectrally efficient system such as OFDM system.**

**UNIT IV: DIGITAL IIR FILTERS:**

ANALOG FILTER APPROXIMATIONS – Butterworth and Chebyshev Approximations.

IIR DIGITAL FILTERS: Design of IIR Digital filters from analog filters-Impulse Invariance, Step invariance and Bilinear Transformation methods, Design Examples, Analog-Digital transformations. Basic structures of IIR systems, Transposed forms,

**Applications: Design of IIR digital filter conforming to given specifications.**

**UNIT V: DIGITAL FIR FILTERS:**

FIR DIGITAL FILTERS: Characteristics of FIR Digital Filters, frequency response, Design of FIR Digital Filters using Fourier series method, Windowing Techniques-Rectangular, Triangular, Hamming, Hanning and Bartlett's Windows, Steps in Kaiser windowing method, Frequency Sampling technique, Comparison of IIR and FIR filters. Basic structures of FIR systems

**Applications: Design of FIR digital filter conforming to given specifications.**

**UNIT VI: MULTIRATE DIGITAL SIGNAL PROCESSING:**

Decimation, interpolation, sampling rate conversion. Introduction to DSP Processors.

**Applications of Multirate Digital Signal processing: Design of digital filter banks and quadrature mirror filters etc.**

**TEXT BOOKS:**

1. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schaffer, PHI Ed., 2006
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
3. Digital Signal Processing: A Modern Introduction, Ashok Ambardar, 9<sup>th</sup> Indian Reprint, 2012, Cengage Learning.

**REFERENCE BOOKS:**

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill, 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
4. Fundamentals of Digital Signal Processing using MatLab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
5. Discrete Time Signal Processing – A.V. Oppenheim

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
AUTOMATA AND COMPILER DESIGN**

**Code: 8D602**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objectives:** *In this course the student will learn*

- i. Concepts of finite automata, phases of compiler, regular expression, tools like LEX and YACC tool.
- ii. Types of grammars and their concepts, different Top down parsing.
- iii. About Bottom up parsing techniques.
- iv. Semantic analyzer and intermediate code generation.
- v. Runtime environment concepts.
- vi. Types of code optimization techniques and machine dependent code generation, to design a compiler.

**Course Outcomes:** *After completing this course, student should be able to*

- i. Convert regular expressions to finite automata, Context Free Grammar (CFG) and work with LEX and YACC tool.
- ii. Parse the input string using CFG through Top down techniques.
- iii. Parse the input string using CFG through Bottom up techniques.
- iv. Generate intermediate code from syntax tree and analyze semantic rules.
- v. Implement various run time environments strategies.
- vi. Generate machine dependent code from optimized code.

**UNIT-I**

Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata – DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools.

Overview of compiler – Environment, pass, phase, phases of compiler, Lexical Analyzer, LEX tool, Bootstrapping.

**UNIT II**

Top Down Parsing: Context free grammar, Top down parsing technique, LMD, RMD, Recursive decent parsing with back tracking, Ambiguous grammar, Elimination of left recursion, Left factoring, unambiguous grammar, Predictive parsing, LL(1).

**UNIT III**

Bottom up parsing: shift reduce parser SLR, CLR, LALR, operator precedence parser, LR(0), LR(1), LR(K) grammar, YACC tool.

**UNIT IV**

Semantic Analysis: Syntax directed translation, S- Attributed, L Attributed definition, Type checker, equivalence of type expressions, type conversions, overloading of functions & operators.

Intermediate code generation: 3-address code form, DAG, polish notation.

**UNIT V**

Runtime environment: Symbol table format, organization of block structure languages, hashing, tree structures representation of scope information Block structures and non-block structures storage allocation, static, runtime stack and heap storage allocations, storage allocation for arrays, strings and records.

**UNIT VI**

Code optimization: Optimization, scope of optimization, common sub expression elimination, frequency reduction, strength reduction, loop optimization, peep-hole optimization, copy propagation.

Data flow Analysis: Data flow graphs, data flow graph Analysis, live variable analysis.

Code generation: Machine dependent code generation, object code forms, register allocation, generic code generation algorithm, DAG for register allocation.

**Case studies:** JIT compiler.

**TEXT BOOKS:**

1. Introduction to Theory of computation.Sipser,2ndEdition,Thomson.
2. Compilers Principles, Techniques and Tools Aho, Ullman, Ravisethi, Pearson Education.

**REFERENCE BOOKS:**

1. Modern Compiler Construction in C , Andrew W.Appel Cambridge University Press.
2. Compiler Construction, LOUDEN, Thomson.

|       |   |   |   |   |   |   |   |   |   |    |    |    |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|
| PO    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Level | L | M | M | M | M | M | L |   |   |    |    |    |

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
CYBER SECURITY AND CYBER LAWS**

**Code: 8FC08**

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 3 | 0 | 0   | 3 |

*Prerequisite: Nil*

**Course Objectives:**

1. To learn fundamentals of cryptography and its application to network security.
2. To understand network security threats, security services, and countermeasures.
3. To learn computer security, Internet, E-commerce and E-governance with reference to Free Market Economy
4. Market Economy
5. To learn International Efforts relating to Cyberspace laws and Cyber crimes
6. To learn Law relating to electronic records and intellectual property rights in India
7. To understand ethical laws of computer for different countries.
8. To learn Penalties, Compensation and Offences under the Cyberspace and Internet in India
9. To learn Miscellaneous provisions of IT Act and Conclusions

**Course Outcomes:**

*At the end of this course the student will be able to*

1. Familiarize the cryptographic procedures and Understand its primitives
2. Outline Security policy in Legislation and Comprehend E-Commerce frame work, models and its associated threats
3. Justify the role of electronic signatures in E-Commerce and summarize the various laws relating to it.
4. Categorize international cyber laws and cybercrimes.
5. Explore Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000
6. Classify and Outline the offences under the Cyberspace law and the Internet in India

**UNIT-I**

**Introduction to cyber Security, cryptography, Types of Attacks, Secrete Key Cryptography**

Introduction: Cyber-attacks, Defense Strategies and Techniques Mathematical background for Cryptography: Modulo arithmetic, The greatest common divisor, Useful Algebraic Structures, Chinese Remainder Theorem Basics of Cryptography: Secret versus Public key Cryptography, Types of attacks, Elementary substitution Ciphers, Elementary Transposition Ciphers, Other Cipher Properties Secrete Key Cryptography: Product Ciphers, DES Construction, Modes of Operation, MAC and other Applications, Attacks, Linear Crypt analysis.

**UNIT-II**

**Introduction to Computer Security, Internet, E-commerce and E-governance with reference to Free Market Economy**

Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity, Conceptual Framework of E-commerce: governance, the role of Electronic Signatures in E-commerce with Reference to Free Market Economy in India.

**UNIT-III**

**Law relating to electronic records and intellectual property rights in India**

Legal aspects of Electronic records / Digital signatures, Cyber laws, the roles and regulations of Certifying Authorities in India, Protection of Intellectual Property Rights in Cyberspace in India.

**UNIT-IV**

**International Efforts relating to Cyberspace laws and Cyber crimes**

International efforts related to Cyber laws, Council of Europe (COE) convention on Cyber Crimes.

**UNIT-V**

**Penalties, Compensation**

Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000 and judicial review.

**UNIT-VI**

**Offences under the Cyberspace, Internet in India and Miscellaneous provisions of IT Act and Conclusions**

Some important offences under the Cyberspace law and the Internet in India, Other offences under the Information Technology Act in India, The role of Electronic Evidence and miscellaneous provisions of the IT Act.

**TEXT BOOK:**

1. Network security and Cryptography by Bernard Menezes CENGAGE Learning Publications, 2010.
2. Cyber Laws and IT Protection, Harish Chander, PHI, 2012

**REFERENCE BOOKS:**

1. Debby Russell and Sr. G.T Gangemi, "Computer Security Basics (Paperback)", 2ndEdition, O' Reilly Media, 2006.
2. Wenbo Mao, "Modern Cryptography – Theory and Practice", Pearson Education, New Delhi, 2006.
3. Cyberspace and Cybersecurity, George Kostopoulos, Auerbach Publications, 2012.
4. Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, Second Edition, Albert Marcella, Jr., Doug Menendez, Auerbach Publications, 2007

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
MICROPROCESSORS AND MICROCONTROLLERS LAB**

**Code: 8DC66**

| L | T | P/D | C |
|---|---|-----|---|
| 0 | 0 | 2   | 1 |

**Course Objectives :**

- a. Familiarize the architecture of 8086 processor, assembling language programming and interfacing with various modules.
- b. The student can also understand of 8051 Microcontroller concepts, architecture, programming and application of Microcontrollers.
- c. Student able to do any type of VLSI, embedded systems, industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.

**Course Outcomes :**

- Analyze and apply working of 8086.
- Compare the various interface techniques. Analyze and apply the working of 8255, 8279, 8259, 8251, 8257 ICs and design and develop the programs.
- Learning the Communication Standards.

**Cycle - I**

Introduction to MASM/TASM, KIEL IDE, Familiarization with 8086, 8051 Kits

**8086 ALP using kit and MASM**

1. Basic arithmetic and logical operations
2. Code conversion decimal arithmetic programs
3. String manipulation programs
4. Display a message on the screen of a computer using DOS / BIOS interrupts.

**Cycle – II****Following peripherals and interfacing experiments to be implemented on 8086 and 8051 kits**

1. A/D and D/A interfacing
2. Serial interfacing with PC
3. Keyboard and display interfacing
4. Stepper motor controller
5. Traffic light controller
6. Real Time clock interface with 8051 using 1<sup>2</sup>C

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
SIGNAL PROCESSING AND COMMUNICATION LAB**

**Code: 8D664**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| <b>0</b> | <b>0</b> | <b>2</b>   | <b>1</b> |

**Prerequisites:** SS , Analog Communications**Course Objectives:** In this course the student will learn

1. Familiarize with various signals and deal with their properties through linear systems
2. Control the parameters like amplitude, frequency and phase in analog modulation techniques
3. Sampling rate conversion Interpolation and decimation
4. To Understand the frequency response of a given system
5. To understand the concept of band pass communication

**Course Outcomes:** After completion of this course, student should be able to

1. Analyze and simulate various signals and study their properties in time and frequency domain
2. Understand the LTI system operation and learn to find the response for other related applications
3. Grasp the nature and significance of communication systems using various modulation and demodulation technique like AM, FM, ASK, FSK and PSK
4. Understand and demonstrate the process involved in analog to digital conversion
5. Understand the concept of sampling rate conversion in terms of Interpolation and Decimation

**Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes**

|    | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO | 2   |     | 3   | 1   | 3   |     |     |     | 2   | 3    | 2    | 3    | 3    |      |      |

**Syllabus Content****Tools to be used:** MATLAB**Cycle 1: Signals and Systems**

1. (a) Basic Operations on Matrices.  
(b) Generation of Various Signals and Sequences (Periodic and a periodic), such as Unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc.
2. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum
3. Convolution between signals and sequences.
4. Verification of linearity and time invariance properties of a given continuous/discrete system.

**Cycle 2: Analog and Digital Communications**

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation
3. Sampling theorem verification.
4. Generation and degeneration of shift keying techniques (ASK,FSK, and PSK)

**Cycle 3: Digital Signal Processing**

1. Impulse response of first order and second order systems.
2. To find the DFT/IDFT, FFT of given DT signals with and without built in functions
3. To find Power Spectral Density of a sequence.
4. Down sampling and up sampling of given sequence by specified factor.



**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
AUTOMATA AND COMPLIER DESIGN LAB**

**Code: 8D665**

| L | T | P/D | C |
|---|---|-----|---|
| 0 | 0 | 4   | 2 |

**Course Objectives:**

- To provide an understanding of the language translation peculiarities by designing complete translator for a language using concepts using lexical analyser tools, parser techniques and tools.

**Course Outcomes:**

1. Implement the lexical analyzer using lexical analyzer generating tool such as LEX.
2. Design top down parser for the given language
3. Design bottom up parser for the given language using YACC parser tool.

**Hardware and Software required:**

- A working computer system with either Windows or Linux
- C/C++ Programming Languages
- C/C++ compiler
- LEX and YACC tools

**LIST OF LAB EXECRCISES**

1. Write a program to design Lexical Analyzer.
2. Write a program implement the Lexical Analyzer using LEX Tool.
3. Write a program to check whether the string belongs to given grammar or not.
4. Write a program to check whether the given grammar is left recursive or not. Remove left recursion from left recursive grammar.
5. Write a program for implementation of Predictive Parser.
6. Write a program to design LALR Bottom Up Parser.
7. Write a program convert the BNF rules into YACC form and write code to generate abstract syntax tree.
8. Write a program to find whether given string is Keyword or not.
9. Write a program to find whether given string is Identifier or not.
10. Write a program to find First Function in Context Free Grammar.

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
GROUP PROJECT**

Code: 8D677

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 0 | 0 | 2   | 1 |

**Course Objective:**

To enhance the knowledge on selecting a project learn related tools and enhance programming and communication skills for employability.

**Pre-Requisites:** All Courses till this semester

**Course Outcomes:**

*At the end of this course, the student will be able to*

- Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
- Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
- Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
- Improve their communicative skills and team skills largely improve.
- Work as an individual and in a team.

A group project shall be carried out by a group of students consisting of 2 to 3 in number in third year first semester. This work shall be carried out under the guidance of the faculty assigned as internal guide and shall involve design, fabrication, software development or any other significant activity. This can be of interdisciplinary nature also.

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external

**The internal evaluation shall consist of: 30 Marks**

| Sl. No | Description                                                                                                                                            | Marks           |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 1      | Abstract, Design, implementation and Presentation in front of Project Review Committee consisting of HoD, Senior faculty and Internal guides (Average) | 15 marks        |
| 2      | Report                                                                                                                                                 | 05 marks        |
| 3      | Evaluation by Internal Guide                                                                                                                           | 10 marks        |
|        | <b>Total sessional marks</b>                                                                                                                           | <b>30 marks</b> |

**The External evaluation shall consist of: 70 Marks**

| Sl. No | Description                      | Marks           |
|--------|----------------------------------|-----------------|
| 1      | Final report                     | 10 marks        |
| 2      | Presentation                     | 10 marks        |
| 3      | Demonstration/defence of project | 50 marks        |
|        | <b>Total sessional marks</b>     | <b>70 marks</b> |

The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the supervisor.

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
COMPREHENSIVE VIVA VOCE-V**

**Code: 8D688**

| L | T | P/D | C |
|---|---|-----|---|
| 1 | 0 | 0   | 1 |

*Prerequisite: All core Courses till this semester*

**Course Objectives:**

*Prepare students in basics and advanced relevant courses to revise and face technical interviews for enhancing employability.*

**Course Outcomes:**

*At the end of this course the student will be*

*1. Assessed the knowledge of the students in the Core and Elective subjects that they have studied till the completion of that academic year.*

Comprehensive Viva Voce will be conducted in third year second semester for 100 marks. Out of 100 marks 30 marks are evaluated internally and 70 marks for external evaluation.

**Internal:**

Comprehensive Viva Voce is conducted twice in a semester and evaluated for 30 marks each and average will be considered for internal.

Internal Examination : 30 Marks

End examination : 70 Marks.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, and subject experts.

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
SUMMER INDUSTRY INTERNSHIP-II  
(Evaluation will be done along with 4-1 courses)**

**Code: 8D781**

Students shall carry out the project in industry during summer vacation for 3 - 6 weeks and the evaluation is carried out in fourth year first semester.

**Syllabus for B. Tech III Year II semester**  
**Electronics and Computer Engineering**  
**BASICS OF ENTREPRENEURSHIP (WADHWANI MODEL)**  
**(Open Elective-I)**

Code: 8ZC22

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objective:** The objective of the course is to make students understand the nature of Entrepreneurship, and its importance to business to the engineering students, which will allow them to get the required intuition and interest in starting their own start-up's

**Course Outcomes:**

1. The students' will acquire basic knowledge on Skills of Entrepreneurship.
2. The students' will understand the techniques of selecting the customers through the process of customer segmentation and Targeting
3. Business Models and their validity are understood by the students'.
4. The basic cost structure, Revenue Streams and the pricing strategies are understood by the students'.
5. The students' will acquire knowledge about the project management and its techniques.
6. The students' get exposure on marketing strategies and business regulations for the Start up.

**Unit – I:**

**Introduction to Entrepreneurship & Self Discovery:** - Define Entrepreneurship, Entrepreneurship as a Career option, Find your Flow, Stock of Your Means, Characteristics, Qualities and Skills of Entrepreneurship, Effectuation, Principles of Effectuation, Life as an Entrepreneur, Stories of Successful Entrepreneurs.

**Unit – II:**

**Opportunity & Customer Analysis:** - Identify your Entrepreneurial Style, Methods of finding and understanding Customer Problems, Run Problem Interview, Process of Design Thinking, Identify Potential Problems worth Solving, Customer Segmentation, Niche Marketing and Targeting, Craft your Values Proportions, Customer-driven Innovation.

**Unit – III:**

**Business Model & Validation:** - Introduction to Business Models, Lean approach to Business Model Canvas, Blue and Red Ocean Strategies, the Problem-Solution Fit, Build your Solution Demo, Solution Interview Method, Identify Minimum Viable Product (MVP), Product-Market fit test.

**Unit – IV:**

**Economics & Financial Analysis:** - Revenue Analysis, Identify different Revenue Streams and Costs Analysis – Startup Cost, Fixed Cost and Variable Cost, Break Even Analysis, Profit Analysis, Introduction to Pricing, different Pricing Strategies, Sources of Finance, Bootstrapping and Initial Financing, Practice pitching to Investors and Corporate.

**Unit – V:**

**Team Building & Project Management:** - Leadership Styles, Shared Leadership Model, Team Building in Venture, Roles and Responsibilities of team in venture, Explore collaboration tools and techniques, Brainstorming, Introduction to Project Management, Project Life Cycle, Create a Project Plan.

**Unit – VI:**

**Marketing & Business Regulations:** - Positioning, Positioning Strategies, Branding, Branding Strategies, Selecting and Measuring Channels, Customer Acquisition, Selling Process, Selling Skills, Sales Plans. Business regulations – List of Required Registrations, Compliance Check List, Business Structures and Legal Entities.

**REFERENCES:**

- Robert D Hisrich, Michael P Peters, Dean A Shepherd, Entrepreneurship, Sixth Edition, New Delhi, 2006.
- Thomas W. Zimmerer, Norman M. Scarborough, Essentials of Entrepreneurship And Small Business Management, Fourth Edition, Pearson, New Delhi, 2006
- Alfred E. Osborne, Entrepreneur's Toolkit, Harvard Business Essentials, HBS Press, USA, 2005.
- MadhurimaLall, ShikhaSahai, Entrepreneurship, Excel Books, First Edition, New Delhi, 2006.
- S.S. Khanka, Entrepreneurial Development, S. Chand and Company Limited, New Delhi, 2007.
- H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.
- S.R. Bhowmik, M. Bhowmik, Entrepreneurship-A tool for Economic Growth And A key to Business Success, New Age International Publishers, First Edition, (formerly Wiley Eastern Limited), New Delhi, 2007.
- <https://www.wfglobal.org/>
- <https://www.learnwise.org/#/IN/en/home/login>.

