ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS

for

B.Tech Four Year Degree Course

(A-18 III & IV year)

in

ELECTRONICS AND COMPUTER ENGINEERING

(ECM)

(Applicable for the batches admitted from 2018-19)

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.

June, 2020

ELECTRONICS AND COMPUTER ENGINEERING (ECM)

VISION OF THE DEPARTMENT

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

MISSION OF THE DEPARTMENT

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.

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.

PROGRAM 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.

PROGRAM EDUCATIONAL OBJECTIVES (PEO's)

PEO – I: Graduates will have strong foundation in fundamentals of basic sciences ,mathematics, Engineering sciences and technology with abilities to understand societal problems

PEO – II: 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.

PEO – III: 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

PEO- IV: 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.

PROGRAM SPECIFIC OUTCOMES (PSO's)

1. Ability to identify, formulate and solve engineering problems using computation and appropriate algorithms in one or more fields of electronics and computer engineering, such as Internet of Things, embedded systems, computer vision, machine learning, artificial intelligence, and signal processing.

2. Ability to use contemporary engineering tools and techniques and adapt to the industry needs for solving multi-disciplinary problems

3. Ability to design a system or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, safety, and sustainability.

ACADEMIC REGULATIONS
FOR B.TECH. REGULAR STUDENTS
WITH EFFECT FROM
THE ACADEMIC YEAR 2018-19
(A-18)

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 2018-19 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 year)

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 merit rank obtained by graduate programs 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 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 39 credits and the credits in II , III and IV years should not exceed 127 credits as per AICTE model curriculum for the B.Tech. programme. Each student shall secure 166 credits (with CGPA $\geq$5) required for the completion of the undergraduate programme and Award of B.Tech Degree.

Each student shall secure 166 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 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 program recommended by AICTE in the model curriculum consisting of courses like **Mandatory Induction program** for 3 weeks i.e. Human Values and Ethics in higher education.
- However there will be an end examination and will also reflect in the Memo of Marks. The grading will be as follows.

% 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

- Other mandatory courses i.e ., Environmental Science and Ecology, Indian standards in concerned branch also will not have credits but evaluation will be done as per the above table. A student can not 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 almost all the guidelines issued by AICTE/UGC.

The groups of the subjects shall be as given in the table given hereunder along with the credits suggested by AICTE

Sl. No.	Category	Suggested Breakup of Credits (Total 160)
1	Humanities and social sciences including Management courses	12*
2	Basic Science courses	25*
3	Engineering Science courses including workshop, drawing, basics of electrical / mechanical / computer etc	24*
4	Professional core courses	48*
5	Professional Elective courses relevant to chosen specialization / branch	18*
6	Open Electives from other technical and / or emerging subjects	18*
7	Project work, seminar and internship in industry or elsewhere	15*
8	Mandatory courses (Environmental Sciences, Induction training, Indian constitution, Essence of Indian Traditional Knowledge)	(Non-credit)
	Total	160*

The Academic council of the institution has approved the total number of credits to be 166. 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/ Councilor 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 / councilor 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 upto 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 **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.

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 UG mini-project and seminar, if 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 mini-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 to IV year or
(iv) secures less than 40% marks in UG mini-project/ seminar evaluations.

Student may reappear once for each of the above evaluations, when they are scheduled again; if student fails in such 'one reappearance' 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 (19) 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	i. Regular course of study of First and second semesters of second year. ii. Must have secured at least 60% of credits (49) 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	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 / subjecs covering 166 credits as specified and listed in the course structure, (ii) fulfils all the attendance and academic requirements for 166 credits, (iii) earn all 166 credits by securing SGPA $\geq$ 5.0 (in each semester), and CGPA (at the end of each successive semester) $\geq$ 5.0, (iv) **passes all the mandatory courses,** to successfully complete the under graduate programme. The performance of the student in these 166 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 Engg.) 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 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) may 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, shall be promoted to the next academic year only after acquiring the required academic credits.**

The academic regulations under which student has been readmitted shall be applicable to him / her.

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 a practical subject with 30 marks Continuous Internal Evaluations (CIE) and 70 marks for Semester End Examinatins (SEE)

In addition, Internship industry-oriented mini-project, group project, Project – I will also be evaluated for 100 marks, Project – II for 100 marks, Technical Seminar and comprehensive viva for 100 marks each.

The continuous internal evaluation for Project – I in IV year I semester shall consist of :

Sl.No	**Description**	**Marks**
1	Literature survey and presenting seminar at the end of 6 weeks	10 marks
2	Report	10 marks
3	Demonstration/presentation at the end of 14 weeks	10 marks
	Total sessional marks	**30 marks**

Semester end examination - 70 marks

Pattern of external evaluation for Project – I in IV year I semester.

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**

The continuous internal evaluation for Project – II in IV year II semester shall consist of :
Division of marks for External Evaluation for project II – 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 defence of project	5 marks
	Total	**30 marks**

Division of marks for External Evaluation for project II – 70 Marks

Sl.No	Description	Marks
1	Final Project Report	10 marks
2	Presentation	20 marks
3	Demonstration / Defense of Project	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 2018-19

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 – total of 9 questions to be submitted before first mid test : 2 marks

Similarly assignment – II will be given to be Submitted before Mid Test II and average of two assignments will be considered.

e) Attendance : 3 marks
f) Class notes : 2 marks
Total :30 marks

Three marks are assigned for each theory course for those 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, and he/she 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 $2^1/_2$ hours. That result will be treated as III mid test and average of better two 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 the 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 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 (100 marks)

There shall be a technical seminar evaluated for 100 marks from I year to III year I Seemester. 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	15
3	Seminar Notes	10
4	Interaction	05
5	Report	10
6	Attendance in the seminar class	10
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	10

9	End Semester Viva	20
	Total	100 Marks

Student must secure 40% i.e. 40 marks to be successful

* According to the syllabus approved by the Academic Council as per Board of studies recommendations

8.7 Comprehensive Viva-voce (II-II, III-II and IV-II*)

There shall be comprehensive viva voce as stated above which will be evaluated for 100 marks. Out of 100 marks, 30 marks are internal and 70 marks are external.

S.No.	Description	marks
1	First mid-sessional viva at the end of 5 weeks (Internal)	15 marks
2	Second mid-sessional viva at the end of 10 weeks (Internal)	15 marks
3	Final viva during practical examinations (External)	70 marks
4	Total	100 Marks

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* According to the syllabus approved by the Academic Council as per Board of Studies recommendations

8.7.2 The evaluation of comprehensive viva-voce has to be carried out by two teachers independently and average be taken.

The sessional marks awarded by the Department are not final.
They are subject to scrutiny by a committee constituted by the college and scaling is done wherever necessary.

The recommendations of the Committee are final and binding.

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 an industrial oriented Mini Project / Summer Internship, in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation. Industrial Oriented Mini Project / Summer Internship shall be submitted in a report form and presented before the committee in IV year I semester similarly summer internship in an Industry of their specialization will be given for B.Tech II year II semester students and pursue it in the summer vacation. A report on summer internship shall be submitted and presented before the committee in III year I semester and IV year I semester. It shall be evaluated for 30 internal marks and 70 external marks. The committee consists of an external examiner, Head of the Department, supervisor of the Industrial Oriented mini project / Summer Internship and a senior faculty member of the department.

8.10 The laboratory marks and the internal marks awarded by the college are subject to scrutiny and scaling 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 committee as and when asked for.

8.11. For mandatory courses of Induction Programme (Human values, and Ethics in Higher Education), Environmental Science and Ecology, Indian Standards a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation and external examination for passing the subject / course. These marks should also be uploaded along with the internal marks of other subjects.

9.0 Grading procedure

9.1 Marks will be awarded to indicate the performance of student in each theory subject, laboratory / practicals, seminar, UG mini project and UG major project.

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 = $\{ \sum_{i=1}^{N} C_i G_i \} / \{ \sum_{i=1}^{N} C_i \}$ …. 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 Points
I Year I Semester				
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 Year II Semester				
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

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 GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when student gets an 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 CGPA ≥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 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) $\geq$ 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) $\geq$ 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) $\geq$ 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.

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 provide one chance to write the CEE (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 2019-20

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 resulting in 160 credits for B.Tech programme performance evaluation**.**

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.

4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

5. <u>Promotion rules based on credits</u>

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 29 credits out of 48 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 58 credits out of 96 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).

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractice/Improper 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.
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 (A18 Regulation) Course Structure

ECM (A18 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	7HC03	Chemistry	3	1	0	4	30	70
2	ES	IT	7FC01	Problem Solving using C	3	0	0	3	30	70
3	BS	S&H	7HC07	Mathematics – I	3	1	0	4	30	70
4	ES	MECH	7BC01	Workshop/Manufacturing practices	1	0	0	1	30	70
5	HS	S&H	7HC01	English (Reading, Listening and Writing skills)	1	0	0	1	30	70
6	HS	S&H	7HC20	Human Values and Professional Ethics in Higher Education	3	0	0	0	30	70
									Grade Evaluation	
7	BS	S&H	7HC63	Chemistry Lab	0	0	3	1.5	30	70
8	ES	IT	7FC71	Problem Solving using C Lab	0	0	3	1.5	30	70
9	ES	MECH	7BC61	Workshop/Manufacturing practices Lab	0	0	3	1.5	30	70
10	HS	S&H	7HC61	English (Reading, Listening and Writing skills) Lab	0	0	2	1	30	70
11	PS	ECM	7D191	Technical Seminar - I	0	0	2	1	100	--
				Total	**11**	**2**	**13**	**19.5**	**400**	**700**

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	7HC05	Engineering Physics	3	1	0	4	30	70
2	PC	EEE	7AC02	Network Analysis	3	0	0	3	30	70
3	BS	S&H	7HC09	Probability and Statistics	3	1	0	4	30	70
4	ES	MECH	7BC02	Engineering Graphics & Design	1	0	4	3	30	70
5	HS	S&H	7HC02	English (Oral communication skills)	1	0	0	1	30	70
6	BS	S&H	7HC65	Engineering Physics Lab	0	0	3	1.5	30	70
7	PC	EEE	7AC61	Electrical Circuits and Networks Analysis Lab	0	0	2	1	30	70
8	HS	S&H	7HC62	English (Oral communication skills) Lab	0	0	2	1	30	70
9	PS	ECM	7D292	Technical Seminar - II	0	0	2	1	100	--

				Total	**11**	**2**	**13**	**19.5**	**340**	**560**

Credits: 19.5 + 19.5 = 39

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	CSE	7EC01	Data Structures	2	1	0	3	30	70
2.	PC	ECM	7D301	Discrete Structure and Graph Theory	3	0	0	3	30	70
3.	PC	ECE	7C301	Electronic Devices and Circuits	3	0	0	3	30	70
4.	PC	ECE	7C302	Digital Logic Design	3	0	0	3	30	70
5.	PC	ECE	7C303	Signals and Systems	2	1	0	3	30	70
6.	HS	SMS	7ZC01	Management Science & Financial Accounting	2	0	0	2	30	70
7.	PC	CSE	7EC71	Data Structures (C, C++)Lab	0	0	2	1	30	70
8.	PC	ECE	7C371	Electronic Devices and Circuits Lab	0	0	2	1	30	70
9.	PC	IT	7FC74	IT Workshop	0	0	2	1	30	70
10.	PS	ECM	7D393	Technical Seminar – III	0	0	2	1	100	--
				Total :	**15**	**2**	**9**	**21**	**370**	**630**

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	7HC16	Mathematics – II (Differential Calculus)	2	0	0	2	30	70
2	PC	CSE	7EC02	Object Oriented Programming through Java	3	0	0	3	30	70
3	PC	ECM	7D403	Computer Organization and Operating Systems	3	0	0	3	30	70
4	PC	CSE	7EC03	Data Base Management Systems	3	0	0	3	30	70
5	PC	ECM	7D414	Software Engineering	2	0	0	2	30	70
6	PC	ECE	7C405	Analog Circuits	3	0	0	3	30	70
7	BS	S&H	7HC21	Environmental Science and Ecology	2	0	0	0	30	70
									Grade Evaluation	
8	PC	ECE	7C474	Analog Circuits Lab	0	0	2	1	30	70
9	PC	CSE	7EC73	Database Management Systems Lab	0	0	3	1.5	30	70
10	PC	CSE	7EC72	Object Oriented Programming through Java Lab	0	0	3	1.5	30	70
11	PS	ECM	7D494	Technical Seminar – IV	0	0	2	1	100	--
12	PC	ECM	7D481	Comprehensive Viva –Voce I	0	0	0	1	30	70
13	PS	ECM	7D584	Summer Industry Internship-I (Evaluation will be done along with 3-1 subjects)						
				Total :	**15**	**0**	**9**	**22**	**430**	**770**

Credits: 21 + 22 = 43

III YEAR I SEMESTER COURSE STRUCTURE

S. No	Course Category	Dept Course	Course Code	Subject	L	T	P/D	C	Max. Marks	
									Int.	Ext.
1	PE			**Professional Elective - I**	3	0	0	3	30	70
2	PC	IT	7F505	Design and Analysis of Algorithms	2	1	0	3	30	70
3	PC	ECE	7CC08	IC Applications	3	0	0	3	30	70
4	PC	ECE	7CC07	Analog Communications	3	0	0	3	30	70
5	PC	ECM	7D504	Data Communications and Computer Networks	3	0	0	3	30	70
6	HS	SH	7HC74	Soft Skills and Technical Communication	0	0	2	1	30	70
7	BS	SH	7H518	Quantitative Aptitude	1	1	0	2	30	70
8	PC	ECE	7CC75	Analog Communications Lab	0	0	2	1	30	70
9	PC	ECE	7CC76	IC Applications Lab	0	0	4	2	30	70
10	PC	CSE	7EC77	Web Technologies Lab	0	0	4	2	30	70
11	PS	ECM	7D595	Technical Seminar – V	0	0	2	1	100	--
12	PS	ECM	7D584	Evaluation of Summer Industry Internship-I	0	0	0	1	30	70
				Total :	**15**	**2**	**14**	**25**	**460**	**840**

III YEAR II SEMESTER COURSE STRUCTURE

S. No.	Course Category	Dept Course	Course Code	Subject	L	T	P/D	C	Max. Marks	
									Int.	Ext.
1	OE			**Open Elective - I**	3	0	0	3	30	70
2	PE			**Professional Elective – II**	3	0	0	3	30	70
3	PC	ECM	7DC05	Microprocessors and Microcontrollers	3	0	0	3	30	70
4	PC	ECE	7CC10	Digital Signal Processing	3	0	0	3	30	70
5	PC	ECM	7D602	Automata and Compiler Design	3	0	0	3	30	70
6	BS	SH	7H619	Logical Reasoning	1	1	0	2	30	70
7	PC	ECM	7DC71	Microprocessors and Microcontrollers Lab	0	0	2	2	30	70
8	PC	ECE	7CC78	Digital Signal Processing Lab	0	0	4	2	30	70
9	PC	ECM	7D689	Complier Design Lab	0	0	4	2	30	70
10	PS	ECM	7D677	Group Project	0	0	4	2	30	70
11	PC	ECM	7D682	Comprehensive Viva –Voce II	0	0	0	1	50	50
12	PS	ECM	7D785	Summer Industry Internship-II (Evaluation will be done along with 4-1 subjects)						
				Total :	**16**	**1**	**14**	**26**	**410**	**820**

