FIRST SEMESTER

Course Code	Course Title	Scheme of Instruction (Hours/Week)			Credits	Evaluation		Total
						Sessional Marks	Semester End Examination Marks	
		L	Tut	P/D				
MABST101	**Mathematics–I**	3	1	0	4	40	60	100
CYBST102	**Engineering Chemistry**	3	1	0	4	40	60	100
ENHST103	**English**	2	0	0	2	40	60	100
EEEST104	**Basic Electrical & Electronics Engineering**	3	1	0	4	40	60	100
MEEST105	**Engineering Graphics**	2	0	3	3.5	40	60	100
ENHSP106	**English Communications Lab**	0	0	3	1.5	40	60	100
	Total	13	3	6	**19**	**240**	**360**	**600**

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

SECOND SEMESTER

Course Code	Course Title	Scheme of Instruction (Hours/Week)			Credits	Evaluation		Total
						Sessional Marks	Semester End Examination Marks	
		L	Tut	P/D				
MABST201	Mathematics–II	3	1	0	4	40	60	100
PYBST202	Engineering Physics	3	1	0	4	40	60	100
CSEST203	Programs for problem solving	3	0	0	3	40	60	100
MEEST204	**Manufacturing Processes**	4	0	0	**4**	40	60	100
MEESP205	**Workshop/ Manufacturing Practice**	0	0	3	1.5	40	60	100
CSESP206	Programs for problem solving Lab	0	0	3	1.5	40	60	100
CEMCT207	**Environmental Science**	4	-	-	-	100	-	100
	TOTAL	**17**	**2**	**6**	**18**	**340**	**360**	**700**

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

THIRD SEMESTER

Course Code	Course Title	Scheme of Instruction (Hours/Week)			Credits	Evaluation		Total
						Sessional Marks	Semester End Examination Marks	
		L	Tut	P/D				
MEPCT301	**Thermodynamics**	3	1	0	**4**	40	60	100
MABST302	**Numerical Methods**	3	0	0	**3**	40	60	100
MEPCT303	**Industrial safety and measures**	3	0	0	**3**	40	60	100
CEEST304	**Engineering Mechanics**	3	1	0	**4**	40	60	100
MEPCT305	**Manufacturing Technology**	3	0	0	3	40	60	100
COHST306	**Finance and Accounting**	3	1	0	**4**	40	60	100
MEPCT308	**Advanced Engineering Graphics**	2	0	3	**3.5**	40	60	100
MEPCP309	**Manufacturing Process Lab**	0	0	3	**1.5**	40	60	100
	TOTAL	**20**	**4**	**6**	**26**	**320**	**480**	**800**

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

FOURTH SEMESTER

Course Code	Course Title	Scheme of Instruction (Hours/Week)			Credits	Evaluation		Total
						Sessional Marks	Semester End Examination Marks	
		L	Tut	P/D				
PAMCT401	**Constitution of India**	4	-	-	0	- -	-	-
MEPCT402	**Applied Thermodynamics**	3	1	0	4	40	60	100
CEPCT403	**Fluid Mechanics &Fluid Machines**	3	1	0	4	40	60	100
CEPCT404	**Solid Mechanics**	2	1	0	3	40	60	100
MEPCT405	**Materials Engineering**	3	0	0	3	40	60	100
MEPCT406	**Instrumentation and Control**	3	0	0	3	40	60	100
MEPCT407	**Machine Drawing**	1	0	4	3	40	60	100
MEHST 408	**Operations Research**	3	1	0	3	40	60	100
MEPCP409	**Fuels and IC Engines Laboratory**	0	0	3	**1.5**	40	60	100
	Industry internship*					*Students caarryout Industry internship (Marks will be shown in 7th Semester)		
	TOTAL	**22**	**4**	**7**	**24.5**	**320**	**480**	**800**

Note: Industry internship for not less than four weeks after 4Th / 6th Semester during summer.

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

FIFTH SEMESTER

Course Code	Course Title	Scheme of Instruction (Hours/Week)			Credits	Evaluation		Total
						Sessional Marks	Semester End Examination Marks	
		L	Tut	P/D				
MEPCT501	**Heat Transfer**	3	1	0	**4**	40	60	100
MEPCT502	**Design of Machine Elements**	3	1	0	**4**	40	60	100
MEPCT504	**Kinematics of Machinery**	3	1	0	**4**	40	60	100
MEPET505	**Elective-I**	3	0	0	3	40	60	100
MEOET506	**Open Elective-I (MOOCS)**	3	0	0	**3**	**Period of study : $5^{th}/6^{th}/7^{th}$ Semesters and Performance reflected in 7^{th} semester**	60	100
MEPCP507	**Machine Tools and Automation Lab**	0	0	3	**1.5**	40	60	100
MEPCP508	**Metrology Lab**	0	0	3	**1.5**	40	60	100
	TOTAL	19	3	6	**21**	**240**	**420**	**700**

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

SIXTH SEMESTER

Course Code	Course Title	Scheme of Instruction (Hours/Week)			Credits	Evaluation		Total
		L	Tut	P/D		Sessional Marks	Semester End Examination Marks	
EOHST601	**Economics**	3	1	0	**4**	40	60	100
MEPCT602	**Machine Design**	3	1	0	4	40	60	100
MEPCT603	**Dynamics of Machinery**	3	0	0	3	40	60	100
MEPET604	**Elective-II**	3	0	0	3	40	60	100
MEOET605	**Open Elective-II (MOOCS)**	3	0	0	3	40	60	100
ME PCP606	**Strength of Materials & Fluid Mechanics Laboratory**	0	0	3	1.5	40	60	100
MEPCP607	**Heat Transfer Lab**	0	0	3	1.5	40	60	100
	Industry Internship*					*Students caarryout summer internship (Marks will be shown in 7th Semester)		
	TOTAL	15	2	6	**20**	**280**	**420**	**700**

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

SEVENTH SEMESTER

Course Code	Course Title	Scheme of Instruction (Hours/Week)			Credits	Evaluation		Total
		L	Tut	P/D		Sessional Marks	Semester End Examination Marks	
MEPET701	**Automobile Engineering**	3	0	0	3	40	60	100
MEPET702	**Elective-III**	3	0	0	3	40	60	100
MEOET703	**Open Elective-III (MOOCS)**	3	0	0	3	40	60	100
MEPEP704	**CAD / CAM Laboratory**	0	0	3	1.5	40	60	100
MEPCI705	**Internship***				3	100	-	100
MEPCX706	**Project Work –Phase-I**	0	0	6	3	100	-	100
	TOTAL	**9**	**0**	**15**	**16.5**	**360**	**240**	**600**

NOTE: internship not less than 4 Weeks.

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

EIGTH SEMESTER

Course Code	Course Title	Scheme of Instruction (Hours/Week)			Credits	Evaluation		Total
						Sessional Marks	Semester End Examination Marks	
		L	Tut	P/D				
MEPET801	**Elective -IV**	3	0	0	3	40	60	100
MEPET 802	**Open Elective-IV (MOOCS)**	0	0	0	3	40	60	100
MEPCP803	**Project Work Phase-II**	0	0	18	9	40	60	100
	TOTAL	**6**	**0**	**18**	**15**	**120**	**180**	**300**

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

CREDIT DISTRUBUTION CHART

S. No.	Category	SEMESTER								Total	Suggested BreakupofCredits (Total160)
		First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth		
1	Humanities and Social Sciences including Management courses	3.5		4	3		3			13.5	12*
2	Basic Science courses	8	8	3						19	25*
3	Engineering Science courses including workshop , drawing, basics of electrical/mechanical/computer etc	7.5	6	7.5						21	24*
4	Professional core courses		4	11.5	21.5	15	10	4.5	3	69.5	48*
5	Professional Elective courses relevant to chosen specialization/branch					3	3	3	3	12	18*
6	Open subjects–Electives from other technical and/or Emerging subjects					3	3	3		9	18*
7	Project work, seminar and internship in industry or elsewhere							6	9	15	15*
8	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]		0		0		0			0	(non-credit)
	Total number of credits	19	18	26	24.5	21	20	16.5	15	160	160*
	Number of Hours per week	22	30	30	33	28	29	18	24	Odd Sem. – 98 Even – Sem. – 116	
	Total Number of marks	600	600	800	800	700	800	500	300	5100	