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
BASICS OF INDIAN ECONOMY  
(Open Elective-I)**

**Code: 8ZC25**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course objectives:** To provide basic knowledge relating to the Indian Economy thus making the students aware of the current aspects taking place in the Indian and world economy.

**Course Outcomes:**

1. Gain knowledge relating to Economics, various sectors and its growth
2. Will gain knowledge relating to various concepts of National income and related aggregates
3. Students will learn about Indian Industrial policy and benefits of LPG to India
4. Comprehend knowledge relating to Fiscal policy & Taxation system in India
5. Learn about inflation & business cycles.
6. Know about the BoP and its influence on economy.

**Unit 1: Introduction to Economics:**

Definition, Economics and economy, back ground of economy, sectors of the economy, types of economy, growth of economy, primary moving force of Economic growth in India, mixed economy.

**Unit 2: National Income and related aggregates**

Aggregates related to National Income: Gross National Product (GNP), Net National Product (NNP), Gross and Net Domestic Product (GDP and NDP) - at market price, at factor cost; National Disposable Income (gross and net), Private Income, Personal Income and Personal Disposable Income; Real and Nominal GDP.

**Unit 3: Industrial policy & Liberalization of Economy**

Industrial policy in India, its objectives, Review of Industrial policies up to 1986, Industrial policy 1991 - causes of its implementation, benefits of Liberalization, privatization & Globalization to the Indian economy.

**Unit 4: Fiscal policy & Taxation system**

Fiscal policy- Definition, objectives, importance, setbacks, recent fiscal policy of India, Reforms to strengthen the fiscal policy in India. Taxation system in India, methods of taxation, a good tax system, VAT, GST, Reforms in taxation.

**Unit 5: Inflation & Business Cycles:** Inflation – Definition, types, effects of inflation on various segments of the population and sectors of the economy, measures to control inflation, Business cycles: Introduction, Depression, Recovery, Boom, and Recession.

**Unit 6: Balance of Payments**

Balance of payments account - meaning and components; balance of payments deficit-meaning. Foreign exchange rate - meaning of fixed and flexible rates and managed floating. Determination of exchange rate in a free market

**REFERENCES:**

- Indian Economy, Datt& Mahajan, 70<sup>th</sup> Edition, Sultan Chand publishers.
- Indian Economy, Misra&Puri, 33<sup>rd</sup> Edition, Himalaya publishing house.
- Latest Budget document by Ministry of Finance
- Latest Economic survey
- 12<sup>th</sup> Five year plan
- News articles in The Hindu, The Business Line

**Syllabus for B. Tech III Year II semester**  
**Electronics and Computer Engineering**  
**BANKING OPERATIONS, INSURANCE AND RISK MANAGEMENT**  
**(Open Elective-I)**

Code: 8ZC05

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objectives:** To make the students understand the concepts and principles of Indian Banking Business, Insurance Business and Capital market business products and services, which facilitate them to understand the nature of market.

**Course Outcomes:**

1. Describe the new dimensions and products served by the banking system in INDIA.
2. Explain the credit control system and create awareness on NPA's
3. Apply the knowledge of Insurance concepts in real life scenarios
4. Recognize the importance of regulatory and legal frame work of IRDA
5. Identify the risk management process and methods.
6. Calculate the diversity of risk and return

**UNIT I: INTRODUCTION TO BANKING BUSINESS:** Introduction to financial services - History of banking business in India, Structure of Indian banking system: Types of accounts, advances and deposits in a bank. KYC norms, New Dimensions and products- E-Banking: Mobile-Banking, Net Banking, Digital Banking, Negotiable Instruments: Cheque system.

**UNIT II: BANKING SYSTEMS AND ITS REGULATION: Banking Systems:** Branch Banking, Unit Banking, Correspondent Banking, Group Banking, Deposit Banking, Mixed Banking and Investment Banking - Banking Sector Reforms with special reference to Prudential Norms, Capital Adequacy Norms, Classification of Assets and NPA's, Functions of RBI, Role of RBI in regulating Indian Banking, Banking Ombudsman scheme.

**UNIT III: INTRODUCTION TO INSURANCE:** Introduction to insurance, Need and importance of Insurance, principles of Insurance, characteristics of insurance contract, branches of insurance and types of insurance: Life insurance and its products, General Insurance and its variants.

**UNIT IV: INSURANCE BUSINESS ENVIRONMENT:** Procedure for issuing an insurance policy – Nomination - Surrender Value - Policy Loans – Assignment - Revivals and Claim Settlement; Insurance as a tax mitigation tool, Role of IRDA in Insurance Regulation.

**UNIT V: FINANCIAL MARKETS AND RISK MANAGEMENT:** Introduction to Financial Markets: Money Market – Capital market; Introduction to Risk Management, meaning and classification of risks, Risk management process, Risk Management Approaches and Techniques.

**UNIT VI: DERIVATIVES AS A RISK MANAGEMENT TOOL:** Introduction to Financial Derivatives, Advantages of Derivatives - types of Derivative Contracts - Forwards, Futures, Options and Swaps - Differences among Forwards, Futures and Option Contracts.

**REFERENCES:**

- Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
- General Principles of Insurance Harding and Evariantly
- Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.
- Scott E. Harringam Gregory R. Nichanus: Risk Management & Insurance, TMH, 2009.
- Geroge E. Rejda: Principles of risk Management & Insurance, 9/e, pearson Education. 2009.
- G. Koteshwar: Risk Management Insurance and Derivatives, Himalaya, 2008.



**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
INTRODUCTION TO ADDITIVE MANUFACTURING PROCESSES  
(Open Elective-I)**

Code: 8BC51

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

*Prerequisites: Metal Cutting***Course Objectives:**

To teach students the fundamental concepts of Additive Manufacturing, techniques involved and their advantages and limitations and various applications of these technologies in relevant fields such as mechanical, Bio-medical, Aerospace, electronics etc.

**Course Outcomes:**

1. Understand the Additive manufacturing processes and their relationship with subtractive manufacturing
2. Demonstrate comprehensive knowledge of the broad range of liquid based rapid proto type processes, devices, capabilities and materials that are available.
3. Demonstrate comprehensive knowledge of the broad range of liquid based rapid proto type processes, devices, capabilities and materials that are available.
4. apply the principles of casting in Additive manufacturing systems
5. Articulate the various tradeoffs of Additive manufacturing softwares / data format that must be made in selecting advanced/additive manufacturing processes, devices and materials to suit particular product requirements.
6. Learn various applications of additive manufacturing, such as in architecture, art, health care direct part production and mass customization

**UNIT-I****Introduction:**

Development of AM, Fundamentals of AM, Classification of AMS, Advantages, Standards on AM, Commonly used terms, AM process chain

**UNIT-II Liquid-based Additive manufacturing Systems:** Stereo lithography Apparatus (SLA), process, working principle, photopolymers, photo polymerization, Layering technology, laser and laser scanning, Applications, Advantages and Disadvantages, 3D bioprinting **Solid-based Additive manufacturing Systems:**, Laminated Object Manufacturing (LOM): process, working principle, Applications, Advantages and Disadvantages, Fused Deposition Modeling (FDM): working principle, Applications, Advantages and Disadvantages

**UNIT-III**

**Powder Based Additive manufacturing Systems:** Selective laser sintering (SLS): working principle, Applications, Advantages and Disadvantages, Color Jet printing, working principle, Applications, Advantages and Disadvantages, **Build time calculations** – SLA, FDM, Problems

**UNIT-IV**

**Additive manufacturing Data Formats:** STL Format, STL File Problems, Consequence of Building Valid and Invalid Tessellated Models, STL file Repairs: Generic Solution, Features of various AM software's like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3 Data Expert and 3 D doctor. **Design for AM** – Basic Principles and Practices

**UNIT-V**

**Rapid Tooling:** Introduction to Rapid Tooling (RT), Conventional Tooling Vs RT, Need for RT. Rapid Tooling Classification, Spray Metal Deposition, Silicone rubber molds, , Casting-Sand Casting, Investment Casting, evaporative Casting

**Reverse engineering** – what is RE, Why use RE, RE Generic process, Overview of RE-Software and Hardware, CMMs-applications and types

**UNIT-VI**

**Applications and examples :** Application - Material Relationship, Application in Design, Application in Engineering, Analysis and Planning, Aerospace Industry, Automotive Industry, Jewelry Industry, Coin Industry, Arts and Architecture. Medical and Bioengineering Applications: Planning and simulation of complex surgery, Customized Implants and Prosthesis, Design and Production of Medical Devices, Bionic ear, dentistry

**SUGGESTED READING:**

1. Chua C.K., Leong K.F. and LIM C.S, Rapid prototyping; Principles and Applications, World Scientific Publications , Third Edition, 2010.
2. Reverse Engineering: An Industrial Perspective, Springer- Verlag, 2008. ISBN: 978-1-84628-855-5
3. Ian\_Gibson\_· David\_Rosen, Brent\_Stucker, AdditiveManufacturingTechnologies3D Printing, Rapid Prototyping, andDirect Digital Manufacturing, Springer
4. PaulF. Jacobs, Rapid Prototyping and Manufacturing ASME Press, 1996.

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
CONTROL SYSTEM ENGINEERING  
(Open Elective-I)**

**Code: 8AC46**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objective:** Course Objective is to Study the principles of system modeling, system analysis and feedback control and use them to design and evaluate feedback control systems with desired performance;

**Course Outcomes:**

Students able to understand

1. Learn basic concepts of control systems.
2. Study about time response analysis.
3. Learn basic concepts of stability and root locus method.
4. Study about frequency response analysis.
5. Learn basic concepts stability analysis in frequency domain.
6. Learn fundamentals of state space analysis.

**UNIT – I INTRODUCTION:**

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions – Translational and Rotational mechanical systems

**Transfer function representation:**

Transfer Function of Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

**UNIT-II TIME RESPONSE ANALYSIS:**

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems, PID controllers.

**UNIT – III STABILITY ANALYSIS IN S-DOMAIN:**

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

**Root Locus Technique:** The root locus concept - construction of root loci-effects of adding poles and zeros to  $G(s)H(s)$  on the root loci.

**UNIT – IV FREQUENCY RESPONSE ANALYSIS:**

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

**UNIT – V STABILITY ANALYSIS IN FREQUENCY DOMAIN:**

Polar Plots-Nyquist Plots-Stability Analysis.

**CLASSICAL CONTROL DESIGN TECHNIQUES:** Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain.

**UNIT – VI STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS:**

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and its Properties.

**TEXT BOOKS:**

1. Automatic Control Systems 8th edition –B. C. Kuo 2003– John wiley and sons.
2. Control Systems Engineering – I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2<sup>nd</sup> edition.

**REFERENCES:**

1. Modern Control Engineering – Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3<sup>rd</sup> edition, 1998.
2. Control Systems – N.K.Sinha, New Age International (P) Limited Publishers, 3<sup>rd</sup> Edition, 1998.
3. Control Systems Engg. – NISE 3<sup>rd</sup> Edition – John wiley.

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
DESIGN LITERACY AND DESIGN THINKING  
(Open Elective-I)**

**Code: 8ZC08**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objective:** The objective of the course is to make students understand the fundamental concepts of design thinking, and to familiarize with product design process and to motivate the students to ideate new products and services.

**Course Outcomes:**

1. The students gain the knowledge on the inputs required for design thinking and also gain familiarity on concepts related to design thinking.
2. The students learn the techniques of idea generation
3. The students gain knowledge on different phases of design thinking
4. The students realize the product design process.
5. The students gain familiarity on design thinking for service design.
6. The students gain knowledge on various cases related to design thinking.

**Unit – I: Design Thinking** – Introduction to Design thinking, Principles of design thinking, Benefits of design thinking, Applications of Design thinking, Social Innovation, Impact of Design thinking, Design thinking tools and techniques. Innovation and Design thinking.

**Unit – II: Idea Generation:** New Idea generation methods - Principles of Idea Generation, Techniques, Creativity thinking techniques and tools, types of creative thinking, select ideas from ideation methods.

**Unit – III: Design Thinking Foundations:** The Design Double Diamond: Discover-Define-Develop-Deliver, User-centric design approaches: Importance of user-centricity for design, Empathisation, Empathy Maps, Data collection from users and for users, Data Validation Responsible Innovation and Ethical Design:

**Unit – IV: Product Design Process:** Identification of opportunities, Problem Statement, Product planning, Characteristics of Successful product Development, New product development process, Stanford design thinking iterative model

**Unit – V: Design Thinking for Service Design:** Attributes of a good service design, service design tools – blueprint, customer journey mapping Identifying the user needs in a service-driven economy; Process Flows and Customer Experience considerations for designing and improving services; 5 Why's; Service Delivery Pathways

**Unit – VI: Case Studies on Design thinking:** Case 1: Arcturus IV by John E. Arnold, Case – 2: How can we make AI to make things better for humans. Case – 3: User Centered Helmet Design by Prof. B.K. Chakravarthy- Part 1 and Part 2; Case – 4: Challenges of Reaching a Million Users by Prof. Chetan Solanki and Prof Jayendran V.

**TEXT BOOKS:**

1. Brown, T. (2008). Design thinking. *Harvard business review*, 86(6), 84.
2. "Innovation by Design", Gerald H. (Gus) Gaynor, AMACOM {American Management Association}, NYC, 2002
3. Ansell, C., & Torfing, J. (2014). Collaboration and design: new tools for public innovation. In *Public innovation through collaboration and design* (pp. 19-36). Routledge.
4. Lewrick, M., & Link, P. (2015). Design thinking tools: Early insights accelerate marketers' success. *Marketing Review St. Gallen*, 32(1), 40-51.

**REFERENCES BOOKS:**

1. Mæhlum, A. R. (2017). *Extending the TILES Toolkit-from Ideation to Prototyping* (Master's thesis, NTNU).
2. Norman, D. (2013). *The design of everyday things: Revised and expanded edition*. Basic books.
3. Design Thinking – A primer, Prof: Dr. BalaRamadurai, Indian Institute of Technology, Madras.

**Websites:**

1. [www.smashingmagazine .com](http://www.smashingmagazine.com)
2. [www.ID](http://www.ID)

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
ADVANCED COMPUTER NETWORKS  
(Professional Elective - II)**

**Code: 8EC12**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

*Prerequisite: Data Communications and Computer Networks*

**Course Objectives:**

*This course aims to provide advanced background on relevant computer networking topics to have a comprehensive and deep knowledge in computer networks.*

**Course Outcomes:**

*At the end of this course the student will be able to*

1. *Appraise networking and Internet concepts and be familiar with OSI Model and TCP/IP model.*
2. *Detect networking errors learn correction techniques*
3. *Infer the role of protocols in networking and to analyze the services and features of the various layers in the protocol stack.*
4. *Differentiate Internet addressing IPv4 and IPv6 and Internet protocols*
5. *Conceptualize wireless networking and to Develop new protocols in networking*
6. *Design new virtual private networks*

**UNIT - I: Computer Networks and the Internet:** Introduction to Internet and Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet – **(Chapter 1) of T1.**

**Foundation of Networking Models:** 6-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM - **(Chapter 2) of T2.**

**UNIT - II: The Link Layer and Local Area Networks:** Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, And Ethernet – **(Chapter 6) of T1**

**Unit - III: Routing and Internetworking:** Network-Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer – **(Chapter 7) of T2**

**UNIT - IV: Logical Addressing:** IPv4 Addresses, IPv6 Addresses - **Internet Protocol:** Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – **(Chapter 19, 20) of T3**

**Transport and End-to-End Protocols:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control – **(Chapter 8) of T2**

**Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing – **(Chapter 2) of T1**

**UNIT – V: Wireless Networks and Mobile IP:** Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) - **Mobile Ad-Hoc Networks:** Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks – **Wireless Sensor Networks** and Protocol Structures - **(Chapter 6, 19, 20) of T2**

**UNIT – VI: VPNs, Tunneling and Overlay Networks:** Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – **VoIP and Multimedia Networking:** Overview of IP Telephony – **(Chapters 16, 18) of T2**

**TEXT BOOKS:**

1. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W.Ross, Third Edition, Pearson Education, 2007
2. Computer and Communication Networks, Nader F. Mir, Pearson Education, 2007

**REFERENCES:**

1. An Engineering Approach to Computer Networking , S.Keshav, Pearson Education, 1997
2. Computer Networks: Principles, Technologies And Protocols For Network Design, Natalia Olifer, Victor Olifer, Wiley India, 2006.
3. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall.
4. Fundamentals of Business Data Communications, Jerry FitzGerald and Alan Dennis, Tenth Edition, Wiley, 2009.
5. Campus Network Design Fundamentals, Diane Teare, Catherine Paquet, Pearson Education (CISCO Press)
6. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill, 2007



**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
MACHINE LEARNING  
(Professional Elective - II)**

**Code: 8EC17**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Prerequisite: Introduction to Data Science**

**Course Objectives:**

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To have a thorough understanding of the Supervised and Unsupervised learning techniques
3. To study the various probability based learning techniques
4. To understand graphical models of machine learning algorithms

**Course Outcomes:**

At the end of this course, the student is able to

1. Understand the fundamental concepts of ML and Designing a Learning System.
2. Understand the basic concepts of MLP, RBF and SVM and their applications.
3. Understand the Probability models namely supervised, unsupervised, basic statistics analyze their analysis of algorithms along with their applications.
4. Understand various Dimensionality Reduction Techniques and Apply various Evolutionary Algorithms with models
5. Understand the Graphical models and their applications
6. Understanding Analytical Learning and Analyze KBANN Algorithm.

**UNIT I: INTRODUCTION:**

Learning (Book-1) – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Linear Discriminants: Definitions of Perceptron, Linear Separability Linear Regression.

Design a Learning System (Book-2) – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm.

**UNIT II: LINEAR MODELS:**

Multi-layer Perceptron(Book-1) – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Interpolations and Basis Functions – Support Vector Machines

**UNIT III: TREE AND PROBABILISTIC MODELS:**

Learning with Trees (Book-1) – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms

**UNIT IV: DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS:**

Dimensionality Reduction(Book-1) – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example

**UNIT V: GRAPHICAL MODELS:**

Markov Chain Monte Carlo Methods (Book-1) – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

**UNIT – VI ANALYTICAL LEARNING**

Learning with perfect domain theory (Book-2) – Explanation based Learning – Inductive analytical approach to learning – KBANN algorithm

**TEXT BOOKS:**

1. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.