Credits: 25 + 26 = 51

IV YEAR I SEMESTER COURSE STRUCTURE

S. No.	Course Category	Dept Course	Course Code	Subject	L	T	P/D	C	Max. Marks	
									Int.	Ext.
1	OE			**Open Elective- II**	3	0	0	3	30	70
2	PE			**Professional Elective-III**	3	0	0	3	30	70
3	PE			**Professional Elective – IV**	3	0	0	3	30	70
4	PC	ECM	7D706	Embedded and Real Time Systems	3	0	0	3	30	70
5	PC	ECM	7D707	VLSI Design	3	0	0	3	30	70
6	PC	ECM	7DC72	Embedded Systems Lab	0	0	3	1.5	30	70
7	PC	ECM	7DC73	VLSI Lab	0	0	3	1.5	30	70
8	PC	ECM	7D788	Python Programming Lab	0	0	4	1	30	70
9	PS	ECM	7D779	Project – I	0	0	4	2	30	70
10	PS	ECM	7D785	Evaluation of Summer Industry Internship-II	-	-	-	1	30	70
				Total :	**15**	**0**	**14**	**22**	**330**	**770**

IV YEAR II SEMESTER COURSE STRUCTURE

S. No	Course Category	Dept Course	Course Code	Subject	L	T	P/D	C	Max. Marks	
									Int.	Ext.
1	PE			**Professional Elective-V**	3	0	0	3	30	70
2	OE			**Open Elective-III**	3	0	0	3	30	70
3	PS	ECM	7D880	Project – II	-	-	10	5	30	70
				Total :	**6**	**0**	**10**	**11**	**90**	**210**

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

B.TECH ECM A18 REGULATION COURSE STRUCTURE

L	T	P/D	C
3	0	0	3

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)
Systems	Advanced Computer Architecture (7EC22)	Distributed Systems (7EC24)	Advanced Operating Systems (7EC23)	Information Security (7EC08)	Internet of Things (IoT) (7DC55)
Data Science	Introduction to Data Science (7EC16)	Machine Learning (7EC17)	Big Data Analytics (7EC18)	Artificial Intelligence and Deep Learning (7DC61)	Cloud Computing (7EC21)
Advanced Technologies	Computer Graphics (7FC14)	Image Processing (7FC15)	Block Chain Technologies (7FC16)	Augmented and Virtual Reality (7FC17)	Internet of Things (IoT) (7DC55)
Communications	Electro Magnetic Waves and Transmission Lines (7CC06)	Digital Communications (7CC09)	Antennas and Wave Propagations (7CC13)	Cellular and Mobile Communications (7CC18)	Wireless Communications and Networks (7CC22)
Network Security	Semantic Web and Social Networks (7EC11)	Advanced Computer Networks (7EC12)	Cyber Security and Cyber Semantic (7EC13)	Information Security, Management and Standards (7EC14)	Mobile Adhoc and Sensor Networks (7EC15)

OPEN ELECTIVES STREAMS

Professional Elective Streams	III-Year II-Semester / (Open Elective – I)	IV -Year I-Semester / (Open Elective – II)	IV-Year II-Semester / (Open Elective – III)
Social Sciences	Basics of Indian Economy (7ZC25)	Basics of Quality and Ecology (7ZC26)	Indian History, Culture and Geography (7ZC27)
Electrical	Control Systems Engineering (7AC46)	Fundamentals of Measurements and Instrumentation (7AC44)	Fundamentals of Renewable Energy Sources (7AC45)
Finance	Banking Operations, Insurance and Risk Management (7ZC05)	Entrepreneurship, Project Management and Structured Finance (7ZC19)	Financial Institutions, Markets and Services (7ZC15)
Mechanical	Smart Materials (7BC51)	Principals of Automation and Robotics (7BC55)	Principals of Operations Research (7BC53)
Entrepreneurship	Basics of Entrepreneurship (7ZC22)	Advanced Entrepreneurship (7ZC23)	Innovation and Design Thinking (7ZC24)

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
DESIGN AND ANALYSIS OF ALGORITHMS
(Common to all branches)

Code: 7F505

L	T	P/D	C
2	1	0	3

Course Objectives:

*To provide a solid foundation in **algorithm design and analysis**.*

1) *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:

1) *Analyze worst-case running times of algorithms using asymptotic analysis.*
2) *Describe the divide-and-conquer paradigm and explain when an algorithmic design Situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.*
3) *Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic programming algorithms, and analyze them.*
4) *Describe the greedy paradigm and explain when an algorithmic design situation callsfor it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.*
5) *Explain what amortized running time is and what it is good for. Describe the different Methods of amortized analysis (aggregate analysis, accounting, potential method). Perform amortized analysis.*
6) *Describe Backtracking, Branch and Bound algorithms and Concept of P and NP Problems.*

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 dead lines, 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 non deterministic 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
IC APPLICATIONS

Code: 7CC08

L	T	P/D	C
3	0	0	3

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 Digital ICs families, and their applications in various digital circuits and systems.*

Course Outcomes

After studying this course, the students will be able to

- *Demonstrate the concepts of Differential Amplifier and Operational Amplifier and their characteristics.*
- *Design the basic circuits using Operational Amplifiers.*
- *Explore, design and analyze Filters, Timers, Voltage Controlled Oscillator and Phase Locked Loop.*
- *Demonstrate the design and analyze Oscillators, D/A Converters and A/D Converters, and IC regulators.*
- *Classify and characterize the TTL/ECL Logic Families.*
- *Explore the design of various logic gates using CMOS logic.*

Mapping of Course Outcomes with Program Outcomes

	a	b	C	d	e	f	g	h	i	j	k	l
CO1	3		2	3					2			
CO2	3	3	3	3	3				3	3		3
CO3	3	3	3		2				3	3		3
CO4	3	2	3	3	3				2	3		3
CO5	3	2			3							2
CO6	2		3	3	3				2	3		3

UNIT – I

OPAMP & ITS CHARACTERISTICS

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

BASIC APPLICATIONS OF OP-AMPs

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

FILTERs, TIMERs & PLLs

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

OSCILLATORS, D/A AND A/D CONVERTERS, IC REGULATORS

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

LOGIC FAMILIES

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

MOS& CMOS LOGIC FAMILY

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

1. D. Roy Chowdhary, Linear Integrated Circuits, New Age Publications (P) Ltd, 2nd Edition, 2003.
2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, PHI,1987.
3. John F. Wakerly, Digital Design Principles & Practices, PHI/ Pearson Education Asia, 3rd Ed., 2005.

References

1. Sergio Franco, Design with Operational Amplifiers & Analog Integrated Circuits, McGraw Hill, 1988.
2. R.F. Coughlin & Fredrick Driscoll, Operational Amplifiers & Linear Integrated Circuits, PHI, 6th Edition.
3. K. Lal Kishore, Linear Integrated Circuit Application, Pearson Educations,2005.
4. Millman, Micro Electronics, McGraw Hill,1988.
5. C.G. Clayton, Operational Amplifiers, Butterworth & Company Publ. Ltd. Elsevier,1971.

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
ANALOG COMMUNICATIONS

Code: 7CC07

L	T	P/D	C
3	0	0	3

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

Prerequisites: *PTSP, SS.*

Course Objectives:

- *To provide both the theory and practice of modulation techniques used in various analog transmitter and receiver systems.*

Course Outcomes

After studying this course, the students will be able to

1. *Understand need for modulation, Types of analog modulation such as AM, DSBSC, SSBSC, VSB , their generation and detection.*
2. *Understand types of multiplexing ,and commercial applications of all types of analog modulations*
3. *Understand the types of angle modulation such as FM, PM, their generation and detection methods, comparison and applications*
4. *Understand types of Noise, analysis and calculation of noise in AM,DSBSC and SSB*
5. *Understand the circuits and characteristics of transmitters and receivers for AM and FM.*
6. *Understand types of Pulse Modulations such as PAM, PPM, PWM, their generation, detection, and applications.*

UNIT I

AMPLITUDE MODULATION

Introduction to Analog Communications, Need for Modulation, Frequency Translation, Amplitude Modulation-Time Domain and Frequency Domain Representation of AM signals, Power and Current Relations in AM waves. Generation of AM Waves: Square Law Modulator, Switching Modulator. Detection of AM Waves: Square Law Detector, Envelope Detector.

UNIT-II

DSBSC & SSBSC MODULATION

Double sideband suppressed carrier and single sideband modulation- Time domain and frequency domain representation of DSBSC and SSB signals. Generation and Detection of DSBSC,SSB signals. Vestigial sideband modulation. Generation and Detection of VSB signal, Frequency Division Multiplexing, ISB Modulation. Comparison of AM techniques, Commercial Applications of AM.

UNIT-III

ANGLE MODULATION

Frequency modulation-Narrowband FM and wideband FM- spectrum of FM signals-Transmission bandwidth of FM.Phase modulation-relationship between FM and PM signals Generation of FM signals-direct(parametric variation method) and indirect(Armstrong method) methods, Detection of FM signals : Frequency discriminators,phase difference discriminators, Phase locked loop, Zero crossing Detector.Comparison of FM & AM, Commercial Applications of FM,PM.

Applications: Design of a 88-108 MHz FM system

UNIT-IV

NOISE AND DISTORTIONS IN COMMUNICATION

Noise in base-band systems-SNR at the output of a base-band system-SNR improvement. Noise in linear CW modulation systems-noise in DSB/SC and SSB systems-noise in AM systems. Noise in angle modulated systems-Output SNR in angle modulated systems- threshold effects in angle modulated systems. Pre-emphasis & De-emphasis.

UNIT-V

TRANSMITTERS AND RECEIVERS

Radio Transmitters, Classification of Transmitters, AM Transmitter, Effect of feedback on performance of AM Transmitter ,FM Transmitter, Frequency stability in FM Transmitter

Radio Receiver-types-Tuned Radio Frequency receivers and super-heterodyne receivers, RF section and characteristics, Intermediate frequency, Image frequency and its rejection ratio, receiver characteristics-Automatic gain control,Tracking& alignment, AM receiver, FM receiver, Amplitude limiting.

Applications: Design of an AM transmitter system.

UNIT-VI

PULSE MODULATION

Analog Pulse Modulation: Sampling theorem for base-band and band pass signals, Pulse Amplitude modulation: generation and demodulation, Time Division Multiplexing system, PPM generation and demodulation, PWM, Spectra of Pulse modulated signals.

Text Books

1. Simon Haykin, *Communication Systems,* John Wiley &Sons , 2nd Edition ,1998.
2. K. Sam Shanmugam, *Digital and Analog Communication Systems*", John Wiley & Sons
3. H.Taub&D.Schilling,Gautamsahe, Principles of Communication systems –TMH,2007,3rd edition

References

1. George Kennedy and Bernard Davis ,*Electronics& Communication System*, TMH,2nd Edition, 2004.
2. Analog and Digital Communications, Theory and Lab work, Abhay Gandhi, Cengage Learning.
3. Dennis Roddy, John Coolen, "Electronic Communications", PHI 1997 B.P. Lathi, "Modern Digital and Analog Commmunication Systems" 3rd Ed. Oxford University Press.
4. P.RamakrishnaRao,"Analog Communications"1st edition,TMH
5. K N HariBhat& Ganesh Rao, "Analog Communications"2nd edition, pearson publications.
6. A.BruceCalrson, " Communication systems", Third edition, MGH Publication.

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
DATA COMMUNICATIONS AND COMPUTER NETWORKS

Code: 7D504

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
x	x	x		x						x	x

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, addressing

UNIT – II: Physical layer and media: Data and signals: Analog and digital, periodic analog signals, digital signals, Transmission impairment, Data rate limits, Performance.
Digital transmission: Digital – to – digital conversion, Analog – to – digital conversion, Transmission modes.
Analog transmission: Digital – to – analog conversion, Analog – to – analog conversion. Bandwidth utilization: Multiplexing and spreading; 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 : Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing.
Dynamic routing – Broadcast routing. Rotary for mobility. Congestion, Control Algorithms – General Principles – of Congestion prevension policies. Internet working: The Network layer in the internet and in the ATM Networks.

UNIT –VI: Transport Layer: Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol.
Application Layer – Network Security, Domain name system, SNMP, Electronic Mail; the World WEB, Multi Media.

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. Data Communications, William Stallings, Seventh edition.

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
SOFT SKILLS AND TECHNICAL COMMUNICATION

Code: 7HC74

L	T	P/D	C
0	0	2	1

1	2	3	4	5	6	7	8	9	10	11	12
							x	x	x		x

Course Objectives:
The objective of the course is to help students in up-skilling themselves to meet the expectations of the industry. The course tries to sharpen the soft skills and the technical communication skills of the students and churn them out as promising assets to the organizations they work for, in future

Programme Outcomes: *Students will be able to*
- *make a self-assessment*
- *enhance their soft skills and behavioral patterns*
- *equip themselveswith the required skillset for their career advancement*
- *develop interpersonal communication skills*
- *participate in group tasks and use effective language skills in interviews*
- *overcome stress and enhance employability quotient*
- *practice technical communication with ease*

Unit 1: Know Yourself – SWOT / SWOC Analysis

1. Introduction: Importance of knowing yourself
2. Meaning of SWOT / SWOC
3. SWOT / SWOC analysis
4. Benefits of SWOT / SWOC analysis
5. SWOT / SWOC grid

Emotional Intelligence

1. Nature and significance of Emotional Intelligence
2. Five basic competencies of Emotional Intelligence according to Goleman:
   a. Self-awareness b. Self regulation c. Motivation d. Empathy
   e. Social skills.
3. Strategies to enhance Emotional Intelligence

Unit 2: Soft Skills-I

1. Introduction to Soft skills
2. Definition of Soft Skills. Difference between Soft Skills and Hard Skills
3. Importance of Soft Skills
4. **Positive Attitude:** Meaning; Difference between Attitude and Behavior
5. Attitude Building
6. Need for developing Positive Attitude

Goal Setting

1. The purpose of Goal setting
2. Types of Goals
3. How to set SMART goals

Time Management

1. Need and Importance of Time Management
2. Scheduling and Prioritizing tasks
3. Identifying major time wasters

Unit 3:Soft Skills-II

Team work and Team Dynamics

1. Introduction
2. Team Vs Group
3. Stages of team building
4. Characteristics of an effective team, role of a team leader

Problem Solving

1.Definition
2. Skill sets in Problem solving
3. Steps in solving problems

Decision Making

1. Decision making: Definition, Importance of Decision Making.
2. Decision Making process

Unit 4: Technical Communication

1. Definition and importance of Technical Communication
2. Types of Technical Communication
3. Report writing: Significance, types, steps, layout and Mechanism
4. Review of technical articles.