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

PROGRAM ELECTIVE COURSES

Sl. No	Course Code	Subject	Credits	SEMESTER	Elective
1	MEPET01	Tool Design	3	VIII	IV
2	MEPET02	Advanced Manufacturing Process	3	V	I
3	MEPET03	CAD/CAM	3	VII	III
4	MEPET04	Robotics	3	VII	III
5	MEPET05	Nanotechnology and Surface Engineering	3	VII	III
6	MEPET06	Mechanical Vibrations	3	VII	III
7	MEPET07	Finite Element Analysis	3	VII	III
8	MEPET08	Advanced Engineering Graphics	3	V	I
9	MEPET09	Refrigeration & Air Conditioning	3	VI	II
10	MEPET10	Internal Combustion Engines	3	VI	II
11	MEPET11	Power Plant Engineering	3	VI	II
12	MEPET12	Non-Conventional Energy Sources	3	VI	II
13	MEPET13	Industrial Engineering &Management	3	V	I
14	MEPET14	Quality Control& Reliability Engineering	3	VIII	IV
15	MEPET15	Analysis and control of production systems	3	VIII	IV
16	MEPET16	Artificial Intelligence and expert systems	3	VIII	IV
17	MEPET17	Simulation and modeling	3	VIII	IV
18	MEPET18	Mechatronic Systems	3	V	I
19	MEPET802	Automation in Manufacturing	3	VIII	IV

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

OPENELECTIVECOURSES OFFERED FOR OTHER DEPARTMENTS

Sl. No	Course Code	Subject	Credits
1	MEOETE01	Industrial Engineering &Management	3
2	MEOETE02	Non-Conventional Energy Sources	3
3	MEOETE03	Quality Control& Reliability Engineering	3
4	MEOETE04	Analysis and control of production systems	3
5	MEOETE05	Engineering system analysis and design	3
6	MEOETE06	Simulation and modeling	3
7	MEOETE07	Green Energy Systems	3

L – Lecture hours; Tut. – Tutorials; P/D – Practicals or Drawing

MABST101 MATHEMATICS – I
B.Tech I Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

UNIT I
Differential Equations: Linear differential equations of second and higher order with constant coefficients-particular integrals-homogeneous differential equations with variable coefficients-method of parameters-simulation equations.

UNIT II
Laplace Transforms I: Laplace transforms of standard functions-inverse transforms-transforms of derivatives and integrals-derivatives of transforms-integrals of transforms.

UNIT III
Laplace Transforms II: Transforms of periodic functions-convolution theorem-applications to solution of ordinary differential equations.

UNIT IV
Calculus: Roll's and Mean value theorems - Taylor's and Maclaurins's series-maxima and minima for functions of two variables - Infinite series - Convergence Tests series of positive terms - comparison, Ratio tests - Alternating series - Leibnitz's rule - Absolute and conditional convergence.

UNIT V
Multiple Integrals: Curve tracing (both Cartesian and polar coordinate) - Evaluations of double and Triple integrals-change of order of integrations-change of variables of integrations-simple applications to areas and volumes.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

CYBST 102 ENGINEERING CHEMISTRY
B.Tech I Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

UNIT I

Atomic and molecular structure (12 lectures)

Postulates of quantum chemistry. Schrodinger equation. Particle in a box solutions 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. Band structure of solids and the role of doping on band structures

UNIT II

Spectroscopic techniques and applications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques.

UNIT III

Chemical equilibrium, Intermolecular forces and potential energy surfaces

Use of free energy in Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Use of free energy considerations in metallurgy through Ellingham diagram. Equations of state of real gases and critical phenomena.

UNIT IV

Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electro negativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular

geometries, Born- Haber cycle, The use of reduction potentials, Properties of ionic and covalent compounds.

UNIT V

Stereochemistry, Organic reactions and synthesis of a drug molecule

Representations of 3 dimensional structures, structural isomers and stereo isomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Reference/Text Books

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S Krishnan
5. Physical Chemistry, by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.
7. Principles of physical chemistry, Puri, Sharma and Pattania

ENHST 103 ENGLISH
B.Tech I Semester
Effective from- 2018-19

Lectures / Week: 2 periods **credits:2**

Course objectives:

1. To introduce students elements of grammar and composition of English Language.
2. To familiarize students with literary texts such as Short stories and prose passages.
3.To maintain linguistic competence through training in vocabulary, sentence structures and pronunciation.
4.To develop communication skills by cultivating the habit of reading comprehension passages.
5.To train the students to develop the language skills like listening, speaking, reading and writing.
6.To initiate them into use of self instructed learner friendly modes of language learning through competence.
To train them in soft skills to reach the needs of global job market

UNIT I
Vocabulary Building
The concept of Word Formation- Root words from foreign languages and their use in English- Acquaintance with prefixes and suffixes from foreign languages in English form derivatives- Synonyms, antonyms, and standard abbreviations.

UNIT II
Basic Writing Skills
Sentence Structures – Use of phrases and clauses in sentences – Importance of proper punctuation - Creating coherence – Organizing principles of paragraphs in documents -Techniques for writing precisely

UNIT III
Identifying Common Errors in Writing
Subject-verb agreement -Noun-pronoun agreement -Misplaced modifiers -Article -Prepositions -Redundancies -Clichés

UNIT IV
Nature and Style of sensible Writing
Describing - Defining - Classifying –Providing examples or evidence –Writing introduction and conclusion

UNIT V
Writing Practices
Comprehension - Précis Writing –Essay Writing

EEEST 104 Basic Electrical & Electronics Engineering

B.Tech I Semester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

UNIT-I

DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and Voltage laws, analysis of simple circuits with dc excitation. Superposition, The venin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT II

AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits
Consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT III

Transformers

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase
Transformer connections.

UNIT IV

Electrical Machines

Ingle-phase induction motor. Construction, working torque-speed characteristic-Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Starting and speed control of induction motor - Construction, working, torque-speed characteristic-Construction and working of synchronous generators and speed control of separately excited dc motor.

UNIT V

Electrical Installations

Introduction to Converters and Inverters- Single phase and three phase voltage source Inverters- Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery Backup.

Text / References Books:

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill,2010.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
3. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press,2011.
4. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
5. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

MEEST105 ENGINEERING GRAPHICS AND DESIGN

B.Tech I Semester

Effective from- 2018-19

Lectures / Week: 2periods **credits:3.5**

Course Objectives

This course is designed to address:

- to prepare you to design a system, component, or process to meet desired needs with in realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- to prepare you to communicate effectively.
- to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Unit – I

Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epi-cycloid, Hypo-cycloid and Involutes.

Unit – II

Scales

Scales– construction of Plain &Diagonal Scales.

Projections of points, lines

Projections of Points and lines inclined to both planes, including traces;

Unit – III

Projections of planes

Projections of planes (Regular surfaces only) inclined Planes-Auxiliary Planes;

Projections of Regular Solids (Simple solids - cylinder, cone, prism & pyramid) those inclined to both the Planes-Auxiliary Views;

Unit – IV

Isometric Projections& Orthographic projections

Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale.

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric

Views to Orthographic Views and Vice-versa, Conventions;

Unit – V

Introduction to CAD [Demonstrating]

CAD workstation and peripherals, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars Standard, Object Properties, Draw, Modify and Dimension, Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom used in CAD, Select and erase objects.;

Suggested Text/Reference Books:

(i) Bhatt N.D., Panchal V.M. &Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
(ii)Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,Pearson Education
(iii)Agrawal B.& A grawal C.M.(2012),Engineering Graphics, TMH Publication
(iv)Narayana, K.L. &P Kannaiah(2008),Text book on Engineering Drawing, ScitechPublishers
(v)(Corresponding set of) CAD Software Theory and User Manuals

ENHSP 106 ENGLISH COMMUNICATIONS LAB
B.Tech I Semester
Effective from- 2018-19

Lectures / Week: 1.5 periods **credits:1.5**

Listening Comprehension -Pronunciation, Intonation, Stress and Rhythm -Common Everyday Situations: Conversations and Dialogues -Communication at Workplace -Interviews -Formal Presentations

Reference/Text Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. LizHamp-Lyonsand Ben Heasly. Cambridge\University Press. 2006.
5. Communication Skills. SanjayKumar and Pushp Lata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

MABST 201 MATHEMATICS-II

B.Tech IISemester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

Unit I

Matrices: rank of a matrix-solution of system of linear equations-Eigen values, vectors –Canley-Hamilton theorem-quadratic forms-diagonalization.

Unit II

Vector Calculus: Gradient, Divergence, Curl of a vector and related properties-line, surface, volume integrals- Green's, Stokes's and Gauss Divergence theorems and its applications.

Unit III

Fourier Series: Fourier series-even and odd functions, periodic functions-half range sine and cosine series-harmonic analysis.

Unit IV

Special Functions I: Gamma and Beta functions-series solutions of differential equations-ordinary points.