**REFERENCES:**

1. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.
2. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014
3. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
IMAGE PROCESSING  
(Professional Elective - II)**

**Code: 8FC18**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Prerequisite : Computer Graphics**

**Course Objectives:**

*Make decisions from image data, online inspection and face recognition*

**Course Outcomes:**

*At the end of this course the student will be able to*

- 1. Analyze general terminology of image processing.*
- 2. Examine various types of images, intensity transformations and spatial filtering.*
- 3. Develop Fourier transform for image processing in frequency domain.*
- 4. Evaluate the methodologies for image segmentation, restoration etc.*
- 5. Implement image process and analysis algorithms.*
- 6. Apply image processing algorithms in practical applications.*

**UNIT – I**

**Introduction:** Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system.. Digital Image Fundamentals: A simple image formation model, image sampling and quantization, basic relationships between pixels

**UNIT – II**

**Image enhancement** in the spatial domain: Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods

**UNIT – III**

**Image restoration:** A model of the image degradation/restoration process, noise models, restoration in the presence of noise–only spatial filtering, Weiner filtering, constrained least squares filtering, geometric transforms; Introduction to the Fourier transform and the frequency domain, estimating the degradation function

**UNIT– IV**

**Color Image Processing:** Color fundamentals, color models, pseudo color image processing, basics of full–color image processing, color transforms, smoothing and sharpening, color segmentation.

**UNIT – V**

**Image Compression and Morphology:** Fundamentals, image compression models, error-free compression, lossy predictive coding, image compression standards, Morphological Image Processing: Preliminaries, dilation, erosion, open and closing, hit or miss transformation

**UNIT – VI**

**Image Segmentation and Recognition:** Detection of discontinuous, edge linking and boundary detection, thresholding, region–based segmentation, Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers

**Text Books:**

1. Digital Image Processing, Rafeal C.Gonzalez, Richard E.Woods, Third Edition, Pearson Education/PHI.

**REFERENCE BOOKS:**

1. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
2. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology
3. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S.Publications
4. Digital Image Processing, William K. Prat, Wily Third Edition
5. Digital Image Processing and Analysis, B. Chanda, D. Datta Majumder, Prentice Hall of India, 2003

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
C# .NET FRAMEWORK  
(Professional Elective - II)**

**Code: 8FC26**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

*Prerequisite: Object Oriented Programming through Java*

**COURSE OBJECTIVES:**

*Understand .NET Interoperation services. Learn Client side programming and Server side architectures and programming technologies, .NET Remoting. Understand the significance of Web services and web service security, the importance of RESTful, SOAP, DISCO, and UDDI and Web Services.*

**COURSE OUTCOMES:**

*At the end of this course, students will able to*

- 1. Introducing .Net Architecture and learn basic programming in C# and the object oriented programming concepts.*
- 2. Explain advance features and enhance skills in writing windows applications, ADO.NET and ASP.NET.*
- 3. Discuss various class libraries for different applications and data manipulation functions.*
- 4. Understand the advanced concepts in data connectivity, WPF, WCF and WWF with C# and .NET 4.5.*
- 5. Develop distributed applications using .NET Framework.*
- 6. Create mobile applications using .NET compact Framework.*

**UNIT I: INTRODUCTION TO C#**

Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.

**UNIT II : OBJECT ORIENTED ASPECTS OF C#**

Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

**UNIT III : APPLICATION DEVELOPMENT ON .NET**

Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box (Modal and Modeless), accessing data with ADO.NET, Dataset, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration.

**UNITIV: WEB BASED APPLICATION DEVELOPMENT ON .NET**

Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web. config, web services.

**UNIT V: SQL Connection: Passing** datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.

**UNIT VI : CLR AND .NET FRAMEWORK**

Assemblies, Versioning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, remoting, security.

**TEXT BOOKS:**

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.

**REFERENCES BOOKS:**

1. Andrew Troelsen , “Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.
2. Ian Griffiths, Matthew Adams, Jesse Liberty, “Programming C# 4.0”, Sixth Edition, O’Reilly, 2010.

**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
ANALOG AND MIXED SIGNAL DESIGN  
(Professional Elective - II)**

Code: 8C623

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 3 | 0 | 0   | 3 |

**Course Objectives:**

This course will introduce design and analysis of mixed-signal integrated circuits. Apply principles of hierarchical mixed signal CMOS VLSI, from the transistor up to the system level, to the understanding of CMOS circuits and systems

**Course Outcomes:** After studying this course, the students will be able to

|     |                                                                                   |
|-----|-----------------------------------------------------------------------------------|
| CO1 | Understand the concepts of Switched capacitors Circuits                           |
| CO2 | know the concepts of PLLS                                                         |
| CO3 | study concepts of Data Converter Fundamentals                                     |
| CO4 | Explore the concepts of Nyquist Rate A/D Converters and develop its applications  |
| CO5 | Understand concepts of the Oversampling Converters and Continuous-Time Filters    |
| CO6 | Understand concepts of concepts of Continuous-Time Filters, CMOS Trans conductors |

**Mapping of Course Outcomes with Program Outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |
| CO2     | 3   | 3   | 3   | 3   | 3   |     |     |     | 3   |      |      | 3    | 3    | 3    | 3    |
| CO3     |     |     |     |     |     |     |     |     |     |      |      |      |      |      |      |
| CO4     | 3   | 3   | 3   | 3   | 3   |     |     |     | 3   |      |      | 3    | 3    | 3    | 3    |
| CO5     | 3   | 3   | 3   | 3   | 3   |     |     |     | 3   |      |      | 3    | 3    | 3    | 3    |
| CO6     | 3   | 3   | 3   | 3   | 3   |     |     |     | 3   |      |      | 3    | 3    | 3    | 3    |
| Overall | 2   | 2   | 2   | 2   | 2   |     |     |     | 2   |      |      | 2    | 2    | 2    | 2    |

**UNIT I**

**Switched Capacitor Circuits:** Introduction to Switched Capacitor circuits basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, Biquad filters.

**UNIT II**

**Phased Lock Loop (PLL):** Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non idealities, Jitter in PLLs, Delay locked loops, applications.

**UNIT III**

**Data Converter Fundamentals:** DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters.

**UNIT IV**

**Nyquist Rate A/D Converters:** Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

**UNIT V**

**Oversampling Converters:** Noise shaping modulators, Decimating filters and Interpolating filters, Higher order modulators, Delta sigma modulators with multi-bit quantizers, Delta sigma D/A.

**UNIT VI**

**Continuous-Time Filters:** Introduction to Gm-C Filters, Bipolar Trans conductors, CMOS Trans conductors Using Triode and Active Transistors, Bi CMOS Tran conductors, MOSFET-C Filters.

**TEXT BOOKS:**

1. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition, 2002
2. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013

**REFERENCE BOOKS:**

1. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.
2. CMOS Analog Circuit Design –Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.



**Syllabus for B. Tech III Year II semester  
Electronics and Computer Engineering  
EMBEDDED C PROGRAMMING  
(Professional Elective - II)**

**Code: 8C624**

**L T P/D C  
3 0 0 3**

**Course Objectives:**

*The objectives of this course are*

- *To provide basic knowledge in embedded system design using Embedded C.*
- *To make the learners understand concept and applications of Embedded C Programming in various fields including industrial automation..*

**Course Outcomes:** *After studying this course, the students will be able to*

|     |                                                                                                                         |
|-----|-------------------------------------------------------------------------------------------------------------------------|
| CO1 | <i>Demonstrate the use of development software for a particular application and choosing appropriate OS.</i>            |
| CO2 | <i>Understanding and building basic embedded system using 8051. Understanding its design</i>                            |
| CO3 | <i>Design of embedded systems and implementation of switch reading.</i>                                                 |
| CO4 | <i>Demonstrate the concepts of OOP's theory inheritance and functions in embedded C to support modular programming.</i> |
| CO5 | <i>Learning the need for realtime implementation in Embedded C..</i>                                                    |
| CO6 | <i>Case study of 'Intruder Alarm" teachihve real time hands on.</i>                                                     |

**Mapping of Course Outcomes with Program Outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    |      |
| CO2     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO3     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO4     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO5     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 3    |
| Overall |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    | 3    |

**Syllabus Content**

**UNIT – I:**

**Programming Embedded Systems in C**

Introduction ,What is an embedded system, Which processor should you use, Which programming language should you use, Which operating system should you use, How do you develop embedded software, Conclusions

**UNIT – II:**

**Introducing the 8051 Microcontroller Family**

Introduction, What's in a name, The external interface of the Standard 8051, Reset requirements ,Clock frequency and performance, Memory issues, I/O pins, Timers, Interrupts, Serial interface, Power consumption ,Conclusions

**UNIT – III:****Reading Switches**

Introduction, Basic techniques for reading from port pins, Example: Reading and writing bytes, Example: Reading and writing bits (simple version), Example: Reading and writing bits (generic version), The need for pull-up resistors, Dealing with switch bounce, Example: Reading switch inputs (basic code), Example: Counting goats, Conclusions

**UNIT – IV:****Adding Structure to the Code**

Introduction, Object-oriented programming with C, The Project Header (MAIN.H), The Port Header (PORT.H), Example: Restructuring the ‘Hello Embedded World’ example, Example: Restructuring the goat-counting example, Further examples, Conclusions

**UNIT – V:****Meeting Real-Time Constraints**

Introduction, Creating ‘hardware delays’ using Timer 0 and Timer 1, Example: Generating a precise 50 ms delay, Example: Creating a portable hardware delay, Why not use Timer 2?, The need for ‘timeout’ mechanisms, Creating loop timeouts, Example: Testing loop timeouts, Example: A more reliable switch interface, Creating hardware timeouts, Example: Testing a hardware timeout, Conclusions

**UNIT – VI:****Case Study: Intruder Alarm System**

Introduction, The software architecture, Key software components used in this example, running the program, the software, Conclusions

**TEXT BOOKS:**

1. Embedded C - Michael J. Pont, 2<sup>nd</sup> Ed., Pearson Education, 2008

**REFERENCE BOOKS:**

1. PICmicro MCU C-An introduction to programming, The Microchip PIC in CCS C - Nigel Gardner

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
EMBEDDED AND REAL TIME SYSTEMS**

Code: 8D706

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Course Objective** - In this course the student will learn about

- i. Embedded System design process using ARM Processor
- ii. ARM interfacing with various bus protocols
- iii. Concepts and constraints related to real-time systems

**Course Outcomes** - After completing this course, student should be able to

- i. Identify and summarize the characteristics and challenges of designing an embedded system
- ii. Utilize and apply ARM architecture for Embedded System Design
- iii. ARM Architecture and Programming (Assembly and C)
- iv. Design simple input output hardware interfaces using ARM
- v. Explain the concepts and design requirements related to a real time systems
- vi. Getting embedded software into target system – Debugging

**UNIT – I**

Embedded Systems and its Applications: Embedded System Design Process, Design challenge, Applications of Embedded Systems (Chapter 1 Vahid) ARM Architectures: ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families (Chapter 1 & 2 Andrew N. Sloss)

**UNIT – II**

ARM Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions. (Chapter 3 Andrew N. Sloss)

**UNIT-III**

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions (Chapter 4 Andrew N. Sloss)

**UNIT – IV**

ARM Programming: Simple C programs using function calls, pointers, structures, integer and floating point Arithmetic, Assembly code using instruction scheduling, Register Allocation, Conditional Execution and Loops.(chapter 5 Andrew N. Sloss)

**UNIT – V**

Interfacing with ARM: LCD Interfacing, Stepper Motor Interfacing, DC motor Interfacing Using PWM, I2C and SPI protocol.

Networked Embedded Systems: Bus Protocols, I2C bus, CAN bus, SPI protocol, Ethernet Enabled Systems, Design Example- Elevator Controller. (chapter 8 Wolf)

**UNIT – VI**

Introduction to Real-Time Systems: Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment Basic Design Using a Real-Time Operating System: Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS uC-OS / Vx-Works / RT Linux;

**TEXT BOOKS:**

1. Computers and Components: principles of embedded computing system design, Wayne Wolf, Elsevier.
2. Embedded System Design – A Unifies Hardware/Software introduction - Frank Vahid, Tony D. Givargis, John Wiley, 2002.
3. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier
4. An Embedded Software Primer, David E. Simon, Pearson Education.
5. ARM reference manual.

**REFERENCES:**

1. Embedded Systems, Raj Kamal, TMH.
2. LPC2148 ARM7 Microcontroller Manual.
3. ARM Microcontroller Interfacing Hardware and Software, Warwick A Smith, Elkator
4. ARM Microcontroller Part1: 35 Projects for Beginners, Bert Van Dam, Elkator

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
VLSI DESIGN**

Code: 8D707

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Course Objective** - In this course the student will learn about

- i. IC fabrication process of various technologies and to understand the electrical properties of MOS transistor.
- ii. Various Layers and layouts for a different technology design rules and how scaling impacts its performance.
- iii. Design of various combinational and sequential circuits using MOS transistors and about CMOS testing

**Course Outcomes** - After completing this course, student should be able to

- i. Understand the existing device technologies and IC fabrication process
- ii. Explore and analyze the electrical properties of MOS device & Inverter design and analysis
- iii. Do physical design of basic logic gates, combinational and sequential circuits
- iv. Analyze the parasitic effect on IC power and performance
- v. Design memory cells and basic data-path units
- vi. Explore on the need for testing and design verification of VLSI circuits.

**UNIT I****INTRODUCTION TO MOS TECHNOLOGIES:** MOS, PMOS, NMOS, CMOS & BiCMOS**INTRODUCTION TO IC TECHNOLOGY AND FABRICATION PROCESS:** VLSI Design Flow, Oxidation, Lithography, Diffusion, Ion Implantation, Metallisation, Encapsulation, Probe testing, Integrated Resistors and Capacitors [T1-CH1, 2 & 3].**Application** – CMOS IC Manufacturing**UNIT II****BASIC ELECTRICAL PROPERTIES:** Basic Electrical Properties of MOS and BiCMOS Circuits:  $I_{ds}$ - $V_{ds}$  relationships, MOS transistor threshold Voltage,  $g_m$ ,  $g_{ds}$ , Figure of Merit ( $\omega_o$ ),  $Z_{pu}/Z_{pd}$ , Latch-Up in CMOS, Pass Transistors [T1-CH2]**INVERTERS:** NMOS Inverter, Various Pull-Ups, CMOS Inverter Analysis and Design, Bi-CMOS Inverters [T1-CH2]**UNIT III****CIRCUIT DESIGN PROCESSES:** MOS Layers, Stick Diagrams, Lambda-based CMOS Design rules for Wires, Contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling. [T1-CH3]**GATES:** CMOS Logic Gates and Structures, Switch logic, Layout Diagrams Gates [T1-CH5]**Application** – IC Physical Design – NAND and NOR**UNIT IV****DELAYS:** Sheet Resistance  $R_s$  and its concept to MOS, Area Capacitance Units, Calculations -  $\square C_g$ ,  $\tau$ -Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out [T1- CH 4 & 5, T2-CH4]**UNIT V****MEMORY AND SUBSYSTEM DESIGN:** Latches and Registers [T2-CH7], Clocking strategies (Single Phase) [T1-CH5.5], Memory cells (SRAM & DRAM), Adders, Shifter, Multipliers and ALUs [T1- CH8]**Applications** – SRAM Based FPGAs and Multiply and Accumulate (MAC) Units**UNIT VI****INTRODUCTION TO CMOS TESTING:** CMOS Testing, Need for testing, Test Principles, Design Strategies for Test, Chip level Test Techniques, System-level Test Techniques [T1-CH7]**Applications** – Implementation of basic ATPG

**TEXTBOOKS:**

1. Principles of CMOS VLSI Design - Weste and Eshraghian, Pearson Education, Second Edition, 2009.
2. Digital Integrated Circuits: A Design Perspective - John M. Rabaey, 2/E, 2002

**REFERENCES:**

1. Chip Design for Submicron VLSI: CMOS Layout & Simulation, - John P. Uyemura, Thomson Learning.
2. Introduction to VLSI Circuits and Systems - John .P. Uyemura, JohnWiley, 2003.
3. Essentials of VLSI circuits and systems – Kamran Eshraghian, EshraghianDouglas and A. Pucknell, PHI, 2005 Edition.
4. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
5. VLSI Technology – S.M. SZE, 2<sup>nd</sup> Edition, TMH, 2003.

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
PRINCIPLES AND TECHNIQUES OF ARTIFICIAL INTELLIGENCE**

**Code: 8D715**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 1 | 0   | 3 |

**Course Objectives:**

1. Understand basic principles of AI toward problem solving, inference and perception.
2. Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information.
3. Assess the ability to apply knowledge representation, problem solving and learning techniques to real-world problems.

**Course Outcomes:**

At the end of this course, the student is able to

1. Understand the different types of AI agents.
2. Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms).
3. To understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving.
4. Know how to build simple knowledge-based systems with various AI concepts and analyze results.
5. Elucidate the basic knowledge representation and learning methods of Artificial Intelligence.
6. Create interactive and rational system using appropriate learning techniques also, to measure the efficiency of the expert system.

**UNIT I**

**Introduction:** AI problems, Intelligent agents: Agents and Environments, Rationality, Nature of environments, Structure of agents, Problem solving agents, Problem formulation – Planning Application – Classical Planning problem.

**UNIT II**

**Searching and Game Theory:** Searching for solutions, Searching with partial information (Heuristic search), Greedy best first search, A\* search Constraint Satisfaction problem -Game Playing: Adversarial search: Games, Minimax algorithm, Optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions.

**UNIT III**

**Knowledge Representation and Reasoning:** Logical Agents, Knowledge Based Agents, Propositional logic, Resolution patterns in propositional Logic, First order logic, Inference in first order logic, propositional vs. First order inference, Unification and Lifting, Forward chaining, Backward chaining, Resolution.

**UNIT IV**

**Uncertain Knowledge and Reasoning:** Bayes Rule, Concepts of Time and Uncertainty, Utility Functions, Value of Information, Value iteration, Policy iteration, Partially Observable MDP.

**UNIT – V****LEARNING SYSTEMS**

Machine learning, Forms of Learning – Types - Supervised, unsupervised, reinforcement learning, Learning Decision Trees, soft computing- Artificial Neural Network.

**UNIT VI****EXPERT SYSTEMS & ANN**

Introduction to Expert Systems- Architecture, Reasoning, and explanation-Knowledge Acquisition-Introduction to Natural Language Processing-Morphological Analysis-Syntax Analysis-Semantic Analysis.

**TEXT BOOKS**

1. Stuart Russell and Peter Norvig Artificial Intelligence - A Modern Approach, Prentice Hall, 3rd edition, 2011.
2. David L. Poole and Alan K. Mackworth, —Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.
3. Artificial Intelligence, 3<sup>rd</sup> Edition, Patrick Henry Winston, Pearson Education, 1992.