Unit 5: Etiquette and Stress Management

1. **Etiquette: Introduction and classification**
2. Work place etiquette
3. Strategies to handle Stress

Unit 6: Résumé Writing and Interview Skills

Résumé: Introduction

1. Types of Résumé
2. Difference among Bio-data, Curriculum Vitaé and Résumé
3. Resume writing: Purpose and Design
4. Tips to write a winning Resume.
5. Cover letter

Interview Skills

1. Meaning and purpose of an Interview
2. Types of interviews (Face to Face / Panel Interviews/Telephonic interviews etc.)
3. Interview Preparation techniques
4. Common mistakes
5. Dress code at an interview
6. FAQs in HR Interview
7. Mock Interviews

Suggested reading:

1. SOFT SKILLS – *Dr. K. Alex, S.Chand publications*
2. SOFT SKILLS – *Meenakshi Raman*
3. Technical communication- *Meenakshi Raman and Sangeetha Sharma (Oxford Publications)*
4. Advanced Technical communication - *Kavita Tyagi and Padma Mistri*
5. Developing Speaking-Listening Skills in English (With CD)
6. Basic Communication Skills For Technology- *Andrea J Rutherfoord- Pearson*
7. Developing Communication Skills- *Krishna Mohan- Macmillan*
8. Written Communication Skills- *Michael Hatton-iste*

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
QUANTITATIVE APTITUDE
(Common to All Branches)

Code: 7H518

L	T	P/D	C
1	1	0	2

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

***Pre Requisites**: Nil*

***Course objectives:** By learning Quantitative Aptitude, student learns the techniques to solve all the problems in his real life..It can improve the numerical ability. The quicker methods are useful to solve the problems within the time and it is helpful in his duties. Student can use Quantitative Aptitude in everyday life to figure out mathematically. Student can improve his mental capacity. It helps in sharpening their minds.*

***Course Outcomes:** After completion of this course students will be able to solve*

1. *The questions given on testing divisibility, prime number and questions of HCF and LCM .*
2. *The questions given on averages, percentage and profit and loss.*
3. *The questions given on ratio and proportion.*
4. *The questions given on simple and compound interest.*
5. *The questions given on time and work, time and distance.*
6. *The questions given on mensuration and data sufficiency.*

Unit I
Number System: Test for Divisibility, Test of prime number, Division and Remainder – HCF and LCM of Numbers - Fractions.

Unit II
Average: Average of different groups, Replacement of some of the items - Percentage - Profit and Loss.

Unit III
Ratio and Proportion: Properties of Ratio, Comparison of Ratios, Useful Simple Results on Proportion – Partnership and Share.

Unit IV
Simple Interest: Effect of change of P, R and T on Simple Interest - Compound Interest: Conversion Period, Difference between Compound Interest and Simple Interest.

Unit V
Time and Work-Pipes and Cisterns, Time and Distance- Problems on Trains- Boats and Streams, Allegation or Mixtures.

Unit VI
Mensuration: Area of Plane Figures, Volume and Surface Area of Solid Figures.
Data Interpretation: Tabulation, Bar Graphs, Pie Charts, Line Graphs.

Text Books:
1.Quantitative Aptitude by R.S.Agarwal
2. Quantitative Aptitude by Abhijit Guha
3. Quantitative Aptitude for Competitive Examinations, U.Mohan Rao, Scitech Publication.

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
ANALOG COMMUNICATIONS LAB

Code: 7CC75

L	T	P/D	C
0	0	2	1

Prerequisites: *SS, PTSP, BS Lab*

Course Objectives:

The objectives of this course are

- *To perform laboratory experiments on various analog and digital modulation techniques and measure the performance parameters.*

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

CO1	*Demonstrate the modulation and demodulation of various forms of amplitude modulation techniques.*
CO2	*Demonstrate the modulation and demodulation of frequency modulated waveform.*
CO3	*Verifying the spectral components of AM and FM.*
CO4	*Verifying the concepts of frequency multiplexing techniques.*
CO5	*Analyze the characteristics of heterodyne receiver.*
CO6	*Verifying sampling theorem.*
CO6	*Demonstrate the modulation and demodulation of pulse modulation techniques.*

Syllabus content:

1. AM Generation and Detection
2. DSB-SC Generation and Detection
3. SSB-SC generation and detection
4. FM Generation and Detection
5. Receiver Characteristics
6. Simple and delayed AGC characteristics
7. PLL characteristics and FM demodulation using PLL
8. Spectrum Analysis of AM and FM signals
9. Frequency Division Multiplexing – Verification
10. Sampling Theorem Verification
11. PAM Generation and Detection
12. Pulse Position Modulation & Demodulation

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
IC APPLICATIONS LAB

Code: 7CC76

L	T	P/D	C
0	0	4	2

Prerequisites: *EDC, ECA, STLD.*

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 Digital ICs.*

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

- *An ability to explore the applications of IC 741 OP-AMP.*
- *An ability to design Active filters and its applications*
- *An ability to understand and implement generate square and Triangular waveforms using 555 Timers*
- *An ability to design D to A converters and its applications*

Mapping of Course Outcomes with Program Outcomes

	a	b	c	d	e	f	g	h	i	j	k	L	m
CO1	3	3	2	3	3				2	3		3	2
CO2	3	2		2	3				3	3		3	2
CO3	3		3		2					3		3	
CO4	3	2	3		3				2	3			2
CO5	3	2	3		3								
CO6	2		3	3	3				2	3		3	2

Syllabus Content

(IC Application Lab)

Design and testing of

1. OP AMP Modes(-vefeed back) – 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

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
WEB TECHNOLOGIES LAB

Code: 7EC77

L	T	P/D	C
0	0	4	2

Course Objectives:
Implement programs using HTML tags, Java scripts along with 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:
After completing the subject, students will be able to
1. Demonstrate use of HTML tags and able to design the web pages.
2. Develop dynamic programs involving Java scripts, popup windows in JavaScript along with Event Handling.
3. Develop an application in PHP.
4. Develop scripts using XML and XSLT and to read XML document using parsers, DOM parser and SAX parser.
5. Implement Java servlets using Apache Tomcat Server for user authentications
6. Develop JDBC Application using JSP and ODBC Connectivity.

Hardware and Software required:
1. A working computer system with either Windows or Linux
2. A web browser either IE or firebox
3. Tomcat web server and Apache web server
4. XML editor like Altova Xml-spy [www.Altova.com/XMLSpy – free] , Stylusstudio , etc.,
5. A database either Mysql or Oracle
6. JVM(Java virtual machine) must be installed on your system

Week-1:
Design the following static web pages required for an online book store web site.
1) HOME PAGE:
The static home page must contain three frames.
Top frame : Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
Left frame : At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link "CSE" the catalogue for CSE Books should be displayed in the Right frame.
Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.

<table>
<tr><td>Logo</td><td colspan="4">Web Site Name</td></tr>
<tr><td>Home</td><td>Login</td><td>Registration</td><td>Catalogue</td><td>Cart</td></tr>
<tr><td>CSE
ECE
EEE
CIVIL</td><td colspan="4">Description of the Web Site</td></tr>
</table>

Fig 1.1

2) LOGIN PAGE:

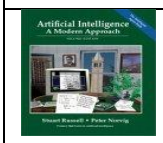
This page looks like below:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Login : Password: Submit Reset			

3) CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table.
The details should contain the following:
Snap shot of Cover Page.

Author Name.
Publisher.
Price.
Add to cart button.

Logo	**Web Site Name**			
Home	**Login**	**Registration**	**Catalogue**	**Cart**
CSE ECE EEE CIVIL		Book : XML Bible Author : Winston Publication :Wiely	$ 40.5	Add to cart
		Book : AI Author :S.Russel Publication : Princeton hall	$ 63	Add to cart
		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
		Book : HTML in 24 hours Author : Sam Peter Sam publication	$ 50	Add to cart

Note: Week 2 contains the remaining pages and their description.

Week-2:

4) CART PAGE:

The cart page contains the details about the books which are added to the cart.
The cart page should look like this:

Logo	**Web Site Name**			
Home	**Login**	**Registration**	**Catalogue**	**Cart**

CSE ECE EEE CIVIL	Book name Java 2 XML bible Total amount -	Price $35.5 $40.5 $130.5	Quantity 2 1	Amount $70 $40.5

5) REGISTRATION PAGE:
Create a "*registration form* "with the following fields
1) Name (Text field) 2) Password (password field) 3) E-mail id (text field)4) Phone number (text field) 5) Gender (radio button) 6) Date of birth (3 select boxes) 7) Languages known (check boxes – English, Telugu, Hindi, Tamil) 8) Address (text area)

WEEK 3:

VALIDATION:
Write *JavaScript* to validate the fields of the above registration page.

```
<html>
<head>
<style>
```

Create the internal stylesheet using the following properties:

1. Apply font-family for all input and tr selectors- as Monotype Corsiva with font-size:30, color:brown, text-align: center
2. Use the following properties for option and select selectors with font-size:24 and color:blue

```
</style>
<script type="text/javascript">
function validate()
{
```

Write an internal javascript to validate fields of the registration form with the conditions:

A. Name field - must not be null, - must have only alphabets, - size must not be greater than 45 characters, - must not have special characters apart from spaces.
B. Password field - must not be null, - size must not be less than 6 characters, - must be combination of digits, special characters and alphabets.
C. Email field - must not be null, - first character should be an alphabet,-must follow standard format: name@domain.com
D. Phone Number field – must not be null, - must have exactly 10 digits, - must not have either the special characters or alphabets.
E. Gender field – values must be Male, Female and Transgender, user must select only one.
F. Date of Birth (DOB) field – must be 3 select boxes (DD, MONTH, YYYY). Else create the calendar for DOB selection.
G. Languages known – values must be English, Telugu, Hindi, Tamil, etc, - user must be able to select known languages.
H. Address field- should be a box of 5 rows and 50 columns, -must not be empty.

```
}
</script>
</head>
<body bgcolor=yellow>
<form name=" " method=" " action=" ">
```

Do the following:

1. Design the above mentioned fields: (Name, Password, Email, Phone Number, Gender, DOB, Languages Known and Address).
2. All should be under one form with the appropriate attributes of form.
3. Above field must be neatly aligned using the table tag.
4. Place the buttons:

- Submit- On clicking submit, validation function must execute.
- Reset- All field must be cleared of the contents.

</form>
</body>
</html>

Note: Students can make use of the different events to validate the fields.

Week-4:

Design a web page using CSS (Cascading Style Sheets) which includes the following and also create the External CSS for the same and apply this to the earlier created web-pages.

1) Use different font, styles:

In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.

2) Set a background image for both the page and single elements on the page. You can define the background image for the page like this:

BODY {background-image:url(myimage.gif);

3) Control the repetition of the image with the background-repeat property.

As background-repeat: repeat Tiles the image until the entire page is filled, just like an ordinary background image in plain HTML.

4) Define styles for links as

A:link
A:visited
A:active
A:hover

Example:

```
<style type="text/css">
A:link {text-decoration: none}
A:visited {text-decoration: none}
A:active {text-decoration: none}
A:hover {text-decoration: underline; color: red;}
</style>
```

5) Work with layers:

For example:

```
LAYER 1 ON TOP:
<div style="position:relative; font-size:50px; z-index:2;">LAYER 1</div>
<div style="position:relative; top:-50; left:5; color:red; font-size:80px; z-
index:1">LAYER 2</div>
LAYER 2 ON TOP:
<div style="position:relative; font-size:50px; z-index:3;">LAYER 1</div>
<div style="position:relative; top:-50; left:5; color:red; font-size:80px; z-
index:4">LAYER 2</div>
```

6) Add a customized cursor:

Selector {cursor:value}

For example:

```
<html>
<head>
<style type="text/css">
.xlink {cursor:crosshair}
.hlink{cursor:help}
</style>
</head>

<body>
```

```
<b>
<a href="mypage.htm" class="xlink">CROSS LINK</a>
<br>
<a href="mypage.htm" class="hlink">HELP LINK</a>
</b>
</body>
</html>
```

Week-5:

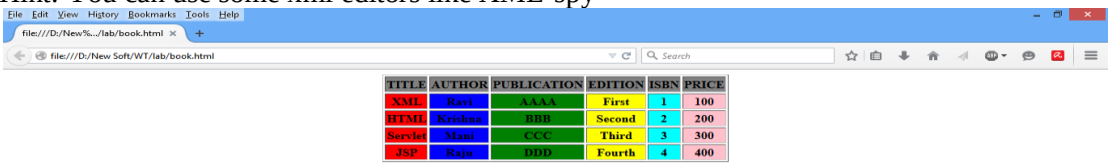
Write an XML file which will display the Book information which includes the following:

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.
- Display the XML file.
- The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns.
- Use XML schemas XSL and CSS for the above purpose.

Note: Give at least for 4 books. It should be valid syntactically.

Hint: You can use some xml editors like XML-spy



TITLE	AUTHOR	PUBLICATION	EDITION	ISBN	PRICE
XML	Ravi	AAAA	First	1	100
HTML	Krishna	BBB	Second	2	200
Servlet	Mani	CCC	Third	3	300
JSP	Raju	DDD	Fourth	4	400

Week 6:

Install a database (Mysql or Oracle). And perform the following:

1. Write a Java program to create a table using the fields of the Registration page created earlier in week 2 (program 5).
2. Write a java program to connect to that database and experiment with various (select, insert, create, update, delete, etc) SQL queries. Also make use of ***Statement*** and ***PreparedStatement***.
3. Write a java program to call a procedure using the ***CallableStatement.***
4. Write jdbc program to get the metadata of the database table. Use M***etaData.***

   For above programs, jdbc connectivity can be done as given below:

   import the required java and jdbc packages.

   public static void main(String args[]) throws Exception

   {

   try{

   1. Pass the driver name using Class.forName("<driver-name>").
   2. Create the Connection using Connection con=DriverManager.getConnection("<url of the driver>","<username of the database>","<password of the database>") method.

3. Create Statement using Statement st= con.createStatement("<sql statement>");
   Use the appropriate Statement with the corresponding methods of the statement object.
4. Execute statement using appropriate methods. (execute(), executeUpdate(), executeQuery()).
5. Make use of ResultSet class for select Query.
6. Close all opened objects.

}
Catch(Exception e)
{}
}

Week-7:

1. 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.

2. Access the above developed static web pages for books web site, using this server by putting the web pages developed in week-1 and week-2 in the document root. Access the pages by using theurl : http://localhost:8181/rama/books.html.

