

**ACADEMIC REGULATIONS COURSE STRUCTURE AND
DETAILED SYLLABUS**

for

B.Tech Four Year Degree Course

(A-18 I & II year)

in

MECHANICAL ENGINEERING

(ME)

(Applicable for the batches admitted from 2018-2019)



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 -501301.

June, 2019

Course structure for B. Tech--I Year – I semester (1 st Semester)								
Sl.No	Course code	Name of the Course	L	T	P	C	Max. Marks	
							CIE	SEE
1	7HC04	Applied Physics	3	1	0	4	30	70
2	7B103	Engineering Mechanics	3	1	0	4	30	70
3	7HC06	Engineering Mathematics – I	3	1	0	4	30	70
4	7BC02	Engineering Graphics & Design	1	0	4	3	30	70
5	7HC02	English (Oral communication skills)	1	0	0	1	30	70
6	7HC64	Applied Physics Lab	0	0	3	1.5	30	70
7	7HC62	English (Oral communication skills) Lab	0	0	2	1	30	70
8	7B191	Technical Seminar I	0	0	2	1	100	
9	7HC20	Human values professional Ethics in Higher Education	3	0	0	0	30	70
							Grade Evaluation	
		Total	14	3	11	19.5	340	560

Course structure for B. Tech--I Year – II semester (2 nd Semester)								
Sl.No	Course code	Name of the Course	L	T	P	C	Max. Marks	
							CIE	SEE
1	7HC03	Chemistry	3	1	0	4	30	70
2	7FC01	Problem Solving using C	3	0	0	3	30	70
3	7HC08	Engineering Mathematics – II	3	1	0	4	30	70
4	7BC01	Workshop/ Manufacturing practices (Theory)	1	0	0	1	30	70
5	7HC01	English (Reading, Listening and Writing)	1	0	0	1	30	70
6	7HC63	Chemistry Lab	0	0	3	1.5	30	70
7	7FC71	Problem Solving using C Lab	0	0	3	1.5	30	70
8	7BC61	Workshop/ Manufacturing practices lab	0	0	3	1.5	30	70
9	7HC61	English lab (Reading, Listening and Writing)	0	0	2	1	30	70
10	7B292	Technical Seminar II	0	0	2	1	100	
		Total	11	2	13	19.5	370	630

Course structure for B. Tech--II Year – I semester (3 rd Semester)								
	Subject Code	Subject	L	T	P/D	C	Max. Marks	
S.No.							CIE	SEE
1	7HC12	Engineering Mathematics –III	2	1	---	3	30	70
2	7B306	Thermodynamics	3	---	---	3	30	70
3	7B307	Mechanics of Solids	3	---	---	3	30	70
4	7B308	Materials Engineering	3	---	---	3	30	70
5	7B309	Fluid Mechanics and Hydraulic Machinery	3	---	---	3	30	70
6	7B310	Machine Drawing and Computer aided drawing Practice	1	---	4	3	30	70
7	7B362	Metallurgy Lab & Mechanics of Solids Lab	---	---	4	2	30	70
8	7B363	Fuels and Lubricants Lab	---	---	2	1	30	70
9	7B364	Fluid Mechanics and Hydraulic Machinery Lab	---	---	2	1	30	70
10	7HC21	Environmental Science and Ecology	2	0	0	0	30	70
							Grade Evaluation	
11	7B393	Technical seminar-III	---	---	2	1	100	-
		Total	17	1	14	23	400	700

Course structure for B. Tech--II Year – II Semester(4th Semester)								
	Subject Code	Subject	L	T	P/D	C	Max. Marks	
S.No.							CIE	SEE
1	7B411	Manufacturing Processes	3	---	---	3	30	70
2	7B412	Applied Thermodynamics-I	3	---	---	3	30	70
3	7B413	Kinematics of Machinery	2	1	---	3	30	70
4	7AC48	Electrical and Electronics Engineering	2	---	---	2	30	70
5	OE	Open Elective-I	3	---	---	3	30	70
6	7ZC01	Management Science and Financial Accounting	2	---	---	2	30	70
7	7AC95	Electrical and Electronics Engineering lab	---	---	2	1	30	70
8	7B465	Manufacturing Processes Lab	---	---	2	1	30	70
9	7B494	Technical seminar-IV	---	---	2	1	100	-
10	7B466	Comprehensive Viva-voce-I	---	---	2	1	30	70
11	**	Summer Industry Internship-I (Evaluation will be in III - I)	---	---	---	---	---	---
		Total	15	1	8	20	370	630

CODE	Open Elective-I	
7EC02	Data Structures	CSC
7GC46	Biology for Engineers	BT
7ZC22	Basics of Entrepreneurship	Entrepreneurship Stream-MBA
7ZC25	Basic of Indian Economy	Social Sciences Stream
7ZC20	Product and Services	Technology Entrepreneurship
7ZC05	Banking Operations, insurance and Risk Management	Finance Stream
7BC61	Smart Materials	MECH
7CC54	Fundamental of Digital Circuits and Microprocessors	ECE

a	B	c	d	e	f	g	h	i	j	k	l
X				X			X				

**Syllabus for B. Tech. I Year I semester
Mechanical Engineering**

Code: 7HC04	APPLIED PHYSICS	L T P C 3 1 0 4
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Course Objectives

- To understand basic fundamentals of crystallography, crystal structures, their properties
- To understand the various defects of a crystal and X-ray diffraction techniques to analyze a crystal structure.
- To make the students to widen the conceptual understanding of the fundamental principles of interference and diffraction (wave optics)
- To understand the basic concepts of normal light, Laser and its applications and to know about the fundamentals of radioactivity and its applications.
- To know the various types of vibrations like periodic, vibrating strings, ultrasonics, magnetostriction, piezo-electricity, NDT.
- To discuss about the nano-technology, preparation techniques and characterization (XRD, SEM & TEM), CNTs

Unit:1

Crystallography and Crystal structures and their relative properties

Space Lattice, Unit Cell, Lattice Parameters, Crystal Systems, Bravais Lattices, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC and HCP Structures. Crystal Planes, directions and Miller Indices, Inter Planar Spacing of Orthogonal Crystal Systems.

Unit:2

Crystal Defects and X-ray diffraction

Point Defects - Vacancies, Substitutional, Interstitial, Frenkel and Schottky Defects-Calculation of concentrations, Qualitative treatment of line (Edge and Screw Dislocations) Defects, Burger's Vector.

X-ray Diffraction: Bragg's Law, Laue method and Powder Method.

Unit:3

Wave optics and applications

Interference: Introduction, Superposition of waves, Young's double slit experiment, Intensity calculation, fringe width, Interference in thin films due to reflection of light, Newton's rings. Applications: Calculation of Refractive Index of liquid, Thickness of glass plate.

Diffraction: Introduction, Plane diffraction grating (Qualitative), Theory of plane transmission grating, Resolving power of a grating - Application; calculation of wavelength of spectral light by using grating.

Unit:4 Lasers

Characteristics of LASER, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, pumping, Population Inversion, Lasing Action, Einstein's Coefficients and Relation between them and significance, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers in medicine and engineering.

Nuclear Energy: Radioactivity, Nuclear binding energy, Nuclear fission, Nuclear fusion, α , β , γ rays decay, Geiger-Muller counter and practical applications of nuclear physics.

Unit:5

Vibrations and ultrasonics

Undamped vibrations and its solutions (quantitative), Damped, Forced vibrations (qualitative) and Resonance. Applications: Physical Pendulum, Torsional Pendulum and Compound Pendulum, Vibrating strings. Production and properties of ultrasonics by magnetostriction effect and piezoelectric effect. Applications of ultrasonics, special reference to NDT.

Unit:6

Nanotechnology

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

Text Books:

- 1.B.K. Pandey & S. Chaturvedi Engineering Physics, Cengage Learning
- 2.D.K. Bhattacharya and Poonam Tandon, OXFORD university press.

Reference Books:

1. Charles Kittel, Introduction to Solid State Physics, John Wiley Publisher
2. Dekker, Solid State Physics
3. Halliday and Resnick, Physics
4. Engineering Mechanics, 2nd ed. – MK Harbola
5. Theory of Vibrations with Applications – WT Thomson
6. S.O. Pillai, Solid State Physics
7. P K Palanisamy, Engineering Physics, Sitech Publications
8. A. Ghatak – Optics
9. Physical Metallurgy principles 4th edition-Reza Abbaschian Lara
Abbaschian Robert E. Reed-Hill

Course Outcomes

After completing the course, students will be able to

- Get the knowledge to classify the crystal structures, their parameters and draw the various crystal planes using Miller indices.
- Understand and analyze the defect type, describe the crystal structure using the various X-ray diffraction techniques.
- Analyze the wave nature and its types, superposition principle, differentiation between interference, diffraction and their applications
- Explain about emission, its types, laser principle, types, working and its applications and also to understand the radioactivity, fusion & fission, alpha, beta and gamma rays decay and its applications.
- Understand about the vibrations, periodic motion and apply the knowledge of ultrasonic, non destruction testing, magnetostriction, piezo-electricity.
- Summarize nano & bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods (physical & chemical), analysis the techniques like XRD, SEM, TEM

**Syllabus for B. Tech. I Year I semester
Mechanical Engineering
ENGINEERING MECHANICS**

Code: 7B103

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

Course Objective:

1. Understand the Concepts of resultant and equilibrium of System of Forces.
2. To learn various method of analysis of structure including Principle of Virtual Work.
3. Learn the concept of Friction & Understanding the Proportion of surfaces and their Application
4. Understand the properties of surfaces and volumes.
5. Develop the capacity to predict the effect of force and motion.
6. To Learn to solve the Problems on Kinetics by energy methods.

Course Outcomes

After completing the subject, students will be able to:

1. Understand and tackle the problems associated to Resultants and Equilibrium of system of forces.
2. Analysis of forces in the structures by using method of joints sections and Principle of virtual work.
3. Analysis and solve the real world problems related to friction.
4. To Locate the centroid of various geometric shapes from basic principles.
5. To determine the area moment of inertia and mass moment of inertia for evaluating the strength and to analysis the rigid body motion. To Analyze and solve the motion parameters under the action of system of forces.
6. Able to apply various energy methods for solving kinetic problem.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1	H								M			L
CO2	H								M			L
CO3	H								M			L
CO4	H								M			L
CO5	H								M			L
CO6	H								M			L

UNIT-I

Introductory Concepts: Fundamental Concepts & Axioms, System of Forces.

Resultant of Force System: Parallelogram law, Resolution of forces, Resultant of Coplanar Concurrent Forces, Component Forces in Space, Moment of Force, Principle of Moments, Moment of Couple, Resultant of Coplanar Non-concurrent Forces, Resultant of Spatial Concurrent and Non-concurrent Forces.

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar systems, Spatial System, Spatial systems for Concurrent and Non-concurrent forces, Lami's Theorem, Equilibrium of Coplanar systems, Equilibrium of Spatial systems.

UNIT-II

Analysis of Structures: Construction of Trusses, Assumptions, Methods of Analysis – Method of Joints and Method of Sections.

Virtual Work: Concept of Virtual work method, Principle and application of Virtual work to simple systems.

Friction: Theory of friction, Laws of Friction, Types of Friction, Limiting Friction, Sliding, Rolling and Pivot friction, Static and Dynamic friction, Motion of Bodies, Wedge friction, Screw Jack and Differential Screw Jack.

Centroid & Centre of Gravity: Centroid of areas and lines, Centroids determined by Integration, Centroids of composite areas and lines, Theorem of Pappus, Centre of gravity of flat plate, Centre of gravity of simple bodies from basic principles, centre of gravity of composite bodies.

UNIT-IV

Area Moment of Inertia: Definition, Polar moment of inertia, Radius of gyration, Transfer Formula for Moment of Inertia, Moment of Inertia by integration, Moment of Inertia for Composite Areas, Product of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Radius of Gyration, Mass moment of Inertia by integration, Transfer Formula for Mass Moment of Inertia, Mass Moment of Inertia of composite bodies.

UNIT-V

Kinematics of Particle: Rectilinear and Curvilinear translation, Rectangular components of curvilinear translation, Normal & Tangential components of acceleration.

Kinematics of Rigid Bodies: Types of rigid bodies motions, Angular motion–Fixed Axis Rotation, Centroidal Rotation and Non–centroidal Rotation.

Kinetics: Analysis as Particle and Rigid Body in translation Fixed Axis Rotation.

UNIT - VI

Work - Energy Method: Work – Energy Equation for translation, Work -Energy applied to particle motion, work-Energy applied to connected systems, Work -Energy applied is fixed axis rotation.

Impulse – Momentum Method: Linear Impulse Momentum, Conservation of linear momentum, Elastic Impact and types of Impacts, Coefficient of Restitution.

TEXT BOOK:

1. K. Vijay Kumar Reddy and J. Suresh Kumar, Singer's Engineering Mechanics, BS Publications, Hyderabad, 2011

REFERENCEBOOKS:

1. Irving H.Shames , Engineering Mechanics.
2. Engineering Mechanics by Tayal.
3. Kurmi R.S. Engineering Mechanics S.Chand & Co.
4. Bansal R.K. A Text book of Engineering Mechanics, Laxmi Publications
5. Engineering Mechanics by S.S.Bhavikatti J.G.Rajasekharappa.
6. Engineering Mechanics by Timoshenko & Young.
7. Engineering Mechanics by Meriam and Kraize
8. Engineering Mechanics by K.L.Kumar / Tata McGraw Hill.