Unit V

Special Functions II: Bessel function-recurrence formulae-generating function for Jn(X)-Lengender polynomials-recurrence formulae-generating function for Pn(X) - Rodriguez's formula - orthogonality of Lengender polynomials.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.

2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.

3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.

4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

PYBST - 202 ENGINEERING PHYSICS
B.Tech IISemester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

UNIT I

Wave Optics:

Interference: Huygen`s Principle-Principle of Superposition-Interference of Light-Young`s double slit experiment- -Newton's Rings.

Diffraction: Fraunhofer Diffraction at a Single Slit and a Circular Aperture-Plane Diffraction grating – Resolving Power-Rayleigh`s Criterion-Resolving power of Grating and Microscope.

Lasers : Introduction – Spontaneous and Stimulated Emission of Radiation – Population Inversion – Types of Lasers – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers.

UNIT II

Mechanics of Rigid Body:

Rigid Body-Rotational Motion and Kinematics Relations-Kinetic Energy and Angular Momentum of a Rotating Body-Equation of Motion of a Rigid body (Torque of a Rigid Body)-Combined Translation and Rotational Motion of a Rigid Body- Body Rolling on an inclined Plane.

Mechanics of Continuous Media:

Elasticity, Stress and Strain- Hook`s Law and Behavior of Wire Under Load- Elastic Constants-Relation Between Elastic Modulii-Types of Supports, Beams and Loads-Different types of Bending-Cantilever with an End Load. Ultrasonic Waves - Sound Absorption and Reverberation -Sabine Formula - Acoustics of Buildings.

UNIT III

Electromagnetism and magnetic properties of Materials:

Laws of Electro statistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws-Maxwell's Equations – Polarization - Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization - Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and Hesteresis, Applications of ferromagnetic materials**.**

UNIT IV

Quantum Mechanics : Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P.Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT V

NanoPhysics and Nanotechnology : Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-Pulsed laser deposition. Characteristics of C60 (Zero dimensional),

Carbon Nan tubes (One Dimensional) and Graphene (Two Dimensional). Applications of Nanomaterials.

Text Books/ Reference Books:

1. R.K.Gaur and S.L.Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi

2. S.L.Gupta and Sanjeev Gupta`Unified Physics`Vol.I Jai Prakash Nath & Co., Meerut.

3. Hitendra K.Malik and A.K.Singh ``Engineering Physics" Tata MCGraw Hill Education PVt.Ltd., New Delhi

4. M.N.Avadhanulu and P.G.Kshirsagar ``A Text Book of Engineering Physics`` S.Chand and Company Pvt.Ltd., New Delhi

5. B.L Theraja, "Modern physics", S.Chand & Company.

6. V. Raghavan "Material Science", Tata Mc Graw Hill Publications.

7. M.S.Ramachandra Rao and Shubra Singh, ``Nanoscience and Nanotechnology``
Wiley India Pvt.Ltd, New Delhi

SEST 203 PROGRAMMING AND PROBLEM SOLVING

B.Tech IISemester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

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- Arithmetic expressions and precedence.

UNIT-II

Conditional Branching and Loops

Writing and evaluation of conditionals and consequent branching, Iteration and loops , Arrays (1-D, 2-D), Character arrays and Strings.

UNIT-III

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)

UNIT-IV

Functions Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference. Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT-V

Structures and Pointers: Defining structures and Array of Structures. Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation) File handling

Text Books& Reference Book:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

MEEST204 MANUFACTURINGPROCESSES

B.Tech IISemester

Effective from- 2018-19

Lectures / Week: 4 periods **credits:4**

.UNIT-I

Casting and moulding: Metal casting processes and equipment, Heat transfer and solidification, shrinkage ,riserdesign ,casting defectsand residual stresses.

UNIT-II

Metal Forming: Introduction to bulk and sheet metal forming, plastic deformation and yield criteria ;fundamentals of hot and cold working processes; load estimation for bulk forming (forging,rolling,extrusion,drawing)andsheetforming(shearing,deepdrawing,bending) principles of powder Metallurgy.

UNIT-lll

Metal cutting Single and multi-point cutting; Orthogonal cutting, various force Components :Chip formation, Tool wear and tool life, Surface finish and integrity, Machinability, ,Cutting toolmaterials,Cuttingfluids,Coating;Turning,Drilling,Millingandfinishingprocesses,
Introductioncto CNC machining. Additive manufacturing: Rapid proto typing and rapid tooling.

UNIT-IV

Joining/fastening processes Physics of welding ,brazing and soldering; design considerations in welding,Solid and liquid state joining processes; Adhesive bonding.

UNIT-V

Unconventional Machining Processes:
AbrasiveJet achining,WaterJetMachining,AbrasiveWaterJetMachining,Ultrasonic Machining ,principles and process parameters, Electrical Discharge Machining, principle and processes parameters, MRR, surface finish, tool wear ,dielectric, power and control circuits,wire EDM;Electro chemicalmachining(ECM),etchant&maskant,processparameters, MRR and surface finish.
Laser BeamMachining(LBM),PlasmaArcMachining(PAM)andElectronBeamMachining

Text Books

1. Kalpak jianand Schmid, Manufacturingprocesses forengineeringmaterials(5thEdition)-PearsonIndia,2014
2. MikellP.Groover, Fundamentals ofModern Manufacturing:Materials,Processes, andSystems
3. Degarmo, Black &Kohser, Materials and Processes inManufacturing

CourseOutcomes:

Uponcompletionofthiscourse,studentswillbeabletounderstandthedifferentconventionalandunconventionalmanufacturingmethodsemployedformakingdifferentproducts.

MEESP 205 WORKSHOP/MANUFACTURING PRACTICES

B.Tech IISemester

Effective from- 2018-19

Lectures / Week: 1.5 periods **credits:1.5**

1.Manufacturing Methods-casting, forming, machining, joining, advanced manufacturing methods
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools
4. Electrical & Electronics
5. Carpentry
6. Plastic moulding, glass cutting
7. Metal casting
8. Welding(arc welding &gas welding), brazing

The above course content is learnt by online videos/ppt presentations**.**

Text/Reference Books:

(i) HajraChoudhury S.K.,Hajra ChoudhuryA.K.andNirjharRoyS.K.,"Elementsof Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and Publisher's private limited, Mumbai.

(ii)KalpakjianS.AndStevenS.Schmid,"ManufacturingEngineeringandTechnology",4thedition,PearsonEducationIndiaEdition,2002.

(iii) GowriP.HariharanandA. SureshBabu, "Manufacturing Technology–I" Pearson Education,2008.

(iv) RoyA. Lindberg, "Processes and Materials of Manufacture",4thedition, Prentice Hall India,1998.

(v) RaoP.N., "Manufacturing Technology", Vol.IandVol.II,TataMcGrawHillHouse 2017.

(ii)Workshop Practice:

1. Machine shop
2. Fitting shop
3. Carpentry
4. Electrical wiring
5. Weldingshop
6. Casting
7. Smithy
8. Plastic moulding & Glass Cutting

** choose any of the above Six for practice**

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

CSESP 206 PROGRAMMING AND PROBLEM SOLVING LAB
B.Tech II Semester
Effective from- 2018-19

Lectures / Week: 1.5 periods **credits:1.5**

Assignments in C
Variable types and type conversions:

Simple computational problems using arithmetic expressions
Branching and logical expressions:

Problems involving if-then-else structures
Loops, while and for loops:

Iterative problems e.g., sum of series
1D Arrays: searching, sorting:

1D Array manipulation
2D arrays and Strings

Matrix problems, String operations
Functions, call by value

Simple functions
Numerical methods (Root finding, numerical differentiation, numericalintegration):

Programming for solving Numerical methods problems
Recursion, structure of recursive calls
Recursive functions
Pointers, structures and dynamic memory allocation
Pointers and structures

Assignments in C and JAVA
File handling

File operations

CEMCT 207 ENVIRONMENTAL SCIENCE
B.Tech IISemester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

Unit I: Environmental Studies and Natural Resources
Definition, Scope and importance of Environment, Environmental studies, Need for public awareness
Components of Environment- Atmosphere, Hydrosphere, Lithosphere.
Renewable and Non Renewable Resources and associated problems
•Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
•Forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
• Land resources: Land as a resource, land degradation, Man induced landslides, soil erosion and desertification.
• Mineral resources: Use and overexploitation, Environmental effects of extracting and using mineral resources, case studies.
• Food resources: World food problems, changes caused agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, Case studies.
• Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
• Role of an individual in conservation of natural resources.
Unit II Ecosystem and Biodiversity :
Ecosystem - Concept of an ecosystem.
- Structure and functions of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem.