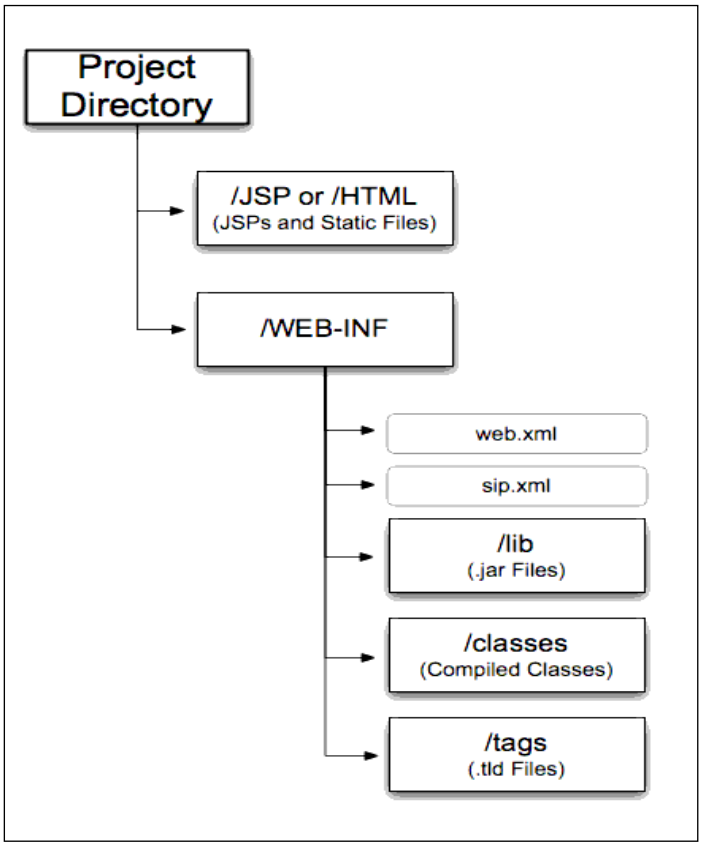


Figure 1 Directory structure for servlet

3. Write a servlet program to print welcome message on the browser.(Files to be developed- java file, and deployment descriptor)
4. Develop a web application to pass the parameters from the HTML page and display them using servlet.(Files to developed- Html,Java, Web.xml)
5. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2) .(Files to be developed- Html,Java, Web.xml)
6. Develop a web application using servlet to perform Create, Update, Retrieve and Delete (CURD) operations on the data in database from HTML form.(Files to be developed- Html,Java, Web.xml)

Servlet Prototype:

1. Servlet File:

```
import required java,sql and servlet packages;
public class Class-Name implements GenericServlets
{
Public void init( initialization parameters to a servlet)
{
Initial configurations to a servlet- if required;
}
Pubic void service(ServletRequestreq, ServletResponse res)throws IOException,ServletException
{
try{
res.setContentType("text/html");
PrintWriter pw=res.getWriter();
//all the necessary actions of a servlets with the respective concept.
//make use of jdbc code if your are interacting with the database – same as weak-6 with respective application.
// close all the opened objects.
}
Catch(Exception e)
{}
Public void destroy(){}}
```

2. Web.xml

```
<web-app>
<servlet>
<servlet-name>--------</servlet-name><servlet-class>---------</servlet-class>
</servlet>
<servlet-mapping>
<servlet-name>-----------</servlet-name><url-pattern>-----------</url-pattern>
</servlet-mapping>
</web-app>
```

Note:

- if you are using Http-Servlets, then extend class with HttpServlets and make use of respective service method - like doGet(),doPost() etc – with request and response objects of Http-Servlets-like(HttpServletRequestreq, HttpServletResponse res)
- Make use of init-parameter and context-parameter with the requirement of your application.
- Make use of appropriate HTML file with your servlet application.

Week 8:

1. 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)
2. Write a servlet using RequestDispatcher class. (Files to developed- Html,Java, Web.xml)

Week- 9:

Develop a web application using servlet to perform the user Authentication:

A. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following:

1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. 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 getInitParameters() method.

B. Authenticate the user when he submits the login form using the user name and password from the database.

Week-10:

Write a JSP which does the following job:

1. Program to print welcome message on the browser.
2. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).
3. Develop a web application to perform Create, Update, Retrieve and Delete (CURD) operations on the data in database from HTML form.

Week-11:

Create tables in the database which contain the details of items (books in our case like Book name , Price, Quantity, Amount)) of each category. Modify your catalogue page (week 2) in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using JDBC.

Week-12:

1. Write a PHP to test the database connection

```
<?php
$servername = "localhost";
$username = "username";
$password = "password";
// Create connection
$conn = new mysqli($servername, $username, $password);
// Check connection
if ($conn->connect_error) {
   die("Connection failed: " . $conn->connect_error);
}
echo "Connected successfully";
?>
```

2. Write a PHP to create Database

```
<?php
$servername = "localhost";
$username = "username";
$password = "password";
// Create connection
$conn = new mysqli($servername, $username, $password);
// Check connection
if ($conn->connect_error) {
   die("Connection failed: " . $conn->connect_error);
}
// Create database
$sql = "CREATE DATABASE myDB";
if ($conn->query($sql) === TRUE) {
   echo "Database created successfully";
} else {
   echo "Error creating database: " . $conn->error;
}

$conn->close();
?>
```

3. Write a php to create Table (for Registration Page of Week-2)

```
<?php
$servername = "localhost";
$username = "username";
$password = "password";
$dbname = "myDB";
// Create connection
$conn = new mysqli($servername, $username, $password, $dbname);
// Check connection
if ($conn->connect_error) {
   die("Connection failed: " . $conn->connect_error);
}
// sql to create table
$sql = "CREATE TABLE Registration(
id INT(6) UNSIGNED AUTO_INCREMENT PRIMARY KEY,
firstname VARCHAR(30) NOT NULL, Phone_no number(30) NOT NULL,
email VARCHAR(50), gender varchar2(20), DOB date, Lang varchar2(20),
Address varchar2(40)
)";
if ($conn->query($sql) === TRUE) {
   echo "Table MyGuests created successfully";
} else {
   echo "Error creating table: " . $conn->error;
}
 $conn->
close();
?>
```

Week 13:

1. Write a PHP to insert values form HTML to database(registration Page)

HTML PAGE

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<title>Add Records Form</title>
</head>
<body>
<form action="insert.php" method="post">
        <p>
        <label for="firstName">First Name:</label>
<input type="text" name="first_name" id="firstName">
</p>
<p>    <label for="phone_no">Phone number:</label>
<input type="text" name="ph_no" id="ph_no"></p>
<p>    <label for="emailAddress">Email Address:</label>
<input type="text" name="email" id="emailAddress"></p>
<p>    <label for="gender">Gender:</label>
<input type="text" name="gender" id="genderder"></p>
        <p>
        <label for="Address">Address:</label>
<input type="text" name="address" id="Address">
</p>
<p>
        <label for="DOB">DOB:</label>
<input type="text" name="dob" id="dob">
```

```
</p>
<p>
        <label for="Language">Language Known:</label>
<input type="text" name="lang" id="lang">
</p>

<input type="submit" value="Add Records">
</form>
</body>
</html>
```

PHP to insert values

```
<?php
$link = mysqli_connect("localhost", "username", "password", "demo");
// Check connection
if($link === false){
die("ERROR: Could not connect. " . mysqli_connect_error());
}
 //Fetching values form html
$first_name = mysqli_real_escape_string($link, $_REQUEST['first_name']);
$phone_no = mysqli_real_escape_string($link, $_REQUEST['phone_no']);
$email = mysqli_real_escape_string($link, $_REQUEST['email']);
$gender = mysqli_real_escape_string($link, $_REQUEST['gender']);
$address = mysqli_real_escape_string($link, $_REQUEST['address']);
$dob = mysqli_real_escape_string($link, $_REQUEST['dob']);
$lang = mysqli_real_escape_string($link, $_REQUEST['lang']);
// attempt insert query execution
$sql = "INSERT INTO registration VALUES ('$first_name', '$phone_no',
'$email','$gender','$address','$dob','$lang')";
if(mysqli_query($link, $sql)){
   echo "Records added successfully.";
} else{
   echo "ERROR: Could not able to execute $sql. " . mysqli_error($link);
}
 // close connection
mysqli_close($link);
?>
```

2. Write a PHP to select values form database table.

```
<?php
$link = mysqli_connect("localhost", "username", "password", "demo");
// Check connection
if($link === false){
die("ERROR: Could not connect. " . mysqli_connect_error());
}
// Attempt select query execution
$sql = "SELECT * FROM registration";
if($result = mysqli_query($link, $sql)){
   if(mysqli_num_rows($result) >0){
      echo "<table>";echo "<tr>";echo "<th>id</th>";echo "<th>first_name</th>";
echo "<th>phone_no</th>";
            echo "<th>email</th>";
             echo "<th>gender</th>";
             echo "<th>ADDRESS</th>";
             echo "<th>Dob</th>";
             echo "<th>lang</th>";
```

```
            echo "</tr>";
while($row = mysqli_fetch_array($result)){
        echo "<tr>";
            echo "<td>" . $row['id'] . "</td>";
            echo "<td>" . $row['first_name'] . "</td>";
            echo "<td>" . $row['phone_no'] . "</td>";
            echo "<td>" . $row['email'] . "</td>";
             echo "<td>" . $row['gender'] . "</td>";
             echo "<td>" . $row['address'] . "</td>";
             echo "<td>" . $row['dob'] . "</td>";
             echo "<td>" . $row['lang'] . "</td>";
           echo "</tr>";
      }
      echo "</table>";
      // Free result set
mysqli_free_result($result);
   } else{
      echo "No records matching your query were found.";
   }
} else{
   echo "ERROR: Could not able to execute $sql. " . mysqli_error($link);
}
 // Close connection
mysqli_close($link);
?>
```

3. Write a PHP to update existing records of a database table.

```
<?php
$link = mysqli_connect("localhost", "username", "password", "demo");
// Check connection
if($link === false){
die("ERROR: Could not connect. " . mysqli_connect_error());
}
 // Attempt update query execution
$sql = "UPDATE registration SET email='xyz@abcdmail.com' WHERE id=1";
if(mysqli_query($link, $sql)){
   echo "Records were updated successfully.";
} else {
   echo "ERROR: Could not able to execute $sql. " . mysqli_error($link);}
 // Close connection
mysqli_close($link);
?>
```

4. Write a PHP to validate user login

```
        a). <html>
        <title>login page</title>

    <form method="post" action="login.php">
    Username:<input type="text" name="username" placeholder="Enter username"><br>
    password:<input type="password" name="password" placeholder="Enter the password"><br>
        <input type="submit" name="submit">
        <input type="reset" name="reset">
        </form>

        </html>
```

b.)