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

H: High **M: Medium** **L: Low**

Syllabus for B. Tech. I Year I semester
Mechanical Engineering
Engineering Mathematics -1
(Common to EEE, ECE, ME, CE)

L	T	P	C
3	1	0	4

Code: 7HC06

Pre Requisites: Mathematics Knowledge at Pre-University Level

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

1. Special functions such as Beta & Gamma functions and their properties, evaluation of improper integrals and the applications of definite integrals.
2. Mean value theorems and their applications to the given functions, series expansions of a function.
3. To test the convergence of a series and expansion of a function in sine and cosine terms.
4. Basic concepts of multivariable differential calculus.
5. About the linear system and some analytical methods for solution.
6. Concept of Eigen values and Eigen vectors their properties and applications.

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

1. Solve the problems using special functions; evaluate surface areas and volumes of revolutions.
2. Verify the mean value theorems and also express the given function in series form using Taylor's theorem.
3. Determine the convergence, divergence or oscillating nature of a series and express the function as trigonometric series.
4. Compute the extreme values of a function defined with and without constraints.
5. Check the consistency or inconsistency of a linear system and ability to solve real time problems.
6. Calculate the Eigen values and Eigen vectors of a matrix and their application for orthogonal transformation.

Syllabus

Unit-1: Calculus-1

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

Unit-2: Calculus-2

Rolle's Theorem and Mean value theorems (Statements and Geometrical Interpretations if any); Taylor's and Maclaurin's theorems with remainders (without proof); Taylor's and Maclaurin's series expansion.

Unit-3: Sequences and series

Convergence of sequence and series, tests for convergence; Power series. Fourier series, Half range sine and cosine series, Parseval's theorem (without proof).

Unit-4: Multivariable Calculus (Differentiation):

Limit, continuity and partial derivatives, total derivative; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, directional derivatives, Tangent plane; Concepts of divergence and curl with physical significance.

Unit-5: Matrices-1

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

Unit-6: Matrices-2

Eigenvalues and Eigenvectors; Cayley - Hamilton Theorem, Diagonalization of matrices and Orthogonal transformation.

Text Books:

- (i) R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.
- (ii) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

Reference Books:

- (ii) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- (iii) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- (iv) B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers
- (v) C Sankaraiah, A Text book of Engineering Mathematics – I, VGS Book Links
- (vi) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- (vii) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
- (viii) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
- (ix) Engineering mathematics, Ravish R.Singh, McGraw Hill Education.

Syllabus for B. Tech. I Year I semester
Mechanical Engineering
ENGINEERING GRAPHICS & DESIGN
B.Tech I year I sem (EEE, ECE & ME) II sem (CSE, ECE, IT & CE)

Code : 7BC02

L	T	P/D	C
1	0	4	3

Course objectives:

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

Course outcomes

After completing this course, the student will able to:

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

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1	H											M
CO2	H											M
CO3	H											M
CO4	H											M
CO5	H											M
CO6	H											M

UNIT – I

Introduction to Engineering Drawing: Drawing Instruments and their uses, types of lines, Types and uses of pencils, Lettering, Rules of dimensioning.

Curves used in Engineering Practice and their Constructions:

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

UNIT – II

Orthographic Projection: Principles of Orthographic Projections – Conventions – First angle and third angle projections (however all drawing exercises must be in first angle only) - Projection of Points, Lines

- Inclined to both planes, Projections of regular Plane, inclined planes - Auxiliary views.

UNIT –III

Projections of Regular Solids: Projections of Regular Solids: Prisms, Cylinders, Pyramids, Cones – Axis inclined to both planes, Auxiliary views.

UNIT –IV

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

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

UNIT – V

Isometric Projections/views: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane, Simple Solids. Conversion of isometric views to orthographic views.

UNIT –VI

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

Text/Reference Books:

- (i) Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
- (ii) Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
- (iii) Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
- (iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
- (v) AUTOCAD Software Theory and User Manuals

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

Syllabus for B. Tech I Year I semester

(Mechanical Engineering)

ENGLISH

(Oral Communication Skills)

Code : 7HC02

L	T	P	C
1	0	0	1

Course Objectives : The course will develop the students' ability to

- integrate listening and speaking skills
- communicate effectively
- speak effectively on a given topic
- master the art of presentation
- interact with peers in a group discussion
- get exposed to face interviews

Course Outcomes : After completing the course students will be able to

- understand, analyze and respond to the audience by listening effectively
- acquire the articulation of different types of sentences by practicing pause patterns and question tags.
- translate and demonstrate self, participate effectively in activities like JAM, extempore
- express and deliver a presentation on the given topic through role plays and situational dialogues
- implement English language to meet the standards of corporate and real world in a group.
- present and communicate effectively by facing mock interviews by experts from industry and academy.

Unit-I : Listening Skills

Integrating Listening, Reading and Speaking

Introduction Integrated Speaking Skills

Unit-II: Oral Communication Skills -I

Types of Sentences – Assertive, Interrogative, Imperative and Exclamatory

Difference between Pauses, Gaps

Question Tags

Introduction and Greetings

Asking and Giving Directions

Unit-III: Oral Communication Skills -II

Speaking on a particular topic

Content development using cohesive devices

Common Errors in Spoken English

Unit-IV: Presentation skills

Introduction to Presentation Skills

Role Plays & Situational Dialogues

Unit-V : Group Discussion

Importance of Group Discussion

Do's and Don'ts of Group Discussion

Unit-VI: Interview Skills

Introduction to Interview Skills

Types of Interviews

Pre-Interview Preparation

Interview Etiquette (Non-Verbal)

Suggested Readings:

- (i) *Step by step learning language and life skills* by Niruparani, Jayasree Mohanraj, Indira, Sailakshmi Pearson Publishers
- (ii) *Communication skills for technical students* by TM Farhathullah, Orient Black swan Publications
- (iii) *English for technical Communication* by K.R. Lakshmi Narayan , Scitech Publications
- (iv) *Practical English Usage*. Michael Swan. OUP. 1995.
- (v) *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
- (vi) *Exercises in Spoken English*. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

a	b	c	d	E	f	g	h	i	j	k	L
X		X									

**Syllabus for B. Tech. I Year I semester
Mechanical Engineering**

Code: 7HC64

APPLIED PHYSICS LAB

L T P C
- - 3 1.5

Course Objectives

- To explain about magnetic induction, Biot-Savart principle - Magnetism
- Explain about the acceleration due to gravity and radius of gyration and periodic vibrations-Compound Pendulum - Vibrations
- To understand the rigidity modulus-Torsional pendulum - Vibrations
- To understand about the ionizing radiation by using the Geiger–Muller counter – Nuclear energy.
- To understand the transverse laws of vibrations-Sonometer - Resonance
- To explain the electrically vibrating the tuning fork by using Melde’s experiments – Electromagnetism.
- Discuss the dispersive power of prism-minimum deviation method - Light
- Explain the formation of Newton’s rings-interference - Light
- Discussion of diffraction pattern using the grating - LASER
- To study the LED characteristics and forward resistance – Semiconductor devices.
- Explaining about the electrical resonance by using the LCR circuit – Electrical / Semiconductor devices.
- To know the time constant of RC circuit - Electrical / Semiconductor devices.

List of Experiments

1. Determination of magnetic induction flux density along the axis of a current carrying circular coil using Stewart and Gee’s experiment.
2. Determination of acceleration due to gravity and radius of gyration using compound pendulum.
3. Determination of rigidity modulus of a given wire material using the Torsional pendulum.
4. Studying the characteristics of Geiger–Muller counter and verifying the inverse square law.
5. Verification the transverse laws of stretched strings by using the Sonometer.
6. Determination of frequency of an electrically vibrating tuning fork using the Melde’s experiment
7. Calculation of dispersive power of a given material of prism by using Spectrometer in minimum deviation method.
8. Determination of wavelength of a monochromatic light source by using

- Newton's rings experiment.
9. Determination of wavelength of a given laser source of light by using diffraction grating in normal incidence method.
 10. Studying the characteristics and calculating the forward resistance of a LED.
 11. Study of series and parallel resonance of an LCR circuit
 12. Determination of time constant of an RC-circuit

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

Course Outcomes

After completing the experiment, students will be able to

- Understand and search to apply the fundamentals of magnetic induction, Ampere's law, Oersted's law and the Biot-Savart law.
- Analyze the concept and application parts of radius of gyration and periodic vibrations.
- Summarize the fundamentals of modulus-types, stress, strain, elasticity, plasticity and Hook's law.
- Understand the concept of radiation, ionizing radiation, radiological protection and inverse square law.
- Demonstrate the resonance phenomenon and verify the transverse laws of stretched strings by using Sonometer.
- Describe the types of waves like longitudinal, transverse, stationary and progressive waves. Electromagnetic induction and its applications.
- Know about the light properties-dispersion, prism, spectrometer and minimum deviation arrangement.
- Understand the concepts of interference, conditions, formation of Newton's rings-reason.
- Recognize the difference between the interference and diffraction, grating, laser characteristics.
- Analyze the difference between normal diode, LED, forward bias, reverse bias, I-V characteristics, direct and indirect band gap semiconductors.
- Analyze the LCR circuit combination, parallel, series electrical resonance, inductance, reactance, capacitance and electrical and electronic fundamentals.
- Characterize the RC network, time constant, capacitor functioning and its application.

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

**Syllabus for B. Tech I Year I
semester (Mechanical Engineering)
ENGLISH (Oral Communication Skills) Lab**

Code : 7HC62

L	T	P	C
0	0	2	1

Course Objectives : The course will develop the students' ability to

- integrate listening and speaking skills
- communicate effectively
- speak effectively on a given topic
- master the art of presentation
- interact with peers in a group discussion
- get exposed to face interviews

Course Outcomes : After completing the course students will be able to

- understand, analyze and respond to the audience by listening effectively
- acquire the articulation of different types of sentences by practicing pause patterns and question tags.
- translate and demonstrate self, participate effectively in activities like JAM, extempore
- express and deliver a presentation on the given topic through role plays and situational dialogues
- implement English language to meet the standards of corporate and real world in a group.
- present and communicate effectively by facing mock interviews by experts from industry and academy.

Unit-I : Practice sessions on
Listen & Speak
Listen, Read, and Speak

Unit-II: Practice sessions on
Articulation of types of
Sentences Question Tags
Introduction and greeting
Asking for and Giving
Directions

Unit-III: Practice sessions on
JAM/Extempore/
Impromptu
Prepared talk on given topics

Unit-IV: Practice sessions on
Formal Presentation
Role Plays & Situational Dialogues

Unit-V : Practice sessions on
Group Discussion

Unit-VI: Practice sessions on
Mock Interviews

Suggested Readings:

- (vii) *Step by step learning language and life skills* by Niruparani, Jayasree Mohanraj, Indira, Sailakshmi Pearson Publishers
- (viii) *Communication skills for technical students* by TM Farhathullah, Orient Black swan Publications
- (ix) *English for technical Communication* by K.R. Lakshmi Narayan , Scitech Publications
- (x) *Practical English Usage*. Michael Swan. OUP. 1995.
- (xi) *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
- (xii) *Exercises in Spoken English*. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

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**Syllabus for B. Tech I Year I semester
(Mechanical Engineering)
TECHNICAL SEMINAR-I**

L	T	P	C
-	-	2	1

Code: 7B191

Course Objective :

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

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

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

Procedure

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

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 9 th week	: 10 marks
End semester Viva	: <u>20 marks</u>
Total	100 marks

**Syllabus for B. Tech I Year I
semester (Mechanical Engineering)
HUMAN VALUES AND PROFESSIONAL ETHICS
IN HIGHER EDUCATION**

L T P/D C
3 0 0 0

Code: 7HC20

Orientation Programme for First Year B.Tech Students Syllabus

Course Duration: Three Weeks

Evaluation: Is done based on the Grading.

Course Objectives This introductory course input is intended

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

Course Outcomes: Student will be able to:

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

UNIT – I: INTRODUCTION TO HUMAN VALUES: The current status of an individual, at the level of Individual, Family, Society and Nature. Basis of Human Beings' Conduct, Desire – Aim, Objective and Purpose. Rationale of Success. Role of Education - Sanskar. Definition of Human aspiration, Human Conduct, Human Being – Physical Facility and Relationships, Right Understanding for Human Being, Achievement of Prosperity.

UNIT – II: HARMONY AND HUMAN BEING: Understanding the co-existence of human being, Different Harmony levels –Harmony in the Human Being, Harmony in the Family, Harmony in the Society and Harmony in Nature / Existence. Understanding the Relationships, Harmony in the Family, Feelings in Relationship: Trust, Respect, Affection, Care Guidance, Reverence, Glory, Gratitude and Love.

UNIT – III: THE CYCLE OF HAPPINESS: Meaning of Happiness and Unhappiness, Sources of Happiness, Self Investigation, Five Dimensions of Human order – Education, Health, Production, Justice and Exchange. Harmony at the Individual Level and Family level, Concerns at Individual, Family and Nature level. Different approach of People behavior – Active, Reactive and Proactive. Resource depletion, Global Warming, Pollution, Harmony in Nature.