(a) Forest ecosystem. (b) Grassland ecosystem
(c)Desert ecosystem. (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)
Biodiversity and its conservation:
- Definition, genetic species and ecosystem diversity.
- Biogeographically classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts.
- Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Unit III Environmental pollution and Global Effects.

- Definition, Causes, Effects, and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards
- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management: Floods, earthquakes, cyclone, landslides, Tsunami.
- Climate change-Global warming, Acid rain, Ozone depletion,.

Unit IV

Environment Issues and Management

•Environment and Human health – Epidemic diseases, HIV/AIDS, Aviation Flue, Water Borne Diseases.

•Environmental Impact Assessment, Sustainable Development, Clean Production and Clean Development Mechanisms

•Environment Legislation: Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act, Public Liability & Insurance Act, Issues involved in Enforcement of Environmental legislation.

Unit V

Social Issues and the Environment

- Population growth, Population Explosion, Population Control, Women and Child welfare.
- Urbanization, Industrialization, Development projects, Resettlement and Rehabilitation of people – Problems concerned, Case studies.
- Consumerism and Waste Products Conservation, Public Awareness, Water Conservation, Rain water harvesting, watershed management, Wasteland reclamation, Human Rights, Value education, Environmental ethics- Issues and possible solution.
- Role of information Technology in Environment and Human Health.

Text books :

1. Anubha Kaushik & C P Kaushik, Environmental studies, New age International Publishers, 2008
2. Benny Joseph, Environmental studies, Tata McGraw-Hill Publishers, 2005
3. M Chandra Sekhar, Environmental Science, Hi-Tech Publishers, 2004
4. Keerthinarayana and Daniel Yesudian, Principles of Environmental Sciences and Engineering , Hi-Tech Publishers, 2005
5. Amal K.Datta, Introduction to Environmental Science and Engineering, Oxford & IBH Publishing Co.Pvt.Ltd, 2000
6. Santhosh kumar Garg,Rajeshawri Garg and Rajni Garg, Ecological and Environmental studies, Khanna publishers, 2006

Reference books:

1. Gilbert M, Introduction to Environmental Engineering and Science, Masters Publication by Prentice –Hall of India Private Ltd., 1991
2. William P Cunningham and Mary Ann Cunningham, Principles of Environmental Science, Tata McGraw Hill Publishing Co.Ltd, 2002

MABST301 ENGINEERING MATHEMATICS – III
B.Tech III Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Unit – I

Simple correlation and regression – Curve fitting – Fitting Linear, second degree and exponential curve by the method of least squares – Normal distribution

Unit – II

Determination of roots of non – linear equations: Bisection method – Falsi position method – Newton Raphson method – Iterative method. Solutions of system of linear equations: Gauss elimination with pivotal condensation – Gauss Jacobian, Gauss Seidel iteration methods.

Unit – III

Numerical interpolation: Newtons's forward and backward interpolation formulae – Lagrange's interpolation formulae, Finding first and second order differential coefficients using Newton's formulae. Numerical integration – Trapezoidal, Simpson's 1/3 and Simpson's 3/8 rules.

Unit – IV

Solutions of ordinary differential equations: Taylor's series – Euler method – Modified Euler's method – Runge Kutta methods (second and fourth order only) – Minlne's predictor corrector method.

Unit – V

Solutions of partial differential equations: Solutions of Laplace equation by Liebmann's iteration process – solution of Poisson's equations by using Gauss Seidel iteration method.

Text Books:

1. M. Ray & H.S. Sharma, *Mathematical Statistics,* Ram Prasad &Sons.
2. S. Armugam, *Numerical Methods*, Second Edition, Scitech Publications, Chennai.

References:

1. B.S. Grewel, *Higher Engineering Mathematics*, Thirty First Edition, Khanna Publications, 1995.

MEPCT302 THERMODYNAMICS
B.Tech IIISemester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

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

UNIT - I

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; Various Thermometers-Definition of heat; examples of heat/ work interaction in systems

UNIT – II

First Law for Cyclic & Non-cyclic processes; Concept of total energy E; Demonstration that E is a property; Various modes of energy, Internal energy and Enthalpy; First Law of Thermodynamics and Flow Processes - Derivation of general energy equation for a control volume; Steady state steady flow processes including throttling; Examples of steady flow devices; Unsteady processes; examples of steady unsteady Firs law applications for system & control volume

UNIT - III

Second law of Thermodynamics- 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. Clausius inequality; Definition of entropy S; Demonstration that entropy S is a property; Evaluation of S for solids, liquids, ideal gases and ideal gas mixtures undergoing various processes.

UNIT - IV

Irreversibility and Availability, Availability function for systems and Control volumes undergoing different processes, Lost work. Second law analysis for a control volume. Exergy balance equation and Exergy analysis. Definition of Pure substance, Ideal Gases and ideal gas mixtures, Real gases and real gas mixtures, Compressibility charts- Properties of two phase systems - Const. temperature and Const. pressure heating of water.

UNIT -V

Thermodynamic and Air standard cycles -; Basic Brayton cycle; Introduction to basic concepts of Gas Turbines; Sterling Engine, Otto, Diesel and Dual cycles; Air Standard Efficiency and comparison with Carnot Cycle Efficiency.

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.

Text Books:

- Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, *Fundamentals of Thermodynamics*, John Wiley and Sons.
- Jones, J. B. and Duggan, R. E., 1996, *Engineering Thermodynamics*, Prentice-Hall of India
- Moran, M. J. and Shapiro, H. N., 1999, *Fundamentals of Engineering Thermodynamics*, John Wiley and Sons.
- Nag, P.K, 1995, *Engineering Thermodynamics*, Tata McGraw-Hill Publishing Co. Ltd.
- Domakundwar and Kothandaraman, *A Course in Thermal Engineering;*
- Vasanadni, V.P. and Kumr, D.S., *Heat Engineering.*

MEPECT303 INDUSRTRIAL SAFETY &MEASURES

B.Tech IIISemester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

UNIT-I

Introduction: Evolution of modern safety concept- Safety policy - Safety Organization - line and staff functions for safety- Safety Committee- budgeting for safety. Accident investigation: Concept of an accident, reportable and non reportable accidents, unsafe act and condition – principles of accident prevention, Supervisory role- Role of safety committee - Accident causation models. Techniques : Incident Recall Technique (IRT), disaster control, Job Safety Analysis (JSA), safety survey, safety inspection, safety sampling, Safety Audit.

UNIT-II

Safety performance monitoring: Permanent total disabilities, permanent partial disabilities, temporary total disabilities - Calculation of accident indices, frequency rate, severity rate, frequency severity incidence, incident rate, accident rate, safety "t" score, safety activity rate – problems

UNIT-III

Safety in engineering industry- Need of safety in engineering industry, general health hazards and control measures in engineering industry.

Safety measures for electric work, Overload and other protections, Energy conservation and safety. Electrical work in hazardous atmosphere, Static electricity

UNIT-IV

Hazard identification techniques: Hazard identification techniques with examples such as FMEA, CMA, Fault Tree Analysis, Preliminary Hazard Analysis (PHA), Hazard and operability (HAZOP) study, Safety Audit.

UNIT-V

Plant and Equipment Safety Appraisal & Control Techniques: Objectives, Plant safety observation, Plant Safety Inspections. Safety Sampling. Safety Surveys. Job Safety Analysis. Safety Inventory System.

REFERENCES:

1. Krishnan N.V. "Safety Management in Industry" Jaico Publishing House, Bombay, 1997.
2. . Accident Prevention Manual for Industrial Operations", N.S.C.Chicago, 1982
3. "Safety in Industry" N.V. Krishnan Jaico Publishery House, 1996.

CEEST304 ENGINEERING MECHANICS
B.Tech III Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

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UNIT – I
Statics : Basic concepts – System of force, Concurrent and non – concurrent Coplanar and non – coplanar forces – Resultant – Moment of force and its applications – Couples and resultant of force systems – Equilibrium of systems of forces – free body diagrams (FBDs), Equations of equilibrium of coplanar systems and spatial systems.

UNIT-II
Center of gravity and moment of inertia – Theory of Pappus – Centroids of composite figures – Areas of gravity of bodies – Moment of inertia – Parallel and perpendicular axis theorems – Moments of inertia of composite of areas (rolled and built – up sections) – Radius of gyration of areas.