**REFERENCE BOOKS**

1. M. Tim Jones, —Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008.
2. Nils J. Nilsson, —The Quest for Artificial Intelligence, Cambridge University Press, 2009.
3. William F. Clocksin and Christopher S. Mellish, Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003.
4. Gerhard Weiss, —Multi Agent Systems, Second Edition, MIT Press, 2013.
5. Deepak Khemani, “A First Course in Artificial Intelligence”, McGraw Hill Education, 2013.
6. Bratko, —Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.



**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
EMBEDDED SYSTEMS LAB**

**Code: 8DC67**

| L | T | P/D | C |
|---|---|-----|---|
| 0 | 0 | 2   | 1 |

**Lab Objective** - *In this lab the student will learn about*

- i. *ARM Architecture and Programming (Assembly and C)*
- ii. *ARM interfacing with various bus protocols*
- iii. *Concepts and constraints related to real-time systems*
- iv. *Developing innovative projects*

**Lab Outcome:**

- *After completion of this course, the student should be able to design simple input output hardware interfaces using ARMLPC2148*

**CYCLE – I : Experiments based on ARM LPC2148 Microcontrollers**

1. Serial Data Transmission using ARM microcontroller in different modes.
2. LCD interface to ARM.
3. ADC, DAC interface based experiment utilizing internal ADC & DAC for ARM Microcontroller.
4. DC Motor Speed Control using PWM using ARM 7.

**CYCLE – II : Experiments using I<sup>2</sup>C, SPI serial communication using ARM Microcontroller**

5. Program to demonstrate I<sup>2</sup>C interface serial EEPROM.
6. Program to demonstrate SPI interface for SD-MMC card interface.
7. Porting of RTOS on ARM Microcontroller.
8. Experiments based on RTOS: sending a message to PC through serial port by 3 different tasks on priority bases.
9. Case study on Embedded Linux/Vx-Works/  $\mu$ COS- II
10. Case study on Cross Compiler/Assembler tools.

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
VLSI LAB**

**Code: 8DC68**

| L | T | P/D | C |
|---|---|-----|---|
| 0 | 0 | 2   | 1 |

**Lab Objective:**

- To familiarize students with VLSI CAD Tools (Xilinx, Microwind and NG SPICE).
- To make students understand and implement digital logic gates and circuits using SPICE and Verilog HDL.
- To introduce the student to physical design by implementing layouts using Microwind.
- To make students implement combinatorial and sequential designs on FPGA boards (SPARTAN 3) using Xilinx tools.

**Lab Outcome:**

- This course provides the design of various digital circuits using different VLSI simulation software tools like Xilinx and Microwind. The outcomes of this course (i) to learn Verilog HDL and implement digital circuits on FPGA using Xilinx tools. (ii) To draw and simulate layout for digital logic gates using Micro-wind tool

**Tools to be used:** Xilinx, MicorWind**Part-A**

1. Introduction to Microwind and Analysis of CMOS 0.25micron Technology MOSFETs
2. CMOS 0.25 micron Technology Inverter Characteristics and layout in Microwind
3. Layout of Basic Gates and a Complex Gate using CMOS 0.25 and layout in Microwind
4. Layout of Multiplexers

**Part-B****COMBINATIONAL LOGIC****1. Implementation of Logic Gates****2. Implementation of Adders**

- A) Half Adder
- B) Full Adder
- C) Binary Adder

**3. Implementation of Encoder and Decoder**

- a) Implementation of 8-3 Encoder
- b) Implementation of 3-8 Decoders

**4. Implementation of Multiplexer and Demultiplexer**

- a) Implementation of 8x1 multiplexer
- b) Implementation of 1x8 demultiplexer

**5. Implementation of code converters (gray to binary and binary to gray, excess-3)****6. Implementation of ALU****SEQUENTIAL LOGIC****7. Implementation of Flip-flops**

- a) D- FLIPFLOP
- b) T- FLIPFLOP
- c) JK -FLIPFLOP
- d) RS -FLIPFLOP

**8. Implementation of Counters****9. Implementation of 8-Bit Shift Register****10. Implement Complex memory modules - RAM, FIFO, and LIFO****Part-C Lab Project –**

1. FPGA based traffic light controller using Verilog HDL
2. FPGA based Beverage Vending Machine
3. FPGA based UART serial communication interface
4. Implement 8-bit 3-stage pipeline processor

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LAB**

**Code: 8DC69**

| L | T | P/D | C |
|---|---|-----|---|
| 0 | 0 | 4   | 2 |

**Course objectives:** This course will enable students to

1. Make use of Data sets in implementing the machine learning algorithms
2. Implement the machine learning concepts and algorithms in any suitable language of choice.
3. Understand the concept of Artificial intelligence.
4. Apply various search algorithms of artificial intelligence.

**COURSE OUTCOMES**

After studying this course, the students will be able to

1. Understand the implementation procedures for the machine learning algorithms
2. Design Java/Python programs for various Learning algorithms.
3. To apply knowledge representation and reasoning techniques.
4. Implement uninformed and informed search to solve the search problems.
5. Identify and apply Machine Learning algorithms and AI techniques to solve real world problems

**List of Experiments:**

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a CSV file.
2. Write a program to implement k-Nearest Neighbor algorithm to classify the iris dataset. Print both correct and wrong predictions Python MLlibrary classes can be used for this problem.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Implement an AI program to implement Breadth first search and Depth First search.
7. Implement an AI program on 8-Puzzle problem using A\*.
8. Implement an AI program for Alpha beta pruning.
9. Implement an AI program on 8-Puzzle problem using A\*
10. Write a Program to Implement Tic-Tac-Toe game.
11. Implement an AI program for Water jug problem.
12. Write a Program to Implement Monkey Banana Problem.

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
SUMMER INDUSTRY INTERNSHIP – II**

Code: 8D781

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 0 | 0 | 0   | 1 |

**Course Objective:**

To enhance the knowledge on selecting a project learn related tools and enhance programming and communication skills for employability.

**Pre-Requisites:** All Courses till this semester

**Course Outcomes:**

*At the end of this course, the student will be able to*

- Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
- Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
- Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
- Improve their communicative skills and team skills largely improve.
- Work as an individual and in a team.

A group project shall be carried out by a group of students consisting of 2 to 3 in number in third year first semester. This work shall be carried out under the guidance of the faculty assigned as internal guide and shall involve design, fabrication, software development or any other significant activity. This can be of interdisciplinary nature also.

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external

**The internal evaluation shall consist of: 30 Marks**

| Sl. No | Description                                                                                                                                            | Marks           |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 1      | Abstract, Design, implementation and Presentation in front of Project Review Committee consisting of HoD, Senior faculty and Internal guides (Average) | 15 marks        |
| 2      | Report                                                                                                                                                 | 05 marks        |
| 3      | Evaluation by Internal Guide                                                                                                                           | 10 marks        |
|        | <b>Total sessional marks</b>                                                                                                                           | <b>30 marks</b> |

**The internal evaluation shall consist of: 70 Marks**

| Sl. No | Description                      | Marks           |
|--------|----------------------------------|-----------------|
| 1      | Final report                     | 10 marks        |
| 2      | Presentation                     | 10 marks        |
| 3      | Demonstration/defence of project | 50 marks        |
|        | <b>Total sessional marks</b>     | <b>70 marks</b> |

The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the supervisor.

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
BLOCK CHAIN TECHNOLOGIES  
(Professional Elective-III)**

**Code: 8EC13**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

*Prerequisite: Information Security*

**Course Objectives:**

*By the end of the course, students will be able to understand how blockchain systems (mainly Bitcoin and Ethereum) work, To securely interact with them, Design, build, and deploy smart contracts and distributed applications, Integrate ideas from blockchain technology into their own projects.*

**Course Outcomes:**

*At the end of this course the student will be able to*

- 1. Understand the principles of HDFS and digital signature.*
- 2. Explore the blockchain Technology, Simplified Payment Verification protocol and its life cycle.*
- 3. Analyze the Nakamoto consensus and differentiate proof-of-work and proof-of-stake consensus algorithms.*
- 4. Understand the working of crypto currency, Bitcoin and Ethereum.*
- 5. Explore Applications on legal issues of blockchain.*
- 6. Explore new trends in blockchain technologies.*

**UNIT I:Basics:** Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete.  
**Cryptography:** Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

**UNIT II: Blockchain:** Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.

**UNIT III:** Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

**UNIT IV:** Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin

**UNIT V:** Cryptocurrency Regulation: Stakeholders, Roots of Bitcoin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

**UNIT VI - (Trends and Topics) -** Zero Knowledge proofs and protocols in Blockchain - Succinct non interactive argument for Knowledge (SNARK) - pairing on Elliptic curves - Zcash.

**TEXT BOOK:**

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

**REFERENCES:**

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger, "Yellow paper.2014.
4. Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, A survey of attacks on Ethereum smart contracts

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
DATABASE SECURITY  
(Professional Elective-III)**

**Code: 8EC21**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Prerequisite:** Database Management System, Information Security

**Course Objective:**

Get familiarity of database security concepts and techniques and describe new directions of database security in the context of Internet information management with respect to database application security models, database access control policies, mechanisms and intrusion detection systems.

**Course Outcomes:**

At the end of the course, the student will be able to

1. Comprehend the various access control rules available to assign privileges and protect data in databases.
2. Differentiate popular Security Models.
3. Categorize the security mechanisms and their functions.
4. Identify the Security Software Design principles to protect data in databases.
5. Classify and compare the Statistical Database Protection & Intrusion Detection Systems.
6. Study the new models of database systems and the models of protection.

**UNIT - I**

**Introduction:** Introduction to Databases, Security Problems in Databases, Security Controls Conclusions.

**UNIT - II**

**Security Models:** Introduction Access Matrix Model, Take-Grant Model, Acten Model, PN Model, Hartson and Hsiao's Model, Fernandez's Model, Bussolati and Martella's Model for Distributed databases, Bell and LaPadula's Model, Biba's Model, Dion's Model, Sea View Model, Jajodia and Sandhu's Model, The Lattice Model for the Flow Control.

**UNIT - III**

**Security Mechanisms:** Introduction User Identification/Authentication, Memory Protection, Resource Protection, Control Flow Mechanisms, Isolation Security Functionalities in Some Operating Systems, Trusted Computer, System Evaluation Criteria.

**UNIT - IV**

**Security Software Design:** Introduction, A Methodological Approach to Security. Software Design, Secure Operating System, Design Secure DBMS Design, Security Packages, Database Security Design.

**UNIT - V**

**Statistical Database Protection & Intrusion Detection Systems:** Introduction Statistics Concepts and Definitions, Types of Attacks, Inference Controls Evaluation Criteria for Control Comparison, Introduction IDES System, RETISS System, ASES System, Discovery.

**UNIT -VI**

**Models for the Protection of New Generation Database Systems:** Introduction, A Model for the Protection of Frame Based Systems, A Model for the Protection of Object- Oriented Systems , SORION Model for the Protection of Object-Oriented Databases, A Model for the Protection of New Generation Database Systems, The Orion Model Jajodia and Kogan's Model, A Model for the Protection of Active Databases.

**Textbooks:**

1. S. Castano, M. Fugini, G. Martella, P. Samarati (eds.), Database Security, Addison- Wesley, 1994.

**REFERENCES:**

1. RonBenNatan, Implementing Database Security and Auditing, Elsevier, Indian reprint 2006
2. Michael Gertz, Sushil Jajodia, Handbook of Database Security : Applications and Trends, Springer,2008

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
BIG DATA ANALYTICS  
(Professional Elective-III)**

**Code: 8EC18**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

*Prerequisites: Machine Learning***Course Objectives:**

1. To explore the fundamental concepts of big data analytics.
2. To understand storage and parallel processing of Big Data using Hadoop
3. To introduce programming tools like HIVE, SQOOP, HBASE in Hadoop ecosystem.
4. To understand the applications using Apache Spark RDD Concepts.
5. To know high level API like Data Frames and Spark SQL
6. To teach the fundamental techniques and principles in achieving big data analytics with stream processing.

**Course Outcomes:***At the end of this course, the student will be able to*

1. Comprehend the fundamentals of big data analytics and understand how Hadoop solves the big data problem in real life.
2. Interpret the challenges with big data and elaborate the knowledge about the technological developments in big data environment.
3. Demonstrate the difference between NOSQL and SQL databases.
4. Discuss the Hadoop distributed file system (HDFS) framework and anatomy of Hadoop map-reduce.
5. Design the algorithms to process big data using Apache Spark Low Level API.
6. Apply Hadoop Data Analysis to social Media Analytics and Opinion Mining on Tweets.

**UNIT- I:**

Introduction to Big Data: Big Data Analytics, Characteristics of Big Data – The Four Vs, importance of Big Data, Different Use cases, Data-Structured, Semi-Structured, Un-Structured  
Introduction to Hadoop and its use in solving big data problems. Comparison Hadoop with RDBMS, Brief history of Hadoop, Apache Hadoop EcoSystem, Components of Hadoop, The Hadoop Distributed File System (HDFS):, Architecture and design of HDFS in detail, Working with HDFS (Commands)

**UNIT-II**

Anatomy of Hadoop map-reduce (Input Splits, map phase, shuffle, sort, combiner, reduce phase) (theory)  
Hive:Introduction to Hive, data types and file formats, HiveQL data definition(Creating Databases and Tables),HiveQL for Data loading, HiveQL data manipulation, Logical joins, Window functions, Optimization, Table partitioning, Bucketing, Indexing, Join Strategies.

**UNIT-III**

SQOOP : Introduction to SQOOP, SQOOP imports : From Database to HDFS/Hive, SQOOP exports: From HDFS/Hive to Database, Incremental imports  
NoSQL &HBase: Overview, HBasearchitecture, CRUD operations

**UNIT-IV**

SPARK Basics: History of Spark, Spark Architecture, Spark Shell,Working with RDDs in Spark:RDD Basics, Creating RDDs in Spark. RDD Operations. Passing Functions to Spark, Transformations and Actions in Spark, Spark RDD Persistence  
Working with Key/Value Pairs : Pair RDDs, Transformations on Pair RDDs, Actions Available on Pair RDDs



**UNIT-V**

Structured API :DataFrames,SQL : Overview of Structured Spark Types, Schemas, Columns and Expressions, DataFrame Transformations, Working with different types of data, Aggregations- Aggregation Functions, Grouping, User-Defined Aggregation Functions, Joins-Inner Joins, Outer Joins, Processing CSV Files, JSON Files, Text Files and Parquet Files, Spark SQL

**UNIT-VI**

Spark streaming:Stream Processing Fundamentals, Structured Streaming Basics - Core Concepts, Structured Streaming in Action, Transformations on Streams, Input and Output(Kafka)  
Case study: Twitter Stream processing application

**TEXT BOOKS:**

1. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley,2012
2. SPARK: The Definitive Guide, Bill Chambers & Matei Zaharia, O'Reilley, 2018 Edition

**REFERENCES:**

1. "Hadoop Operations", O'Reilley, Eric Sammer,2012
2. "ProgrammingHive",O'Reilley,E.Capriolo,D.Wampler,andJ.Rutherglen, 2012
3. "HBase: The Definitive Guide", O'Reilley, Lars George,2011
4. Big Data, Big Analytics: Emerging, Michael Minnelli, Michelle Chambers, and AmbigaDhiraj

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
COMPUTER VISION  
(Professional Elective-III)**

**Code: 8FC19**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

*Prerequisite: Image Processing***Course Objectives:**

*In this course students will learn basic principles of image formation, image processing algorithms and different algorithms for 3D reconstruction and recognition from single or multiple images (video). This course emphasizes the core vision tasks of scene understanding and recognition. Applications to 3D modeling, video analysis, video surveillance, object recognition and vision based control will be discussed.*

**Course Outcomes:**

*After learning the course the students should be able to:*

- 1. Understand the basic fundamentals of computer vision and diversity of computer vision applications*
- 2. Explore the various camera models, multi view geometry, structures and generate 3D model from images*
- 3. Analyze and apply image preprocessing, continuous and discrete representation methods and feature extraction techniques*
- 4. Apply regularization theory, optical communication, stereo vision, and motion estimation techniques to detect moving objects in a video*
- 5. Illustrate different image shape representations and understand Fourier and wavelet descriptors and segmentation methods*
- 6. Understand various object recognition methods, Hough transforms and illustrate shape matching*

**UNIT 1:**

Introduction : Computer Vision and Computer Graphics , What is Computer Vision - Low-level, Mid-level, High-level , Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia.

**UNIT 2:**

Image Formation Models : Monocular imaging system , Radiosity: The ‘Physics’ of Image Formation, Radiance, Irradiance, BRDF, color etc, Orthographic & Perspective Projection, • Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading , Photometric Stereo, Depth from Defocus , Construction of 3D model from images

**UNIT 3:**

Image Processing and Feature Extraction: Image preprocessing, Image representations (continuous and discrete), Edge detection

**UNIT 4:**

Motion Estimation: Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion

**UNIT 5:**

Shape Representation and Segmentation: Contour based representation, Region based representation, Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multire solution analysis

**UNIT 6:**

Object recognition: Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Shape priors for recognition

**Text books:**

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.

**Reference Books:**

1. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
2. D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs, 1982.
3. Richard Szeliski, Computer Vision: Algorithms and Applications (CVAA). Springer, 2010
4. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
4. E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012
5. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012
6. Mark Nixon and Alberto S. Aquado, Feature Extraction & Image
7. Processing for Computer Vision, Third Edition, Academic Press, 2012

**List of Open Source Software/learning website:**

1. Computer Vision. Ballard and Brown
2. Invitation to 3D Vision: From Images to Geometric Models: Y. Ma, S. Soatto, J. Kosecka and Sastry

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
EMBEDDED SYSTEM DESIGN USING ARM  
(Professional Elective-III)**

**Code: 8C730**

**L    T    P/D    C**  
**3    0    0    3**

On completion of this course you should be able to:

1. Understand the basic architecture of Embedded System and their classification.
2. Explore the architecture of ARM processor.
3. Understand the addressing modes and data processing instructions of ARM processor.
4. Understand the ARM thumb instruction set and its capabilities.
5. Use both assembly and C language based ARM programming and Explore the memory management techniques in ARM.

**Mapping of Course Outcomes with Program Outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    |      |
| CO2     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO3     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO4     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO5     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 3    |
| Overall |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    | 3    |

**UNIT-I**

**Introduction to embedded system:**

Embedded system architecture, classifications of embedded systems, challenges and design issues in embedded systems, fundamentals of embedded processor and microcontrollers, CISC vs. RISC, fundamentals of VonNeuman/Harvard architectures, types of microcontrollers, selection of microcontrollers.