UNIT – IV: IMPROVING LEARNING CAPABILITIES: Principles of learning, Study skills and E- Learning, Listening skills, Soft skills and Employability skills, Effective Reading and Reviewing, Reading Comprehension, Textbook Reading strategies, Effective Communication in English, Test taking strategies.

Unit – V: PERSONALITY DEVELOPMENT: Self Development, Goal Setting, Motivation, Time Management, Positive Attitude, Building Self Confidence, Decision Making, The Discovery Wheel, Some attributes of a good personality, Memory Management, Interpersonal Skills, Importance of Yoga and Meditation.

UNIT – VI: ROLES AND RESPONSIBILITIES OF STUDENTS: Responsibilities of the students in shaping themselves, Effective and Successful Habits, Difference between studying in a Professional college and High school / Junior college, Characteristics of a Successful Student, Morals, Ethics and Values, Some tips to students to do well in B.tech program and also later in Professional Career.

TEXT BOOK:

1. Improving Learning Capabilities and Personality Development – Manual prepared by SNIST for private circulation

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X					X	X					

**Syllabus for B. Tech I Year II semester
(Mechanical Engineering)**

CHEMISTRY

Code: 7HC03

Course Objectives:

L	T	P	C
3	1	0	4

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

Course Outcomes

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

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

UNIT - I

Atomic and molecular structure (6L)

Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT - II

Engineering materials (8L)

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

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

Lubricants

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

UNIT - III**Water Technology (8L)**

- (a) **Introduction**:- Hardness of water – types of hardness (temporary and permanent), calculation of hardness- Numerical problems. Estimation of hardness of water by EDTA Method.
- (b) **Water for Industrial purpose**: Food, sugar, textile, paper and pharma industries, water for steam making characteristics of boiler feed water, boiler troubles- scale and sludge & Carry over (priming & foaming), boiler corrosion, caustic embrittlement.
- (c) **Water Treatment**: Internal conditioning- phosphate, carbonate & calgon conditioning. External Treatment: Ion-exchange process. Desalination-reverse osmosis. Municipal water treatment- sedimentation, coagulation, filtration, disinfection-chlorination, ozonation.
Engineering applications: Methodology and working of mineral water plant for drinking purpose.

UNIT - IV**Electrochemistry (8L)**

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

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

Batteries : Types of batteries

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

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

UNIT - V**Corrosion and its prevention (7L)**

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

Cathodic protection – sacrificial anodic protection and impressed current cathodic protection method. Methods of metallic coatings-hot dipping (**tinning and galvanizing**), metal cladding (**Al cladding**), electroplating (**copper plating**) and electroless plating (**nickel plating**).

UNIT-VI**Organic reactions and drug molecules (5L)**

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

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

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

Applications.

TEXT BOOKS:

1. Engineering Chemistry: by Jain & Jain ,Dhanapathrai Publications (2015)
2. Engineering Chemistry: by Thirumala Chary & Laxminarayana, Scitech Publications (2016)
3. Engineering Chemistry: by & B.Rama Devi, Prsanta Rath & Ch. Venkata Ramana Reddy, Cengage Publications (2016)

REFERENCE BOOKS:

1. Fundamentals of Molecular Spectroscopy by C. N. Banwell
2. Drugs by David Krupadanam- Universities Press
3. University chemistry by B. H. Mahan
4. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

Organic Chemistry: Structure and Function by K. P. C. Vollhardt and N. E. Schore, 5th Edition
<http://bcs.whfreeman.com/vollhardtschore5e/default.asp>

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

H: High M: Medium L: Low

**Syllabus for B. Tech I Year II semester
(Mechanical Engineering)
Problem Solving using C**

Code: 7FC01

Course Objectives:

1. To impart adequate knowledge on architecture of computer and problem solving techniques.
2. To understand and effective usage of syntax and semantics using 'c' languages
3. The impart the concept of modularity
4. Learn and apply the concept of array to solve the real time problems.
5. To understand effective and efficient utilization of memory.

L	T	P	C
3	0	0	3

Course Outcomes:

After completion of this course student will learn

1. To formulate simple algorithms for arithmetic, logical problems and to translate the algorithms in to programs using C language
2. To test and execute the programs and correct the logical errors if any, to implement Conditional branching, iteration
3. To analyze and decompose a problem into functions and synthesize a complete program using divide and conquer approach.
4. Students will be able to learn, understand and apply the concept of arrays in various applications.
5. To impart the knowledge about pointers this is the backbone of effective memory handling techniques.
6. Students will be able to express the advantages of user defined data types and issues related to file organizations, which provide flexibility for application development.

UNIT I

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

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

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

UNIT II

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

Arithmetic expressions, Operator Precedence & Associativity

Conditional Branching and Loops

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

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

UNIT III

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

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

UNIT IV

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

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

UNIT V

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

Strings: String Handling Functions.

UNIT IV

Structure: Structures, Defining structures and Array of Structures,

Nested Structures enum, typedef

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

File Handling Functions, File Modes, File

Operations Suggested Text Books

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

Reference Books

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

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

H: High M: Medium L: Low

**Syllabus for B. Tech I Year II
semester (Mechanical Engineering)
Engineering Mathematics -II**

Code: 7HC08

L	T	P	C
3	1	0	4

Pre Requisites: Engineering Mathematics-I**Course Objectives:** To make the students to understand and expected to learn

- Multiple integration and its applications also acquire knowledge on curvilinear coordinate system.
- Various analytical methods to solve first order first degree and also the equations not of first degree ordinary differential equations.
- Methods to solve higher order ordinary differential equations.
- Series solution of second order ordinary differential equations with variable coefficients.
- Basic concepts of Complex Analysis and conformal mapping and their properties.
- Series expansion of a function using Taylor's and Laurent's series. Evaluation of definite integrals and improper integrals.

Syllabus

Unit-1: Multivariable Calculus**(Integration):**

Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), Introduction to orthogonal curvilinear coordinates, Simple applications involving cubes; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes (without proofs).

Unit-2: First order ordinary differential equations:

Exact, linear and Bernoulli's equations; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Unit-3: Ordinary differential equations of higher orders:

Higher order linear differential equations with constant coefficients, method of variation of parameters, Cauchy-Euler equation;

Unit-4: Series Solutions to Second Order Ordinary Differential Equations:

Power series solutions: Legendre polynomials, Bessel functions of the first kind and their properties.

Unit- 5: Complex Variable – Differentiation:

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

Unit- 6: Complex Variable – Integration:

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation

of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Text Books:

- (i) R K Jain and S R K Iyengar Advanced Engineering Mathematics, Narosa Publications.
- (ii) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

Reference Books:

- (i) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- (ii) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- (iii) B.S. Grewal, Elementary Engineering Mathematics, Khanna Publishers
- (iv) Engineering Mathematics, Srimanta Pal, OXFORD university press.
- (v) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- (vi) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
- (vii) Engineering Mathematics, P.Sivaramakrishna Das, Pearson Publications.

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

1. Solve the problems of multiple integration and apply these concepts for finding the parameters like surface area, volume, center of mass and centre of gravity.
2. Find the solutions of first order first degree and not of first degree differential equations and their applications such as Newton's law of cooling, Natural growth and decay.
3. Identify and solve higher order ordinary differential equations with constant coefficients using some standard methods and also their applications in LCR circuits.
4. Write the solutions of Legendre and Bessel's equations series.
5. Understand the concept of analyticity of a function; solve the problems on conformal mapping. Express the functions of a complex variable in series form also able to evaluate definite and improper integrals using complex integration.

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Syllabus for B. Tech I Year II semester
(Mechanical Engineering)
WORKSHOP/MANUFACTURING PRACTICES (THEORY)
B. Tech I year II sem (EEE, ECE & ME)

Code: 7BC01

Course Objectives:

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

L	T	P	C
1	0	0	1

COURSE OUTCOMES:

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

Theory: In theory classes the following syllabus is to be covered in 10hrs using PPTS and Videos (Elementary treatment only)

1. Fitting & Power Tools
2. Electrical & Electronics Appliances
3. Carpentry
4. Plastic molding & Glass Cutting
5. Metal Casting
6. Metal Joining: Arc & gas welding and brazing
7. Metal forming
8. Machining
9. Advanced manufacturing methods: (Micro machining, USM,ECM,EDM)
10. CNC machining & Additive Manufacturing

Suggested Text/Reference Books:

- 1 Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
- 2.Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

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**Syllabus for B. Tech I Year II
semester (Mechanical Engineering)
ENGLISH - (Reading, Listening and Writing)**

Code: 7HC01

L	T	P	C
1	0	0	1

Course Objectives : The students will

- acquire knowledge on various types of listening techniques, barriers and benefits of listening
- recognize the speech sounds and learn the intonation patterns
- learn various vocabulary patterns
- develop the ability to structure and punctuate the sentences
- learn different reading techniques
- learn different writing skills

Course Outcomes : At the end of the course the students will be able to

- understand and differentiate different types of listening techniques used to interact with real world problems
- differentiate the speech sounds and improve their accent and modulation while speaking
- understand and illustrate different word roots, word derivatives – synonyms, antonyms and word inflections
- discriminate a variety of sentence types, their structure and use punctuations
- get acclimatized to reading strategies and note making.
- develop proficiency in writing and preparing resume

Unit-I : Listening

Importance of Listening;
Types of listening
Barriers to Listening
Benefits of Listening

Unit-II: Basic Communication Skills

Introduction to Speech Sounds
Vowels, Diphthongs, Consonant Sounds
Significance of word
accent 2.4.Intonation
Patterns

Unit-III: Vocabulary

Word Roots - Affixes: Prefixes and Suffixes
Homophones, Homonyms, Homographs
Synonyms – Antonyms
One word substitutes
Idioms and Phrases

Unit-IV: Basic Writing Skills

Sentence Structure
Kinds of Sentences
Punctuation in Writing

Unit-V : Reading Comprehension

Skimming and Scanning
Prediction Techniques and Inferring

Note Making
Reading Comprehension

Unit-VI: Writing Skills

Paragraph Writing
Paraphrasing
Letter Writing
Resume Writing

Suggested Readings:

- (i) *English grammar just for you* Rajeevan Karal, Oxford publications
- (ii) *Practical English Usage*. Michael Swan. OUP. 1995.
- (iii) *Remedial English Grammar*. F.T. Wood. Macmillan.2007
- (iv) *On Writing Well*. William Zinsser. Harper Resource Book. 2001
- (v) *Study Writing*. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
- (vi) *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
- (vii) *Learn to Write* by Dr. G. Varalakshmi, Kindle Edition 2016
- (viii) *A practical course for developing writing skills in English* by J.K. Gangal, PHI Learning Pvt Ltd.

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X	X					X					

**Syllabus for B. Tech I Year II semester
(Mechanical Engineering)
CHEMISTRY LABORATORY**

Code: 7HC63

Course Objectives:

The student will be able to learn:

L	T	P	C
0	0	3	1.5

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

Course Outcomes

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

1. Methods to prepare inorganic complexes.
2. The process to determine surface tension of different liquids using stagonometer
3. The process to determine viscosity of lubricants by using redwood viscometer.
4. How to find acid value of an oil.
5. The principle and determination of Hardness of a water sample.
6. The methods to estimate amount of chlorine in water.
7. To determine unknown concentration of acid by using conductometric method.
8. To determine unknown concentration of acid by using potentiometric method.
9. Estimate rate constants of reactions from concentration of reactants/products as a function of time.
10. Methods to prepare industrially important polymers.
11. The method of preparation for organic compounds.
12. To separate the organic compounds from their mixture by using Thin layer chromatography.

List of Experiments

1. Preparation of coordination complex NiDMG Complex
2. Determination of surface tension
3. Determination of viscosity
4. Saponification/acid value of an oil
5. Ion exchange column for removal of hardness of water / Estimation of Hardness of water by EDTA Method
6. Determination of chloride content of water
7. Determination of cell constant and conductance of solutions (HCl Vs NaOH / Mixture of acid Vs Strong base)

8. Potentiometry - determination of redox potential and emf (FeSO_4 Vs KMNO_4 / HCl Vs NaOH)
9. Determination of the rate constant of acid catalyzed hydrolysis of methylacetate
10. Synthesis of a polymer- Thiokol rubber / Urea-Formaldehyde resin
11. Synthesis of a drug- Aspirin
12. Thin layer chromatography

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H	H	L	H	M		M	L	H		L	H

**Syllabus for B. Tech I Year II semester
(Mechanical Engineering)
Problem Solving using C LAB**

Code: 7FC71

Course Objectives:

1. Students should enhance their analyzing and problem solving and analytic skills to write programs in C language.
2. Student will be trained to implement the basic concepts of the C-programming language.
3. To understands the lab components and apply them to solve the real time problems.
4. To understand design and implementation issues involved in variable allocation, binding, control flow, types, subroutines, and parameter passing.
5. To write diversified solutions using C language.

L	T	P	C
0	0	3	1.5

Course Outcomes:

After completion of this course student will learn

1. To formulate the algorithms and flow charts for simple, conditional and iterative problems.
2. To be able to follow the syntax of C and correct the errors as reported by the compilers
3. To convert the given problems to programs using expressions, conditions, loops.
4. To do basic programs with arrays and do searching and sorting techniques with arrays.
5. To implement the concept of modularity by using functions.
6. To implement programs by using pointers and pointer arithmetic.
7. To create and implement user defined data types such as structures and unions.
8. To be able to create, read and write simple files.