UNIT-III
Simple Stress and Strains – Elasticity and Plasticity – Types of stresses and strains – Hooke's law – Stress – Strain diagram for mild steel – Working stress – Factor of safety.
Lateral Strain and Poisson's ratio – Volumetric strain – Elastic module and relationship between elastic constants – Bars of varying section – Composite bars – Temperature stresses. Strain energy - principles of virtual work.

UNIT-IV
Kinematics: Rectilinear and Curvilinear motion – Velocity and Acceleration – Motion of A Rigid Body
– Types and their Analysis in Planar Motion.
Kinetics: Analysis as a particle and Analysis as a Rigid Body in Translation – Central Forces of motion– Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies – Work Energy Method – Equation for Translation – Work Energy application to Particle Motion, Connection System – Fixed axis Rotation and Plane Motion

UNIT-V
Analysis of Perfect Frames: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints and method of sections.
Mechanical Vibrations: Definitions, Concepts-Simple Harmonic motion-Free vibrations-Simple Compound and Torsional pendulum- Numerical problems.

Text Books:

1. Ghose, D.N., Applied Mechanics and Strength of Materials
2. Timoshenko and Young, Engineering Mechanics
3. Junarkar, S.B. Mechanics of Structures, Vol. 1.
4. Junarkar, S.B., Elements of Applied Mechanics

MEPCT305 Manufacturing Technology

B.Tech IIISemester

Effective from- 2018-19

Lectures / Week: 3 periods **credits: 3**

Objective:

(i)To provide knowledge on machines and related tools for manufacturing various components.

(ii) To understand the relationship between process and system in manufacturing domain.

(iii) To identify the techniques for the quality assurance of the products and the optimality of the process in terms of resources and time management.

Unit - I

Tooling for conventional and non-conventional machining processes: Mould and die design,Press tools, Cutting tools; Holding devices: Jigs and fixtures, principles, applications and design; press tools – configuration, design of die and punch; principles of forging die design. **(8)**

Unit - II

Metrology: Dimensions, forms and surface measurements, Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; Metrology in tool wear and part quality including surface integrity, alignment and testing methods. **(8)**

Unit - III

tolerance analysis in manufacturing and assembly. Process metrology for emerging machining processes such as micro-scale machining, Inspection and workpiece quality.Assembly practices: Manufacturing and assembly, process planning, selective assembly, Material handling and devices. Additive Manufacturing, Rapid Prototyping and Rapid Tooling. **(8)**

Unit - IV

Production planning & control: Forecasting models, Aggregate Production Planning, materials requirement planning. Inventory Models: Economic Order Quantity, quantity discount models, practical inventory control models, ABC,VED,FSN analyses, JIT. Simple queuing theory models. **(8)**

Unit – V

Competitive aspects in manufacturing. selection of materials, shapes and commercially available materials, manufacturing properties, cost of materials and processing, substitution of materials, selection of manufacturing process, dimensional tolerance and surface finish, production volume, manufacturing costs, value engineering concept . (8)

Course Outcomes:

Upon completion of this course, students will be able to the tooling needed for manufacturing, the dimensional accuracy and tolerances of products, assembly of different Components and the application of optimization methods in manufacturing.

Text Books:

1. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)-Pearson India, 2014.
2. Taha H. A., Operations Research, 6th Edition, Prentice Hall of India, 2003.
3. Shenoy G.V. and Shrivastava U.K., Operations Research for Management, Wiley Eastern, 1994.
4. Panneerselvam, "Operations Research", PHI Learning, 2006.

MEPCT308 Advanced Engineering Graphics
B.Tech IIISemester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3.5**

Course Contents:

UNIT-I

Sections of solids of tetrahedron, cube, prism, pyramids and cone, section planes perpendicular to HP and inclined to VP, Section planes perpendicular to VP and inclined to HP sections plane Perpendicular to both HP and VP.

UNIT-II

Development of surfaces: Development of lateral surfaces of right regular solids as prisms, pyramids, cylinders and cones which are cut by plane inclined to HP only.

UNIT-III

Introduction to interpenetration of solids of intersection of two prisms, cylinders, cone and cylinder.

UNIT-IV

Isometric Projections: Isometric Projections and views such as prisms, Pyramids, cylinders and cones.

Solids placed one over the other.

UNIT-V

Introduction to AUTOCAD-Co-ordinate system, Object snap, Draw Tools -Line, Polyline, Rectangle, circle, spline, Ellipse, Point, Hatch, Text, Modify Tools - Erase, copy, Mirror, Offset, Array, Move Rotate, Trim, Fillet, Dimensions - Dimension Variables, Linear, Aligned, Radius and diameter, Angular Dimensions

Text Books:

1. Bhatt N.D. and V.M. Panchal, Engineering Drawing Revised Edition, Charotar Publications, 2010.
2. Dhananjaya A Jolhe, Engineering Drawing with an introduction to Auto CAD, Tata MeGrawhill - 2009.
3. Gautam Pohit, Gautam Gosh: Machine Drawing with auto cad-Pearson Publications
4. K.L.Narayana and P. Kannaih, A text Book of Engineering Drawing, SCITECH Publications – (1999)
5. K. Venugopal: Engineering Drawing & Graphics, New age International Publishers.

MEPCP309 Manufacturing Process Lab

B.Tech IIISemester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:1.5**

LIST OF EXPERIMENTS:

LATHE

Model 1: Step Turning

Model 2: Taper Turning with Knurling

Model 3: V Threading

SHAPER

Model 4: Making Square prism on Shaper

Model 5: Slot Cutting with Shaping Machine

MILLING MACHINE

Model 6: Rectangular Slot Cutting on Vertical Milling Machine

Model 7: Hexagonal Cutting on Horizontal Milling Machine

Model 8: Spur Gear cutting on Milling

THREADING

Model 9: Square Threading

Model 10: Double Start V Threading

Model 11: Drilling and Tapping

Model 12: Joining of Two Metal Work Pieces with Arc Welding or Gas Welding

Model 13: Pattern Making Related Moulding

MEPCT402 Applied Thermodynamics
B.Tech IV Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

Objectives:

- To learn about of I law for reacting systems and heating value of fuels
- To learn about gas and vapor cycles and their first law and second law efficiencies
- To understand about the properties of dry and wet air and the principles of psychrometry
- To learn about gas dynamics of air flow and steam through nozzles
- To analyze the performance of steam turbines

Contents:

UNIT – I

Introduction to Fuels; Solid, liquid and gaseous fuels– Calorific Value of Fuels; Determination and Calculation of from Chemical Analysis, Combstion equations – Air required complete combustion. Stoichiometry, exhaust gas analysis- First law analysis of combustion reactions-Heat calculations. (8)

UNIT - II

Vapor power cycles- Basic Steam Power Cycles., Carnot and Rankine cycle, Modified Ranking Cycle; Binary Vapour Cycle- with superheat, reheat and regeneration, energy analysis. Super-critical and ultra super-critical Rankine cycle- Gas power cycles, - cycle, effect of reheat, regeneration & intercooling- Combined gas and vapor power cycles. Introduction to Psychrometry: Refrigeration and Air Conditioning- Use of Refrigerant Tables – R134a. **(8)**

UNIT -III

Steam Properties and Steam Generators: Properties of Steam, Definitions of saturated states; PV, TS, HS Diagrams, P-V-T surface; Use of steam tables; Determination of S from steam tables- Principle of increase of entropy; Saturation tables; Superheated tables; Steam Processes – Constant Volume, Constant pressure – Isothermal, Adiabatic and Hyperbolic Process, Throttling expansion.Identification of states & determination of properties, Mollier's chart **(8).**

UNIT – IV

Basics of compressible flow. Stagnation properties, Isentropic flow of a perfect gas through a nozzle, choked flow, subsonic and supersonic flows- normal shocks- use of ideal gas tables for isentropic flow and normal shock flow- Flow of steam and refrigerant through nozzle, supersaturation- compressible flow in diffusers, efficiency of nozzle and diffuser. **(8)**

UNIT -V

Analysis of steam turbines: Principles and operation – Classification - velocity and pressure compounding of steam turbines – Work done – Diagram Efficiency, Effect of Blade friction – stage efficiency, , Turbine reheat factor, Height of Turbine blade – Axial Thrust – losses in steam turbine ; Governing of turbines; Nozzles and classification - Definition of Isentropic efficiency for compressors, turbines and nozzles. **(8)**

Total number of hours (40 lecture hours + 12 tutorials)

Outcomes:

After completing this course, the students will get a good understanding of various practical power cycles and heat pump cycles.

They will be able to analyze energy conversion in various thermal devices such as combustors, air coolers, nozzles, diffusers, steam turbines and reciprocating compressors

They will be able to understand phenomena occurring in high speed compressible flows

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.