```
<?php
$con=mysqli_connect('localhost','username','password','database');
if(isset_POSt['submit']){
$name=$_POST['username'];
$password=$_POST['password'];
$sql=mysqli_query("select name,password from table name where name=$name and
password=$password");
$result=mysqli_query($con,$sql);
if(mysqli_num_rows($result)>0)
  {
                        header("location: home.php");  }else  {     echo "login denied";  }}?>
```

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
TECHNICAL SEMINAR – V

Code: 7D595

L	T	P/D	C
0	0	2	1

1	2	3	4	5	6	7	8	9	10	11	12
x									x		x

Course objective
Develop an ability to understand and present the latest technological developments in computer science. Identify one of them, understand its impact on the event/method/society as a whole and present the seminar on the same which enhances oratory and interview facing skills.

Course Outcomes :
At the end of this course, the student will be able to
1 Deliver lecture on emerging technologies.
2 Explain domain knowledge to resolve real time technical issues
3 Demonstrate ability to lead and explain concepts and innovative ideas.
4 Demonstrate team leading qualities.
5 Demonstrate public speaking and lifelong learning skills for higher studies and to pursue professional practice.
6 Exchange new information that would not have been available otherwise.
7. Develop debating and interview skills.

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 from students.
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 needs 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.

Distribution of marks
There shall be a Technical Paper writing and seminar evaluated for 100 marks in First Year First Semester. The evaluation is purely internal and will be conducted as follows:

Literature survey, topic and Content	: 10 marks
Presentation including PPT	: 15 marks
Seminar Notes	: 10 marks
Interaction	: 5 marks
Report	: 10 marks
Attendance in the seminar class	: 10 marks
Punctuality in giving seminar as per schedule time and date	: 10 marks
Mid semester viva (on the seminar topics completed up to the end of 9th week	: 10 marks
End semester Viva	: 20 marks
Total	**100 Marks**

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
EVALUATION OF SUMMER INDUSTRY INTERNSHIP-I

Code: 7D584

L	T	P/D	C
0	0	0	1

1	2	3	4	5	6	7	8	9	10	11	12
x									x		x

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:

Day to day work	:	15 marks
Report	:	05 marks
Demonstration / presentation	:	10 marks
		---
		30 marks
End examination	**:**	**70 Marks.**

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
INTRODUCTION TO DATA SCIENCE
(Professional Elective - I)

Code: 7EC16

L	T	P/D	C
3	0	0	3

Course Objectives:
To know the fundamental concepts of Data Science. To explore tools and practices for working with Data Science. To learn about Principle component analysis and understand about Predictive Analytics.

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

1. *Implement Data analysis techniques for solving practical problems.*
2. *Perform Data analysis on variety of data.*
3. *Perform appropriate statistical tests using R and Python to visualize the outcome.*
4. *Apply of data pre-processing, extraction, cleaning, annotation, integration on data.*
5. *Apply the suitable visualization techniques to output analytical results.*

UNIT-I DATA TYPES & COLLECTION
Types of Data: Attributes and Measurement, What is an Attribute?, 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-1), Nominal Attributes, Binary Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes (Pg. No. 39-44, Text-2), 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-1)

UNIT-II Basics of R: Introduction, R-Environment Setup, Programming with R, Basic Data Types, 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. (Text Book-3)

UNIT-III
Lists: Introduction, Creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors, 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-IV: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, Text-2)
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)

UNIT-V:DIMENSIONALITY REDUCTION

Eigen values and Eigenvectors of Symmetric Matrices, Definitions, Computing Eigen values 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

PREDICTIVE ANALYTICS

Data Interfaces: Introduction, CSV Files: Syntax, Importing a CSV File

Statistical Applications: Introduction, Basic Statistical Operations, Linear Regression Analysis, Chi-Squared Goodness of Fit Test, Chi-Squared Test of Independence, Multiple Regression. (Text Book-4)

TEXT BOOKS:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education Inc.
2. Han, Jiawei, Jian Pei, and Micheline Kamber, "Data mining: concepts and techniques", 3 rd Edition, Elsevier, 2011.
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. Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
2. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
3. Samir Madhavan, "Mastering Python for Data Science", Packt, 2015.
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: 7FC14

L	T	P/D	C
3	0	0	3

Course Objective:

- *To understand basic algorithms for computer graphics and image processing*
- *To understand different applications of graphics.*

Course Outcomes:

1. Explain fundamental terms within computer graphics
2. Implement 2D graphics and algorithms including: line drawing, polygon filling,clipping, and transformations.
3. Implement functions 2D viewing and apply clipping algorithms.
4. Explain the concepts of and techniques used in 3D computer graphics, includingviewing transformations, hierarchical modeling, color, lighting and texture mapping.
5. Apply single and multiple transformations to 3D points &Describe various visible surface determination algorithms.
6. Describe the animation production pipeline and Produce a short animation

UNIT I:
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.

UNIT II:
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 III:
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 IV:
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 V:
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 VI:
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.

REFERENCES:

1. "Computer Graphics", second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.
2. "Computer Graphics Second edition", Zhigandxiang, Roy Plastock, Schaum'soutlines, 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
ELECTRO MAGNETIC WAVES AND TRANSMISSION LINES
(Professional Elective - I)

Code: 7CC06

L	T	P/D	C
3	0	0	3

After studying this course, the students will be able to

1. *Apply the Maxwell's equations in propagation of EM waves*
2. *Demonstrate the behavior of EM waves in different media.*
3. *Understand the property of EM energy at different boundary conditions.*
4. *Understand the impossibility of TEM waves in rectangular wave guides.*
5. *Design different transmission lines.*
6. *Understand the concepts of high frequency dissipation less and open&short circuited lines*

Mapping of Course Outcomes with Program Outcomes

	a	b	c	**d**	e	f	g	h	i	j	k	l	m
CO1	3	2		3									
CO2	3	2		3									
CO3	3	2		3									
CO4	3	2		3									
CO5	3	2		3									
CO6	3	2		3									
Overall	3	2		3									

UNIT I

REVIEW OF VECTOR ANALYSIS AND ORTHOGONAL COORDINATE SYSTEMS

Line, surface, and volume integrals. Curl, divergence and gradient of fields.

ELECTROSTATICS

Static electric fields, Coulomb's Law, Gauss Law and Applications, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation time, Parallel plate, Coaxial and Spherical capacitors.

Applications: Electric current in vacuum and gases, photocopier.

UNIT II

MAGNETOSTATICS: Static magnetic fields, Ampere's Circuital Law, Magnetic Flux Density, Magnetic Scalar and Vector Potentials. Forces due to Magnetic fields, Ampere's Force Law, Inductance and magnetic energy.

Applications: Electromagnetic suspension (EMS) maglev train, speakers and micro phones.

UNIT III

MAXWELL'S EQUATIONS

Differential and Integral forms-word statement-proofs and conversion. Faraday's Law and their Application in free space, polarization, Power flow and energy storage; Boundary conditions and boundary value problems

.***Applications: Electromagnetic wave propagation***

UNIT I V

REFLECTION AND REFRACTION OF EM WAVES

Reflection by a perfect conductor-Normal and Oblique Incidence-Reflection by a perfect Insulator-Normal and Oblique Incidence. Brewster angle.EM Wave characteristics, Guided waves between parallel Planes, Power losses in plane conductor. Pointing Theorem.

Applications: Calculation of power loss in plane conductor.

UNIT V
TRANSMISSION LINE THEORY
Transmission line – general solution –The infinite line – Wavelength, velocity of propagation – Waveform distortion – the distortion less line - Loading and different methods of loading – Line not terminated in Z_0 – Reflection coefficient – calculation of current , voltage, power delivered and efficiency of transmission – Input and transfer impedance – Open and short circuited lines – reflection factor and reflection loss.
Applications: Calculation of voltage and current distribution in a 10-Km transmission line.

UNIT VI
HIGH FREQUENCY TRANSMISSION LINES
Transmission line equations at radio frequencies – Line of Zero dissipation – Voltage and current on the dissipation less line, Standing Waves, Nodes , Standing Wave Ratio – Input impedance of the dissipation less line - Open and short circuited lines – Power and impedance measurement on lines – Reflection losses. Smith Chart-Construction and applications.
Applications: determination of load standing wave ratio and reflection coefficient with smith chart

Text Books:
1. W.H.Hayt Jr., Engineering Electromagnetics, Tata Mc-Graw-Hill, 2001.
2. EC Jordan, EM waves and radiating systems, PHI, 1995.
3. Elements of Electromagnetics-Mathew N.OSadiku, 4ed., 2008, Oxford Univ.Press
4. Transmission Lines and Networks by Umesh Sinha

References:
1. N. Narayana Rao, Elements of Engineering Electro magnetics, Pearson Education, 2006.
2. J.D.Ryder, Networks lines and fields, PHI, 1990

Syllabus for B. Tech III Year I semester
Electronics and Computer Engineering
SEMANTIC WEB AND SOCIAL NETWORKS
(Professional Elective - I)

Code: 7EC11

L	T	P/D	C
3	0	0	3

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 the is course, the student is able to

1. *Describe role of Web, its need and Intelligence.*
2. *Explain Machine Intelligence Ontology, Inference engines, Software Agents, Berners-Lee www and Semantic Road Map.*
3. *Describe 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. *Explain 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: What is social Networks analysis, 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.

REFERENCE BOOKS:

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies,RudiStuder,PaulWarren,JohnWiley&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 II semester
Electronics and Computer Engineering
MICROPROCESSORS AND MICROCONTROLLERS
(Common to ECM & EEE)

Code: 7DC05

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
x	x	x		x						x	x

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, 2nd Edition, 1999.
3. 8051 Microcontroller–Kenneth J. Ayala, Penram International/ Thomson, 3rd Edition, 2005.
4. The 8051 Microcontroller And Embedded Systems Using Assembly And C – Mazidi, Pearson Education India,2nd edition, 2008.

REFERENCES :

1. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd 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: 7CC10

L	T	P/D	C
3	0	0	3

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 filter in several forms and structures for a given transfer function H(z).*
5. *Design of digital filters by several methods once the desired specifications are given & Distinguish b/w IIR and FIR filters;*
6. *Understand the need and implement the multirate sampling techniques.*

Mapping of Course Outcomes with Program Outcomes

	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	2	2	2									2	3
CO2	2	2	2									2	3
CO3	2	2	2									2	3
CO4		2	2		3							2	3
CO5		2	3		3							2	3
CO6		2	3		2							2	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, 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 : REALIZATION OF DIGITAL FILTERS:
Review of Z-transforms, Applications of Z–transforms, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function.
Applications: Design of digital system function to meet the given specifications.

UNIT V: DIGITAL 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.
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.
Applications: Design of IIR/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. Schafer, 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, 9th 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: 7D602

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
x	x	x	x	x							x

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 techniquesand 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,2nd Edition,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.

Syllabus for B. Tech III Year II semester
Electronics and Computer Engineering
LOGICAL REASONING
(Common to All Branches)

Code: 7H619

L	T	P/D	C
1	1	0	2

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

***Pre Requisites**: Nil*

***Course objectives:**By learning logical reasoning 1.Students can improve their mental capacity.2.Students acquire ability to arrive at answers and solutions in a logical way.3.Logical reasoning is helpful in sharpening their minds.4.Student can draw conclusions, based on the facts and evidences after a casual and rational analysis in his real life problems. 5.Logical reasoning measures the mental capacity of the students.*

***Course Outcomes:** After completion of this course students will be able to solve*

1. *The questions given on series completion and analogy.*
2. *The questions given on odd one out in classification and coding and decoding.*
3. *The questions given on blood relations.*
4. *The questions given on directions and Arithmetical reasoning.*
5. *The questions given on Venn diagrams, cubes and dice. .*
6. *The questions given on clocks and calendar.*

Unit–I: 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.

Unit–II: Classification / Odd One Out: Word Classification, Number Classification and Letter Classification.Coding – Decoding: Letter Coding, Number Coding, Matrix Coding, Substitution, Deciphering Message Word Codes, Jumbled Coding.

Unit–III: Blood Relations, Deciphering Jumbled up Descriptions, Relation Puzzle – Direction sense test.Number, Ranking & Time Sequence Test –Mathematical Operations.

Unit –IV: 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 –V: Assertions and Reason– Logical Venn Diagrams – Alpha Numeric Sequence Puzzle. Cubes and Dice – Analytical Reasoning .Logical Deduction: Logic, Statement – Arguments,

Unit – VI: Clocks &Calendar .Data Sufficiency and Syllogism.

Text Books:

1. Verbal and Non Verbal Reasoning by R.S.Agarwal.
2. Quantitative Aptitude and Reasoning, R.V.Praveen, Second Edition, PHI Learning Pvt. Ltd.

Syllabus for B. Tech III Year II semester
Electronics and Computer Engineering
MICROPROCESSORS AND MICROCONTROLLERS LAB
(Common to ECM & EEE)

Code: 7DC71

L	T	P/D	C
0	0	2	2

1	2	3	4	5	6	7	8	9	10	11	12
x	x	x	x	x						x	x

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 1^2C

Syllabus for B. Tech III Year II semester
Electronics and Computer Engineering
DIGITAL SIGNAL PROCESSING LAB

Code: 7CC78

L	T	P/D	C
0	0	4	2

Prerequisites: *SS,PTSP, Basic Simulation Lab*

Course Objectives*: After completing this course, the students will have demonstrated*

CO1	*To Understand the frequency response of a given systems*
CO2	*Design of FIR & Butterworth and chebyshev approximations and converting them to IIR filters*
CO3	*Transforming an analog filter to its digital equivalent*
CO4	*Sampling rate conversion Interpolation and decimation*
CO5	*An ability to use TMS320c6713 for different algorithms*

Mapping of Course Outcomes with Program Outcomes

	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1					3								3
CO2	3	2											
CO3		3	3		3								
CO4			3	3									
CO5			2		3							3	3

Syllabus Content

Tools to be used: MATLAB, CC Studio, TMS320C6713

1. Impulse response of first order and second order systems.
2. Program to find frequency response of LP/HP filters (difference equation/ transfer function).
3. To find Circular convolution of given sequence with and without built in function.
4. To find the DFT/IDFT, FFT of given DT signals with and without built in functions.
5. To find Power Spectral Density of a sequence.
6. To implement IIR filter (LP/HP/BP)
   a) Butterworth filter
   b) Chebyshev Type-I and Type-II filters
7. To design FIR filter (LP/HP) using windowing technique
   a) Using rectangular window
   b) Using triangular window
   c) Using Kaiser Window
8. Down sampling and up sampling of given sequence by specified factor.
9. Conversion of Analog filter to Digital Filter.
   a) impulse invariant transformation
   b) bilinear transformation
10. Generation of DTMF signals
11. Noise removal: Add noise above 3 KHz and then remove, interference suppression using 400 Hz tone.

The following experiments are to be implemented using CCS

1. Study the architecture of DSP chips-TMS 320C 5X/6X Instructions
2. To find Linear convolution of given sequence.
3. To find Circular convolution of given sequence
4. To find the DFT & FFT of given sequence
5. Generation of DTMF Signals
6. Implementation of Decimation Process & Interpolation Process.

Syllabus for B. Tech III Year II semester
Electronics and Computer Engineering
COMPILER DESIGN LAB

Code: 7D689

L	T	P/D	C
0	0	4	2

1	2	3	4	5	6	7	8	9	10	11	12
x	x	x	x	x							x

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: 7D677

L	T	P/D	C
0	0	4	2

1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x			x		x	x

Course Objective:
To acquire basic 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:

Day to day work	:	15 marks
Report	:	05 marks
Demonstration / presentation	:	10 marks
		---
		30 marks
End examination	**:**	**70 Marks.**

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 - II

Code: 7D682

L	T	P/D	C
0	0	0	1

Course Objective:

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 able to

1. *Assess the relevant courses they have undergone till the completion of that academic year.*
2. *Comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills.*