1. Unit I (Cycle 1)

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

2. Unit II (Cycle 2)

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

3. Unit II (Cycle 3)

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

4. Unit III (Cycle 4)

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

5. Unit III (Cycle 5)

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

6. Unit III (Cycle 6)

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

7. Unit III (Cycle 7)

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

8. Unit IV (Cycle 8)

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

9. Unit IV (Cycle 9)

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

10. Unit V (Cycle 10)

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

11. Unit VI (Cycle 11)

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

12. Unit VI (Cycle 12)

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

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

Syllabus for B. Tech I Year II semester
(Mechanical Engineering)
WORKSHOP/MANUFACTURING PRACTICES (LAB)

Code: 7BC61

L	T	P	C
0	0	3	1.5

Course Objectives:

- 1) To identify various basic tools to perform simple joints using metal and wood.
- 2) To recognize various electrical and electronic and their applications.
- 3) To understand the manufacturing process of welding , casting and tinsmithy and apply the processes in making simple products.
- 4) To understand and operate basic machines for fabrication of Metals, Plastics and Glass.
- 5) To understand the functions and parts of commonly used domestic appliances.

COURSE OUTCOMES:

1. After completion of the course , the student will be able to fabricate components with their own hands.
2. Assemble different components and produce small devices of their interest.

Work shop and Manufacturing Practices: Minimum of 10 experiments out of twelve given here under are to be completed

LIST OF EXPERIMENTS

S.No	Trades	List of Experiments
1	Fitting Shop	1. Preparation of T-Shape Work piece 2. Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding.
2	Carpentry	3. Practice of Cross Half lap joint 4. Practice of Half lap Dovetail joint
3	Electrical & Electronics	5. One lamp one switch Practice 6. Stair case wiring: Practice
4	Welding shop (Arc & Gas)	Demonstration of Gas and Resistance welding 7. Practice of Lap and Butt joint using Arc welding
5	Casting	8. Preparation of mould by using split pattern 9. Mould preparation and pouring of molten metal.
6	Tin Smithy	10. Preparation of Rectangular Tray & Square box
7	Machine Shop	11. Demonstration of turning , Drilling and Reaming operations
8	Plastic molding & Glass Cutting	12 a) Demonstration of Injection Moulding b) Demonstration of Glass Cutting with hand tools
9	Domestic Appliances	13. Demonstration of Electric Iron, fan, Mixer, Hair Drier, Washing Machine etc.
10	Lab project	14. Making various components and / or assembling the components which can be useful in domestic / engineering applications

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

**Syllabus for B. Tech I Year II
semester (Mechanical Engineering)
ENGLISH LAB (Reading, Listening and
Writing)**

Code: 7HC61

L	T	P	C
0	0	2	1

- Course Objectives** : The students will
- acquire knowledge on various types of listening techniques, barriers and benefits of listening
 - recognize the speech sounds and learn the intonation patterns
 - learn various vocabulary patterns
 - develop the ability to structure and punctuate the sentences
 - learn different reading techniques
 - learn different writing skills

- Course Outcomes** : At the end of the course the students will be able to
- understand and differentiate different types of listening techniques used to interact with real world problems
 - differentiate the speech sounds and improve their accent and modulation while speaking
 - understand and illustrate different word roots, word derivatives – synonyms, antonyms and word inflections
 - discriminate a variety of sentence types, their structure and use punctuations
 - get acclimatized to reading strategies and note making.
 - develop proficiency in writing and preparing resume

Unit-I : Practice sessions on
Listening for Basic
Vocabulary Listening for
General Information Listen
for specific information
Listening Comprehension

Unit-II: Practice sessions on Pronunciation
Articulation of Vowel and Consonant
sounds Listening for Word accent
Intonation Patterns

Unit-III: Exercises on Word Roots
Affixes : Prefixes and
Suffixes Identifying
Homophones,
Homonyms, Homographs
Synonyms - Antonyms
One word substitutes
Idioms and Phrases

Unit-IV: Exercises on
Punctuation and Spelling
Error Identification in Sentences
Conversion of Sentences

Unit-V : Practice sessions on
Using passages for skimming and
scanning Note Making using Texts

Reading Comprehension using different techniques
Unit-VI: Exercises on
Paragraph Writing using hints/Guided
Paragraphs Writing Letters
Writing Resume

Suggested Readings:

- (i) *English grammar just for you* Rajeevan Karal, Oxford publications
- (ii) *Practical English Usage*. Michael Swan. OUP. 1995.
- (iii) *Remedial English Grammar*. F.T. Wood. Macmillan.2007
- (iv) *On Writing Well*. William Zinsser. Harper Resource Book. 2001
- (v) *Study Writing*. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006.
- (vi) *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
- (vii) *Learn to Write* by Dr. G. Varalakshmi, Kindle Edition 2016
- (viii) *A practical course for developing writing skills in English* by J.K. Gangal, PHI Learning Pvt Ltd.

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

**Syllabus for B. Tech I Year II semester
(Mechanical Engineering)
TECHNICAL SEMINAR II**

L	T	P	C
-	-	2	1

Code: 7B292

Course Objective :

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

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

6. Identify current general, political and technology related topics.
7. Arrange and present seminar in a effective manner
8. Collect, survey and organize content in presentable manner
9. Demonstrate oratory skills with the aid of Power Point Presentations
10. Exhibit interview facing skills and team leading qualities

Procedure

8. 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.
9. The slots, titles shall be decided upfront and seminar in charge shall take signatures.
10. The same sheet shall be affixed in the respective classrooms and seminar register.
11. 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.
12. Progress of the seminars need to be reviewed by the concerned HOD once in 15 days.
13. The evaluation for technical seminars has to be informed to students and displayed in the classrooms.
14. 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 9 th week	: 10 marks
End semester Viva	: <u>20 marks</u>
Total	100 marks

Syllabus for B. Tech. II Year I semester
Engineering Mathematics–III
(Partial differential equations, Probability and Statistics)
(Common to ME & CE)

Code: 7HC12	L T P/D C
	2 1 0 3

Pre Requisites: Engineering Mathematics-II

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

1. Form partial differential equations and find the solution to first order linear and nonlinear partial differential equations.
2. Applications of PDE.
3. Concepts of the probability, types of random variables and probability distributions.
4. Sampling distributions and their properties, concepts on estimation.
5. Concepts on testing the hypothesis concerning to large samples.
6. Different kinds of tests related to small samples and tests concerned to small size samples and goodness of fit and independence of attributes using chi-square distribution.

Course Outcomes:

Students will able to

1. Form partial differential equations and find the solution to first order linear and nonlinear partial differential equations.
2. Applications of PDE.
3. Learn basic concepts of probability and able to evaluate probability.
4. Will able to solve problems on discrete and continuous probability distributions.
5. Learn basic concepts of sampling distribution and able solve problems on estimation.
6. Learn basic concepts of test of hypothesis and able solve problems.

UNIT- I: First Order Partial Differential Equations: (10L)

Formation of Partial Differential Equations by Elimination of Arbitrary Constants and Arbitrary Functions. Solutions to First order Linear and Non-linear Equations-Standard Forms, Equations Reducible to Standard Forms.

UNIT-II: Higher Order Partial Differential Equations: (10L)

Classification of partial differential equations. Method of Separation of Variables. Initial and Boundary conditions, Solutions of One dimensional wave, Heat equations and Laplacian equation in Cartesian form.

UNIT-III: Random Variables and Probability Distributions: (12L)

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

UNIT-IV: Sampling Distributions and Estimation: (8L)

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

UNIT-V: Tests of Hypothesis for Large Samples: (10 L)

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

UNIT-VI: Tests of Hypothesis for Small Samples: (10 L)

Student t-test, Hypothesis testing concerning one mean and two means, F-test and χ^2 test-Goodness of fit, Independence of Attributes.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publications, New Delhi.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics For Engineers & Scientists, 9th Ed. Pearson Publishers.
3. Probability and Statistics for Engineers: Miller and John E. Freund, PHI Publishers, 9th Edition

REFERENCE BOOKS:

2. Advanced Engineering Mathematics, S.R.K. Iyengar and R.K.Jain, Narosa Publication.
3. Probability and Statistics, T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham, M.V.S.S.N. Prasad, S. Chand Publications.
4. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Education.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering Department
THERMODYNAMICS

Code: 7B306

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

Course Objective:

- To learn about work and heat interactions, and balance of energy between system and its surroundings
- To learn about application of I law to various energy conversion devices
- To evaluate the changes in properties of substances in various processes
- To understand the difference between high grade and low grade energies and II law limitations on energy conversion
- To Learn the application of steam tables and Mollier charts for pure substances(steam)
- To understand the processes and efficiencies of basic power cycles

Course Outcomes: After completing this course

- The students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions
- Students can evaluate changes in thermodynamic properties of substances
- The students will be able to evaluate the performance of energy conversion devices
- The students will be able to differentiate between high grade and low grade energies.
- The students will be able to use property table and Mollier charts to evaluate properties of steam at different states.
- The students will be able to analyze and evaluate the performance of basic thermodynamics cycles

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1	H		M	L								L
CO2	H		M	L								L
CO3	H		M	L								L
CO4	H		M	L								L
CO5	H		M	L								L
CO6	H		M	L								L

Unit I: INTRODUCTION AND ZEROth LAW

Contents: Fundamentals - System & Control volume; Property, State & Process; Exact & Inexact differentials; Work-Thermodynamic definition of work; examples; Displacement work; Path dependence of displacement work and illustrations for simple processes; electrical, magnetic, gravitational, spring and shaft work.

Temperature, Definition of thermal equilibrium and Zeroth law; Temperature scales; thermometric properties of various thermometers

Applications: These concepts will be useful in analyzing thermodynamics systems and construction of thermometers

Unit II: GAS LAWS & FIRST LAW FOR NON FLOW PROCESS

Definition of heat, specific heat, examples of heat/work interaction in systems- control mass-First Law for Cyclic & Non-cyclic processes; Concept of total energy E ; Demonstration that E is a property; Various modes of energy, Internal energy.

Fundamentals- Working Fluid & behaviour: Perfect gas laws – Ideal gas-Equation of state, specific and universal gas constants-specific heat relations.

Application of First law for ideal gas undergoing during different processes; calculation of displacement Work; heat transfer; internal energy

Applications: These concepts will be applied in analysis of closed systems- piston cylinder cases.

Unit III: FIRST LAW FOR FLOW PROCESS & SECOND LAW

First Law for Flow Processes - Derivation of general energy equation for a control volume; definition of Enthalpy; Steady state steady flow processes including throttling; Examples of steady flow devices; Application of I law applications for steady flow devices.

Second law - Definitions of direct and reverse heat engines; Definitions of thermal efficiency and COP; Kelvin-Planck and Clausius statements; Definition of reversible process; Internal and external irreversibility; Carnot cycle; Absolute temperature scale.

Applications: These concepts will be employed in different applications like turbines, compressors, nozzles etc.

Unit IV: ENTROPY, AVAILABILITY, IRRIVERSIBILY

Clausius inequality; Definition of entropy S ; Demonstration that entropy S is a property; Evaluation of entropy for solids, liquids, ideal gases undergoing various processes; Principle of increase of entropy.(4) Calculation of change in entropy during mixing process; Ideal Gas Mixtures- governing laws: evaluation of equivalent properties.

Irreversibility and Availability, Availability function for systems and Control volumes undergoing different processes, Lost work. Second law analysis for a control volume

Applications: (i) The above concepts are employed in calculating the efficiency and losses of different processes.

Unit V: PROPERTIES OF PURE SUBSTANCES

Pure substances-definition, Properties of two phase systems - Const. temperature and Const. pressure heating of water; Definitions of saturated states; P-v-T surface; Use of steam tables; Saturation tables; Superheated tables; Identification of states & determination of properties, Mollier's chart.

Determination of entropy from steam tables; Definition of Isentropic efficiency for compressors, turbines and nozzles

Applications: The above concepts are employed in the steam power plants.

Unit VI: BASIC THERMODYNAMIC CYCLES

Thermodynamic cycles - Basic Rankine cycle; Basic Brayton cycle; Basic vapor compression cycle and comparison with Carnot cycle.

Applications: The basics of these cycles will be useful for the actual design of external combustion engines

Text Books:

1. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley and Sons.
2. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India
3. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.
4. Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd.

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
MECHANICS OF SOLIDS

Code: 7B307

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

Course Objective:

The objective is to learn the fundamental concepts of stresses, strains, and deformation of solids with applications to beams and columns. Fundamentals of applying equilibrium, compatibility, and force- deformation relationships to structural elements in order to evaluate the strength of materials.