5) Eastop and McKaney, *Applied Termodynamics*

6) Domakundwar and Kothandaraman, *A Course in Thermal Engineering.*

CEPCT403 Fluid Mechanics And Fluid Machines

B.Tech IV Semester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

Objective:

- To learn about the application of mass and momentum conservation laws for fluid flows
- To understand the importance of dimensional analysis
- To obtain the velocity and pressure variations in various types of simple flows
- To analyze the flow in water pumps and turbines.

Contents :

UNIT-I

Definition of fluid, Newton's law of viscosity, Units and dimensions-Properties of fluids, mass density, specific volume, specific gravity, viscosity, compressibility and surface tension, Control volume- application of continuity equation and momentum equation, Incompressible flow, Bernoulli's equation and its applications.**(9)**

UNIT-II

Exact flow solutions in channels and ducts, Couette and Poisuielle flow, laminar flow through circular conduits and circular annuli- concept of boundary layer – measures of boundary layer thickness – Darcy Weisbach equation, friction factor, Moody's diagram. **(9)**

UNIT-III

Need for dimensional analysis – methods of dimension analysis – Similitude – types of similitude Dimensionless parameters – application of dimensionless parameters – Model analysis. **(6)**

UNIT-IV

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. **(8)**

UNIT-V

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. **(8)**

Course Outcomes:

- Upon completion of this course, students will be able to mathematically analyze simple flow situations
- They will be able to evaluate the performance of pumps and turbines.

TEXT BOOKS:

1. Fluid Mechanics - Frank M. White ll
2. Fox and Mcdonald's Introduction to Fluid Mechanics
3. Fluid Mechanics - Yunus Cengel and John Cimbala
4. Introduction To Fluid Mechanics And Fluid Machines - SK Som, G Biswas and S Chakraborty
5. A Text book of FLUID MECHANICS AND HYDRAULIC MACHINES- RK BANSAL

CEPCT404 Solid Mechanics
B.Tech IV Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Objectives:
The objective is to present the mathematical and physical principles in understanding the linear continuum behavior of solids.

Course Contents:

UNIT-I
Introduction to Cartesian tensors, Strains: Concept of strain, derivation of small strain tensor and compatibility, Stress: Derivation of Cauchy relations and equilibrium and symmetry equations, principal stresses and directions

UNIT-II
Constitutive equations: Generalized Hooke's law, Linear elasticity, Material symmetry; Boundary Value Problems: concepts of uniqueness and superposition.

UNIT-III
Plane stress and plane strain problems, introduction to governing equations in cylindrical and spherical coordinates, axisymmetric problems.

UNIT-IV
Application to thick cylinders, rotating discs, torsion of non-circular cross-sections, stress concentration problems, thermo-elasticity, 2-d contact problems.

UNIT-V
Solutions using potentials. Energy methods. Introduction to plasticity.

Course Outcomes:
Upon completion of this course, students will be able understand the deformation behavior of solids under different types of loading and obtain mathematical solutions for simple geometries.

Text Books:
[1] G. T. Mase, R. E. Smelser and G. E. Mase, Continuum Mechanics for Engineers, Third Edition, CRC Press, 2004.
[2] Y. C. Fung, Foundations of Solid Mechanics, Prentice Hall International, 1965.
[3] Lawrence. E. Malvern, Introduction to Mechanics of a Continuous Medium, Prentice Hall international, 1969.

MEPCT405 Materials Engineering
B.Tech IV Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Course Contents:

Unit - I

Crystal Structure: Unit cells, Metallic crystal structures, Ceramics. Imperfection in solids: Miller Indices, Point, line, interfacial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress. **(8)**

Unit - II

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. **(8)**

Unit - III

Alloys, substitutional and interstitial solid solutions- Phase diagrams: Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. Iron Iron-carbide phase diagram and microstrctural aspects of ledeburite, austenite, ferrite and cementite, cast iron. **(8)**

Unit - IV

Heat treatment of Steel: Annealing, tempering, normalising and spheroidising, isothermal transformation diagrams for Fe-C alloys and microstructure development. Hot Working and Cold Working, Continuous cooling curves and interpretation of final microstructures & properties- austempering, martempering, case hardening, carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, vacuum & plasma hardening. **(8)**

Unit – V

Alloying of steel, properties of stainless steel and tool steels, maraging steels – TTT Cures- cast irons; grey, white, malleable and spheroidal cast irons- copper and copper alloys; brass, bronze and cupro-nickel; Aluminium and Al-Cu – Mg alloys- Nickel based superalloys and Titanium alloys Powder metallurgy Basic Concepts, introduction to Nano Materials. **(8)**

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

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. Sidney Avner. "Introduction to Physical Metallurgy", Tata McGraw-hill, New Delhi, 1997.

MEPCT406 Instrumentation and Control
B.Tech IV Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Objectives:

1. To provide a basic knowledge about measurement systems and their components
2. To learn about various sensors used for measurement of mechanical quantities
3. To learn about system stability and control
4. To integrate the measurement systems with the process for process monitoring and control

Contents:

UNIT-I

Basic Concepts of Measurements: Introduction to measurement and measuring instruments, Methods of measurement, Modes of measurement, generalized measuring system and functional elements, instruments and its classifications, Sensors and Transducer and its classification, Static and dynamic performance characteristics of measurement devices, sources of error in measurement, classification and elimination of errors, uncertainty in measurements.

UNIT-II

Displacement Velocity/Speed, and Acceleration Measurement: Working principal of Resistive Potentiometer, Linear variable differential transducers, Electro Magnetic Transducers, Mechanical, Electrical and Photoelectric Tachometers, Piezoelectric Accelerometer, Seismic Accelerometer.

UNIT-III

Pressure Measurement: Pressure standards and methods of pressure measurement; Manometers; Elastic pressure transducers; Measurement of Vacuum; Force balance pressure gauges; Electrical pressure transducers; pressure switches; Calibration of pressure measuring instruments.

UNIT-IV

Temperature Measurement: Methods of temperature Measurement; Expansion thermometers: Bi-metallic, Liquid in glass; Filled System thermometers; Electrical temperature measuring instrument: Thermocouples, RTD, Thermistors; Pyrometers; Calibration of temperature measuring instruments.

UNIT-V

Measurement of Force, Torque, Power: Force measurement: Hydraulic force meter, Pneumatic force meter, Strain gauge load cell, cantilever beams, proving rings, and differential transformers. Measurement of torque and power: Prony brake dynamometer, Rope brake dynamometer, Hydraulic dynamometer, Eddy current dynamometer, Torsion bar dynamometer, Servo-controlled dynamometer.

Course Outcomes:

Upon completion of this course, the students will be able to understand the measurement of various quantities using instruments, their accuracy & range, and the techniques for controlling devices automatically.

Text Books:

1. D.S. Kumar, “Mechanical Measurement & Control”, 4th Edition, Metropolitan Book Co, New Delhi, 2006.
2. B.C.Nakra and K.K.Choudhary, “Instrumentation measurement and analysis”, 3rd Edition, McGraw Hill Education (India) Private Limited, New Delhi, 2009.
3. A.K.Sawhney and Puneet Sawhney, “Mechanical Measurement and Instrumentation & Control”, 12th Edition, Dhanpat Rai & Co, 2009.
4. S. K. Singh, “Industrial Instrumentation and Control”, 3rd Edition, McGraw Hill Education (India) Private Limited, New Delhi, 2009.
5. R. K. Rajput, “Mechanical Measurements and Instrumentation”, 2nd Edition, S K Kataria & Sons, New Delhi, 2006.
6. Thomas G. Beckwith, Roy D. Marangoni, John H. and Lienhard V, “Mechanical Measurements”, 6th Edition, Addison Wesley

MEPCT407 Machine Drawing
B.Tech IV Semester
Effective from- 2018-19

Lectures / Week: 4periods **credits:3**

Unit – I

Orthographic Views: Conversion of Pictorial views into Orthographic views with sectioning.

Unit - II

Machine Elements: Drawing views of the following machine elements: Thread profiles, Bolted joint, machine and cap screws, types of nuts, locking devices for nuts, Foundation Bolts.
Keys: Sunk Keys, Feather Keys, Spline Shaft, Wood – Ruff Key and round Key.

Unit – III

Shaft Couplings: Muff Coupling, Split muff Coupling, Flanged Coupling, protective type flanged coupling.
Riveted Joints: Different types of rivet heads, Different types of lap joints and butt joint.