**UNIT –II:**

**ARM Architecture:**

ARM Design Philosophy, Registers, Program Status Register, Instruction Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

**UNIT –III:**

**ARM Programming Model – I:**

Instruction Set: Data Processing Instructions, Addressing Modes, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

**UNIT –IV:**

**ARM Programming Model – II:**

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

**UNIT –V:**

**ARM Programming:**

Simple C Programs using Function Calls, Pointers, Structures, Integer and Floating Point Arithmetic, Assembly Code using Instruction Scheduling, Register Allocation, Conditional Execution and Loops.

**UNIT –VI:**

**Memory Management:**

Cache Architecture, Policies, Flushing and Caches, MMU, Page Tables, Translation, Access Permissions, Context Switch.

**TEXT BOOKS:**

1. ARM Systems Developer's Guides- Designing & Optimizing System Software – Andrew N. Sloss, Dominic Symes, Chris Wright, 2008, Elsevier.

**REFERENCE BOOKS:**

Embedded Microcomputer Systems, Real Time Interfacing – Jonathan W. Valvano – Brookes / Cole, 1999, Thomas Learning.

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
VLSI PHYSICAL DESIGN  
(Professional Elective-III)**

**Code: 8C729**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

This course is introduced to help VLSI career aspirants in the field of VLSI Physical Design. It covers complete details from VLSI design specification till VLSI IC physical design flow, helps to acquire sufficient skills as needed by Industry.

Course modules cover industry needed in depth knowledge to handle challenges in VLSI Back EndFlow. Students will learn complete knowledge from netlist to GDS2, by working on advanced lower nanometer technology nodes.

The course will benefit VLSI Engineers seeking to enter into VLSI backend design job. In this role engineers will be working for Block & full chip level Physical Design Implementation. The main focus of the course is to make students understand physical design of IC from netlist through GDSII, creating physical layout representation for each logical functions within blocks to enable IC fabrication process. Through this course emphasis will be given on learning through practical backed by theoretical concepts taught during class room & extended lab sessions.

**Prerequisite Courses** - Digital Logic Design, VLSI and Digital Design Through Verilog

**CAD Tool** - Cadence - Innovus, Tempus, Genus, Xcelium, and Others..

**Units 1 - Introduction**

Overview of ASIC/SOC design flow, Digital Design Concepts and Physical Design flow setup. Review of ASIC fundamentals & fabrication methodologies. Design Strategies - a) Simulation and synthesis issues, b) RTL design strategies, c) Static timing analysis.

**Units 2 - Design Standard Cell Libraries**

Design of combinational circuits, Implementation and analysis of combinational circuits like, adders, comparator, multiplier etc., Design of sequential circuits (Synchronous and Asynchronous), Design of Finite State Machines (FSM). Design data preparation, process technologies and standard cell libraries. Understanding of standard cell technology parameters, netlist generation and technology mapping. Reviewing timing constraints and IO constraints. Low power and low area design concepts Exercises on Cadence Tool - Writing RTL for ASIC design flow, Understand ASIC Design Flow with 4-bit Counter Design

**Units 3 - Static Timing Analysis**

Introduction to STA, Comparison with DTA, Timing Path and Constraints, Different types of clocks, Clock domain and Variations, Clock Distribution Networks, How to fix timing failure, Introductions to timing static and dynamic hazards, Path delay, Gate delay, Metastability states, Sequential timing delays like set-up time, hold time, Maximum frequency, violations, slew, slack, Delay analysis, Sequential logic pad to set up, pad to pad, clk to next Reg, Reg to o/p and Reg to Reg. violations wrt sequential circuit.

**Units 4 - Design Floor Planning - Power Planning**

Design plan for hierarchical and flat design implementation, better partition techniques and flow setup. Special cells and IO cells usage planning, congestion removal techniques and implementation constraint setup. Understanding various floor planning techniques, setting up guidelines for better floor planning and meeting design goals. IO PAD placement planning, power planning. Adding power rings and power mesh.

**Units 5 - Clock Tree Synthesis and Routing**

Implementation of clock tree in placed design, understanding various aspects of timing parameters like clock setup/hold, skew and latency issues, Adding buffers in clock tree and implementing clock tree. Analyzing timing reports after clock tree synthesis and fixing issues. Various types of routing, trial route, special route, global routing and detailed routing. Analyzing routed design checking post routed design issues, DRC checks, timing checks, optimization of routing constraints

#### **Units 6 - Design Checks and Signoff**

Doing complete path and module based timing analysis, checking timing optimizer reports, identifying failing paths, fixing issues. Extracting capacitor table values for the design. IR drop and electro migration analysis. Perform DRC, Logical Equivalence checking, generating detailed timing/power reports, generating power reports. GDS-II generation.

#### **BOOKS**

Physical Design Essentials: An ASIC Design Implementation Perspective by *Khosrow Golshan*, ISBN 0-387-36642-3

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
INFORMATION SECURITY, MANAGEMENT AND STANDARDS  
(Professional Elective-IV)**

**Code: 8EC14**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

*Prerequisite: Cyber Security and Cyber Laws***Course Objectives:**

*To introduce the terminology, technology and its applications To introduce the concept of Security Analyst To introduce the tools, technologies & programming languages which are used in day to day security analyst job role*

**Course Outcomes:**

*At the end of this course the student will be able to*

- 1: Recall various Security Issues and Measures undertaken.*
- 2: Outline the Key and Logical Elements of Risk Management.*
- 3: Categorize various networking connections & appraise IDS/IPS Systems.*
- 4: Compile the type of audits along with the Significance.*
- 5: Comprehend SSE, CMM & other Models.*
- 6: Discriminate various policies & laws in Information Security.*

**UNIT I:**

**Information Security Management in Organizations** Security Policy, Standards, Guidelines and Procedures, Information Security Management System (ISMS), Organizational responsibility for Information Security Management, Information Security Awareness Scenario in Indian Organizations, Building Blocks of Information Security

**UNIT II:**

**Risk Management** Overview of Risk Management, Risk Identification, Risk Assessment, Risk Control, Quantitative and Qualitative Approaches, Introduction to OCTAVE and COBIT approach.

**UNIT III:**

Finding Networking vulnerabilities, Firewalls – Processing modes, Categorization, Architectures, Selecting the right firewall, managing the firewalls. Intrusion Detection and Prevention Systems (IDS & IPS), Protecting Remote Connections – Virtual Private Networks for security

**UNIT IV:**

Introduction to security audits, need for security audits, organizational roles, Auditor's roles, Types of security audits, Audit approaches, and Technology based audits. Business Continuity and Disaster Recovery Planning.

**UNIT V:**

Overview of ISO 17799/ISO 27001 Standards, System Security Engineering Capability Maturity Model (SSE-CMM). NIST Model, VISA International Security Model, Base lining and Best Business practitioners, Design of Security Architecture.

**UNIT VI:**

Legal, Ethical, and professional Issues in Information Security – Law and Ethics in Information Security, Types of Law, Relevant US Laws, International Laws and Legal Bodies, Policy versus Law, Ethics and Information Security, Codes of Ethics and Professional Organizations.

**TEXT BOOKS:**

- 1 Information Systems Security, *Nina Godbole*, Wiley India, 2009
- 2 Principles and Practices of Information Security. *Michael E. Whitman, Herbert J. Mattord*, Cengage Learning,



**REFERENCES:**

1. Microsoft Security Risk Management Guide
2. Risk Management Guide for Information Technology Systems  
<http://csrc.nist.gov/publications/nistpubs/800-30/sp800-30.pdf>
3. OCTAVE approach  
<http://www.cert.org/octave/>
4. COBIT  
<http://www.isaca.org/>
5. Guide to Firewalls and Policies (Unit 3)  
<http://csrc.nist.gov/publications/nistpubs/800-41/sp800-41.pdf>
6. Firewalls and Network Security, MichealE. Whitman, et al. Cengage Learning, 2008
7. Audit Trails (Unit 7)  
<http://csrc.nist.gov/publications/nistpubs/800-12/800-12-html/chapter18.html>

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
BUSINESS INTELLIGENCE  
(Professional Elective-IV)**

**Code: 8EC19**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Prerequisite: Nil****Course Objectives:**

1. Introduce the Business intelligence concepts, techniques and models
2. Understand the modeling process behind business analytics
3. To analyze different data analysis tools and techniques Expected

**Course Outcomes:**

At the end of this course the student will be able to

1. Understand the importance of business intelligence and its applications in today's world.
2. Illustrate the different form of analytics such as business analytics, predictive analytics.
3. Compare in detail the various aspects of business intelligence.
4. Understand the technological components of operational intelligence.
5. Analyze and understand the broad concepts in prescriptive analytics with Decision Tables.
6. Apply business intelligence process for web mining and web analytics.

**UNIT-I**

Introduction to Business Intelligence, Business Intelligence, Mobile Business Intelligence, Real-time Business Intelligence (Text Book-1)

**UNIT-II**

Analytics: A Comprehensive Study, Business Analytics, Analytics, Software Analytics, Embedded Analytics, Learning Analytics, Predictive Analytics, Prescriptive Analytics, Social Media Analytics, Behavioral Analytics (Text Book-1)

**UNIT-III**

Essential Aspects of Business Intelligence, Context Analysis, Business Performance Management, Business Process Discovery, Information System, Organizational Intelligence, Data Visualization, Data Profiling, Data Cleansing, Process Mining, Competitive Intelligence (Text Book-1)

**UNIT-IV**

Operational Intelligence: Technological Components, Operational Intelligence, Business Activity Monitoring, Complex Event Processing, Business Process Management, Metadata, Root Cause Analysis (Text Book-1)

**UNIT-V**

Prescriptive Analytics

Decision Support Systems Modeling - Mathematical Models for Decision Support - Certainty, Uncertainty, and Risk- Decision Modeling with Spreadsheets - Mathematical Programming Optimization - Decision Analysis with Decision Tables and Decision Trees - Problem-Solving Search Methods - Problem-Solving Search Methods (Text Book-2)

**UNIT-VI**

Web Analytics and Web Mining

Web Mining Overview - Web Content and Web Structure Mining - Search Engines - Search Engine Optimization - Web Analytics Technologies, metrics - Web Analytics Maturity Model and Web Analytics Tools (Text Book-2)

**TEXT BOOK**

1. Drew Bentley, Business Intelligence and Analytics, Published by Library Press
2. Efraim Turban, Ramesh Sharda, DursunDelen, “Business Intelligence and Analytics”, 10th Edition, Pearson, 2015

**REFERENCES:**

- 1 S. Christian Albright, Wayne L. Winston, Business Analytics: Data Analysis & Decision Making, 6th Edition, CENGAGE INDIA, 2017
- 2 Dinabandhu Bag, Business Analytics, Routledge, 1st edition, 2016
- 3 Rick Sherman, Business Intelligence Guidebook: From Data Integration to Analytics, Morgan Kaufmann, 1st edition 2014
4. Introduction to business Intelligence and data warehousing, IBM, PHI.

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
AUGMENTED REALITY AND VIRTUAL REALITY  
(Professional Elective-IV)**

**Code: 8FC20**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

*Pre-Requisites: Data Structure***COURSE OBJECTIVE:**

*This course provides students with an opportunity to explore the research issues in Augmented Reality and Virtual Reality (AR & VR). It also makes the students know the basic concept and framework of virtual reality.*

**COURSE OUTCOMES:**

*After completion of course, students will be able to*

- 1. Understand the fundamentals of Virtual Reality.*
- 2. Analyze multiple Models of Input and Output Interface in Virtual Reality like Gloves, Video-based Input, 3D Menus & 3DScanner etc.*
- 3. Illustrate the fundamentals or advanced topics of Computer Graphics.*
- 4. Analyze the Interactive Techniques on VR in respect of Body Track, Hand Gesture, 3D Manus, and Object Grasp.*
- 5. Understand the development Tools of VR.*
- 6. Explore the Conceptual idea on Augmented Reality and relate the illustrations.*

**Unit 1:** Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality.

**Unit 2:** Multiple Models of Input and Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual /Auditory Haptic Devices.

**Unit 3:** Visual Computation in Virtual Reality: Fundamentals of Computer Graphics. Software and Hardware Technology on Stereoscopic Display. Advanced Techniques in CG: Management of Large Scale Environments & Real Time Rendering.

**Unit 4:** Interactive Techniques in Virtual Reality: Body Track, Hand Gesture, 3D Manus, And Object Grasp.

**Unit 5:** Development Tools and Frameworks in Virtual Reality: Frameworks of Software Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools etc. Application of VR in Digital Entertainment: VR Technology in Film & TV Production. VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR.

**Unit 6:** Augmented and Mixed Reality, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

**TEXTBOOK:**

1. Burdea, G. C. and P. Coffet. Virtual Reality Technology, Second Edition. Wiley-IEEE Press, 2003/2006.
2. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

**REFERENCE BOOKS:**

1. Alan Craig, William Sherman and Jeffrey Will, Developing Virtual Reality Applications, Foundations of Effective Design, Morgan Kaufmann, 2009.

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
DESIGN VERIFICATION USING SYSTEM VERILOG  
(Professional Elective-IV)**

**Code: 8C735**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| 3        | 0        | 0          | 3        |

**Course Description:**

*This course gives a student an in-depth introduction to the main System Verilog enhancements to the Verilog hardware description language (HDL), discusses the benefits of the new features, and demonstrates how design and verification can be more efficient and effective when using System Verilog constructs.*

*The course is broken down into two modules: The Design module examines improvements for RTL design and synthesis; the Verification module explores verification enhancements such as object-oriented design, assertions and randomization.*

**Prerequisites:**

- A working knowledge of Verilog HDL
- The ability to navigate a file system and use a text editor
- A basic understanding of digital hardware design and verification

**Course Outcomes**

|     |                                                                                                                       |
|-----|-----------------------------------------------------------------------------------------------------------------------|
| CO1 | Understand the UVM concepts                                                                                           |
| CO2 | Explore the class instances and functions                                                                             |
| CO3 | Comprehend the UVM Configurations                                                                                     |
| CO4 | Analyzing UVM sequences and Modeling in UVM                                                                           |
| CO5 | Developing Reusable Test benches using UVM and Analyzing the Case studies of Layered test bench for SPI, APB and AXI. |

**Mapping of Course Outcomes with Program Outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    |      |
| CO2     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO3     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO4     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO5     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 3    |
| Overall |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    | 3    |

**Syllabus Contents:**

**Unit-1: Introduction to Functional Verification:** What is Verification?, What do we verify?, Verification Abstractions, Behavioral level, Transaction level, Functional / RTL level, Gate level, Transaction level; Importance of (Functional) Verification in Chip design life cycle, Verification goals; Overview of various Functional Verification techniques: Simulations, FPGA Prototyping, Emulation, HW/SW Co-verification, Formal Verification, Semiformal Verification, Models of Functional Verification. Black box, White box, Gray box, Verification Hierarchy: Chip-level, Cluster / Subsystem level, IP level, Module / Unit level.

**Unit- II :** Overview of SoC Architectures and Functional Verification Environment: What is an SoC ?, Advantages of SoCs over conventional ASICs?, Typical components of an SoCs, Sample SoC Architectures, Typical SoC based Testbench environment , Stimuli Generators, Hard coded, Direct Stimuli from the environment, Stimuli from the model of the environment (BFMs), Random Stimuli

Generation; Predictors: Golden/Reference Model, More Abstract (Functional, Transaction Level), Hardwired response, Response database; Transactors, Monitors , Scoreboards , Coverage Collectors - Coverpoints, Property Checkers - Assertions.

**Unit-III:** SystemVerilog Language Concepts: Evolution of SystemVerilog : Differences between Verilog and System Verilog HDL, New features added in System Verilog (New Data type additions, Arrays - Fixed, Packed, Dynamic, Queues, Associated, Structures & Unions, New Operators, New additions to Subroutines, New additions to Procedural statements & Control flow, Concurrency: Fork.join, Fork.join\_any, Fork.join\_none, Automatic Variables, Interfaces, Program block);

**Unit-IV:** Object Oriented Programming Concepts-I: Classes : Encapsulating properties & methods, Object memory creation, Working with Object handles, Object copying : Shallow and Deep copy, Object cloning, Object protection, Object variables Vs Class variables: Static keyword, Object Randomization, Randomization Seed - A deep look, Randomization variables, Constraint Block, Weighted Randomization, Controlling Randomization, Solve order, Inline Constraints - with constraints, Object Inheritance, Limitations of Inheritance, Polymorphism and Methods overriding ,

**Unit-V:** Object Oriented Programming Concepts-II: Virtual Interfaces, Inter thread Synchronization & Communication: Events, Semaphores, Mailboxes, Packages, Assertions, Immediate assertions, Procedural assertions, Temporal operators, Boolean operators, Sequences, Properties, Functional Coverage: Cover points & Bins, Covergroups, Cross coverage, Sampling coverpoints, Calculating functional coverage, Interfacing with C - DPI, Compiler Directives.

**Unit-VI:** Advanced Testbench Design using SystemVerilog: Introduction to Layered testbench, architecture, Driver, Monitor, Transactor, Generator, Configurations - Device, Transaction, Scoreboard, Reference models, Bus function models.

#### **TEXTBOOKS:**

1. System Verilog For Verification: A Guide to Learning the Testbench Language Features by *Chris Spear & Greg Tumbush (3rd Edition/5th Edition)*.
2. A Practical Guide For System Verilog Assertions by Srikanth Vijayaraghavan & Meyyappan Ramanathan.

#### **REFERENCE BOOKS:**

1. A Practical Guide For System Verilog Assertions by Srikanth Vijayaraghavan & Meyyappan Ramanathan.
2. Logic Design and verification using System Verilog by Donald Thomas

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
EMBEDDED REAL TIME OPERATING SYSTEMS  
(Professional Elective-IV)**

**Code: 8C736**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| 3        | 0        | 0          | 3        |

**Course outcomes:**

1. Understand the Basic concepts of UNIX operating Systems and files, commands usage.
2. Understand the Real time Systems concepts and classification of Real time systems.
3. Design concepts of scheduling algorithms and its applications.
4. Understand the Interprocess communications and its applications in Real time systems.
5. Understand the Exceptional handling and Interrupts and Timers
6. Understand the case study of RTOS.

**Mapping of Course Outcomes with Program Outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    |      |
| CO2     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO3     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO4     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO5     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 3    |
| CO6     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 3    |
| Overall |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    | 3    |

**UNIT – I**

**Introduction:** Introduction to UNIX/LINUX, Overview of Commands, File I/O,( open, create, close, lseek, read, write), Process Control ( fork, vfork, exit, wait, waitpid, exec).

**UNIT - II**

**Real Time Operating Systems:** Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, Tasks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use.