There will be 100 marks in total with 50 marks of internal evaluation and 50 marks of external evaluation.

Internal:

Comprehensive Viva Voce is Conducted twice in a semester and evaluated for 50 marks each.

End examination : 50 Marks.

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
MACHINE LEARNING
(Professional Elective - II)

Code: 7EC17

L	T	P/D	C
3	0	0	3

Course Objective:

- *To introduce students to the basic concepts and techniques of Machine Learning.*
- *To have a thorough understanding of the Supervised and Unsupervised learning techniques*
- *To study the various probabilities based learning techniques*
- *To understand graphical models of machine learning algorithms*

Course Outcomes:

At the end of this course, the student is able to

1. *Distinguish between, supervised, unsupervised and semi-supervised learning*
2. *Apply the apt machine learning strategy for any given problem*
3. *Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem*
4. *Design systems that use the appropriate graph models of machine learning*
5. *Modify existing machine learning algorithms to improve classification efficiency*
6. *Analytical approach in Learning*

UNIT I: INTRODUCTION:

Learning(Book-1) – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – 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 – Linear Discriminants: (Book-1) – Perceptron – Linear Separability – Linear Regression.

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 – Curse of Dimensionality – 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: 7FC15

L	T	P/D	C
3	0	0	3

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 enhancementin 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, RafealC.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
DIGITAL COMMUNICATIONS
(Professional Elective - II)

Code: 7CC09

L	T	P/D	C
3	0	0	3

Prerequisites: *PTSP, SS, AC*

Course Objectives:

The objectives of this course are

- *To provide both the theory and practice of digital communication including signal design, modulation methods, demodulation methods and their performance evaluation.*
- *To make the learners understand concept and applications of various source coding to maximize the channel capacity and error control coding techniques for providing reliable communications.*

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

CO1	*Demonstrate the principle of converting analog signal to digital by using PCM, DM,ADM systems.*
CO2	*Explore baseband transmission and optimal reception of digital signals using different filters and M-ary Error Probabilities.*
CO3	*Design and compare ASK,PSK,FSK,DPSK,QPSK modulators and demodulators .*
CO4	*Demonstrate the concepts of information theory , source coding techniques ,channel capacity and can find channel capacity and coding efficiency.*
CO5	*Demonstrate encoding and decoding techniques of different channel coding techniques like ,block codes, cyclic codes, convolutional codes.*
CO6	*Explore the knowledge on different types of spread sprectrum modulation techniques,DSSS,FHSS,CDMA and PN sequence.*and OFDM

Mapping of Course Outcomes with Program Outcomes

	A	b	c	d	e	f	g	h	I	j	k	l	m
CO1	3		2										3
CO2	3		2										3
CO3	3		2										3
CO4	3		2										3
CO5	3		2										3
CO6	3		2										3

Syllabus Content

Unit-I:

ELEMENTS OF DIGITAL COMMUNICATION SYSTEMS

Model of Digital Communication Systems, Advantages of Digital Communication Systems, Digital Representation of Analog signal.

PULSE CODE MODULATION: PCM Generation and Reconstruction, Quantization Noise, Non-uniform Quantization and Companding, DPCM, DM, Noise in DM, ADM.

Applications: Design of E-1 and T-1 carrier systems

Unit-II:

BASE BAND DIGITAL TRANSMISSION

Digital Signals and Systems, Digital PAM Signals, Transmission limitations, Eye Diagram, Power Spectra of Digital PAM signals, Spectral Shaping by Precoding, Noise and Errors, Binary Error Probabilities, Regenerative Repeaters, Optimum receiver, Matched Filtering.

Unit-III:
DIGITAL MODULATION TECHNIQUES
Introduction, Gram Schmidt Orthogonalization, BASK, ASK Modulator, Non-coherent and Coherent ASK Detector, BFSK, Bandwidth and Frequency spectrum of FSK, FSK Modulator, Non-coherent and Coherent FSK Detector, FSK Detection using PLL, BPSK, Coherent PSK Detection, QPSK, DPSK, Definition of BER, Calculation of error probability of BASK, BPSK, BFSK, QPSK, Comparison of Digital modulation systems, MSK.
Applications: Design of MODEM for voice transmission

Unit-IV:
INFORMATION THEORY
Information and entropy, Mutual information, Information rate.
SOURCE CODING: Introduction, Advantages, Shannon's theorem for Channel capacity, Huffman code, Shannon-Fano coding, bandwidth –S/N trade off.

Unit-V:
CHANNEL CODING
Linear Block Codes, Error detection and correction capabilities of Linear Block Codes, Hamming Code, Cyclic Codes: Encoding, syndrome calculation, Decoding, Convolution Codes: Encoding using State, tree and trellis diagrams, Decoding using Viterbi algorithm.

UNIT VI:
SPREAD SPECTRUM MODULATION
Use of Spread Spectrum, Spread spectrum techniques: DSSS and FHSS, PN-sequences: Generation and Characteristics, CDMA.

TEXT BOOKS:

1. B. P. Lathi, *Modern Analog and Digital Communication*, 3rd Ed., Oxford University Press
2. K. Sam Shanmugham, *Digital and Analog Communication Systems*, John Wiley & Sons
3. Simon Haykin, *Digital communications* -, John Wiley, 2005
4. H. Taub and D. Schilling, *Principles of Communication Systems* –, TMH, 2003
5. A. Bruce Carlson, & Paul B. Crilly, "*Communication Systems – An Introduction to Signals & Noise in Electrical Communication"*, McGraw-Hill International Edition, 5th Edition, 2010.

REFERENCES:

1. John Proakis, *Digital Communications* –, TMH, 1983.
2. Singh &Sapre, Communication *Systems Analog & Digital* –, TMH, 2004.
3. Sklar: *Digital Communication*, 2nd Ed., Pearson Education
4. "Digital Communications", J.S Chitode, Technical publication, Pune.

Syllabus for B. Tech III Year II semester
Electronics and Computer Engineering
ADVANCED COMPUTER NETWORKS
(Professional Elective - II)

Code: 7EC12

L	T	P/D	C
3	0	0	3

Course Objectives:
Course Objective: This course aims to provide advanced background on relevant computer networking topics to have a comprehensive and deep knowledge in computer networks.

Course Outcomes:
1. *To master networking and Internet concepts and be familiar with OSI Model and TCP/IP model.*
2. *To be able to detect networking errors,learn correction techniques*
3. *To explain the role of protocols in networking and to analyze the services and features of the various layers in the protocol stack.*
4. *To understand Internet addressing IPv4 and IPv6 and Internet protocols*
5. *To understand wireless networking and to Develop new protocols in networking*
6. *Will bw able to build new virtual private networks*

UNIT I
Computer Networks and the Internet: What is the Internet, The 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, 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

REFERENCE BOOKS:

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
BASICS OF INDIAN ECONOMY
(Common to all Branches)
(Open Elective - I)

Code: 7ZC25

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
								x		x	

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, 70th Edition, Sultan Chand publishers.
- Indian Economy, Misra&Puri, 33rd Edition, Himalaya publishing house.
- Latest Budget document by Ministry of Finance
- Latest Economic survey
- 12th Five year plan
- News articles in The Hindu, The Business Line

Syllabus for B. Tech III Year II semester
Electronics and Computer Engineering
CONTROL SYSTEMS ENGINEERING
(Open Elective - I)

Code: 7AC46

L	T	P/D	C
3	0	0	3

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

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, 2nd edition.

REFERENCES:
1. Modern Control Engineering – Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems – N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. Control Systems Engg. – NISE 3rd Edition – John wiley.

Syllabus for B. Tech III Year II semester
Electronics and Computer Engineering
BANKING OPERATIONS, INSURANCE AND RISK MANAGEMENT
(Open Elective - I)

Code: 7ZC05

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
							x			x	

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 Evantly
- 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
SMART MATERIALS
(Open Elective - I)

Code: 7BC51

L	T	P/D	C
3	0	0	3

Course Objectives:
To provide the knowledge on principles of smart materials, their functions and applications.

Course Outcomes:
After studying this course the student will be able to:

1 *Apply the knowledge for developing/producing sensors, devices based on the assimilated know-how of composites, ceramics, electro-magnetic materials, shape memory alloys, and their properties.*
2 *Develop/process new sensing and actuating smart devices based on the assimilated knowledge on the principles of phase transformations.*
3 *Evaluate shape memory materials, electro rheological fluids and develop newer applications.*
4 *Comprehend the principles of operation of optical fibers, actuators, and methods of analyses employed in smart materials.*
5 *To apply the principles for developing smart skins for aerospace and transportation vehicles.*
6 *To develop or process sensors and actuators for MEMS using shape memory alloys, PZT actuators.*

UNIT - I
Introduction: Characteristics of composites and ceramics materials, Dynamics and controls, concepts, Electro-magnetic materials and shape memory alloys-processing and characteristics

UNIT - II
Sensing And Actuation: Principles of electromagnetic, acoustics, chemical and mechanical sensing and actuation, Types of sensors and their applications, their compatibility conventional and advanced materials, signal processing, principles and characterization.

UNIT - III
Control Design: Design of shape memory alloys, Types of MR fluids, Characteristics and application, principles of MR fluid value designs, Magnetic circuit design, MR Dampers, Design issues.

UNIT - IV
Optics And Electromagnetic: Principles of optical fiber technology, characteristics of active and adaptive optical system and components, design and manufacturing principles.

UNIT - V
Structures: Principles of drag and turbulence control through smart skins, applications in environment such as aerospace and transportation vehicles, manufacturing, repair and maintainability aspects.
Controls: Principles of structural acoustic control, distributed, analog and digital feed back controls, Dimensional implications for structural control.

UNIT - VI
Principles Of Vibration And Modal Analysis: PZT Actuators, MEMS, Magnetic shape Memory Alloys, Characteristics and Applications.
Information Processing: Neural Network, Data Processing, Data Visualisation and Reliability – Principles and Application domains.
06 Hours

TEXT BOOKS:

1. **Analysis and Design',** A. V. Srinivasan, 'Smart Structures –Cambridge Universities Press, New York, 2001, (ISBN :0521650267)
2. **'Smart Materials and Structures',** M V Gandhi and B S Thompson Chapmen & Hall, London, 1992 (ISBN : 0412370107)**133**

REFERENCE BOOKS:

1. **'Smart Materials and Structures',** Banks HT, RC Smith, Y Wang,Massow S A, Paris 1996
2. **G P Gibss'AdaptiveStructres',** Clark R L, W R Saunolers, JhonWiles and Sons, New York, 1998
3. **An introduction for scientists and Engineers',** EsicUdd, OpticSensors : Jhon Wiley & Sons, New York, 1991 (ISBN :0471830070)

Syllabus for B. Tech III Year II semester
Electronics and Computer Engineering
BASICS OF ENTREPRENEURSHIP
(Open Elective - I)

Code: 7ZC22

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
				x		x				x	

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 IV Year I semester
Electronics and Computer Engineering
EMBEDDED AND REAL TIME SYSTEMS

Code: 7D706

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
x	x	x		x						x	x

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, Elseveir.
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: 7D707

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
x	x	x		x		x			x		

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 paracitic 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: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, Figure of Merit (ω_o), Zpu/Zpd, 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, Lamda-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 - C_g, τ-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, EshraghianDougles and A. Pucknell, PHI, 2005 Edition.
4. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
5. VLSI Technology – S.M. SZE, 2nd Edition, TMH, 2003.

Syllabus for B. Tech IV Year I semester
Electronics and Computer Engineering
EMBEDDED SYSTEMS LAB

Code: 7DC72

L	T	P/D	C
0	0	3	1.5

1	2	3	4	5	6	7	8	9	10	11	12
x	x	x	x	x						x	x

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^2C, SPI serial communication using ARM Microcontroller

5. Program to demonstrate I^2C 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/ μCOS- II
10. Case study on Cross Compiler/Assembler tools.

Syllabus for B. Tech IV Year I semester
Electronics and Computer Engineering
VLSI LAB

Code: 7DC73

L	T	P/D	C
0	0	3	1.5

1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x				x			

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 MicrowindandAnalysisof CMOS 0.25micron Technology MOSFETs
2. CMOS0.25 micron TechnologyInverterCharacteristics and layout in Microwind
3. Layout ofBasic Gates and aComplexGateusing CMOS0.25 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
PYTHON PROGRAMMING LAB

Code: 7D788

L	T	P/D	C
0	0	4	1

1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x				x		x	x

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.

Week -2:

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. The volume of a sphere with radius r is 5? (Use Sphere volume formula)
6. 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 -3:

7. 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.

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

9.
```
+ - - - - + - - - - +
|         |         |
|         |         |
|         |         |
+ - - - - + - - - - +
|         |         |
|         |         |
|         |         |
|         |         |
+ - - - - + - - - - +
```

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. The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
16. Write a python code to read a dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.

Week-6:

17. 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.
18. How does a module source code file become a module object?
19. Why might you have to set your PYTHONPATH environment variable?

Week-7:

20. What is a namespace, and what does a module's namespace contain?
21. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
22. What is the purpose of a _ _init_ _.py file in a module package directory? Explain with a suitable example.

Week-8:

23. Use the structure of exception handling all general purpose exceptions.

Week-9:

24.
    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-10:

25. Write a Python program to demonstrate the usage of MRO in multiple levels of inheritances.
26. Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week-11:

27. Write a Python code to merge two given file contents into third file.
28. 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-12:

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

Syllabus for B. Tech IV Year I Semester
Electronics and Computer Engineering
PROJECT - I

Code: 7D779

L	T	P/D	C
0	0	4	2

1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x			x		x	x

Course Objective

To enhance the knowledge on selecting a project , learn related tools and enhance programming and communication skills for employability.

Course Outcomes: After completing this course, student shall 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
Division of Marks for External Evaluation – 70 Marks

Syllabus for B. Tech IV Year I Semester
Electronics and Computer Engineering
EVALUATION OF SUMMER INDUSTRY INTERNSHIP-II

Code: 7D785

L	T	P/D	C
0	0	0	1

1	2	3	4	5	6	7	8	9	10	11	12
x									x		x

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:

Day to day work	:	15 marks
Report	:	05 marks
Demonstration / presentation	:	10 marks
----------		
		30 marks
End examination	**:**	**70 Marks.**

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
BIG DATA ANALYTICS
(Professional Elective - III)

Code: 7EC18

L	T	P/D	C
3	0	0	3

Course Objectives:
Understanding about big data for business intelligence, Learning business case studies for big data analytics, Learning about the cloud and big data ,Knowledge about risk management involved in big data, Understanding nosql big data management ,Understanding about map reduces work flows. Capability to Perform map-reduce analytics using Hadoop and related tools

Course outcomes:
At the end of this course, the student will be able to
- *Understand the importance of big data*
- *Understand challenges with big data*
- *Knowledge about the technological developments in big data environment*
- *Understanding about map reduce work flows*
- *Knowledge about nosql data environment.*
- *Analysis with Hadoop and related tools*
- *Capability of understanding the usage of big data in context to cloud and other technologies.*

UNIT-I INTRODUCTION TO BIG DATA
What is big data, why big data, convergence of key trends , unstructured data ,industry examples of big data ,web analytics, big data and marketing, fraud and big data ,risk and big data ,credit risk management, big data in medicine, introduction to Hadoop open source technologies , cloud and big data

UNIT-II UNDERSTANDING BIG DATA
Types of digital data, characteristics of data, challenges with big data, definition of big data, big data analytics, data science, technologies in big data environments, CAP theorem.

UNIT-III NOSQL DATA MANAGEMENT
Introduction to NoSQL, aggregate data models, aggregates, key-value and document data Models, relationships, graph databases, schemaless databases, materialized views, distribution models, sharding, master-slave replication, peer-peer replication, sharing and replication

UNIT-IV BASICS OF HADOOP
Data format, features of Hadoop, analyzing data with Hadoop , design of Hadoop distributed file system (HDFS) ,HDFS concepts, scaling out, Hadoop streaming , Hadoop pipes, Hadoop related tools

UNIT- V MAPREDUCE APPLICATIONS