Unit – IV

Assembly Drawing: Preparation of assembly drawing of Plumber Block, Foot Step Bearing, Swivel Bearing, Screw jack, Stuffing Box, Pipe Vice, Lathe tail Stock, Clapper box, Drill Jig, Cross head, Air cock.

Unit – V

Part Drawing: Preparation of part drawing of IC engine connecting rod, Revolving Centre, Square tool post, Eccentric, V- Belt drive, Drill jig, Cross head.

TEXT BOOKS:

1. Narayana K.L, Kannaiah P. and Venkata Reddy K.: Production Drawing, First Edition, New Age International, 2005.
2. Narayana K.L, Kannaiah P. and Venkata Reddy K.: Machine Drawing, Third Edition, New Age International, 2006.

REFERENCES:

1. Bhatt N.D.: Machine Drawing, Charotor Publishers, 2008
2. Dhawan R.K.: Machine Drawing, Second Edition, S. Chand & Company Limited, 1998

MEHST408 Operations Research
B.Tech IV Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

UNIT-I

Introduction to general nature of operations research Models and their types
Introduction to LP Problems, examples, Graphical method of solution. Simplex Algorithm.
Duality.

UNIT-II

Transportation and Assignment problems, Transhipment models and Traveling Salesman Problems

UNIT-III

Replacement models – replacement of items that deteriorate with time and group replacement of items that fail suddenly.

Game theory models – two persons zero sum games.

UNIT-IV

Inventory models, costs used in inventory models, Basic inventory models – deterministic and static demand. Models with price breaks - Models with restrictions. Single period models with probabilistic demand and without set up cost.
Inventory control: ABC Analysis. Fixed order quantity, Fixed order interval systems and S-s policy.

UNIT-V

Waiting line models – Basic structure of queuing models, single server and multi server models-Stress is only on applications.
Simulation – simple models in inventory and queuing systems.

TEXT BOOKS:

1. Vohra N. D.: Quantitative Techniques in Management, 3rd Edition, Tata Mc Graw Hill, 2007.
2. Pannerselvam R.: Operations Research, 2nd Edition, PHI, 2006.

MEPCP409 Fuels and IC Engines Laboratory
B.Tech IV Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:1.5**

LIST OF EXPERIMENTS:

1. Measurements of Viscosity of Various Lubricating oils.
2. Test on Flash and Fire Point Apparatus.
3. Test on Distillation Apparatus.
4. Test on Aniline Point Apparatus.
5. Test on Bomb Calorimeter.
6. Performance Test On A Centrifugal Blower
7. Load Test and Smoke Test on I.C. Engines.
8. Heat balance sheet on I.C. Engines.
9. Valve Timing diagrams for Petrol & Diesel Engine cut models.
10. Port Timing diagrams for Petrol & Diesel Engine cut models
11. Performance Test on Air Compressor.
12. Performance Test on centrifugal blower.
13. Volumetric efficiency test on I.C engine.
14. Retardation Test on an I.C. Engine.
15. Air fuel ratio & volumetric efficiency test on I. C. Engine.
16. Test for optimum flow rate of cooling water for an I. C. Engine.

MEPCT501 Heat Transfer
B.Tech V Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

Objectives:

(1) The aim of the course is to build a solid foundation in heat transfer exposing students to the three basic modes namely conduction, convection and radiation.

(2) Rigorous treatment of governing equations and solution procedures for the three modes will be provided, along with solution of practical problems using empirical correlations.

(3) The course will also briefly cover boiling and condensation heat transfer, and the analysis and design of heat exchangers.

Contents:

UNIT-I

Introduction to three modes of heat transfer, Derivation of heat balance equation- Steady one dimensional solution for conduction heat transfer in Cartesian, cylindrical and spherical geometry, concept of conduction and film resistances, critical insulation thickness, lumped system approximation and Biot number, heat transfer through pin fins- Two dimensionalconduction solutions for both steady and unsteady heat transfer-approximate solution to unsteady conduction heat transfer by the use of Heissler charts.**(12)**

UNIT-II

Heat convection,basic equations, boundary layers- Forced convection, external and internal flows- Natural convective heat transfer- Dimensionless parameters for forced and free convection heat transfer-Correlations for forced and free convection- Approximate solutions to laminar boundary layer equations (momentum and energy) for both internal and external flow- Estimating heat transfer rates in laminar and turbulent flow situations using appropriate correlations for free and forced convection. **(8)**

UNIT-III

Interaction of radiation with materials, definitions of radiative properties, Stefan Boltzmann's law, black and gray body radiation, Calculation of radiation heat transfer between surfaces using radiative properties, view factors and the radiosity method.**(8)**

UNIT-IV

Types of heat *exchangers,* A nalysis and design of heat exchangers using both LMT D and ε - NTU methods.**(6)**

UNIT-V

Boiling and Condensation heat transfer, Pool boiling curve**(3)**

Introduction mass transfer, Similarity between heat and mass transfer**(3)**

Course Outcomes:

1. After completing the course, the students will be able to formulate and analyze a heat transfer problem involving any or all of the three modes of heat transfer
2. The students will be able to obtain exact solutions for the temperature variation using analytical methods where possible or employ approximate methods or empirical correlations to evaluate heat transfer problems.
3. The student will be able to calculate the insulation needed to reduce heat losses and also select the right type of insulation.
4. The students will be able to design devices such as heat exchangers by applying relevant equations.

TextBooks:

1. A. Bejan, Heat Transfer John Wiley, 1993
2. J.P.Holman, Heat Transfer, Eighth Edition, McGraw Hill, 1997.
3. F.P.Incropera, and D.P. Dewitt, Fundamentals of Heat and Mass Transfer, John Wiley, Sixth Edition, 2007.
4. MassoudKaviany, Principles of Heat Transfer, John Wiley, 2002
5. Yunus A Cengel, Heat Transfer : A Practical Approach, McGraw Hill, 2002
6. Heat Transfer by R.C. Sachdeva

MEPCT502 Design of Machine Elements
B.Tech V Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

Objectives:
This course seeks to provide an introduction to the design of machine elements commonly encountered in mechanical engineering practice, through 1. A strong background in mechanics of materials based failure criteria underpinning the safety-critical design of machine components 2. An understanding of the origins, nature and applicability of empirical design principles, based on safety considerations 3. An overview of codes, standards and design guidelines for different elements 4. An appreciation of parameter optimization and design iteration 5. An appreciation of the relationships between component level design and overall machine system design and performance

Course Contents:

UNIT-I
Engineering Design
What is designing? ; The process of Design; design by evolution; The Morphology of design; Identification and analysis of need; True need; Specifications ; Standards of performance ; use of checklists ; Morphological Analysis ; Brainstorming; measure of physical realizibility; Economic and financial feasibility ; Designing for shipping, handling and installation; Design for maintenance ; Detailed design

Unit-II
Design considerations - limits, fits and standardization, Modes of failure; factor of safety; Stress-strain relationships; shear stress and shear strain relationships Review of failure theories for static and dynamic loading (including fatigue failure), Stress Concentration factors; Reduction of stress concentration effects ; Fluctuating stresses; fatigue Failure; Endurance limit; Notch sensitivity; Endurance limit; Soderberg and Goodman Diagrams; Modified Goodman's diagrams; Fatigue design under combined stresses. Design for finite and infinite life.

UNIT-III
Design of shafts and keys:
Design of shafts under static and fatigue loadings,; Axial, Bending, Torsional stresses; principles stresses; Theories of failure. Couplings:
Keys: Types of Keys; Design of shunk key. Effect of key way. Design of Splines.

UNIT-IV
Design of shaft couplings & pipe joints:
Introduction, Types of Shaft Couplings: Design of Sleeve or muff couplings, Clamp or Compression coupling, Flange Couplings. Design of Bushed pin type flexible coupling.
PIPE JOINTS: Introduction, Design of pipe joints, Hydraulic Pipe Joints, Design Of Flanged Pipe Joints

UNIT-V
Design of fasters Threaded joints-Thread joints; ISO metric screw threads, Bolted joint in tension; Torque requirement for bolt tightening; bolted joint under fluctuating load; eccentricity loaded bolted joints in shear; bolted joints with combined stresses; Bolt of uniform strength. Analysis and applications of power screws
Welded joints-types of welded joints; stresses in butt and fillet welds; strength of welded joints;

eccentricity welded joint; weld joint subject to bending moment and fluctuating forces; welding symbols; weld inspection

Course Outcomes:

Upon completion of this course, students will get an overview of the design methodologies employed for the design of various machine components

Text Books:

[1] Shigley, J.E. and Mischke, C.R., Mechanical Engineering Design, Fifth Edition, McGraw-Hill International; 1989.