**Unit III:**

**Scheduling:** Commonly used Approaches to Real Time Scheduling Clock Driven, Weighted Round Robin, Priority Driven, Dynamic Vs State Systems, Effective release time and Deadlines, Offline Vs Online Scheduling.

**UNIT - IV**

**Inter-process Communication:** Inter-process Communication and Synchronization of Processes, Tasks and Threads- Multiple Process. Problem of Sharing data by multiple tasks & routines, Inter-process communication

**UNIT - V**

**Exceptions, Interrupts and Timers:** Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.



**UNIT - VI**

**Case Studies of RTOS:** RT Linux, Micro C/OS-II, Vx Works, Embedded Linux, and Tiny OS.

**TEXT BOOK:**

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2<sup>nd</sup> ed., 2008, TMH.
2. Real Time Systems- Jane W. S. Liu- PHI.
3. Real Time Systems- C.M.Krishna, KANG G. Shin, 1996, TMH
4. Qing Li, "Real Time Concepts for Embedded Systems", 2011, Elsevier.

**REFERENCE BOOKS:**

1. Rajkamal, "Embedded Systems- Architecture, Programming, and Design", 2007, TMH.
2. W. Richard Stevens, Stephan A. Rago, "Advanced UNIX Programming", 2006, 2nd Edition, Pearson.
3. Dr. Craig Hollabaugh, "Embedded Linux: Hardware, Software and Interfacing", 2008, 1<sup>st</sup> Edition, Pearson.

**Syllabus for B. Tech IV Year I semester**  
**Electronics and Computer Engineering**  
**ADVANCED ENTREPRENEURSHIP (Wadhvani Concept)**  
**(Open Elective-II)**

Code: 8ZC23

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objective:** The course is designed to impart the necessary managerial skills and tactics required for an emerging Entrepreneur for the Engineering students to enhance their prospects as an Entrepreneur.

**Course Outcomes:**

- The Students' gain knowledge on the stages of Startup and the turbulence environment it undergoes and the stages related to growth of the Startup.
- The Students are exposed to the various business models and critically evaluating the effectiveness of the business models and products
- The students understand the method of business traction, create roles and build their A- team
- The students understand the various channels of revenue building and exploration of new revenue avenues.
- The students understand the need of sales planning and people plan and also financial modeling
- The students are exposed to the legal implications affecting the company's prospects and identifying right mentors and advisors to support startups

**Unit – I: Fundamentals of Entrepreneurship & Refining Business Model and Product:**

Fundamentals and key concepts of entrepreneurship, refining the business model, products and services, pivoting, types of business models, business model evolution, generating new business models, analyzing the business model, adding new customer segment, product manager, significance and role of product manager.

**Unit – II: Business Planning & Exploring Revenue:**

Business plan, sales plan, hiring sale team, people plan, financial planning, financial forecasting, create a procurement plan, negotiating role play, understanding primary revenue sources, exploring customer lifecycle for growth customers, exploring and identify secondary sources of revenue,

**Unit- III: Funding the Growth & Building the A-Team:**

Overview of funding, funding options for an entrepreneur, explore the right funding options, create funding plan, pitch deck, introduction to building A-Team, pitching to attract the talent, setting your team, defining roles, hiring the A-Team members.

**Unit- IV: Brand and Channel Strategy & Leveraging Technologies:**

Introduction to branding, drawn the venture's golden circle, positioning and positioning statements, creating brand name, logo, social media handle, Identify right channels, leaping ahead with technology, digital marketing for startups, plan a social media campaign, digital collaboration, store documents online, other technology platforms, make tech plan, platform wish list.

**Unit V: Measuring Progress and Legal Matters:**

Metrics for customer acquisition (CAC, CLV, and ARPU), metrics for customer retention and satisfaction, find CAC, CLV and ARPU, key financial metrics, communicate metrics, new revenue stream through key financial metrics, re-forecasting of financial plan, identify professional help for legal and compliance requirements, searching of trademark and brand name and company name.

**Unit –VI: Seeking Support and Final Project:**

Mentors help to create successful startups, identify mentors and advisors, importance of mentors and advisors, scout the board of directors, overview on final project, capstone project presentation, contents of capstone project.

**BOOKS RECOMMENDED:**

- Entrepreneurship Rajeev Roy “” oxford ,2012
- Entrepreneurship Development Khanka, ,S.Chand 2012

**REFERENCES:**

- Small Scale industries and Entrepreneurship Vasanth Desai “Himalya publishing 2012
- Robert Hisrich et al “enterpreneruship TMH 2012
- Entrepreneurship Development Khanka, ,S.Chand 2012
- Entrepreneurship Development B.Janikairam and M Rizwana
- e-source: - [www.learnwise.org](http://www.learnwise.org)

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
BASICS OF POLITY (PART-A)  
(Open Elective-II)**

**Code: 8ZC26**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objectives:**

To provide basic knowledge relating to the Indian Polity , thus making the students appreciate the current aspects related to polity .

**Course Outcomes:**

1. Gain knowledge relating to the Indian Constitution and the Preamble to the Constitution.
2. Gain knowledge relating to the fundamental rights and duties of the Indian citizens and the directive principles of state policy.
3. Students will learn about the federal structure and judiciary of India.

**Unit 1: Introduction to Salient Features of Constitution**

Significance of the Constitution, Distinction between Written and Unwritten Constitution, Composition of the Constituent Assembly and the role and objectives of the Drafting Committee, Main features and the nature of the Constitution of India. Preamble to the Constitution and its relevance; Basic principles of Preamble and their reflection in the constitutional provisions.

**Unit 2: Fundamental Rights, Duties and Directive Principles of State Policy**

Fundamental Rights and Duties of Citizens- Importance of Rights and Duties, Dignity of an individual, Safeguards against deprivation of life and personal liberty; Writs for the protection of Fundamental Rights; Meaning of Directive Principles of State Policy, Classification of the Directive Principles, Role of Directive Principles, Role of Directive Principles in the establishment of economic and social democracy.

**Unit 3: Government and Judiciary**

Legislative, financial and judicial powers of the President; Appointment of Prime Minister and constitution of Council of Ministers; Powers and functions of Prime Minister; Individual and collective responsibility; Powers and discretionary powers of the Governor; Appointment of the Chief Minister, Formation of the Council of Ministers; Powers and jurisdiction of the Supreme Court and High Courts of India.

**REFERENCES**

- Indian Polity - M. Laxmikanth, 5<sup>th</sup> Edition, McGraw Hill Education, Chennai
- Environment And Ecology A Complete Guide for Civil Services Preliminary and Main Examinations – R. Rajgopalan, 2017, Oakbridge Publishing Pvt. Limited.
- Introduction to Constitution of India – Dr. Durga Das Basu, 22<sup>nd</sup> Edition, 2015, LexisNexis
- Our Constitution – Subhash C Kashyap, 5<sup>th</sup> Edition, 2015, National Book Trust, India

**Syllabus for B. Tech IV Year I semester**  
**Electronics and Computer Engineering**  
**ENTREPRENEURSHIP, PROJECT MANAGEMENT AND STRUCTURED FINANCE**  
**(Open Elective-II)**

Code: 8ZC19

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objective:** The objective of the course is to make students understand the nature of Entrepreneurship, its importance and to create an awareness regarding the systematic planning and implementation of projects; highlight the components of structured finance and establish a framework of CMBS with respect to Servicing Agreements

**Course Outcomes:**

1. Students will understand the nature of Entrepreneurship and its importance
2. Will gain knowledge regarding project, its life cycle and organization
3. Will gain knowledge relating to project formulation and implementation
4. Comprehend the components of structured finance
5. Establish a framework of CMBS
6. Students will gain knowledge relating to the CRE Servicing

**UNIT I**

**CONCEPTS OF ENTREPRENEURSHIP:** Definition of Entrepreneurship, Evolution of Entrepreneurship, Classification of Entrepreneurs, Characteristics of Entrepreneur, Selection of Product and the means required for starting an enterprise, Financing and Financial incentives available, Success rate of entrepreneurs – a case study.

**UNIT-II**

**BASICS OF PROJECT MANAGEMENT:** Concept and characteristics of a project - types of projects - Objectives of project management - Project Organizational structure - Project life cycle - Challenges and problems of project management - Qualities & functions of a project manager.

**UNIT III**

**PROJECT FORMULATION AND IMPLEMENTATION:** Generation of Project Ideas; Monitoring the environment; Preliminary Screening of Projects; Feasibility study; Project Selection. Detailed Project Report: Market, Technical, Financial and Economic aspects. Pre-requisites for Successful Project Implementation; Control of in-progress Projects (Gantt chart, PERT, CPM); Project Risk Management Process, Post-audit; Abandonment Analysis

**UNIT-IV**

**INTRODUCTION TO STRUCTURED FINANCE:** Term Loans, Bonds/Debentures, Types of debentures, Issue of debt instruments. Structured Finance: Evolution, Securitization process, characteristics, and structured finance products (ABS, CDO, MBS, CDS)

**UNIT-V**

**COMMERCIAL MORTGAGE LOAN BASICS:** Definition and characteristics of CMBS, CMBS Vs other Mortgage Backed Securities, CMBS three level perspective: property level, loan level, bond level; Life cycle of commercial real estate loans – Loan cycle, Key players in loan cycle; Property types and characteristics, property performance.

**UNIT-VI**

**BASICS OF CRE SERVICING:** Introduction to servicing, Role of the Servicer, Servicing approaches, Influence of technology, Ethics in commercial servicing, Servicing – sources of income, Overview of servicing agreements, Pooling & Servicing agreement, Sub servicing agreement.

**REFERENCES:**

- H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.
- Jeffrey K. Pinto “Project Management”, 2<sup>nd</sup> edition, Pearson
- DhandapaniAlagiri “Structured Finance – Concepts & Perspectives”, ICFAI University press.
- Projects by Prasanna Chandra, McGraw-Hill Publishing Co. Ltd
- Project Management: Systems approach to Planning Scheduling and Controlling, H. Kerzner.
- The Complete Real Estate Documents by Mazyar M. Hedayat, John J. Oleary
- The Fundamentals of Listing and Selling Commercial Real Estate - By Keim K. Loren (Author)

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
PRINCIPLES OF OPERATIONS RESEARCH  
(Open Elective-II)**

Code: 8BC52

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objectives:**

The course aims at building capabilities in the students for analyzing different situations in the industrial/business scenario involving limited resources and finding the optimal solution within constraints.

**Course Outcomes:**

- CO1:** Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.
- CO2:** Recognize and Solve the problem of transportation involving a large number of shipping routes with least transportation cost and generate optimal assignment strategy for different situations
- CO4:** Use Johnson's rule to create the optimal sequencing schedule for a sequencing problem and make decisions about replacing an item using replacement policy
- CO5:** Analyze the performance measures of Queuing system and Calculate the EOQ for minimizing the total inventory cost
- CO6:** Apply simulation techniques for solving various types of problems and general idea development about Markov chains

**UNIT – I**

**INTRODUCTION:** Definition, Characteristics and Phases and Types of models, applications.

**LINEAR PROGRAMMING PROBLEM-** Formulation – Graphical solution, Simplex method- Types of variables, Unique and Multiple optimal solution, Redundancy & Degeneracy in LPP, Unbounded solution, Artificial variables techniques - Big-M method with feasible and infeasible solutions, Two-phase method, Primal to Dual formation with Duality Principle.

**UNIT – II**

**TRANSPORTATION PROBLEM** – Formulation – methods of finding initial solution (NW corner, VAM, Least cost Method) Optimal solution (Stepping stone Method, MODI method) Special cases in TP: unbalanced, Degeneracy, Restriction and maximization case.

**ASSIGNMENT PROBLEM** – Formulation – Optimal solution (Hungarian Method) - Variants of Assignment Problem-Unbalanced, Restriction, Maximization, Airlines layover case, Traveling Salesman problem.

**UNIT – III**

**SEQUENCING** – Introduction – Terminology, Assumptions, Johnson's procedure- Processing n jobs through two machines – Processing n jobs through three machines – Processing two jobs through 'm' machines (Gantt Chart).

**REPLACEMENT:** Introduction – Types of failure, Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, Group replacement.

**UNIT – IV**

**THEORY OF GAMES:** Introduction and Terminologies, Criterion and optimal strategy – Solution of games with saddle points: Mixed Strategies-Rectangular games without saddle points, Dominance principle, Average Relational Dominance,  $m \times 2$  &  $2 \times n$  games -Graphical method and Sub Game Method, Matrix Method, Application of LPP in game theory.

**UNIT – V**

**WAITING LINES:** Introduction, Terminology, Structure of a queue, calling population characteristics-size, behavior, pattern of arrivals, Kendall-Lee notation, Queuing Models: Single Channel: Poisson arrivals: exponential service times: with finite and infinite population, Multichannel: Poisson arrivals: exponential service times with infinite population

**INVENTORY :** Introduction, Inventory costs, Concept of EOQ, Single item Deterministic models with and without shortages, Single item inventory models with one price break and multiple price breaks, Stochastic models – Instantaneous demand and no set up cost.

**UNIT – VI**

**SIMULATION:** Definition – Types of simulation – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages

Markov chains: Introduction to Markov chains, Analysis Assumptions, Input output probabilities, Applications (Only basic understanding)

**TEXT BOOKS:**

1. Operations research / Hira & Gupta
2. Operation Research /J.K.Sharma/Macmillan Publishers.

**REFERENCES:**

1. Quantitative Techniques in Management: N D Vohra, TMH



**Syllabus for B. Tech IV Year I semester**  
**Electronics and Computer Engineering**  
**FUNDAMENTALS OF MEASUREMENTS AND INSTRUMENTATION**  
**(Open Elective-II)**

Code: 8AC44

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objective:**

The basic principles of all measuring instruments and in measurement of electrical and non-electrical parameters viz., Resistance, Inductance, Capacitance, voltage, current Power factor, Power, Energy, Strain, Temperature, Torque, Displacement etc. and the different types of electrical and non electrical transducers. It introduces the different signal analyzers and oscilloscopes.

**Course Outcomes**

The student should be able to

1. Understand the principle of operation of different types of instruments viz., PMMC, moving iron type of instruments, the required characteristics of an instrument in general. The student demonstrates the ability to compensate for the errors in the instruments and to extend the range of the instruments.
2. Demonstrates the knowledge of Potential and Current transformers; the errors in them and the effect of having an open/short in the secondary circuits; Understand the principle of operation of Dynamometer and Moving-iron type of Power factor meters.
3. Comprehends the principle of operation of dynamometer type of Wattmeter and Induction type of Energy meter; use the wattmeter to measure the Active and Reactive power and demonstrates the ability to extend the range of them.
4. Identify and use different techniques of measurement of Resistance, Inductance and Capacitance values.
5. Understand the principle of operation of Different type of digital voltmeters, wave analyzers, spectrum analyzers and Cathode ray Oscilloscope.
6. Demonstrates the ability in characterizing the different types of transducers and uses them to measure Strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque and Temperature.

**UNIT-I MEASURING INSTRUMENTS- INSTRUMENT TRANSFORMERS:**

Significance of Measurement, static characteristic of system- Linearity, Sensitivity, Precision, Accuracy - Classification - Deflecting, Control and Damping torques, Ammeters and Voltmeters, PMMC, Moving iron type instruments, Expression for the Deflecting torque and Control torque, Errors and Compensations, Extension of range using Shunts and Series resistance.

**UNIT –II: INSTRUMENT TRANSFORMERS**

Introduction, advantages, burden of instrument transformer, Current Transformer - errors in current transformer, Effect of secondary open circuit, Potential transformer- errors in potential transformer, Testing of current transformers with silsbee's method.

Power Factor Meters: Type of P.F. Meters, Dynamometer and Moving iron type, 1- ph and 3-ph meters.

**UNIT –III MEASUREMENT OF POWER& ENERGY:**

Single phase dynamometer wattmeter-LPF and UPF-Double element and three element dynamometer wattmeter, Expression for deflecting and control torques, Extension of range of wattmeter using instrument transformers, Measurement of active and reactive powers in balanced and unbalanced systems, Single phase induction type energy meter, Driving and braking torques, Testing by phantom loading, Three phase energy meter .

**UNIT - IV MEASUREMENT OF RESISTANCE - MAGNETIC MEASUREMENTS- A.C. BRIDGES:**

Principle and operation of D.C. Crompton's potentiometer, Standardization, Measurement of unknown resistance, current, voltage. Method of measuring low- Medium and High resistance, sensitivity of Wheatstone's bridge, Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, Measurement of high resistance, loss of charge method, Measurement of inductance, Quality Factor,

Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle, Desauty Bridge, Wien's bridge, Schering Bridge.

**UNIT-V DIGITAL VOLTMETERS- SIGNAL ANALYZERS- CRO:**

Digital voltmeters, Successive approximation, Ramp, Dual slope integration continuous balance type, Wave Analyzers, Frequency selective analyzers, Heterodyne, Application of Wave analyzers, Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, Spectral displays, Q meter and RMS voltmeters . CRO- Cathode Ray Tube (CRT), Screens, Probes, Applications of CRO, Measurement of frequency and phase using CRO, Block diagram.

**UNIT-VI MEASUREMENT OF NON-ELECTRICAL QUANTITIES:**

Transducers - Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers, Principle operation of Resistor, Inductor, LVDT and Capacitor transducers, LVDT Applications, Strain gauge and its principle of operation, Gauge factor- Thermistors, Thermocouples, Piezo electric transducers, Photovoltaic, Photo conductive cells. Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque, Measurement of Temperature.

**TEXT BOOKS:**

1. Electrical Measurements and measuring Instruments – E.W. Golding and F.C. Widdis, 5<sup>th</sup> Edition, Wheeler Publishing.
2. Transducers and Instrumentation– D.V.S Murthy, Prentice Hall of India, 2<sup>nd</sup> Edition.
3. A course in Electrical and Electronic Measurements and Instrumentation -A.K. Sawhney, Dhanpatrai & Co. 18<sup>th</sup> Edition.

**REFERENCE BOOKS:**

1. Measurements Systems, Applications and Design – D O Doebelin- Tata MC Graw-Hill.
2. Principles of Measurement and Instrumentation – A.S Morris, Pearson /Prentice Hall of India.
3. Electronic Instrumentation- H.S.Kalsi Tata MC Graw – Hill Edition, 3<sup>rd</sup> Edition.
4. Modern Electronic Instrumentation and Measurement techniques – A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India.

**Syllabus for B. Tech IV Year I semester  
Electronics and Computer Engineering  
CO-CREATION AND PRODUCT DESIGN  
(Open Elective-II)**

Code: 8ZC09

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objective:** The objective of the course is to make students understand the fundamental concepts of design thinking, and to familiarize with product design process and to motivate the students to ideate new products and services.