Course Outcomes:

After studying this course, the students will be able:

1. To Understand simple stresses and strains of uniform bars, cross- section varying bars, compound bars and statically in-determinate bars
2. To Understand principle stresses, strains and torsion of circular shafts
3. To Understand Shear Force Diagrams (SFD) and Bending Moment Diagrams(BMD) for various types of beams
4. To Understand bending stresses and shear stresses of different types of beams
5. To Understand how to determine deflections of various beams and buckling load of slender columns.
6. To Understand how to find out various stresses that are developed in thin and thick cylinders

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1	H		M	L								L
CO2	H		M	L								L
CO3	H		M	L								L
CO4	H		M	L								L
CO5	H		M	L								L
CO6	H		M	L								L

UNIT – I (Simple Stresses & Strains)

Simple Stresses & Strains: Elasticity, plasticity – Types of stresses- uniaxial, biaxial & triaxial and strains–Hooke’s law, stress-strain diagram for Mild steel, Working stress, Factor of safety, Lateral strain, Poisson’s ratio, volumetric strain, Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses, Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT – II (Mohr’s circle and Torsion)

Principal stresses: Normal stress, Shear stress. Principal stresses, Mohr’s stress circle and its application. **Torsion of shafts:** Stresses and deformation in circular and hollow shafts, stepped shafts.

UNIT – III (SF & BM Diagrams)

Shear Force and Bending Moment Diagrams: Definition of beam, Types of beams, Concept of SF and BM, SF and BM diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, UVL and combination of these loads, Point of Contra flexure – Relation between SF, BM and rate of loading at a section of a beam.

UNIT – IV (Flexural Stresses)

Bending Stresses: Theory of simple bending, Assumptions, Derivation of bending equation: $M/I = f/y = E/R$, Neutral axis, Determination bending stresses, section modulus of rectangular, circular (Solid and Hollow) and I sections.

Shear Stresses: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular and I sections.

UNIT – V (Deflections)

Deflection of Beams: Bending of Beam into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's method.

UNIT – VI (Thin & Thick cylinders)

Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter and volume of thin cylinders – Riveted boiler shells – Thin spherical shells.

Thick cylinders: Lamé's equation – cylinders subjected to inside & outside pressures – compound cylinders

TEXT BOOKS:

1. Strength of materials by S.Ramamrutham
2. Strength of materials by Bhavikatti, Lakshmi publications
3. Strength of Materials by SS Rattan
4. Mechanics of Materials By Hibbeler Pearson Publications

REFERENCES:

1. Strength of Materials by S.Timshenko and Young
2. Engineering Mechanics os Solids by Egor P.Popov
3. Mechanics of Materials by Gere & Goodno Cengage Publications
4. Mechanics of Materials by Ferdinand P Been, Russel Johnson Jr and John J Dewole
TMG
5. Strength of Materials by RK Rajput
6. Strength of Materials by R. Subramanian Oxford University press

**Syllabus for B. Tech. II Year I semester
Mechanical Engineering
MATERIALS ENGINEERING**

Code : 7B308

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

Objectives:

1. Understanding of the correlation between the internal structure of materials, their mechanical properties and various methods to quantify their mechanical integrity and failure criteria.
2. To provide a detailed interpretation of equilibrium phase diagrams.
3. Learning about different phases and heat treatment methods to tailor the properties of Fe- C alloys.

Course Outcomes:

1. Student will be able to identify crystal structures for various materials and understand the defects in such structures.
2. Understand how to tailor material properties of ferrous and non-ferrous alloys
3. How to quantify mechanical integrity and failure in materials

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1	M	H	L									
CO2	M	H	L									
CO3	M	H	L									
CO4	M	H	L									
CO5	M	H	L									
CO6	M	H	L									

Unit – I**Mechanical Behavior and Properties of Metals:**

Crystal Structure: Unit cells, Crystal structures of metals and ceramics. **Imperfection in solids:** Point, line, interfacial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress. **Mechanical Property measurement:** Tensile, compression and torsion tests; Young's modulus, relations between true and engineering stress-strain curves, generalized Hooke's law, yielding and yield strength, ductility, resilience, toughness and elastic recovery; **Hardness:** Rockwell, Brinell and Vickers and their relation to strength, **NDT:** Introduction to non-destructive testing (NDT).

Unit – II

Failure: Static failure theories: Ductile and brittle failure mechanisms, Tresca, Von-mises, Maximum normal stress, Mohr-Coulomb and Modified Mohr-Coulomb; Fracture mechanics: Introduction to Stress intensity factor approach and Griffith criterion. **Fatigue failure:** High cycle fatigue, Stress-life approach, SN curve, endurance and fatigue limits, effects of mean stress using the Modified Goodman diagram; Fracture with fatigue,

Unit - III

Alloys: Alloys, substitutional solid solution, Hume Rothery's rules for solid solution and interstitial solid solutions- **Phase diagrams:** Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. **Binary phase diagrams:** Ni-Cu, Cu-Zn, Cu-Sn, Al-Cu, and Al-Si.

Unit - IV

Fe-Fe₃C Phase diagram: Iron-iron-carbide phase diagram and description of microstructural aspects of phases (Ferrite, Austenite, Cementite, Pearlite, ledeburite, hypo and hyper eutectoid steels; hypo and hyper eutectic cast irons). **Steels:** low carbon, medium carbon, high carbon, stainless, Hadfield, high speed steels, their compositions, microstructures and applications. **Cast irons:** Types of cast irons; compositions, microstructures and applications of (Grey, white, Spheroidal graphite, Malleable) cast irons.

Unit - V

Heat treatment of Steels: Annealing, normalizing and spheroidising, hardening, tempering, isothermal transformation diagrams for Fe-C alloys and microstructure development. Continuous cooling curves and interpretation of final microstructures and properties-austempering, martempering, case hardening, carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, vacuum and plasma hardening.

Unit - VI

Special steels: Alloying of steel, properties of stainless steel and tool steels, maraging steels, **Nonferrous Alloys:** copper and copper alloys; brass, bronze and cupro-nickel; Aluminium and Al-Cu – Mg alloys- Nickel based superalloys and Titanium alloys. **Advanced Materials:** Composites: Metal matrix composites (MMCs), C-C composites, Polymer matrix composites; applications of composites. Principles and applications of SMART Materials (Shape memory alloys and Piezo electric ceramics) and Nanomaterials.

Text Books:

1. W. D. Callister, 2006, "Materials Science and Engineering-An Introduction", 6th Edition, Wiley India.
2. Kenneth G. Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 4th Indian Reprint, 2002.
3. V. Raghavan, "Material Science and Engineering", Prentice Hall of India Private Limited, 1999.
4. U. C. Jindal, "Engineering Materials and Metallurgy", Pearson, 2011.
5. Physical Metallurgy principles by Reed-Hill
6. Introduction to Physical Metallurgy / Sidney H. Avener.- Design Data book
7. Material Science and Metallurgy/Kodgire.

References:

1. Material Science - Vanclak
2. Engineering Materials-2, An Introduction to Microstructure, Processing and Design – Micheal F Ashby & David R H Jones
3. Mechanical Metallurgy / G.E. Dieter
4. Essential of Materials science and engineering/ Donald R.Askeland/Thomson

Syllabus for B. Tech. II Year I semester
Mechanical Engineering
Fluid Mechanics and Hydraulic Machinery

Code: 7B309

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

Course Objectives:

To understand the basic principles of fluid mechanics and types of flows. To understand boundary layer concepts and flow through pipes. Evaluate the performance of hydraulic turbines and characteristic curves of pumps.

Course Outcomes:

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

1. understand the fluid properties and measurement of pressure with monometers.
2. Understand the classification of fluid, Bernoulli's equation, momentum equation and their applications
3. understand Reynolds's experiment, major losses, minor losses
4. understand velocity triangle, work done calculations, elements of Hydroelectric power plant, pump storage plant.
5. Understand the classifications of turbines working principles of turbines, draft tube theory, performance of turbine.
6. Understand various types of pumps working principle of reciprocating pump, centrifugal pump, performance characteristics of centrifugal pump.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POL
CO1		H	L						M			L
CO2		H	L						M			L
CO3		H	L						M			L
CO4		H	L						M			L
CO5		H	L						M			L
CO6		H	L						M			L

UNIT I

Fluid statics : Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers. Applications: *Foundation of basic concepts and pressure measurement devices.*

UNIT II

Fluid kinematics : Stream line, path line and streak lines and stream tube, classification of flows- steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows- equation of continuity for one dimensional flow and three dimensional flow.

Fluid dynamics : Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

Applications: *The fluid dynamics concepts are employed in analyzing fluid flow problems and design of hydraulic devices.*

UNIT III

Exact flow solutions in channels and ducts, Couette and Poiseuille flow, laminar flow through circular conduits and circular annuli- concept of boundary layer – measures of boundary layer thickness – Darcy Weisbach equation, friction factor,

Applications: *Analysis of fluid flow through pipes and design of hydraulic pipe.*

UNIT IV

Need for dimensional analysis–methods of dimension analysis–Similitude–types of similitude
Dimensionless parameters–application of dimensionless parameters–Model analysis.

UNIT V

Euler's equation – theory of Rotodynamic machines – various efficiencies – velocity components at entry and exit of the rotor, velocity triangles – Centrifugal pumps, working principle, work done by the impeller, performance curves – Cavitation in pumps- Reciprocating pump–working principle.

Applications: Lifting of water in steam power plant, irrigation, and other power plants.

UNIT VI

Classification of water turbines, heads and efficiencies, velocity triangles- Axial, radial and mixed flow turbines Pelton wheel, Francis turbine and Kaplan turbines, working principles – draft tube- Specific speed, unit quantities, performance curves for turbines – governing of turbines.

Applications: Turbines used in hydro-powerplants under different head conditions.

TEXT BOOKS :

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines by Rajput.

REFERENCES :

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
2. Fluid Mechanics and Machinery by D. Rama Durgaiyah, New Age International.
3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.
4. Hydraulic Machines Including Fluidics PB by Jagdish Lal Metropolitan Book Co. Pvt. Ltd. , 1994.

**Syllabus for B. Tech. II Year I
semester Mechanical Engineering
Machine Drawing and Computer Aided Drawing Practice**

Code: 7B310

L T P/D C
1 -- 4 2

Course Objective:

To familiarize with the standard conventions for different materials and machine parts in working drawings. To make part drawings including sectional views for various machine elements. To prepare assembly drawings given the details of part drawings.

Course Outcomes:

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

- Understand the principles and requirements of the machine drawings.
- Understand the various symbols used in machine drawing.
- Understand the principles and requirements of various Assembly drawings.
- Drawing of different machine components
- Imagine and drawing the assembly by seeing the components given.
- Ability to understand the existing geometric modeling and develop a geometric modeling for a new component in design process

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1	H											
CO2	H											
CO3	H											
CO4	H											
CO5	H											
CO6	H											

UNIT-I : Machine Drawing Conventions

- a) Sectional views: section planes and drawing of sections, Types of sectional views – Full sectional view, half sectional view, auxiliary sectional views, Parts not usually sectioned
- b) Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.

UNIT-II : Drawing of simple machine parts

Selection of Views, additional views for the following machine parts with easy drawing proportions.

- a) Popular forms of Screw threads like V, Metric, BSW, Buttress, Square, ACME, Worm nuts like square and hexagonal headed, Bolts like square and hexagonal headed, eye bolt, foundation bolts, stud bolts, set screws, washers
- b) Keys, cotters & joints and knuckle joint.

UNIT-III : Drawing of machine elements

Selection of Views, additional views for the following machine elements and parts with easy drawing proportions Shaft coupling: Flange, Split-Muff, Flexible couplings, Claw, Oldham's and Universal Coupling
Riveted joints for plates.

UNIT-IV : Assembly Drawings of Engine parts

Stuffing box, Cross head, Eccentric, Connecting rod - Drawings of assembled views for the part drawings using conventions and easy drawing proportions

Assembly Drawings of Valves and Detailed drawings

Steam stop valve, spring loaded safety valve, feed check valve and air cock - Drawings of assembled views for the part drawings using conventions and easy drawing proportions

UNIT-V : Assembly Drawings of Machine parts

Screws jack, Tailstock, Machine Vice, Plummer block, foot step bearing - Drawings of assembled views for the part drawings using conventions and easy drawing proportions

UNIT-VI :Computer Aided 2D Drafting:

1. Introduction to Auto CAD, Setting up drawing environment, Command and System variables, Coordinate system.
2. Creating graphic primitives like Point, Line, Planes, Circle, Arc, Annotation etc.
3. Creating and editing 2D object, Layers and object Properties. Creating dimensions, Blocks and External reference.
4. Creating a layout to plot, documents, file formats.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS:

1. Machine Drawing – Dhawan, S.Chand Publications
2. Machine Drawing –K.L.Narayana, P.Kannaiah & K. Venkata Reddy / New Age/ Publishers
3. Shan Tickoo, “Auto CAD 2011: A Problem Solving Approach”, Autodesk Press USA.
4. Shan Tickoo, “Customizing Auto CAD 2011”, Delmar Cengage Press USA.

REFERENCES:

1. Machine Drawing – P.S.Gill.
2. Machine Drawing – Luzzader
3. Machine Drawing – Rajput
4. Machine Drawing – ND Bhat

1. Direct Tension Test
2. Bending Test on simply supported and cantilever beams
3. Torsion Test
4. Brinell and Rockwell hardness tests (of samples obtained from Jominy End quench Test & samples of various treated and untreated steels obtained from Metallurgy Lab)
5. Test on Springs
6. Compression Test on Cube
7. Impact Test

**Syllabus for B. Tech. II Year I semester
Mechanical Engineering
FUELS AND LUBRICANTS LAB**

Code : 7B363

L T P/D C
- - 2 1

Course Objectives: To understand the properties of fuels and lubricants.