Map Reduce workflows, unit tests with MRUnit , test data and local tests, anatomy of Map Reduce job run,classic Map-reduce, YARN ,failures in classic Mapreduce and YARN , job scheduling , shuffle and sort ,task execution, Map Reduce types ,input formats, output formats

UNIT-VI SOCIAL MEDIA ANALYTICS AND TEXT MINING: Introducing Social Media; Key elements of Social Media; Text mining; Understanding Text Mining Process; Sentiment Analysis, Performing Social Media Analytics and Opinion Mining on Tweets;

TEXT BOOKS:
1. Seema Acharya, S.Chellappan,"Big Data and Analytics",Wiley,2014
2. BIG DATA, Black Book TM, Dream Tech Press, 2015 Edition.

REFERENCE BOOKS:

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
3. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
4. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.

Syllabus for B. Tech IV Year I semester
Electronics and Computer Engineering
BLOCK CHAIN TECHNOLOGIES
(Professional Elective - III)

Code: 7FC16

L	T	P/D	C
3	0	0	3

Course Objectives:

Course Outcomes:

1) *Familiarize the functional/operational aspects of crypto currency ECOSYSTEM.*
2) *Understand emerging abstract models for Block chain Technology.*
3) *Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain*

UNIT 1 - The consensus problem - Asynchronous Byzantine Agreement - AAP protocol and its analysis - Nakamoto Consensus on permission-less, nameless, peer-to-peer network - Abstract (2 weeks)

UNIT2 - Models for BLOCKCHAIN - GARAY model - RLA Model - Proof of Work (PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW + PoS) . (4 weeks).

UNIT 3 - cryptographic basics for cryptocurrency - a short overview of Hashing, signature schemes, encryption schemes and elliptic curve cryptography (2 weeks)

UNIT 4 - Bitcoin - Wallet - Blocks - Merkley Tree - hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bitcoin.

UNIT 5 - Ethereum - Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity - Smart Contracts - some attacks on smart contracts (6 weeks for UNIT 3 and 4).

UNIT 6 - (Trends and Topics) - Zero Knowledge proofs and protocols in Blockchain - Succinct non interactive argument for Knowledge (SNARK) - pairing on Elliptic curves - Zcash. (2 weeks).

Text Books:

Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction. Princeton University Press, 2016. (Free download available)

Reference Books:

1. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015 (article available for free download) {curtain raiser kind of generic article, written by seasoned experts and pioneers}.

2. J.A.Garay et al, The bitcoin backbone protocol - analysis and applications EUROCRYPT 2015 LNCS VOl 9057, (VOLII), pp 281-310. (Also available at eprint.iacr.org/2016/1048).
(Serious beginning of discussions related to formal models for bitcoin protocols).

3. R.Pass et al, Analysis of Blockchain protocol in Asynchronous networks, EUROCRYPT 2017, (eprint.iacr.org/2016/454). A significant progress and consolidation of several principles).
R.Pass et al, Fruitchain, a fair blockchain, PODC 2017 (eprint.iacr.org/2016/916).

Syllabus for B. Tech IV Year I semester
Electronics and Computer Engineering
ANTENNAS AND WAVE PROPAGATIONS
(Professional Elective - III)

Code: 7CC13

L	T	P/D	C
3	0	0	3

Prerequisites: *EMTL*

Course Objectives:
The objectives of this course are

- *To study and learn various antennas, their working principle, arrays and radiation patterns of antennas.*
- *To understand various techniques involved in various antenna parameter measurements.*
- *To understand the radio wave propagation in the atmosphere*

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

CO1	*Explain electromagnetics and antenna characteristics.*
CO2	*Explain wire antennas and antenna arrays*
CO3	*Evaluate knowledge on Horn, Parabolic and Lens antennas.*
CO4	*Recall knowledge on Horizontal Polarized antennas, Helical antennas, Patch antennas etc.*
CO5	*Discuss ground wave and space wave propagation and space wave concepts.*
CO6	*Analyse concepts of sky wave propagation.*

Mapping of Course Outcomes with Program Outcomes

	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3												
CO2		2	3										
CO3		2	3			2							
CO4		2	3			2							
CO5					3								
CO6			3		3	2						2	2

Syllabus Content

Unit-I:

FUNDAMENTAL PARAMETERS OF ANTENNAS

Review of Electromagnetic Theory: Vector Potential, Solution of Wave Equation, Retarded Case, Hertizian Dipole. Antenna Characteristics: Radiation Pattern, Beam Solid Angle, Directivity, Gain, Input Impedance, Polarization, Bandwidth, Reciprocity, Equivalence of Radiation Patterns, Equivalence of Impedances, Effective Aperture, Vector Effective Length, Antenna efficiency.

Unit-II:

LINEAR WIRE ANTENNAS AND ARRAYS

Wire Antennas: Short Dipole, Radiation Resistance and Directivity, Half Wave Dipole, Monopole, Small Loop Antennas. Antenna Arrays: Linear Array and Pattern Multiplication, Two-Element Array, Uniform Array, BSA and EFA, EFA With increased Directivity. BSA with Non- uniform Amplitude Distributions and Binomial Arrays.

Unit-III:

APERTUREAND REFLECTOR ANTENNAS

Magnetic Current and its Fields, Uniqueness Theorem, Field Equivalence Principle, Duality Principle, Method Of Images, Pattern Properties, Slot Antenna, Horn Antenna, Pyramidal Horn Antenna, Reflector Antenna-Flat Reflector, Corner Reflector, Common Curved Reflector Shapes, Lens Antenna.

Applications: Design of parabolic reflector for DTH.

Unit-IV:
Long Wire, V and Rhombic Antenna, Yagi-Uda Antenna, Turnstile Antenna, Helical Antenna- Axial Mode Helix, Normal Mode Helix, Biconical Antenna, Log Periodic Dipole Array, Spiral Antenna, Microstrip Patch Antennas. Antenna Measurements: Radiation Pattern Measurement, Gain and Directivity.
Applications: Design of a 3-element Yagi guda Antenna for given specifications

Unit-V:
Surface Wave Propagation-Modes of Wave Propagation-Surface Wave Propagation and Surface Wave Tilt-Plane Earth Reflection, Reflection and Refraction of Waves-Field Strength due to Ground Wave-Multi-Hop Transmission. Tropospheric and Space Wave Propagation

Unit-VI:
Ionospheric Propagation: Structure of Ionosphere-Measures of Ionosphere Propagation-Critical Frequency-Angle of Incidence-MUF And LUF,Optimum Working Frequency-Skip Distance, Virtual Height, Refractive Index of The Ionosphere, Effect of the Earth Magnetic Field and Fading

TEXT BOOKS -

1. John D. Kraus and Ronald J. Marhefka, *Antennas for All Applications* –TMH, 3rd Edn., 2003.
2. E.C. Jordan and K.G. Balmain,*Electromagnetic Waves and Radiating Systems* –, PHI, 2nd ed., 2000. .

REFERENCES –

1. C.A. Balanis, *Antenna Theory* -John Wiley & Sons, 2nd ed., 2001.
2. K.D. Prasad, *Antennas and Wave Propagation* –, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. E.V.D. Glazier and H.R.L. Lamont,*Transmission and Propagation* –, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
4. F.E. Terman*Electronic and Radio Engineering* –, McGraw-Hill, 4th edition, 1955.
5. John D. Kraus, *Antennas* – McGraw-Hill, 2nd ed, 1988.

Syllabus for B. Tech IV Year I semester
Electronics and Computer Engineering
CYBER SECURITY AND CYBER LAWS SEMANTIC
(Professional Elective - III)

Code: 7EC13

L	T	P/D	C
3	0	0	3

Course Objectives:

1. *To learn fundamentals of cryptography and its application to network security, network security threats, security services, and countermeasures.*
2. *To learn computer security, Internet, E-commerce and E-governance with reference to Free Market Economy*
3. *To learn International Efforts relating to Cyberspace laws and Cyber crimes*
4. *To learn Law relating to electronic records and intellectual property rights in India*
5. *To understand ethical laws of computer for different countries, Penalties, Compensation and Offences under the Cyberspace and Internet in India*
6. *To learn Miscellaneous provisions of IT Act and Conclusions*

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

1. *Realize the importance of cyber security and various forms of cyber attacks and countermeasures.*
2. *Get familiar with the E-Commerce frame work and the various model of E-Commerce, security threats to cyberspace and E-Commerce and the basic laws associated with it.*
3. *Understand the role of electronic signatures in E-Commerce and the role of certifying authority in regulating license with the various laws relating to it.*
4. *Understand the various laws related to trades and WTO, council of Europe related to cyber crimes and have awareness with the various penalty and compensation in failure to protect data.*
5. *Get familiar with obscenity and pornography in cyber space and understand the violation of Right of privacy on Internet.*
6. *Elucidate the various chapters of the IT Act 2008, power of Central and State Government to make rules under IT Act 2008.*

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 IV Year I semester
Electronics and Computer Engineering
INFORMATION SECURITY
(Professional Elective - IV)

Code: 7EC08

L	T	P/D	C
3	0	0	3

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.*
6. *To design and develop Intrusion Detection Systems and Firewall.*

Course Outcomes

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

1. *Get familiarized with the fundamental concepts of security attacks, security services.*
2. *Implement the conventional cryptographic techniques.*
3. *Simulate the Public key cryptography techniques.*
4. *Comprehend IP security Architecture and its role in security framework.*
5. *Implement SSL and TLS for Web Security.*
6. *Design Intrusion Detection Systems and Firewall.*

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, 4th Edition.

2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn IdoDubrawsky, Steve W.Manzuik and Ryan Permeh, wileyDreamtech

REFERENCES:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by CharlieKaufman, 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.

Syllabus for B. Tech IV Year I semester
Electronics and Computer Engineering
ARTIFICIAL INTELLIGENCE AND DEEP LEARNING
(Professional Elective - IV)

Code: 7DC61

L	T	P/D	C
3	0	0	3

Course Objectives:
Understand the different types of AI agents. Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information. Ability to apply knowledge representation, reasoning, and machine 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*
5. *Ability to apply concepts of convolutional networks in day to day applications.*
6. *Understand Reinforcement Learning-Markov Decision Processes (MDP) and the related concepts*

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. **Case studies:** Tic-tac-toe game

UNIT III
Knowledge Representation and Reasoning: Logical Agents, Knowledge Based Agents, Wumpus world, 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
BASICS OF DEEP LEARNING
Deep learning architectures: Convolutional Neural Networks : Neurons in Human Vision-The Shortcomings of Feature Selection - Full Description of the Convolutional Layer - Max Pooling-Full Architectural Description of Convolution Networks - Closing the Loop on MNIST with Convolutional Networks- -Building a Convolutional Network for CIFAR-10 - Visualizing Learning in Convolutional Networks- Leveraging Convolutional Filters to Replicate Artistic Styles-Learning Convolutional Filters for Other Problem Domains-Training algorithms.

UNIT VI

DEEP REINFORCEMENT LEARNING:

Deep Reinforcement Learning Masters Atari Games - Reinforcement Learning-Markov Decision Processes (MDP)-Explore Versus Exploit - Pole-Cart with Policy Gradients-Q-Learning and Deep Q-Networks-Improving and Moving Beyond DQN.

TEXT BOOKS

1 S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Prentice Hall, Third Edition, 2009.
2. Artificial Intelligence, 3rd Edition, Patrick Henry Winston, Pearson Education, 1992.
3. Nikhil Buduma, Nicholas Locascio, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms", O'Reilly Media, 2017.
4. Ian Goodfellow, YoshuaBengio, Aaron Courville, "Deep Learning (Adaptive Computation and Machine Learning series", MIT Press, 2017.

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. David L. Poole and Alan K. Mackworth, ―Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.
6. I. 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
AUGMENTED AND VIRTUAL REALITY
(Professional Elective - IV)

Code: 7FC17

L	T	P/D	C
3	0	0	3

PRE-REQUISITES:: Data Structure

Course Objectives:
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 would gets knowledge and familiarity on the following concepts
1. *Fundamentals of Virtual Reality.*
2. *Multiple Models of Input and Output Interface in Virtual Reality like Gloves, Video-based Input, 3D Menus & 3DScanner etc.*
3. *Fundamentals or Advanced topics of Computer Graphics.*
4. *Interactive Techniques on VR in respect of Body Track, Hand Gesture, 3D Manus, Object Grasp.*
5. *Developments Tools of VR*
6. *Conceptual idea on Augmented Reality.*

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, 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
CELLULAR AND MOBILE COMMUNICATIONS
(Professional Elective - IV)

Code: 7CC18

L	T	P/D	C
3	0	0	3

Prerequisites: *DC*

Course Objectives*:*
The objectives of this course are

- *Be acquainted with the role of cellular and mobile communications in frequency management issues.*
- *Be acquainted with different interference factors influencing cellular and mobile communications.*
- *Be able to efficiently use the background behind developing different path loss and/or radio coverage in cellular environment*

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

CO1	*Understand the working principle and limitations/advancements of conventional mobile telephone systems, cellular mobile systems and Advanced generations of cellular wireless systems*
CO2	*Analyze Frequency reuse concept and avoidance of Co-channel interference.*
CO3	*Explore the concepts of adjacent channel interference, its effects and avoidance mechanism.*
CO4	*Analyze signal reflections, path loss, propagation delay/loss, near and long distance propagation loss under different conditions, Merits of Lee model*
CO5	*Analyze frequency allocation of cellular systems*
CO6	*Demostrate the concept of handoff mechanism and dropped calls.*

Mapping of Course Outcomes with Program Outcomes

	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	1	2											2
CO2	3	2					2					3	2
CO3	2	2		2			2					3	2
CO4	2	2		2			2					3	2
CO5	2	2		2			2					3	2
CO6	2	2		2			2					3	2

Syllabus Content

UNIT I
INTRODUCTION TO CELLULAR MOBILE RADIO SYSTEMS:
Limitations of conventional mobile telephone systems, Significance of 800MHz,Basic cellular wireless systems; 1G,2G,2.5G,3G,4G,5G cellular wireless systems; Uniqueness of mobile radio environment – Long term fading, factors influencing short term fading , parameters of mobile multi path fading- time dispersion parameters, coherence bandwidth, Doppler spread and coherence time, Types of small scale fading.

UNIT-II
FUNDAMENTALS OF CELLULAR RADIO SYSTEM DESIGN:
Concept of Frequency reuse, Co-channel Interference, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, System capacity, Trunking and grade of service; Improving coverage and capacity in cellular system – cell splitting, sectoring, micro cell zone concept.

UNIT-III

CHANNEL INTERFERENCE:

Measurement of real time Co-Channel Interference, Design of antenna system, Antenna parameters and their effects; Diversity techniques- Space diversity, polarization diversity, Frequency diversity and Time Diversity. Non-co-channel interference-Adjacent channel Interference, near end and far end interference, cross talk, effect on coverage and Interference by power decrease, antenna height decrease, effect of cell site components, UHF TV interference

Applications: Design of a cellular systems using frequency reuse factor (k=19) for directional and Omni-directional antenna systems

UNIT-IV

CELL COVERAGE FOR SIGNAL AND TRAFFIC :

Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation, path loss from a point to point prediction model in different conditions, merits-of-LEE-model.

UNIT-V

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT:

Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

HANDOFF, DROPPED CALLS:

Handoff initiation, types of Handoff, delayed handoff, Advantages of handoffs, Power difference handoff, forced handoff, mobile assigned handoff and soft handoff, Intersystem handoff. Introduction to dropped call rates and their evaluation.

UNIT-VI

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiplex access scheme , TDMA, FDMA CDMA,WCDMA,SDMA,OFDM

TEXTBOOKS :

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.

REFERENCES:

1. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.
2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
3. Wireless Communication and Networking – Jon W. Mark and WeihuaZhqung, PHI, 2005.
4. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

Syllabus for B. Tech IV Year I semester
Electronics and Computer Engineering
INFORMATION SECURITY, MANAGEMENT AND STANDARDS
(Professional Elective - IV)

Code: 7EC14

L	T	P/D	C
3	0	0	3

Prerequisite : Cyber Security and Cyber Laws Semantic

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: Understand the Security Issues and Measures.
2: Know the KEY Elements and Logical Elements of Networks
3: Understand the Data Leakage, its Threats and Mitigation.
4: Understand the Database Security.
5: Understand the Policies, Guideline and Framework of Information Security.
6: Understand the Ethics, Roles and Responsibilities of ISM

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, 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, Baselining 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,

REFERENCE BOOKS:

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
BASICS OF POLITY AND ECOLOGY
(Common to all Branches)
(Open Elective - II)

Code: 7ZC26

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
					x		x				

Course Objectives:
To provide basic knowledge relating to the Indian Polity and Ecology, thus making the students appreciate the current aspects related to both polity and ecology.

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.*
4. *Comprehend knowledge relating to the conservation of the environment.*
5. *Learn about bio-diversity and climatic changes occurring in the environment.*
6. *Know about the international treaties, conventions and organizations active in thefield of environmental protection.*