**Course Outcomes:**

1. The students gain the knowledge on the inputs required for human centric design thinking the students learn the techniques of idea generation.
2. The students gain knowledge on exploring the different phases of Ideation process.
3. The students grasp the awareness on emerging technologies and understand 3d printing in manufacturing.
4. The students gain familiarity on development of prototypes.
5. The students understand reverse engineering methods in product development.
6. The students have access to information on IPR, and patent application.

**Unit – I: Human Centered Design:** Understanding user and Customer perspectives, Identify insights and opportunities, Interviewing, User Experience design. Frame your design challenge. Empathy tools and techniques.

**Unit – II: Ideation Process:** Articulation of Problem Statement, Visualizing Ideas, Communicating ideas and compelling story telling, Brainstorming, Divergent thinking in exploring solutions, 3- box thinking, 3- box framework and Box-3 ideation.

**Unit – III: Emerging Technologies and Design:** Emerging technologies, utilization and growth, Automation through Industry 4.0, IOT for Network and Intelligent world, efficient and effective manufacturing aided by Robotics, Custom manufacturing by Additive / 3D printing, Augmented reality for product and process.

**Unit – IV: Prototyping:** Introduction to Prototype, types of prototype, prototyping strategies, Design consideration in the five stages of the product life cycle. Prototype building by different engineering disciplines. Testing Solution and taking the solution to the users. Create a pitch for your design.

**Unit – V: Reverse engineering in product development:** Reversing engineering methods, identifying the bad features in a product, reduction in size and weight, usage of new materials, importance of ergonomics in product development, environmental considerations in design, and safety considerations in design.

**Unit – VI: Intellectual Property Rights:** Introduction to IPR, Patents – Types of Patents, elements of patentability, Patents registration Procedure, Patent office and Appellate Board, Rights and Duties of Patentee, Restoration of Lapsed patents.

**TEXT BOOK(S)**

1. Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, “Exploring Engineering: An Introduction to Engineering and Design”, 4th edition, Elsevier, 2016.
2. David Ralzman, “History of Modern Design”, 2nd edition, Laurence King Publishing Ltd., 2010
3. An AVA Book, “Design Thinking”, AVA Publishing, 2010.
3. Ingle, B. R. (2013). *Design thinking for entrepreneurs and small businesses: Putting the power of design to work*. Apress.
4. Norman, D. A. (2016). *Living with complexity*. MIT press.
5. Chapman, J. (2017). *Routledge handbook of sustainable product design*. Taylor & Francis.
6. Nithyananda, K.V. (2019), IPR, protection and Management, India, Cengage learning India.

**REFERENCE BOOKS:**

1. G. Pahl, W.Beitz, J. Feldhusen, KH Grote, “Engineering Design: A Systematic Approach”, 3rd edition, Springer, 2007. 2. Tom Kelley, Jonathan Littman, “Ten Faces in Innovation”, Currency Books, 2006.
2. Kumar, V. (2012). *101 design methods: A structured approach for driving innovation in your organization*. John Wiley & Sons.
3. Chapman, J. (2012). *Designers Visionaries and Other Stories: A Collection of Sustainable Design Essays*. Taylor & Francis.
4. Garrett, J. J. (2010). *The elements of user experience: user-centered design for the web and beyond*. Pearson Education.
5. Neeraj, P. &Khusdeep, D (2014), IPR, India, IN: PHI Learning.

**Syllabus for B. Tech IV Year II semester  
Electronics and Computer Engineering  
MAJOR PROJECT**

Code: 8D879

|   |   |     |   |
|---|---|-----|---|
| L | T | P/D | C |
| 0 | 0 | 10  | 5 |

**Course Objective**

To enhance the knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

**Course Outcomes: At the end of this course, the student will be able to**

1. Develop plans with relevant people to achieve the project's goals
2. Break work down into tasks and determine handover procedures
3. Identify links and dependencies, and schedule to achieve deliverables
4. Estimate the human and physical resources required, and make plans to obtain the necessary resources
5. Allocate roles with clear lines of responsibility and accountability with team spirit.
6. Design the architectures and various diagrams.
7. Implement the designs and present the project execution.

Out of total 100 marks for project work (in the final year second semester), 30 marks shall be for Internal Evaluation and 70 marks for the External Evaluation at the end of the Semester.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The committee consists of an external examiner, HOD, a Senior Faculty Member and Internal Guide.

**Division of marks for internal assessment – 30 marks**

| Sl. No | Description                                                                                                                  | Marks           |
|--------|------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 1      | Progress of Project work and the corresponding interim report as evaluated by Project Review Committee at the end of 6 weeks | 5 marks         |
| 2      | Seminar at the end of 6 weeks                                                                                                | 5 marks         |
| 3      | Progress of Project work as evaluated by Project Review Committee at the end of 11 weeks                                     | 5 marks         |
| 4      | Seminar at the end of 11 weeks                                                                                               | 5 marks         |
| 5      | Evaluation by Project Review Committee at the end of 15 weeks and Final Project Report                                       | 5 marks         |
| 6      | Final presentation and defense of project                                                                                    | 5 marks         |
|        | <b>TOTAL</b>                                                                                                                 | <b>30 marks</b> |

**Division of Marks for External Evaluation – 70 Marks**

| Sl. No | Description                                         | Marks           |
|--------|-----------------------------------------------------|-----------------|
| 1      | Final Project Report                                | 10 marks        |
| 2      | Presentation                                        | 20 marks        |
| 3      | Demonstration / Defense of Project before committee | 40 marks        |
| 4      | <b>TOTAL</b>                                        | <b>70 marks</b> |

**Syllabus for B. Tech IV Year II semester  
Electronics and Computer Engineering  
MOBILE COMPUTING  
(Professional Elective-V)**

**Code: 8EC15**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Prerequisite:**

**Course Objectives:**

*Learn concepts of mobile communication and various media access control methods. Understand IP mobile primitives and concepts of network and transport layer with regard to mobile communication. Learn WAP protocols, Bluetooth and the Necessary Tools for Android.*

**Course Outcomes:**

*At the end of this course, the student will be able to*

1. *Identify vast application areas for mobile / wireless communications and Understand GSM Architecture, Services.*
2. *Examine Hidden and exposed terminals, Near and far terminals and Differentiate medium access control methods for wireless communication SDMA, FDMA, TDMA and CDMA.*
3. *Illustrate mobile IP primitives in Network layer and Demonstrate IP packet delivery, DHCP.*
4. *Distinguish Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP in Transport layer*
5. *Understand applications of MANETs routing algorithms, data hoarding, client server computing along with the data delivery mechanisms.*
6. *Understand protocols and tools such as WAP, Bluetooth and Identify emerging mobile operating systems.*

**UNIT - I**

**Introduction to Mobile Communications and Computing:** Mobile Computing (MC): Introduction to MC, novel applications, limitations, introduction to mobile architecture - UMTS, GSM.

**Architecture GSM:** Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

**UNIT - II**

**(Wireless) Medium Access Control:** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

**UNIT - III**

**Mobile Network Layer:** Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

**UNIT - IV**

**Mobile Transport Layer:** Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

**UNIT - V**

**Mobile Ad hoc Networks (MANETs):** Overview, Properties of a MANET, spectrum of MANET applications, routing algorithms.

**Database:** Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, data delivery mechanisms

**UNIT - VI**

**Protocols and Tools:** Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking,

security, link management), introduction to mobile operating systems- Android: **Android versions, Typographical Conventions, the Necessary Tools for Android.**

**TEXTBOOKS:**

1. Jochen Schiller, "Mobile Communications", *Addison-Wesley*. (Chapters 1, 2, 3, 4, 7, 8 and 9). Second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", *Wiley*, 2002, ISBN 0471419028. (Chapters 6, 11, 15, 17, 18, 19, 26 and 27)
3. Android Programming: The Big Nerd Ranch Guide by Bill Phillips, Chris Stewart, Brian Hardy and Kristin Marsicano, second edition.

**REFERENCES:**

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004,
2. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", *Springer*, second edition, 2003.
4. Martyn Mallick, "Mobile and Wireless Design Essentials", *Wiley DreamTech*, 2003
5. A. Tanenbaum "Computer Networks", 4<sup>th</sup> edition.
6. Android Programming (Big Nerd Ranch Guide), by Phillips, Stewart, Hardy and Marsicano
7. Android Programming – Pushing the limits by Hellman

**Syllabus for B. Tech IV Year II semester  
Electronics and Computer Engineering  
CLOUD COMPUTING  
(Professional Elective-V)**

**Code: 8EC20**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

**Prerequisite: NIL**

**COURSE OBJECTIVES:**

*Understand the basic characteristics of cloud computing and technologies that support to implement cloud computing. Analyze the basic cloud computing models that are used to implement cloud technology and available cloud resources in the market. Analyzing the security issues in cloud computing environment and understanding different case studies in cloud computing and IOT platform.*

**COURSE OUTCOMES :**

*At the end of this course, the students will be able to*

1. *Summarize the characteristics of cloud and differentiate the cloud service and deployment models.*
2. *Demonstrate the different kinds of cloud services.*
3. *Analyze different architectures for cloud applications, Create and run Amazon ec2 instance through python programs*
4. *Assess the performance of cloud services and summarize the innovative applications of IOT on cloud.*
5. *Design architecture of an Apps such as map reduce, image processing app etc on cloud.*
6. *Understand various security aspects in cloud.*

**UNIT-1** Introduction to Cloud Computing : Introduction ,characteristics ,Cloud Models and examples, Applications of Cloud Services .Cloud Concepts and Technologies .

**UNIT-2** Cloud Services and Platforms : Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment and Management Services, Identity and Access Management Services, Open Source Private cloud Software.

**UNIT-3** Cloud Application Design: Design Considerations for Cloud Application, Reference Architectures for Cloud Applications .Cloud Application Design Methodologies , Data Storage Approaches. Python For Cloud: Python for Amazon Web Services, Map Reduce

**UNIT – 4 book 2.** Cloud and the Internet of Things: Performance of Distributed Systems and the Cloud-Enabling Technologies for the Internet of Things- Innovative Applications of the Internet of Things- Online Social and Professional Networking

**UNIT-5** Cloud Application Development in Python: Design Approaches, Image Processing App, Document Storage App, Map Reduce App, Social Media Analytics App.

**UNIT-6** Cloud Security: Introduction, Cloud Security Architecture (CSA), Authentication, Authorization, Identity Access Management (IAM), Data Security, Key Management, Auditing. Cloud for Industry, Healthcare and Education.

**TEXT BOOKS:**

1. Cloud Computing –A Hands on Approach , Arshdeep,Vijay Mediseti,University Press.
2. Distributed and Cloud Computing,1st Edition,From Parallel Processing to the Internet of Things,Authors: Kai Hwang Jack Dongarra Geoffrey Fox(Unit4)
3. Cloud Computing: Raj Kumar Buyya,James Broberg,Andrzej GOscinski,Wiley.



**REFERENCES:**

1. Cloud Computing: Dr.Kumar Saurab Wiley India 2011 .
2. Code in the cloud computing: K Chandrasekharan CRC Press.
3. Cloud Computing: John W. Rittinghouse ,James Ransome,CRC press.
4. Virtualization Security: Dave Shackleford2013,SYBEX a Willy Brand.
5. Cloud Computing and Software Service: Ahson, iiyas.2011.
6. Cloud Computing Bible: Sosinsky 2012 Wiley India.

**Syllabus for B. Tech IV Year II semester  
Electronics and Computer Engineering  
INTERNET OF THINGS (IOT)  
(Professional Elective-V)**

**Code: 8DC44**

| L | T | P/D | C |
|---|---|-----|---|
| 3 | 0 | 0   | 3 |

*Prerequisite: Data Communications and Computer Networks***COURSE OBJECTIVES:**

*Terminology, technology and applications of IoT IoT system management using M2M (machine to machine) with necessary protocols Python Scripting Language preferred for many IoT applications Raspberry PI as a hardware platform for IoT sensor interfacing Implementation of web based services for IoT with case studies*

**COURSE OUTCOMES:**

*At the end of this course, the students will be able to*

- 1. Getting familiar with terminology, technology and applications of IOT*
- 2. Understand and explain IoT system management using M2M (machine to machine) with necessary protocols*
- 3. Design and develop Python Scripting Language programs preferred for many IoT applications*
- 4. Use Raspberry PI as a hardware platform for designing the IoT sensor interfacing*
- 5. Implement web based services for IoT*
- 6. Understand and analyze the case studies illustrating IoT Design*

**UNIT I:** Introduction to Internet of Things Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies like Wireless Sensor Networks, Cloud Computing, Big data analytics, and Communication protocols, Embedded Systems, IoT Levels and Templates.

**UNIT II:** IoT and M2M Software defined networks, network function virtualization, difference between SDN and NFV for IoT; Basics of IoT System Management with NETCOZF-YANG (Block Diagrams).

**UNIT III:** Developing IoT, IoT Design Methodology – The 10 steps design methodology; Logical design using Python: Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, date/time operations, Python packages of interest for IoT.

**UNIT IV:** IoT Physical Devices and End points Raspberry PI – Introduction to Raspberry PI and its Interfaces (serial, SPI, I2C) Programming – Python programming with Raspberry PI – Controlling Input / output (Interfacing with LED and LDR).

**UNIT V:** IoT Physical Servers and Cloud Offerings Cloud concepts (IaaS, PaaS, SaaS), Introduction to Cloud Storage models and communication APIs – WAMP, Xively; Python web application framework with Django, Designing a RESTful web API

**UNIT VI:** Case Studies Illustrating IoT Design Home Automation – Smart Lighting, Home intrusion detection, Cities – Smart parking, Environment – Weather monitoring system, Weather reporting bot, Air pollution monitoring, Forest fire detection, Agriculture – Smart irrigation, Productivity applications – IoT printer

**TEXT BOOKS:**

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madiseti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

**Syllabus for B. Tech IV Year II semester  
Electronics and Computer Engineering  
SYSTEM ON CHIP ARCHITECTURE  
(Professional Elective-V)**

**Code: 8C842**

|          |          |            |          |
|----------|----------|------------|----------|
| <b>L</b> | <b>T</b> | <b>P/D</b> | <b>C</b> |
| 3        | 0        | 0          | 3        |

**OBJECTIVES**

After going through this course the student will be able to

- Understand the System Architecture and Processor Architecture, approach for a SOC Design.
- Learn the, Basic concepts in Processor Micro Architecture, and Learn Different Types of Processors like VLIW Processors, Superscalar Processors etc.
- Learn about SOC external memory, Scratchpads and Cache memory and Multilevel Caches.
- Learn the SOC Design approach, Design and evaluation, Applications Like Image compression etc

After studying this course, the students will be able to

1. Know basics of System Architecture
2. Understand the various types of Processors like VLIW Processors, Superscalar Processors.
3. Distinguish Cache memory and Multilevel Caches, SOC external memory.
4. Know the Concept of Inter Connect Architectures, SOC Standard Buses and Reconfiguration Technologies.
5. Know the concepts and issues related to Interconnect Configuration.
6. Explore the SOC Design approach and develop its applications.

**Mapping of Course Outcomes with Program Outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    |      |
| CO2     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO3     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO4     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO5     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 3    |
| CO6     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    | 3    |
| Overall |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    | 3    |

**UNIT-I:**

**Introduction:** Introduction to the System Approach: System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, an approach for SOC Design, System Architecture and Complexity.

**UNIT-II:**

**Processors:** Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

**UNIT-III:**

**Memory Design for SOC:** Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

**UNIT-IV:**

**Interconnect Customization and Configuration:** Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor.

**UNIT-V:**

**Interconnect Configuration:** Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration – overhead analysis and trade-off analysis on reconfigurable Parallelism.

**UNIT-VI:**

**Application Studies / Case Studies:** SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

**TEXT BOOKS**

- Computer System Design System-on-Chip – Michael J. Flynn and Wayne Luk, Wiley India Pvt. Ltd.
- Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer

**REFERENCE BOOKS**

- ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.
- System on Chip Verification – Methodologies and Techniques – Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

**Syllabus for B. Tech IV Year II semester  
Electronics and Computer Engineering  
LOW POWER VLSI DESIGN  
(Professional Elective-V)**

**Code: 8C841**

**L T P/D C**  
**3 0 0 3**

**Pre-Requisites:**

**Course Objectives:**

**Course Outcomes:**

*By the end of the course, students will be able to*

- CO1. understand the*
- CO2. Learn*
- CO3. confidently apply*
- CO4. Differentiate*

**Mapping of Course Outcomes with Program Outcomes**

|         | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    |      |
| CO2     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO3     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| CO4     |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 2    | 3    | 3    |      |
| Overall |     | 3   | 3   | 3   | 3   |     |     |     | 2   |      |      | 3    | 3    | 3    | 3    |

**UNIT-I**

Introduction, Low-Power design an overview, Low-Voltage, Low-Power design limitations: Power supply voltage, Threshold voltage, Scaling and Interconnect wires.

**UNIT II**

BiCMOS Processes: BiCMOS process using N-Well Process, BICMOS process using P-Well Process and BICMOS process using Twin-Well Process.

BiCMOS manufacturing and Integration considerations: Process considerations for CMOS device structures, Process considerations for Bipolar Transistors.

**UNIT III**

Isolation in BiCMOS: Isolation in Bipolar transistors-Junction isolation in the SBC process, Collector diffusion isolation; Isolation in MOS transistors-Local oxidation of Silicon, Deep trench isolation.

**UNIT IV**

Low-Voltage, Low-Power Logic Circuits-I: Conventional CMOS logic gates-Power dissipation in CMOS inverter, Basic NAND and NOR gates, Conventional BiCMOS logic gates-BiCMOS inverter, Basic driver configurations. Full swing with shunting devices.

**UNIT V**

Low-Voltage, Low-Power Logic Circuits-II: Full swing complementary MOS/Bipolar logic circuit, Full swing complementary MOS/Bipolar logic circuit with feedback, Merged BiCMOS digital circuit, Complementary BiCMOS circuits.

## **UNIT VI**

Low-Power Latches and Flip-Flops: Introduction, Evolution of Latches and Flip-Flops.

### **TEXT BOOKS**

1. CMOS/BiCMOS ULSI low voltage, low power by Yeo Rofail/ Goh(3 Authors)-Pearson Education Asia 1<sup>st</sup> Indian reprint, 2002

### **REFERENCES**

1. Digital Integrated circuits, J.Rabaey PH. N.J 1996
2. CMOS Digital ICs, Sung-moKang and Yusuf Leblebici 3<sup>rd</sup> edition TMH 2003 (chapter 11)
3. VLSI DSP systems, Parhi, John Wiley & sons, 2003 (chapter 17)
4. IEEE Trans Electron Devices, IEEE J.Solid State Circuits, and other National and International Conferences and Symposia

**Syllabus for B. Tech IV Year II semester  
Electronics and Computer Engineering  
PRODUCT AND SERVICES  
(Open Elective-III)**

Code: 8ZC24

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

*Course Objectives: This course helps to provide the basic concepts of Product and Services. This course will enable the students to study areas of basic insights in product management and Services Design.*

**Course Out Comes:**

- 1) The students will be introduced to basic concepts of product .
- 2) Will enlighten the students with the process of new product development and stages in the process.
- 3) Will help the students understand the concept of product testing, product planning and the preparatory groundwork for launching a new product
- 4) Will help the students to understand the nature of services, its differences with the goods and the application of marketing principles for services.
- 5) Will enlighten the students to understand the attributes of a good service design and the tools for producing and distributing the services.
- 6) To make the students understand about the importance of quality of services and also introduce some measurement scales to evaluate the service quality.