Course Outcomes:

- To determine the flash and fire point using Abels Apparatus
- To determine the flash and fire point using Pensky Martens Apparatus
- To determine the Viscosity using Saybolt Viscometer
- To determine the Calorific value using Bomb Calorimeter

List of Experiments:

1. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Abels Apparatus
2. Determination of Flash and Fire points of Liquid fuels/Lubricants using: Pensky Martens apparatus
3. Carbon residue test: Liquid fuels.
4. Determination of Viscosity of Liquid lubricants and Fuels using: Saybolt Viscometer
5. Determination of Viscosity of Liquid lubricants and Fuels using: Redwood Viscometer
6. Determination of Viscosity of Liquid lubricants and Fuels using: Engler Viscometer.
7. Determination of Calorific value: of Gaseous fuels using: Junkers Gas Calorimeter.
8. Determination of Calorific value: Solid/Liquid/ fuels using: Bomb Calorimeter.
9. Drop point and Penetration Apparatus for Grease.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1		H	L						M			L
CO2		H	L						M			L
CO3		H	L						M			L
CO4		H	L						M			L
CO5		H	L						M			L
CO6		H	L						M			L

**Syllabus for B. Tech. II Year I
semester Mechanical Engineering
FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**

Code: 7B364

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

Course Objectives:

To understand the basic principles of fluid mechanics and types of flows. To understand boundary layer concepts and flow through pipes. Evaluate the performance of hydraulic turbines and characteristic curves of pumps.

Course Outcomes:

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

1. compute the performance of pelton wheel under working conditions
2. compute the performance of francis turbine under working conditions
3. compute performance of reciprocating pump under working conditions
4. compute the Performance of centrifugal pump under working conditions
5. compute the Performance of multistage pump under working conditions
6. compute the coefficient of discharge of venturimeter of orifice meter under working conditions

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1		H	L						M			L
CO2		H	L						M			L
CO3		H	L						M			L
CO4		H	L						M			L
CO5		H	L						M			L
CO6		H	L						M			L

List of Experiments:

Verification of Bernoulli's Theorem

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Calibration of Rotameter
4. Calibration of Flow Nozzle
5. Determination of friction factor for a given pipe line
6. Determination of minor losses in a pipeline.
7. Determination of Co-efficient of discharge for mouth piece (cd)
8. Performance Test on Single Stage Centrifugal Pump
9. Performance Test on Multi Stage Centrifugal Pump.
10. Performance Test on Reciprocating Pump.
11. Impact of jets on Vanes
12. Performance Test on Pelton Wheel.
13. Performance Test on Francis Turbine.
14. Performance Test on Kaplan Turbine

**Syllabus for B. Tech. II Year I semester
Mechanical Engineering
ENVIRONMENTAL SCIENCE AND ECOLOGY**

Code: 7HC21

L	T	P/D	C
2	0	0	0

There are no credits but grading will be given based on marks scored as **Excellent/ Very good/ Good/ Satisfactory/Not satisfactory**

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
 - Understanding the impacts of developmental activities and mitigation measures.
 - Understanding the environmental policies and regulations
- Course Outcomes:
- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

Course Outcomes

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

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

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

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

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

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

UNIT-V Sustainable development and Green Technology: Concept of sustainable development, threats to sustainability population and its explosion, Crazy consumerism, over- exploitation of resources, strategies for achieving sustainable development environmental education, conservation of resources, urban sprawl sustainable cities and sustainable communities, human health , role of IT in Environment, Environmental Ethics, Environmental Economic – Concept of Green Building, Clean Development Mechanism (CDM).

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

TEXT BOOKS:

TEXT BOOKS:

1. Introduction to Environmental Science Dr. Y. Anjaneyulu, 2004, BS Publications.
2. Environmental Studies by Erach Bharucha, 2005 University Press.

REFERENCE BOOKS:

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

**Syllabus for B. Tech. II Year I semester
Mechanical Engineering
Technical Seminar -III**

Code: 7B393

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

Course objective:

To learn the importance of delivering seminars on technologies for demonstrating oratory and interview facing skills.

Course Outcomes:

- 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 skills.
- 6 Exchange new information that would not have been available otherwise.
- 7 Develop debating and interview skills.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1						M	M	M	L	L		
CO2						M	M	M	L	L		
CO3						M	M	M	L	L		
CO4						M	M	M	L	L		
CO5						M	M	M	L	L		
CO6						M	M	M	L	L		

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 seminar evaluated for 100 marks. 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 9 th week	: 10 marks
End semester Viva	: 20 marks

Total 100 marks

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
MANUFACTURING PROCESSES

Code: 7B411

L	T	P/D	C
3	0	0	3

Course Objectives:

- 1) To understand the basic casting process and calculate the pattern allowances and design the riser system needed for defect free casting and understand various types of castings and their applications
- 2) To understand the importance of metal forming processes and study the Rolling process
- 3) To gain knowledge in the working principle of Extrusion and Forging operations and learn the various ways of performing these operations.
- 4) To be acquainted with the fundamentals of sheet metal operations and distinguish between various types of operations and learn about plastic processing techniques.
- 5) To understand the various welding processes and learn about the various types of welding operations and their applications.
- 6) To gain understanding of powder based manufacturing technique and manufacturing methods of plastic based products

Course Outcomes:

- 1) Select moulding material, pattern and calculate pattern allowances used in casting and design the gating system and Design a suitable riser for the casting and decide specific casting type for a defect free product
- 2) Distinguish between different forming processes and Analyze the forces and power consumed in rolling operation
- 3) Decide the specific forging/ extrusion process for making a part and identify the specific defects if any in the process
- 4) Suggest the sheet metal process for making a part and decide the processing technology for a particular type of plastic.
- 5) Propose the type of welding joint and specific welding process for an application and estimate the effect of process variables on arc welding
- 6) Choose appropriate technique for making discrete parts and opt the specific plastic processing method based on type of plastic.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1	H	M										
CO2	H	M										
CO3	H	M										
CO4	H	M										
CO5	H	M										
CO6	H	M										

UNIT- I

Metal Casting : Advantages and applications of casting processes, Casting terms, Patterns - Pattern allowances and Numerical Problems in pattern calculation, Types of patterns, Pattern Materials, Moulding materials, Elements of Gating system, Gating ratio, Solidification of pure metal and alloys, Cooling curves, Risers - Function, Riser design – Chvorinov's rule, Caine's method- Numerical Problems, Cores-uses, Special casting processes- Centrifugal casting, Die casting, and Investment casting, Casting defects

UNIT – II

Metal Forming: Advantages of forming operations, Nature of plastic deformation, hot working and cold working processes-Advantages, Disadvantages, Types of stresses applied in metal working, Bulk metal forming processes: **Rolling:** Principle, Rolled Products, mechanics of Rolling, Types of Rolling mills, Forces in rolling and power requirements - Numerical Problems

UNIT – III

Forging: basic forging operations, Forging types: Smith, Drop, Press & Machine Forging, Forging defects, Swaging

Extrusion: Extrusion principle Hot extrusion and cold extrusion - Forward extrusion and backward extrusion, Impact extrusion, Hydrostatic extrusion

UNIT – IV

Sheet-Metal Operations: Classification, Springback in metals, shearing action, Press operations: Blanking, Piercing and other operations, Clearance and Shear in press operations, Forces and power requirement in press operations- Numerical Problems, Bending: Nomenclature, Bend allowance, bend length calculation, Types of bending dies, Numerical Problems. Spinning, Stretch forming, Embossing and Coining.

UNIT- V

Welding : Classification of welding processes, Welding terms, Gas welding: Fuel gases, Oxy-Acetylene welding, Flame types, Electric Arc welding: Electrodes, AC & DC, V-I Characteristics- Numerical Problems, Resistance Spot welding, Thermit-welding, Inert Gas welding: Shielding gases, TIG & MIG welding, Submerged arc welding, Friction welding, & Friction stir welding, Explosive welding, Welding defects – causes and remedies. Principles and Applications of Soldering, Brazing and Adhesive bonding

UNIT – VI

Powder Metallurgy- Principle, steps in PM processing, production of metallic powder, mixing and blending, compacting, sintering, Advantages & limitations of PM

Plastics processing: Working Principle and Applications of: Injection moulding, Blow moulding, Compression moulding, and Transfer moulding

TEXT BOOKS:

1. Manufacturing Technology (Foundry, Forming and Welding)Vol 1 / P.N. Rao/TMH
2. A Text book of Production Technology (Manufacturing Processes) /Dr. P C Sharma /S.Chand Publishers

REFERENCES:

1. Manufacturing Engineering and Technology/Kalpakjian S/ Pearson Education
2. Welding Engineering and Technology / RS Parmar / Khanna Publishers

**Syllabus for B. Tech. II Year II semester
Mechanical Engineering
APPLIED THERMODYNAMICS – I**

Code: 7B412

L	T	P/D	C
3	0	0	3

Course Objective:

To understand the working principles of 2-stroke and 4-stroke cycles, combustion processes of S.I and C.I Engines, working principles of compressors.

Course Outcomes:

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

1. Compare the air standard, actual and the fuel-air cycles of Internal Combustion Engines.
2. Classify IC Engines, understand the working principles of 2-stroke and 4-stroke cycles, draw valve and port timing diagrams and explain different engine subsystems.
3. Understand the combustion process in S.I and C.I Engines, the phenomenon of knocking, factors affecting knocking, and different types of combustion chambers for S.I and C.I Engines,
4. Understand the performance parameters, methods of measurement of brake and friction power and Draw the heat balance diagram.
5. Understand the working principles of Roots blower, vaned blower, reciprocating compressor-single stage and multi-stage compression with inter cooling.
6. Understand the working principles of centrifugal and axial compressors and draw the velocity diagram and calculate the Compressor Power input and efficiency.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1	H	M										
CO2	H	M										
CO3	H	M										
CO4	H	M										
CO5	H	M										
CO6	H	M										

UNIT – I

Actual Cycles and their Analysis: Introduction, Comparison of Air Standard and Actual Cycles, Time Loss Factor, Heat Loss Factor, Exhaust Blow down - Loss due to Gas exchange process, Volumetric Efficiency, Loss due to Rubbing Friction, Actual and Fuel-Air Cycles of CI Engines. Applications: *These concepts will be useful in achieving overall knowledge about I.C. engines.*

UNIT-II

I.C. Engines : Classification - Working principles, Valve and Port Timing Diagrams, Air Standard, Air-fuel and Actual cycles - Engine systems – Fuel Carburetor, Fuel Injection System, Multipoint fuel Injection, Ignition, Cooling and Lubrication. Applications: *These topics will give broader view of working of IC engines.*

UNIT – III

Combustion in S.I. Engines : Normal Combustion and Abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types. Applications: *These concepts are useful for achieving deeper knowledge about normal and abnormal combustion in SI and CI engines.* **Combustion in C.I. Engines :** Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT – IV

Testing and Performance : Parameters of performance - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, Brake power – Determination of frictional losses and indicated power – Performance test – Heat balance sheet and chart. Applications: *These topics will tell in greater detail about the performance evaluation of IC engines.*

UNIT – V

Compressors – Classification –positive displacement and roto-dynamic machinery – power absorbing machines, fan such as blower and compressor – reciprocating and rotary types.

Reciprocating: Principles of operation, work required, Isothermal efficiency, volumetric efficiency and effect of clearance, stage compression, under cooling, saving of work, minimum work condition for stage compression. *Applications: These topics will discuss on the design and applications of reciprocating air compressors.*

UNIT VI

Centrifugal Compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape- losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power input calculations.

Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage, degree of reaction, work done factor - isentropic efficiency- pressure rise calculations – Polytropic efficiency. *Applications: This unit will bring in differences between reciprocating and rotary compressors. These compressors are employed in land based power plants and aircraft engines.*

TEXT BOOKS:

1. I.C. Engines / V. GANESAN- TMH
2. Thermal Engineering / Rajput / Lakshmi Publications.

REFERENCES:

1. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.
2. Thermodynamics & Heat Engines / B. Yadav/ Central Book Depot., Allahabad
3. I.C. Engines / Heywood / McGraw Hill.
4. IC Engines/ Ramalingam/ Scitech publishers
5. “A Treatise on Turbo Machines”, G.Gopalakrishnan, & D.Prithviraj, Scitech Publications (India) Pvt. Limited (2002.)

**Syllabus for B. Tech. II Year II semester
Mechanical Engineering
KINEMATICS OF MACHINES**

Code: 7B413

L T P/D C
2 1 0 3

Course Objective:

The main objective of this course is intended to cover the field of engineering theory, analysis, design and practice that is generally described as mechanisms and kinematics of machines.

Course Outcomes

After completing the subject, students will be able to:

- Understand the basic concepts of mechanism, types of mechanisms and inversions difference between machine mechanism and structure. [CO 1]
- Understand velocity and acceleration diagram in order to evaluate the inertia forces in mechanism and machines.[CO 2]
- Understand the concept of steering gear mechanism, types and Hooke's joint with respect to an automobile.[CO 3]
- In order to understand and design complex motions possible out of Cam's and Followers.[CO 4]
- Understand the concept of toothed gears and selection different types of gear trains in order obtain required velocity ratios.[CO 5]
- Understand transmission power by various means like belts, rope and chains and their advantages and limitations.[CO 6].