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.

Unit 4: Ecology and Environment
Environment-Origin, Evolution of Environment and its uses by Humans; Degradation of Natural Environment, Principles of Ecology; Composition and various types of Ecosystem; International Solar Alliance.

Unit 5: Bio-diversity and Climate Change
Classification of Biodiversity, Biodiversity loss, Methods of biodiversity conservation, Conservation of Natural Resources such as Soil, Land, Water and Energy. Sustainable Development and Cleaner Technology. Green house effect and Global Warming, Strategies to cope with Green House Effect, Desertification, Depletion of ozone layer.

Unit 6: International Treaties, Conventions & Organizations:
Indian Board for Wildlife (IBW). United Nations Environmental Programme (UNEP), United Nations Framework Convention for Climate Change (UNFCCC). International Union for conservation of Nature and National Resources (IUCN), World Wide Fund for Nature (WWF).Montreal Protocol (1987), Kyoto Protocol (1997), Paris Agreement (2016).

References:

- Indian Polity - M. Laxmikanth, 5th 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, 22nd Edition, 2015, LexisNexis
- Our Constitution – Subhash C Kashyap, 5th Edition, 2015, National Book Trust, India
- Environment and Ecology – Anil Kumar De and Arnab Kumar De, 2009, New Age International (P) Limited.
- ICSE Environment Education for Class X – Dr. M.P. Mishra, 2009, S.Chand and Company

Syllabus for B. Tech IV Year I semester
Electronics and Computer Engineering
FUNDAMENTALS OF MEASUREMENTS AND INSTRUMENTATION
(Open Elective - II)

Code: 7AC44

L	T	P/D	C
3	0	0	3

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

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, Guage 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, 5th Edition, Wheeler Publishing.
2. Transducers and Instrumentation– D.V.S Murthy, Prentice Hall of India, 2nd Edition.
3. A course in Electrical and Electronic Measurements and Instrumentation -A.K. Sawhney, Dhanpatrai& Co. 18th Edition.

REFERENCE BOOKS:
1. Measurements Systems, Applications and Design – D O Doeblin- 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, 3rd 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
ENTREPRENEURSHIP, PROJECT MANAGEMENT AND STRUCTURED FINANCE
(Open Elective - II)

Code: 7ZC19

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
								x	x	x	x

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 MORTAGAGE 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-V1

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", 2nd edition, Pearson
- Dhandapani Alagiri "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
PRINCIPALS OF AUTOMATION AND ROBOTICS
(Open Elective - II)

Code: 7BC55

L	T	P/D	C
3	0	0	3

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 BOOK:
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 I semester
Electronics and Computer Engineering
ADVANCED ENTREPRENEURSHIP
(Open Elective - II)

Code: 7ZC23

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
				x						x	

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

Syllabus for B. Tech IV Year II Semester
Electronics and Computer Engineering
PROJECT - II

Code: 7D880

L	T	P/D	C
0	0	10	5

1	2	3	4	5	6	7	8	9	10	11	12
	x	x	x	x	x			x		x	x

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
Division of Marks for External Evaluation – 70 Marks

Syllabus for B. Tech IV Year II semester
Electronics and Computer Engineering
INTERNET OF THINGS (IOT)
(Professional Elective - V)

Code: 7DC55

L	T	P/D	C
3	0	0	3

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

Course Objectives: The student will learn about

1. *Terminology, technology and applications of IoT*
2. *IoT system management using M2M (machine to machine) with necessary protocols*
3. *Python Scripting Language preferred for many IoT applications*
4. *Raspberry PI as a hardware platform for IoT sensor interfacing*
5. *Implementation of web based services for IoT with case studies*

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

1. *Identify the implementation layers of an IoT application system*
2. *Summarize the characteristics and challenges of designing SDN and NFV*
3. *Describe the management of an IoT system using necessary protocols*
4. *Design, Develop and Illustrate IoT applications using Raspberry PI platform and Python Scripting*
5. *Implement web based services on IoT devices*
6. *Design new projects using Raspberry PI*

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 Endpoints

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, ArshdeepBahga and Vijay Madisetti, 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
CLOUD COMPUTING
(Professional Elective - V)

Code: 7EC20

L	T	P/D	C
3	0	0	3

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 student will be able to

1. *Describe the characteristics of cloud*
2. *Describe the cloud services.*
3. *Understand different architectures for cloud applications, Creation and running of python programs, running amazon ec2 instance*
4. *Understand Data Intensive applications and future trends of Internet Clouds supporting Mobile Computing, Ubiquitious Computing and Social Networking*
5. *Discuss mapreduce and image processing app on cloud.*
6. *Discuss cloud security architecture.*

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,VijayMedisetti,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,JamesBroberg,AndrzejGOscinski,Wiley.

References:

1. Cloud Computing: Dr.KumarSaurab Wiley India 2011 .
2. Code in the cloud computing: K Chandrasekharan CRC Press.
3. Cloud Compuitng: 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
WIRELESS COMMUNICATIONS AND NETWORKS
(Professional Elective - V)

Code: 7CC22

L	T	P/D	C
3	0	0	3

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

Prerequisites: ***CMC***

Course objectives*:*
The objectives of this course are

- *To provide an overview of Wireless Communication networks area and its applications in communication engineering.*
- *To appreciate the contribution of Wireless Communication networks to overall technological growth.*
- *To understand the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.*

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

CO1	*Explain wireless communication systems and Modern wireless communication systems with examples.*
CO2	*Characterise Multiple Access Techniques for Wireless Communication and calculate capacity of cellular systems.*
CO3	*Explain Traffic routing in wireless networks, Wireless data services, Common channel signaling.*
CO4	*Describe about Mobile IP And Wireless Access Protocol*
CO5	*Develop different Wireless LAN protocols*
CO6	*Define About Fundamentals Of 3G Services, Its Protocols And Applications.*

Mapping of Course Outcomes with Program Outcomes

	a	b	c	d	e	f	g	h	i	j	k	l	m
CO1	3	1	1										
CO2	2	3	2	1									
CO3	2	3	2										
CO4	2	3	2	2									
CO5	**1**	3	3	2								1	1
CO6	1	3	3	2								1	1

Syllabus Content

UNIT-I

Introduction to Wireless Communication Systems: Evolution of mobile radio communications, Examples of wireless communication systems, Paging systems, Cordless telephone systems, Comparison of various wireless systems.

Modern wireless communication systems: Second generation cellular networks, Third generation wireless networks, Wireless in local loop, Wireless LAN, Bluetooth and PAN.

UNIT- II

Multiple Access Techniques for Wireless Communication: Introduction to multiple access, FDMA, TDMA, Spread spectrum multiple access, Space division multiple access, Packet Radio, Capacity of cellular systems.

UNIT-III

Wireless Networking: Differences between wireless and fixed telephone networks, Development of wireless networks, Fixed network transmission hierarchy, Traffic routing in wireless networks, Wireless data services, Common channel signaling.

UNIT- IV

Mobile IP And Wireless Access Protocol: Mobile IP: IP Packet Delivery, Agent Discovery, Tunneling And Encapsulation, IPV6-Network Layer In The Internet- Mobile IP Session Initiation Protocol WAP Architecture-overview, WML scripts, WAP service, WAP session protocol, Wireless transaction, Wireless datagram protocol.

UNIT- V

Wireless LAN: Introduction-WLAN Technologies: Infrared, UHF Narrowband, Spread Spectrum - IEEE802.11: System Architecture, Protocol Architecture, Physical Layer, MAC Layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, Security – IEEE802.16-WIMAX: Physical Layer, MAC, Spectrum Allocation For WIMAX, Introduction to OFDM, Blue tooth protocol Architecture.

UNIT- VI

Wireless WAN: Overview Of UTMS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High Speed Downlink Packet Access (HSDPA)- LTE Network Architecture And Protocol.

TEXT BOOKS:

1. Theodore S. Rappaport, *"Wireless Communications and applications"*, Pearson Education -2003.
2. Kaveh Pahlavan, Prashant Krishna Murthy, *"Principles of Wireless networks",* Pearson Education, 2002.
3. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012. (Unit IV, V)
4. Vijay Garg , "Wireless Communications And Networking", First Edition, Elsevier 2007.(Unit VI)

REFERENCE BOOKS:

1. P.Nicopolitidis, M.S.Obaidat, G.I.Papadimitria, A.S. Pomportsis, "*Wireless Networks",* John wily & sons, 2003.
2. Dr. Sunil kumar, S.manvi, M.S.Kakkasageri, "*Wireless and Mobile Networks, Concepts and Protocols*", Wiley India, 2010.
3. Jon W.Mark and W.Zhqung , " *Wireless Communication and Networking* ", PHI, 2005.

Syllabus for B. Tech IV Year II semester
Electronics and Computer Engineering
MOBILE ADHOC AND SENSOR NETWORKS
(Professional Elective - V)

Code: 7EC15

L	T	P/D	C
3	0	0	3

Course Objectives:
To provides a detailed treatment of proactive, reactive, and hybrid routing protocols in mobile wireless networks.

Course Outcomes:
At the end of tbis course, a student will be able to

1. *Recognize of the principles of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.*
2. *Comprehend the characteristics of wireless sensor networks (WSNs).*
3. *Report how proactive protocols function and their implications on data transmission delay and bandwidth consumption.*
4. *Assess how reactive routing protocols function and their implications on data transmission delay and bandwidth consumption.*
5. *Analyze the functioning of proactive routing protocols and their implications on data transmission delay and bandwidth consumption*
6. *Analyze the functioning of reactive routing protocols and their implications on data transmission delay and bandwidth consumption. And become familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs.*

UNIT I
Ad Hoc Wireless Networks: Introduction, Issues in Ad hoc wireless networks, Ad hoc wireless Internet
MAC protocols for Ad hoc Wireless Networks Issues in Designing a MAC Protocol for Ad hocWireless Networks, Design Goals for a MAC Protocol for Ad hoc Wireless Networks, Classifications of the MAC Protocols, Other MAC Protocols.

UNIT II
Routing Protocols for Ad Hoc Wireless Networks Issues in Designing a Routing Protocol for Adhoc Wireless Networks, Classifications of Routing Protocols
Transport Layer for Ad Hoc Wireless Networks Issues in Designing a Transport layer protocol for Ad hoc Wireless Networks, Design goals of a Transport layer protocol for Ad hoc Wireless Networks, Classification of Transport layer solutions, TCP over Ad hoc Wireless Networks, Other Transport layer protocols for Ad hoc Wireless Networks.

UNIT III
Security protocols for Ad hoc Wireless Networks Security in Ad hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad hoc Wireless Networks

UNIT IV
Basics of Wireless, Sensors and Applications: The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, Clustering of Sensors, Applications

UNIT V
Sensor Network Hardware: Components of Sensor Mote, **Data Retrieval in Sensor Networks:** Classification of WSNs, MAC layer, Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

UNIT VI

Operating System in Sensors– TinyOS, LA-TinyOS, SOS, RETOS

Imperative Language: nesC, Dataflow style language: TinyGALS, Node-Level Simulators, ns2 and its sensor network extension, TOSSIM

TEXT BOOKS:

1. Adhoc Wireless Networks – Architectures and Protocols, C.Siva Ram Murthy, B.S.Murthy,Pearson Education, 2004
2. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio Dharma, P.Aggarwal*, World Scientific Publications / Cambridge University Press, March 2006
3. Wireless Sensor Networks – Principles and Practice, Fei Hu, Xiaojun Cao, An Auerbachbook, CRC Press, Taylor & Francis Group, 2010

REFERENCE BOOKS:

1. Wireless Sensor Networks: An Information Processing Approach, *Feng Zhao, LeonidasGuibas*, Elsevier Science imprint, Morgan Kauffman Publishers, 2006, rp2009
2. Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008.
3. Ad hoc Networking, *Charles E.Perkins*, Pearson Education, 2001.
4. Wireless Ad hoc Networking, *Shih-Lin Wu, Yu-Chee Tseng*, Auerbach Publications, Taylor & Francis Group, 2007
5. Wireless Ad hoc and Sensor Networks – Protocols, Performance and Control, Jagannathan

Syllabus for B. Tech IV Year II semester
Electronics and Computer Engineering
INDIAN HISTORY, CULTURE AND GEOGRAPHY
(Common to all branches)
(Open Elective - III)

Code: 7ZC27

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
							x	x		x	

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 – ainism 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 Paramahamsa and Vivekananda – Iswara Chandra Vidyasagar and Veeresalingam – Emancipaition 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
FUNDAMENTALS OF RENEWABLE ENERGY SOURCES
(Open Elective - III)

Code: 7AC45

L	T	P/D	C
3	0	0	3

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

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
FINANCIAL INSTITUTIONS, MARKETS AND SERVICES
(Open Elective - III)

Code: 7ZC15

L	T	P/D	C
3	0	0	3

1	2	3	4	5	6	7	8	9	10	11	12
x			x						x		

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 OPERATIONS RESEARCH
(Open Elective - III)

Code: 7BC53

L	T	P/D	C
3	0	0	3

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 Queing 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 andTerminologies, Criterion and optimal strategy – Solution of games with saddle points: Mixed Strategies-Rectangular games without saddle points, Dominance principle, Average Relational Dominance, m X 2 & 2 X 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 II semester
Electronics and Computer Engineering
INNOVATION AND DESIGN THINKING
(Common to all Branches)
(Open Elective - III)

Code: 7ZC24

L	T	P/D	C
3	0	0	3

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Course Objective: *The objective of the course is to make students understand the nature of Innovation, creativity and IPRs, and to motivate the student to start his/her own enterprise with innovative skills.*

Course Outcomes:

1. *The students gain the knowledge on the inputs required for innovation and also gain familiarity on Entrepreneurship.*
2. *The students will get exposure on creative methods of ideation and the importance of protecting the ideas.*
3. *The students gain knowledge on design thinking and types of thinking.*
4. *The students gain familiarity on emerging technologies like Internet of things (IOT).*
5. *The students understand the process of building the startup.*
6. *The students gain knowledge on various startup funding and also to branding building for the startup.*

Unit – I: Introduction to Innovation: - Meaningof Innovation, Difference between innovation and invention, Difference between Innovation and Creativity, Need to be Creative , Importance of Innovation, Innovation as a Competitive Advantage, Innovation Continuum, Innovation Cycle, Disruptive Innovation, Breakthrough innovations and its consequences on the society, Challenges in Innovation.

Unit – II: Creative Thinking : - Types of Creative Thinking, Creative Thinking Process, Components of Creativity, Characteristics of a Creative Mindset, New product ideas, Idea generation methods, Principles of Idea Generation, Difference between Idea Generation and Brainstorming, Killing the ideas through Stage Gate Models, Process of Reverse Thinking.Intellectual Property Rights, Importance of IPR, Role of WIPO, Case Studies on Patents and Infringement of Rights.

Unit – III: Design Thinking & Liberal Art: - Concept of Design Thinking, Difference between Designer and Scientist, Stages of Design Thinking, Difference between Convergent Thinking and Divergent Thinking. Definition of Liberal Art and its Importance of Liberal Art , Role of Art and Culture to Innovate Business.

Unit – IV: Emerging Technologies: - Meaning of Internet of Things, Components of IoT, Benefits of IoT, Types of Product – Service hybrid, examples of IoT enabled Innovations, Impact of IoT on Business, Future of IoT. Case Study on IoT.Innovation Leadership &Network: - Leadership, Skills and Characteristics of an Innovation Leadership, Meaning of Innovation Network, Significant of Innovation Network, Define Social Media Analysis, Steps to Build an Innovation Network.

Unit –V Building Startup

Kelly Johnsons KISS Principle, Road map for building a startup, identify, analyze and evaluate funding, advantages of crowd funding. Pricing strategies.Determining factors for Monetizing Innovation, Process of Monetization, Fixing the price of an Innovative Project.Detailed study on market potential, pitfalls andNegative effects of Monetizing innovation.Reasons for failure of Monetization of Innovation.

Unit-VI Startup Funding & Branding

Sources of funding: Bootstrapping, Angel Investors, Crowd funding, Venture capitalists, Advantages of crowd funding, Schemes of Government through Startup India, role of Institutional support and Commercial Banks. Introduction to branding a startup and developing branding strategies.

References:

- Peter Drucker (1993), "Innovation and Entrepreneurship", Hyper Business Book.
- C.K. Prahalad, M.S. Krishnan, The new age of Innovation – TATA McGRAW-HILL Edition 2008.
- "Innovation by Design", Gerald H. (Gus) Gaynor, AMACOM {American Management Association), NYC, 2002
- Bholanath Dutta: Entrepreneurship – Text and cases, Excel, 2009.
- Vasanth Desai: Entrepreneurship, HPH, 2009
- Barringer: Entrepreneurship, Pearson, 2009.
- H. Nandan: Fundamentals of Entrepreneurship, PHI, 2009.
- John M Nicholas "Project Management for Business and Technology" Prentice Hall of India Pvt. Ltd.
- Stay Hungry Stay Foolish, Rashmi Bansal and published by IIM., Ahmedabad