**UNIT- I****INTERPRETATIONS ON PRODUCT**

Meaning of Product, Product Market Fit Analysis, Product Levels, Product Mix, Product Pruning, and Product Cannibalization. Types of Product Classification

**UNIT- II****PRODUCT INNOVATION and VALIDATION**

New products-What is a new product, New Product Development Process, Idea generation Systems, Concept test, Product testing, Pre-launch, Market test, Final evaluation using “Stage / Gate Process. Product Validity, Break Even Analysis, Financial and Market Analysis.

**UNIT- III****LAUNCHING PRODUCT**

Cost Analysis, Steps to fix the final price, Promotion planning, Digital Marketing and Methods, Retailing, Types of Retailing online Retailing, Post Market Analysis of the Launch

**UNIT - IV: INTRODUCTION TO SERVICE:**

Meaning and Definition of Service, Characteristics of Services, Classification of Service, Five levels of Service, Service verses Physical Goods, 7 P’s for Marketing of Services, Servicescape

**UNIT – V: SERVICE PROCESS DESIGN and SERVICE DISTRIBUTION:**

Service Design Meaning, Tools for Service Design, Attributes of a Good Design Customer involvement in the Production Process, Role of Intermediaries, Methods of Distribution of Services

**UNIT – VI: QUALITY OF SERVICE:**

Definition of Service Quality, Elements of Service Quality, Service Quality Measuring Tools; SERVQUAL Scale, Service Quality Gap Analysis, Objective Service Metrics, Cost of Quality in Service. Challenges and Problems of Service Quality in India.

**ESSENTIAL READINGS:**

- Dr. S.L. Gupta, Product Management, Wisdom Publications
- C.Merle Crawford ,New Product Management
- Valarie A.Zeithaml& Mary Jo-Bitner: Services Marketing—Integrating Customer Focus Across the Firm, 3/e, Tata McGraw Hill, 2007.
- Thomas J.Delong&Asish Nanda: Managing Professional Servies—Text and Cases, McGraw-Hill International, 2006.
- Christopher Lovelock: Services Marketing People, Technology, Strategy, Fourth Edition, Pearson Education, 2006



**Syllabus for B. Tech IV Year II semester  
Electronics and Computer Engineering  
INDIAN HISTORY, CULTURE AND GEOGRAPHY  
(Open Elective-III)**

Code: 8ZC27

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objectives:** To equip the students with necessary knowledge relating to ancient, medieval and modern Indian and its culture and also facts relating to existence of earth.

**Course Outcomes:**

1. To appreciate and understand our Indian History, Culture and Indian heritage.
2. To understand secularism of our country.
3. To appreciate and understand the social reformers who brought revolutionary changes in Indian society.
4. To understand earth evolution and world climatic change.
5. To understand India Oceanography,
6. Able to enhance and understand Indian monsoons, Indian agriculture.

**Unit I: Ancient Indian History**

Fundamental Unity of Indian Harappan and Vedic Civilization – Evolution of Caste System – Jainism and Buddhism – Gandhara Art., Political unification of India under Mauryas and Guptas, Historical evolution of Satavahanas., Contribution of Pallavas and Cholas to Art – Chola Administrative Systems .

**Unit II: Medieval India and Culture**

Influence of Islam on Indian Culture – The Sufi, Bhakthi and Vishnavite movements, Historical Achievements of Vijayanagara Rulers., Contribution of Shershah and Akbar to the evolution of administration system in India – Cultural Development under Mughals.

**Unit III: Modern India**

Western Impact on India – Introduction of Western Education – Social and Cultural awakening and social reform movements – Raja Rama Mohan Roy – DayanandaSaraswathi – Theosophical Society – Ramakrishna Paramahansa and Vivekananda – Iswara Chandra Vidyasagar and Veeresalingam – Emancipation of women and struggle against Caste. Rise of Indian Nationalism – Mahatma Gandhi – Non Violence and Satyagraha – Eradication of untouchability – Legacy of British rule.

**Unit IV: Geo Morphology and Climatology**

The Origin and Evolution of the Earth, Interior of the Earth, Distribution of Oceans and Continents , Minerals and Rocks, Geomorphic Processes, Landforms and their Evolution Composition and Structure of Atmosphere, Solar Radiation, Heat Balance and Temperature. Atmospheric Circulation and Weather Systems, World Climate and Climate Change

**Unit V: Oceanography**

Water (Oceans), Movements of Ocean Water, Physical features of India viz., The Mountains in the North, The Northern Plains, The Peninsular Plateau, The Great Indian Desert, The Coast; and The Islands.

**Unit VI: Physical Features Of India And India's Monsoon**

India's monsoon., Winter, Summer(pre-monsoon),rainy (monsoon),autumn (post-monsoon)., Indian Agriculture, Agriculture and colonialism, Indian Agriculture after Independence Major crops and yields, Horticulture, Organic farming.

**REFERENCES:**

- Sharma .R.S., (2011).Indian Ancient past, Oxford Publications.
- Nitin Singhaniya.,(2017). Indian Culture and Heritage, Publisher: McgrawTestPrep, Second Edition.
- Certificate of Physical and Human Geography,Goh Cheng Leong,Oxford University Press.
- Bipin Chandra.(2000). India's Struggle for Independence., Penguin Global Publishers
- Saveendra Singh: Physical Geograpghy.,PrayagPustakBhavan ISBN-10: 8186539298. Edition : 1st Edition Number of Pages : 641 Pages Publication : Year 2006.
- Majumdar, R. C. et al. *An Advanced History of India* London: Macmillan. 1960. ISBN 0-333-90298-X
- Basham, A.L. : The wonder that was India ,New York: Grove Press, 1954. (OUP, Madras 1983)
- Basham, A.L. : Cultural heritage of India , Vols.I to IV ,Oxford University Press, Delhi, 1975.

**Syllabus for B. Tech IV Year II semester**  
**Electronics and Computer Engineering**  
**FINANCIAL INSTITUTIONS, MARKETS AND SERVICES**  
**(Open Elective-III)**

**Code: 8ZC15**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objective:** The objective of the course is to provide to students an understanding of Financial Markets, the major Institutions involved and the Services offered within this framework.

**Course Outcomes:**

1. This unit enables the students to understand the financial structure and the financial sector reforms after 1991.
2. The unit gives the exposure on the role of RBI and the Regulating and credit policies adopted by the RBI.
3. The students get awareness on the role of Non-Banking financial institutions and the role of financial institutions in India.
4. The unit educates the students to know the role of regulatory bodies like SEBI and also to know the capital and money market instruments
5. The unit equips the students to understand about the asset fund based financial services
6. The students will get exposure about the investment banking and merchant banking.

**UNIT I**

**INTRODUCTION:** The structure of financial system, Equilibrium in financial markets, Indicators of Financial Development, Financial system and Economic Development, Financial Sector Reforms after 1991.

**UNIT II**

**BANKING INSTITUTIONS:** Structure and Comparative performance, Functions and Role of RBI, Competition, Interest rates, Spread; Bank Capital Adequacy norms; Banking Innovations – BPLR to Base rate, Core Banking System, Financial Inclusion, Current rates: Policy rates, Reserve Ratios, Exchange rates, Lending/ Deposit rates.

**UNIT III**

**NON BANKING FINANCIAL INSTITUTIONS:** Structure and functioning of Unit Trust of India and Mutual Funds, Growth of Indian Mutual funds and their Regulation, Role of AMFI. Performance of Non-Statutory Financial Organizations: IFCI, IRBI, NABARD, SIDBI and SFCs.

**UNIT IV**

**FINANCIAL AND SECURITIES MARKETS:** -, Role and functions of SEBI, Structure and functions of Call Money Market, Government Securities Market – T-bills Market, Commercial Bills Market, Commercial paper and Certificate of Deposits; Securities Market – Organization and Structure, Listing, Trading and Settlement, SEBI and Regulation of Primary and Secondary Markets.

**UNIT V**

**ASSET/FUND BASED FINANCIAL SERVICES:** Lease Finance, Consumer Credit and Hire purchase Finance, Factoring - Definition, Functions, Advantages, Evaluation, Forfeiting, Bills Discounting, Housing Finance, Venture Capital Financing. Fee-based Advisory services: Stock Broking, Credit Rating.

**UNIT VI**

**INVESTMENT BANKING AND MERCHANT BANKING:**

Investment Banking: Introduction, Functions and Activities, Underwriting, Banker to an Issue, Debenture Trustees and Portfolio managers, Challenges faced by Investment Bankers.

Merchant Banking: Definition, Merchant Banks Vs Commercial Banks, Services of Merchant Banks.

**REFERENCES:**

- L.M. Bhole: Financial Institutions and Markets, TMH, 2009.
- E. Gordon, K. Natarajan: Financial Markets and Services, Himalaya Publishing House, 2013.
- Vasant Desai: Financial Markets and Financial Services, Himalaya,2009
- Pathak: Indian Financial Systems, Pearson, 2009
- M.Y. Khan: Financial Services, TMH, 2009.
- S. Gurusamy: Financial Services and System, Cengage,2009
- Justin Paul and Padmalatha Suresh: Management of Banking and Financial Services, Pearson, 2009.
- Gomez, Financial Markets, Institutions and Financial Services, PHI, 2012.
- R M Srivatsava: Dynamics of Financial Markets and Institutions in India, Excel, 2013.

**Syllabus for B. Tech IV Year II semester  
Electronics and Computer Engineering  
PRINCIPALS OF AUTOMATION AND ROBOTICS  
(Open Elective-III)**

**Code: 8BC53**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Outcomes:**

After completing the subject, students will be able to:

- Understand a production system, principles of automobile
- understand the methods of work part transfer mechanical buffer storage control functions
- understand the implementation of automated flow lines
- know the analysis and design of material handling systems, automated guided vehicle system
- understand adaptive control systems and Applications.
- understanding the business process Engineering. Concept of concurrent Engineering, techniques of rapid prototype.

**UNIT – I**

Introduction: Production system, Automated manufacturing systems, Reasons, Principles and strategies of automation, Basic elements of automated system, pneumatic and hydraulic circuit components, Assembly system and line balancing: Manual Assembly process, and work transport systems, Line pacing, Analysis of manual assembly lines, line balancing methods-problems, ways of improving line balance lines.

**UNIT – II**

Analysis of Automated flow lines: System configuration, Workpart transfer, General terminology and analysis of transfer lines without and with buffer storage. Automated Assembly systems: Fundamentals and Design of assembly systems.

**UNIT – III**

Automated material handling: Principles, Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems-technology, Analysis of material transport systems.

Automated storage systems: Basic terminology, AS/RS; Carousel storage, work in process storage,

**UNIT – IV**

Adaptive control systems: Introduction, Adaptive control with optimization, Adaptive control with constraints, Application of A.C. in Machining operations. Use of various parameters such as cutting force, Temperature, vibration and acoustic emission. Concept of Concurrent Engineering, MRP,MRP II, Techniques of Rapid Proto typing.

**Unit – V: Robotics:**

Classification and structure of Robotic systems, structure of continuous path robot systems, drives and control systems, control approaches for robots.

**Unit – VII**

Robot arm kinematics, the direct kinematics problem and inverse kinematic solutions, planning of manipulator trajectories, robot sensors, range sensors, proximity sensors, touch sensors, force and torque sensors, programming, manual teaching, lead through teaching, programming languages, storing and operating task programmes, robot selection and application.

**TEXT BOOKS:**

1. Automation, Production Systems and Computer Integrated Manufacturing: M.P. Groover./PE/PHI
2. Mittal and Nagrath, 'Robotics and Control', Tata Mc Graw Hill.

**REFERENCES:**

1. Computer control of Manufacturing Systems by Yoram Coreom.
2. CAD / CAM/ CIM by Radhakrishnan.

**Syllabus for B. Tech IV Year II semester**  
**Electronics and Computer Engineering**  
**FUNDAMENTALS OF RENEWABLE ENERGY SOURCES**  
**(Open Elective-III)**

**Code: 8AC45**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objectives:**

Becomes familiar with solar energy, its radiation, Collection, storage and application and also gets introduced to other forms of Renewable Energy sources viz., the Wind energy, Biomass energy, geothermal energy and ocean energy.

**Course Outcomes:**

The student should be able to

1. Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation.
2. Demonstrates the knowledge of different techniques of solar collection and storage.
3. The student becomes familiar with the different types of horizontal and vertical axis wind mills and understands the performance characteristics of the same. The student also demonstrates the knowledge of different Bio-gas digesters and factors influencing its yield.
4. Aware of the potential of geothermal energy in India and will be able to characterize different types of geothermal wells.
5. Aware of the different methods of kinetic energy extraction from Ocean waves and tides and thermal energy extraction from Oceans.
6. Demonstrates the knowledge of Direct Energy Conversion in different phenomena viz., Joule Thomson effect, Seebeck effect, Peltier effect etc. and the principle of operation of Fuel Cells.

**UNIT – I -PRINCIPLES OF SOLAR RADIATION:**

Role and potential of new and renewable source, The solar energy option, Environmental impact of solar power, Physics of the sun, the solar constant, Extraterrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, Solar radiation data.

**UNIT-II- SOLAR ENERGY COLLECTION STORAGE AND APPLICATIONS:** Flat plate and concentrating collectors, Classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Different methods, Sensible, Latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

**UNIT – III WIND ENERGY:**

Sources and potentials, Horizontal and vertical axis windmills, Performance characteristics, Betz criteria  
**BIO-MASS:** Principles of Bio-Conversion, Anaerobic/aerobic digestion, Types of Bio-gas digesters, Gas yield, Combustion characteristics of bio-gas, Utilization for cooking, I.C.Engine operation and economic aspects.

**UNIT – IV GEOTHERMAL ENERGY:** Resources, types of wells, methods of harnessing the energy, Potential in India.

**UNIT-V OCEAN ENERGY:** OTEC, Principles utilization, Setting of OTEC plants, Thermodynamic cycles. Tidal and wave energy, Potential and conversion techniques, Mini-hydel power plants and their economics.

**UNIT-VI DIRECT ENERGY CONVERSION:**

Need for DEC, Carnot cycle, Limitations, principles of DEC. Thermoelectric generators, seebeck, Peltier and joul Thomson effects, Figure of merit, materials, Applications, MHD generators, Principles, Dissociation and ionization, Hall effect, Magnetic flux, MHD accelerator, MHD Engine, Power

generation systems, Electron gas dynamic conversion, economic aspects. Fuel cells – principles - Faraday's law's - Thermodynamic aspects - selection of fuels and operating conditions.

**TEXT BOOKS:**

1. Non-Conventional Energy Sources - G.D. Rai
2. Renewable Energy Technologies - Ramesh & Kumar /Narosa.

**REFERENCE BOOKS:**

1. Renewable energy resources - Tiwari and Ghosal/ Narosa.
2. Non-Conventional Energy - Ashok V Desai /Wiley Eastern.
3. Non-Conventional Energy Systems - K Mittal /Wheeler



**Syllabus for B. Tech IV Year II semester**  
**Electronics and Computer Engineering**  
**ENTREPRENEURSHIP AND BUSINESS DESIGN**  
**(Open Elective-III)**

**Code: 8ZC10**

| L | T | P/D | C |
|---|---|-----|---|
| 2 | 0 | 0   | 2 |

**Course Objective:** The objective of the course is to make students understand the essentials of building their startups and to familiarize with business design process develop business models, and market their product.

**Course Outcomes:**

1. The students gain the knowledge on the essentials of entrepreneurship and the key role played by the entrepreneurs.
2. The students gain knowledge on exploring the different phases of UI /UX.
3. The students grasp the attentiveness on designing a business strategy.
4. The students gain familiarity on designing and delivery of services.
5. The students understand reverse engineering methods in product development.
6. The students have access to information on IPR, and patent application.

**Unit - I: Introduction to Entrepreneurship:** Meaning of Entrepreneurship. Reasons feeding the Entrepreneurial fire. Understanding Entrepreneurship as a Process. Multiple roles of Entrepreneur: Intrapreneur, Inventor, Coordinator, Manager and Controller. Psychological and behavioral aspects of First-Generation Entrepreneur.

**Unit - II: Introduction to UI/UX:** Human centered design and benefits, the distinction between UX and UI, UX process – user research, prototyping strategies, UI principles, UI analysis, UI design, UI components and Responsive design.

**Unit - III: Designing a Business Strategy:** Define a problem and frame a strategic question, map the lives of users, journey mapping and ideation, color theory, killing the ideas through Stage Gate Models, pitching of full-fledged, idea, choosing the Start-Up Team.

**Unit - IV: Designing Services and Services Delivery:** Services as solutions, Service delivery pathways, rapid branding and marketing strategies, key metrics for Design thinking. Types of New services, Mix of core services and secondary and enhancing services, service flower and service design matrix.

**Unit - V: Business Model:** Meaning of business model, Difference between business model and business planning, the business model canvas, Risks and Assumptions, Validation of business models, building solution demo and MVP, revenue streams and pricing strategies.

**Unit – VI: Entrepreneurial Funding and Risk Management:** Bootstrapping, Angel Investors, Venture capitalists, Private equity funding, customer acquisition, return on equity and Break even analysis, Risk propensity Vs. Risk avoidance, Locus of control of entrepreneur, Risk estimation techniques, risk avoidance strategies.

**TEXT BOOK(S)**

1. Adrian McEwen, Hakim Cassimally – “Designing the Internet of Things”, Wiley Publications, 2012
2. Hedman, J., &Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations. *European journal of information systems*, 12(1), 49-59.
3. Cabrera, J. (2017). *Modular Design Frameworks: A Projects-based Guide for UI/UX Designers*. Apress.

## REFERENCES

1. J. Chris Leach & Ronald W. Melicher “Entrepreneurial Finance, Fourth Edition”, South Western, Cengage Learning, 2012.
2. Robert D. Hisrich & Veland Ramadani – “ Effective Entrepreneurial Management, Strategy, Planning, Risk Management, and Organization” , Springer, 2017.
3. Mæhlum, A. R. (2017). *Extending the TILES Toolkit-from Ideation to Prototyping* (Master's thesis, NTNU).
4. Norman, D. (2013). *The design of everyday things: Revised and expanded edition*. Basic