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1	H		M	L								L
CO2	H		M	L								L
CO3	H		M	L								L
CO4	H		M	L								L
CO5	H		M	L								L
CO6	H		M	L								L

UNIT –I (Basic concepts and Inversions)

Introduction : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained.

Mechanism & Machines: Classification of machines – kinematic chain – inversions of kinematic chain – Inversions of quadric cycle chain – single and double slider crank chains.

UNIT – II (Velocity and Acceleration Diagrams)

Velocity and Acceleration Diagrams:(Relative velocity method) Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain. Analysis of slider crank chain for displacement, velocity and acceleration of slider – Acceleration diagram for a given mechanism, Klein's construction, Coriolis acceleration, Determination of Coriolis component of acceleration.

Velocity Diagrams:(Instantaneous centre method): Instantaneous center of rotation, centroid and axode – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT – III (Mechanisms with lower pairs)

Steering Mechanisms: Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio.

Hooke's Joint: Single and double Hooke's joint –Polar velocity diagram- Angular acceleration of driven shaft- problems.

Straight Line Motion Mechanisms: Exact and approximate, copiers and generated types – Peaucellier, Hart, Scott- Russel, Grasshopper, Watt, Tchebicheff , Robert Mechanisms and Pantograph.

UNIT –IV (Cams and Followers)

Cams and Followers: Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of follower motion - Uniform velocity, Simple harmonic motion, Uniform acceleration and Cycloid motions. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

Cams with specified contours (analysis of motion of followers) : Tangent cam with roller follower, circular arc (convex) cam with flat faced follower and Roller follower.

UNIT – V (Belt, Rope and Chain Drives)

Belt , Rope and Chain Drives : Introduction, Belt and rope drives, selection of belt drive- types of belt drives, V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

UNIT – VI (Toothed Gears & Gear Trains)

Toothed Gear: Higher pairs, friction wheels and toothed gears – types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference.

Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel, worm and rack and pinion gears.

Gear Trains: Introduction – Train value – Types – Simple, compound and reverted gear train – Epicyclic gear Train. Methods of finding train value or velocity ratio , Differential gear for an automobile.

TEXT BOOKS:

1. Theory of Machines and Mechanisms-S.S.Rattan, Tata McGraw Hill Publishers
2. Theory of Machines by Thomas Bevan/ CBS
3. Kinematics and Dynamics of Machinery by Robert L. Norton, Tata McGraw Hill Publishers
4. Theory of Machines by Sadhu Singh/ Pearson

REFERENCES:

1. Theory of Machines R.S Khurmi & J.K Gupta
2. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age
3. The theory of Machines /Shiegley/ Oxford.
4. Theory of Mechanisms and Machines by Ghosh and Mallick

**Syllabus for B. Tech. II Year II semester
Mechanical Engineering
Electrical and Electronics Engineering**

Code: 7AC48

L	T	P/D	C
2	0	0	2

Course Outcomes:

CO's: after studying this course, the student will be able to

1. Understand the fundamentals of electrical engineering and DC machines.
2. Understand the principles of AC circuits.
3. Understand the principle and operation of three phase induction motor and measuring instruments.
4. Understand the principle and operation of diode.
5. Understand the principle and operation of transistor.
6. Understand the principles of digital electronics.

Unit – I: Fundamentals of Electrical Engineering and DC Machines:

Ohm's Law, Kirchhoff's Laws, types of sources, passive elements. Series parallel circuits, mesh and nodal analysis. Superposition, Reciprocity theorem.

DC Machines: Principle of operation of D.C generators, types, E.M.F equation. Principle of operation of D.C motors, Types motors, Torque equation, Losses and efficiency, simple problems on D.C Generators and motors.

Unit – II: Fundamentals of AC circuits:

AC voltage wave form and basic definitions: Peak Value, R.M.S. value, Average values, Form factor and Peak factor, 'j' operator, Analysis of single phase AC circuits series and parallel (Simple circuits). Three phase circuits – Star - delta connection, Relation between line and phase voltages / currents in a 3-phase Star-Delta balanced system.

Unit – III: Induction Motors and Instruments:

Concept of Faraday's laws, 3- phase induction motor working principle, operation and construction details.

Instruments: Introduction, classification of instruments, operating principles, essential features of measuring instruments, permanent magnet moving coil (PMMC) instruments, moving iron (MI) instruments.

UNIT IV-DIODE: Overview of Semiconductors, PN junction diode and Zener diode –Diode circuits: rectifiers (bridge type only), filters, clippers and clampers.

UNIT V- TRANSISTOR: BJT construction, operation, characteristics (CB, CE and CC configurations) and uses – JFET and MOSFET construction, operation, characteristics (CS configuration) and uses.

UNIT VI-DIGITAL ELECTRONICS :Number systems – binary codes –binary arithmetic - Boolean algebra, laws & theorems - simplification of Boolean expression using K maps - logic gates - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

Text Books:

1. Basic Electrical Engineering –T.K. Nagesarkar and M.S. Sukhja, Oxford University Press.2nd edition.
2. Basic electrical Engineering – M.S. Naidu and S. Kamakshiah – TataMcGraw-Hill, 2005 edition.
3. Basic Electrical & Electronics Engineering –T.K. Nagesarkar and M.S. Sukhja, Oxford University Press.2nd edition.
4. Principles of Electronics - V.K.Mehta, S.Chand Publications, 2nd edition.

References:

1. Theory and problems of Basic electrical Engineering- D.P.Kotahari & I.J.Nagrath
PHI. Electronic Devices and Circuits, Millman & Halkias, TMH publications.

**Syllabus for B. Tech. II Year II
semester Mechanical Engineering**

**(Open Elective-I)
DATA
STRUCTURES**

Code: 7EC02

L	T	P/D	C
3	-	-	3

Course Objective:

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

Course Outcomes:

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

UNIT I

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

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

UNIT II

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

UNIT III

Trees- Binary trees, terminology, representation, traversals.

AVL trees, AVL tree operations: Insertion, deletion and searching. Graphs- terminology, representation, graph traversals

(DFS and BFS). **UNIT IV**

Searching - Linear and binary search methods.

Sorting - Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort. Heaps - Introduction, Min Heap, Max Heap, Operations on Heaps, Heap Sort. Performance analysis of Searching and Sorting Algorithms.

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

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

TEXT BOOKS:

1. **Data Structures and C++ by Reema Thareja**
2. **Data Structure through C by Yashavant Kanetkar.**
3. **The complete reference C++ By Herb Schildt.**

REFERENCES:

1. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft. *Data Structures and Algorithms*. Addison Wesley, 1983.
2. Data Structures using c Aaron M. Tenenbaum , Yedidiah Langsam, Moshe J Augenstein.
3. Introduction to Data Structures In C By Kamtane
4. Data Structures, A pseudocode Approach with C by Richard F. Gilberg and Behrouz A. Forouzan.

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
(Open Elective-I)
Biology for Engineers

CODE: 7GC46

L	T	P/D	C
3	-	-	3

UNIT I: BIOLOGY IN ENGINEERING

Biology- Definition, Scope and relevance of Biology in Engineering-Biomechanics, Bioelectronics, Bioinformatics. Origin of Life – Big Bang Theory, Evolutionary Theories -Darwinism and Lamarckism. Significance of water as universal solvent. Diversity of Life - Whittaker's five kingdom classification, Model Organisms- *E. coli*, *A. thaliana*, *M.musculus*.

UNIT II: CELL BIOLOGY

Cell – Unicellular & Multicellular Organisms, Cell structure- Prokaryotic & Bacterial growth curve; Eukaryotic cell Organelles and their Functions. Concept of cell, tissue, organ and organism, Cell cycle, Cell division – Overview of Mitosis and Meiosis, Overview of Cell Signaling & Communication - Autocrine, Paracrine, Synaptic signaling, Endocrine signaling.

UNIT III: GENETICS IN INFORMATION TRANSFER

Genetics- definition, Mendel Laws- Law of dominance, Law of segregation and Law of independent assortment, concept of heredity - Chromosomes & DNA,RNA as hereditary material, Genetic code.

UNIT IV: BIOMOLECULES

Biomolecules – Carbohydrates - glucose, starch, glycogen, amino-acids-essential and non-essential, Proteins, lipids, Enzymes- classification, kinetics, Inhibition. Metabolism-aerobic (Glycolysis, Krebs cycle) & anaerobic respiration, ATP as energy currency, Photosynthesis-overview, Thermodynamics in biological systems- Exothermic & Endothermic Reactions, Endergonic and Exergonic Reactions, Energy flow in organisms (Autotrophs, Heterotrophs, lithotrophs).

UNIT V: HUMAN PHYSIOLOGY

Introduction to Human Physiology, Circulatory System - Heart and its functions, blood as transport systems , Nervous System - Brain and its functions, Excretory system - Kidney and its functions, (ammoniotelic, uricotelic and ureotelic)

UNIT VI: BIOINSPIRED ENGINEERING APPLICATIONS

Comparison of Science and Engineering-Eye and camera, Bird flight and aircraft, Principles of Brownian movement, Biosensors and their applications in health care and environmental monitoring, Brain Machine Interface- Human locomotion and robotics, Artificial Neural Networks (ANN), Genetic algorithms. Internet of Things (IoT) in agriculture and Healthcare, Nanorobots in medicine.

TEXT BOOKS:

Satyanarayana, U. "Biotechnology", 4th Edition, Books and Allied Pvt. Ltd. Kolkata, 2007.
 Lehninger A.L,
 Nelson D.L, Cox .M.M, "Principles of Biochemistry",. CBS Publications 1993

REFERENCE:

Biosensors, Elizabeth A. H. Hall, open University Press Biotechnology Series

**Syllabus for B. Tech. II Year II
semester Mechanical
Engineering**

(Open Elective-I)

BASICS OF ENTREPRENEURSHIP

Code: 6ZC22

L	T	P/D	C
3	-	-	3

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.
3. Business Models and their validity are understood by the students'.
4. The basic cost structure and the pricing policies 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 for the Start up.

Unit – I: Introduction to Entrepreneurship: - Define Entrepreneurship, Entrepreneurship as a Career option, Benefits and Myths of Entrepreneurship, Success Rate of Entrepreneurs related to Experience and Family Backup, Characteristics, Qualities and Skills of Entrepreneurship, Entrepreneurial Propensity, Life as an Entrepreneur, Impact of Entrepreneurship on Economy and Society.

Unit – II: Opportunity & Customer Analysis: - Identify your Entrepreneurial Style, Identify Business Opportunities, Methods of finding and understanding Customer Problems, Process of Design Thinking, Identify Potential Problems, Customer Segmentation and Targeting, Customer Adoption Process, craft your Values Proportions, Customer-driven Innovation.

Unit – III: Business Model & Validation: - Types of Business Models, Lean approach, the Problem- Solution Test, Solution Interview Method, difference between Start-up Venture and Small Business, Industry Analysis, Identify Minimum Viable Product (MVP), Build-Measure-Learn Feedback loop, Product-market fit test.

Unit – IV: Economics & Financial Analysis: - Revenue sources of Companies, Income Analysis, and Costs Analysis - Product Cost and Operations Cost, basics of Unit Costing, Break Even Analysis Profit Analysis, Customer Value Analysis, different Pricing Strategies, advantages and disadvantage of various Sources of Finance, Investors Expectations, Return on Investment , Practice pitching to Investors and Corporate.

Unit – V: Team Building & Project Management: - Leadership Styles, Shared Leadership Model, Team Building in Venture, Role of good team in venture, Roles and Respondents, Explore collaboration tools and techniques- Brainstorming, Mind mapping. Importance of Project Management, Time Management, Workflow, Network Analysis Techniques – Critical Path Method, Project Evaluation Review Technique and Gantt chart.

Unit – VI: Marketing & Business Regulations: - Positioning, Positioning Strategies, building Digital presence and leveraging Social Media, Measuring effectiveness of Channels, Customer Decision-making Process, Sales Plans and Targets, Unique Sales Proposition (USP), Follow-up and close Sales. Business regulations of starting and operating a Business, Start-up Ecosystem, Government schemes.

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.
- Madhurima Lall, Shikha Sahai, 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.

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
(Open Elective-I)
BASICS OF INDIAN ECONOMY
(Common to all Branches)

Code:7ZC25

L	T	P/D	C
3	-	-	3

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. II Year II
semester Mechanical Engineering**

**(Open Elective-I)
PRODUCT & SERVICES**

Code: 7ZC20

L	T	P/D	C
3	-	-	3

Course Objectives: This course helps to provide the basic concepts of Product and Services. This course will enable the students to study areas of basic insights in product management and Services Design.

Course Outcomes:

1. The students will be introduced to basic concepts of product .
2. Will enlighten the students with the process of new product development and stages in the process.
3. Will help the students understand the concept of product testing, product planning and the preparatory groundwork for launching a new product
4. Will help the students to understand the nature of services, its differences with the goods and the application of marketing principles for services.
5. Will enlighten the students to understand the attributes of a good service design and the tools for producing and distributing the services.
6. To make the students understand about the importance of quality of services and also introduce some measurement scales to evaluate the service quality.

UNIT- I

PRODUCT AS A COMMERCIAL FACTOR

Product concept: premarketing, product definition, product dimensions. Product classification- by its nature, by final use by reasons for purchase, by consumer groups.

UNIT- II

PRODUCT INNOVATION

New products-What is a new product, Concept, Reasons, Succeed and failure factors, Launch process, Opportunities identification, Idea generation Systems, Evaluation, Check list, Financial analysis, Product concept.

UNIT- III

PRODUCT MANAGEMENT

Concept test, Product testing, Pre-launch, Market test, Final evaluation “Stage / Gate Process” A sequence system for a product launch. Product planning and development-Product planning, Price planning, Break even point analysis, Communications Planning, Advertising Planning, Distribution planning

UNIT - IV: INTRODUCTION TO SERVICE:

Meaning and Definition of Service, Characteristics of Services, Classification of Service, Five levels of Service, Service versus Physical Goods, 7 P’s for Marketing of Services, Marketing Mix for Tourism, Hospitality, Education, and Health Industry.

UNIT – V: SERVICE PROCESS DESIGN:

Challenges & Critical Success Factors, Distribution Methods for Service, Process of Service Delivery, Tools for Service Design, Customer involvement in the Production Process, Tools for Innovation, Role of Intermediaries, Attributes of a Good Design.

UNIT – VI: QUALITY OF SERVICE:

Definition of Service Quality, Elements of Service Quality, Service Quality Measuring Tools; SERVQUAL Scale, Service Quality Gap Analysis, Objective Service Metrics, Cost of Quality in Service. Challenges and Problems of Service Quality in India.

References:

- Dr. S.L. Gupta, Product Management, Wisdom Publications
- C.Merle Crawford ,New Product Management
- Valarie A.Zeithaml & Mary Jo-Bitner: Services Marketing—Integrating Customer Focus Across the Firm, 3/e, Tata McGraw Hill, 2007.
- Thomas J.Delong & Asish Nanda: Managing Professional Services—Text and Cases, McGraw-Hill International, 2006.
- Christopher Lovelock: Services Marketing People, Technology, Strategy, Fourth Edition, Pearson Education, 2006

**Syllabus for B. Tech. II Year II
semester Mechanical Engineering**

(Open Elective-I)

**BANKING OPERATIONS, INSURANCE AND RISK
MANAGEMENT**

Code:7ZC05

L	T	P/D	C
3	-	-	3

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 Ewantly
- 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. II Year II semester
Mechanical Engineering
Smart Materials
(Open Elective-I)

Code: 7BC61

L	T	P/D	C
3	-	-	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, 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. principles and characterization.

UNIT - III

Control Design: Design of shape memory alloys, Types of MR fluids, Characteristics and application, principles of MR fluid valve designs, Magnetic circuits, MR Dampers, Design issues.

UNIT - IV

Optics And Electromagnetic: Principles of optical fiber technology, characteristics of active and adaptive optical system and components, 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 acoustics analog and digital feedback 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 Visualisation and Reliability – Principles and Application domains.

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 Chapman & Hall, London, 1992 (ISBN : 0412370107)

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REFERENCE BOOKS:

1. **'Smart Materials and Structures'**, Banks HT, RC Smith, Y Wang, Massow S A, Paris 1996

2. **G P Gibss' Adaptive Structres'**, Clark R L, W R Saunolers, Jhon Wiles and Sons, New York, 1998

3. **An introduction for scientists and Engineers'**, Esic Udd, OpticSensors : Jhon Wiley & Sons, New York, 1991 (ISBN :0471830070)

**Syllabus for B. Tech. II Year II semester
Mechanical Engineering
Fundamental of Digital Circuits and Microprocessors
(Open Elective-I)**

Code: 7CC54

L	T	P/D	C
3	-	-	3

Course Objectives:

The objectives of this course is to provide the students an overview of basic combinational and sequential circuits and also basic architecture and programming of 8086 microprocessor

Course Outcomes:

After completing this course, the students will have demonstrated

1. an ability to understand number systems and apply the rules of Boolean algebra to simplify Boolean expressions.
2. an ability to simplify of Boolean expressions using K-map.
3. an ability to design MSI combinational circuits such as fulladders, multiplexers, decoders, encoders. Code converters.
4. an ability to design basic memory units (latches and flip-flops) and sequential circuits such as counters and registers
5. Understands the Architecture of 8086.
6. Able to write the Assembly Language Programs using 8086 instruction set and DOS interrupts.
7. Understands the concept of interface and can write interface programs.

UNIT – I

Number System:

Binary, decimal, octal, hexa decimal, weighted and un-weighted codes. Boolean Algebra: Axiomatic definition of Boolean algebra, Binary operators, postulates of and theorems. Boolean addition, subtraction, 1's complement, 2's complement. Switching functions, Canonical forms and Standard forms, Simplification of switching functions using theorems.

Application: hexadecimal numbers to design colors on web pages

UNIT – II

Logic gates:

Basic gates and universal gates.

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

Application: Design of a Basic Calculator Using Logic Gates.

UNIT - III

Combinational Logic Design:

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

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

UNIT - IV

Sequential Circuits 1:

Classification of sequential circuits (Synchronous, Asynchronous Pulse mode, and Level mode with examples). Basic flip-flops-Triggering and excitation tables. Conversions of flip flops, Design of simple synchronous sequential circuits such as counters, shift registers

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

UNIT - V

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 - VI

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.

Applications: *Interfacing of a Temperature sensor with 8086*

Text Books:

1. Morris Mano-,Digital design –PHI, 2nd Edition.
2. Zvi Kohavi and Niraj K Jha -Switching & Finite Automata theory – Cambridge, 3rd Edition.
3. Subrata Ghoshal, Digital Electronics,2012, Cengage Learning
4. Advanced microprocessor & Peripherals - A.K.Ray & K.M.Bhurchandi, TMH, 2000.
5. Microprocessors and interfacing – Douglas V. Hall, TMH, 2nd Edition, 1999.

References:

- 1.Fletcher -An Engineering Approach to Digital Design – PHI.
- 2.Fundamentals of Logic Design, Roth, Kenny, Seventh Edition, Cengage Learning
- 3.R.P.Jain-Switching Theory and Logic Design- TMH Edition,2003.
- 4.John M. Yarbrough -Digital Logic Applications and Design – Thomson Publications, 2006
5. CVS Rao -Switching Theory and Logic Design –Pearson Education, 2005
6. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd Edition.

**Syllabus for B. Tech. II Year II
semester Mechanical Engineering**

MANAGEMENT SCIENCE AND FINANCIAL ACCOUNTING (MSFA)

Code: 7ZC01

L	T	P/D	C
2	-	-	2

Course Objective: To make students understand the basics of management and Financial Accounting, its principles, practices and latest concepts for increasing the performance of engineering graduates in their respective fields, which facilitate them in making better planning and decisions.

Course Outcomes:

1. Outlines the significance of management, defines the basic concepts and applicability of management principles in changing paradigms.
2. Helps in understanding organization behavior, personality determinants and other key aspects
3. Infers the need to understand the importance of Strategic management and Business environment in particular
4. Enrich students with basic concepts of Financial Accounting.
5. Understand basic concepts of Depreciation and need for preparing trial balance.
6. Helps in preparation of Financial Statements (final accounts).

UNIT I

INTRODUCTION TO MANAGEMENT: Management- Definitions, Levels of Management, Functions of management- Planning: types of planning, planning process; Organizing: Organizational Design and Structure, Staffing; Directing; Controlling: Basic control process- Fayol's principles of Management - Taylor's principles of scientific management- Maslow's Motivational theory.

UNIT II

INTRODUCTION TO ORGANIZATIONAL BEHAVIOR: Definition, Nature and Scope of OB, Personality-determinants of Personality – Perception- Attitudes- Attribution theory- Johari Window and Transactional Analysis, Stress Management- factors and remedies

UNIT III

STRATEGIC MANAGEMENT: Introduction to Strategic Management, Vision, Mission, Goals, Objectives, Environmental Scanning- PESTEL, SWOT Analysis, Competitive Advantage, Concept of Core Competence, PORTER's five force model, types of strategies, Strategic formulation and Implementation.

UNIT IV

FUNDAMENTALS OF FINANCIAL ACCOUNTING: Definition of Accounting, Accounting Concepts and conventions, principles of Double-Entry system, Book Keeping, Overview of books of original records Journal, Ledger and Subsidiary books

UNIT V

TRIAL BALANCE AND DEPRECIATION OF FIXED ASSETS: Significance of Trial balance, Preparation of trial balance Definition of Depreciation, Depreciation of fixed assets, Methods of Depreciation – Straight line method and Diminishing Balance method

UNIT VI

CLASSIFICATION OF REVENUE AND CAPITAL EXPENSES, AND PREPARATION OF FINAL ACCOUNTS: Revenue expenditure, Capital expenditure, Preparation of Final Accounts - Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments

References:

- A R Aryasri: Management Science, Tata Mc Graw Hill
- Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi
- A R Aryasri: Managerial Economics and Financial Analysis, Tata Mc Graw Hill

**Syllabus for B. Tech. II Year II semester
Mechanical Engineering
Electrical and Electronics Engineering Lab**

Code:7AC95

L	T	P/D	C
-	-	2	1

COURSE OUTCOMES:**Electrical Experiments**

1. Brake test on 3-phase induction motor (performance characteristics).
2. Speed control of DC shunt motor by
 - a) Armature Voltage Control
 - b) Field flux control method.
3. Brake test on DC shunt motor.
4. Swinburne's test on DC shunt machine.
5. OCC characteristics of DC shunt generator.
6. Verification of superposition and Reciprocity Theorems.

Electronics Experiments

1. V-I Characteristics of PN -junction diode.
2. V-I Characteristics of Zener -junction diode.
3. Half wave and full wave rectifier.
4. V-I Characteristics of Bipolar junction Transistor.
5. V-I Characteristics of MOSFET.
6. Verification of logic gates

Syllabus for B. Tech. II Year II semester
Mechanical Engineering
MANUFACTURING PROCESSES LAB

Code: 7B465

L T P/D C
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Course Objective:

Understand the entire procedure for preparing a component through the sand casting route
 Perform sand testing to produce defect free product
 Understand the procedure for doing arc, gas, and resistance welding processes. Understand the procedure for press working operations
 Understand the plastic processing techniques.

COURSE OUTCOMES:

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

- Make a pattern preparation of sand mould and cast the part
- Perform welding operation under different conditions and test the quality of the weld
- Make use of plasma technique for accurately cutting metals and also perform brazing operation
- Identify the various press working operations and various parts of hydraulic press and perform operations
- Choose the appropriate plastic moulding method to manufacture a plastic product

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1		H	M								L	
CO2		H	M								L	
CO3		H	M								L	
CO4		H	M								L	
CO5		H	M								L	
CO6		H	M								L	

I. Metal Casting Lab:

1. Pattern Design and making – 1
- Exercise 2 .Core Making-1 Exercise
3. Sand properties testing - -for strengths, and permeability – 2 Exercises
4. Melting and Pouring - 1 Exercise

II Welding Lab:

1. Arc welding (AC & DC)- To study the effect of polarity on weld strength and heat effected zone in Arc welding. 2 Exercises
2. Spot Welding - 1 Exercise
3. Inert Gas Welding - 2 Exercises
4. Plasma Cutting and Brazing - 2 Exercises

III Mechanical Press Working:

1. Study of simple, compound and progressive press tool.
2. Blanking & Piercing operation- 1 Exercise
3. Bending and other operations-1 Exercise

IV Processing Of Plastics:

1. Injection Moulding
2. Blow Moulding

V Demonstration of Electrical Discharge Machine & Submerged Arc Welding

Syllabus for B. Tech. II Year II semester
TECHNICAL SEMINAR-IV

Code: 7B494

L T P/D C
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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 Outcome :

- 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.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1						H	H	M	M		L	
CO2						H	H	M	M		L	
CO3						H	H	M	M		L	
CO4						H	H	M	M		L	
CO5						H	H	M	M		L	
CO6						H	H	M	M		L	

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.
 1. The same sheet shall be affixed in the respective classrooms and seminar register.
 2. 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.
3. Progress of the seminars needs to be reviewed by the concerned HOD once in 15 days.
4. The evaluation for Technical Seminars has to be informed to students and displayed in the classrooms.
5. 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 9 th week	: 10 marks
End semester Viva	: <u>20 marks</u>
Total	: 100 marks

**Syllabus for B. Tech. II Year II semester
Mechanical Engineering
COMPREHENSIVE VIVA VOCE - I**

Code: 7B466

L T P/D C
- - 2 1

Course Objective :

Evaluate, comprehend and assess of the concepts and the knowledge gained in the core courses of the first and the second year.

Course Outcome :

3. Comprehend the concepts in the core and elective courses.
4. Exhibit technical knowlegde to face interviews.
5. Exhibit life long Learning skills for higher education and to persue Professional practice.

	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl
CO1		H	M				H	M			L	L
CO2		H	M				H	M			L	L
CO3		H	M				H	M			L	L
CO4		H	M				H	M			L	L
CO5		H	M				H	M			L	L
CO6		H	M				H	M			L	L

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external evaluation.

Internal:

Comprehensive Viva Voce is Conducted twice in a semester and evaluated for 15 marks each.

End examination : 75 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.