[2] Deutschman, D., Michels, W.J. and Wilson, C.E., Machine Design Theory and Practice, Macmillan, 1992.

[3] Juvinal, R.C., Fundamentals of Machine Component Design, John Wiley, 1994.

[4] Spottes, M.F., Design of Machine elements, Prentice-Hall India, 1994.

[5] R. L. Norton, Mechanical Design – An Integrated Approach, Prentice Hall, 1998

MEPCT504 Kinematics of machinery

B.Tech V Semester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

Objectives:

- To understand the kinematics and rigid- body dynamics of kinematically driven machine components
- To understand the motion of linked mechanisms in terms of the displacement, velocity and acceleration at any point in a rigid link
- To be able to design some linkage mechanisms and cam systems to generate specified output motion
- To understand the kinematics of gear trains

Contents :

UNIT-I

Classification of mechanisms- Basic kinematic concepts and definitions- Degree of freedom, mobility- Grashof's law, Kinematic inversions of four bar chain and slider crank chains- Limit positions- Mechanical advantage- Transmission angle- Description of some common mechanisms- Quick return mechanism, straight line generators- Universal Joint- Rocker mechanisms

UNIT-II

Displacement, velocity and acceleration analysis of simple mechanisms, graphical velocity analysis using instantaneous centers, velocity and acceleration analysis using loop closure equations- kinematic analysis of simple mechanisms- slider crank mechanism dynamics- Coincident points- Coriolis component of acceleration- introduction to linkage synthesis- three position graphical synthesis for motion and path generation

UNIT-III

Classification of cams and followers- Terminology and definitions- Displacement diagrams- Uniform velocity, parabolic, simple harmonic and cycloidal motions- derivatives of follower motions- specified contour cams- circular and tangent cams- pressure angle and undercutting, sizing of cams, graphical and analytical disc cam profile synthesis for roller and flat face followers

UNIT-IV

Involute and cycloidal gear profiles, gear parameters, fundamental law of gearing and conjugate action, spur gear contact ratio and interference/undercutting- helical, bevel, worm, rack & pinion gears, epicyclic and regular gear train kinematics**(8)**

UNIT-V

Surface contacts- sliding and rolling friction- friction drives- bearings and lubrication- friction clutches- belt and rope drives- friction in brakes **(8)**

CourseOutcomes:

- After completing this course, the students can design various types of linkage mechanisms for obtaining specific motion and analyse them for optimal functioning

Text Books:

1. Thomas Bevan, Theory of Machines, 3rd edition, CBS Publishers & Distributors, 2005.
2. CleghornW.L. , Mechanisms of Machines, Oxford University Press, 2005.
3. Robert L. Norton, Kinematics and Dynamics of Machinery, Tata McGrawHill, 2009.
4. Ghosh A. and Mallick A.K., Theory of Mechanisms and Machines, Affiliated East-West Pvt. Ltd, New Delhi, 1988.

MEPETE 02 ADVANCED MANUFACTURING PROCESS
B.Tech V Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Course Objectives: To make the student

- Acquire knowledge about nontraditional machining process
- Understand theory involved material removal mechanism
- Study the different process parameters
- Know the material addition processes

UNIT-I

MATERIAL REMOVAL PROCESSES: Introduction, history of machining, traditional machining processes, nontraditional machining processes, hybrid machining processes. need for non-traditional machining processes.

MECHANICAL PROCESSES: Ultrasonic machining - Introduction, the machining system, material removal process, factors affecting material removal rate, dimensional accuracy and surface quality, applications.

Water jet machining - Introduction, The machining system, Process parameters, Applications, Advantages and disadvantages of Abrasive jet machining - Introduction, Machining system, Material removal rate, Applications, Advantages and limitations of AJM.

UNIT-II

CHEMICAL PROCESSES: Chemical Milling - Introduction, Tooling for CHM, Process parameters, Material removal rate, Accuracy and surface finish, Advantages, Limitations, Applications Photochemical Milling - Introduction, Process description Applications, Advantages Electro Polishing - Introduction, Process parameters, Applications, Process limitations.

ELECTROCHEMICAL PROCESSES: Electro Chemical Machining: Introduction, Principles of electrolysis, Theory of ECM, ECM equipment, Basic working principles, Process characteristics, Process control, Applications Basics of Electrochemical Drilling, Electro-Chemical Deburring, and Electro stream drilling

UNIT-III

HYBRID ELECTROCHEMICAL PROCESSES: Electro Chemical Grinding - Introduction, Material removal rate, Accuracy and surface quality, Applications, Advantages and disadvantages Electrochemical Honing - Introduction, Process characteristics, Applications Electrochemical Super Finishing - Introduction, Material removal process, Process accuracy Electrochemical Buffing - Introduction, Material removal process

UNIT-IV

THERMAL PROCESSES: Introduction, Mechanism of material removal, The machining system, Material removal rates, Heat-affected zone, Applications. Wire EDM principle, Process parameters, surface finish and machining accuracy, applications.

Laser beam machining - Introduction, material removal mechanism, applications, advantages and limitations. electron beam machining - introduction, basic equipment and removal mechanism, applications, advantages and disadvantages. Plasma beam machining - introduction, machining systems, material removal rate, accuracy and surface quality, applications, advantages and disadvantages. Ion beam machining - introduction, material removal rate, accuracy and surface effects, applications

UNIT-V MATERIAL ADDITION PROCESSES: INTRODUCTION, CLASSIFICATION : Liquid-Based Techniques – stereo-lithography, holographic interference solidification, beam interference solidification, solid ground curing-liquid thermal polymerization, fused deposition, modeling, multi jet modeling, ballistic particles manufacturing, shape deposition manufacturing. Powder based processes - selective laser sintering, laser engineered net shaping, three-dimensional printing. Solid-Based techniques -solid foil polymerization, laminated object modeling.

Course Outcomes: The student will be able to

- Differentiate between various nontraditional machining process
- Identify suitable nontraditional machining process
- Be familiar with various material removal mechanisms
- Explain the phenomena of material addition processes

TEXT BOOKS:

El-Hofy, Hassan Abdel-Gawad, "Advanced Machining Processes: Nontraditional And Hybrid Machining Processes", McGraw-Hill, 2005.

REFERENCES:

1. Pandey P.C. and Shah H.S, "Modern Machining Processes", 1st Edition, TMH, 2010.

2. Bhattacharya A, "New Technology, the Institution of Engineers", India 1984.

3. V. K. Jain, "Advanced machining processes", 1st Edition, Allied publishers, 2010.

MEPETE08 Advanced Engineering Graphics
B.Tech V Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

UNIT-I

Sections of solids of tetrahedron, cube, prism, pyramids and cone, section planes perpendicular to HP and inclined to VP, Section planes perpendicular to VP and inclined to HP sections plane Perpendicular to both HP and VP.

UNIT-II

Development of surfaces: Development of lateral surfaces of right regular solids as prisms, pyramids, cylinders and cones which are cut by plane inclined to HP only

UNIT-III

Introduction to interpenetration of solids of intersection of two prisms, cylinders, cone and cylinder.

UNIT-IV

Isometric Projections: Isometric Projections and views such as prisms, Pyramids, cylinders and cones. Solids placed one over the other.

UNIT-V

Introduction to AUTOCAD-Co-ordinate system, Object snap, Draw Tools -Line, Polyline, Rectangle, circle, spline, Ellipse, Point, Hatch, Text, Modify Tools - Erase, copy, Mirror, Offset, Array, Move Rotate, Trim, Fillet, Dimensions - Dimension Variables, Linear, Aligned, Radius and diameter, Angular Dimensions

Text Books:

1. Bhatt N.D. and V.M. Panchal, Engineering Drawing Revised Edition, Charotar Publications, 2010.
2. Dhananjaya A Jolhe, Engineering Drawing with an introduction to Auto CAD, Tata MeGrawhill - 2009.
3. Gautam Pohit, Gautam Gosh: Machine Drawing with auto cad-Pearson Publications
4. K.L.Narayana and P. Kannaih, A text Book of Engineering Drawing, SCITECH Publications – (1999)
5. K. Venugopal: Engineering Drawing & Graphics, New age International Publishers.

MEPETE13 INDUSTRIAL ENGINEERING AND MANAGEMENT
B.Tech V Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

UNIT – I

Administration, Management and Organization. Scientific Management. Functions of Management . Principles of Management. Types of Organization. Principles of Organization. Fayol's and Taylor's contributions to Management.
Personnel Management – A brief review of functions of personnel management. Concepts of job evaluation and merit rating.

UNIT – II

Plant Location – Location factors, concept of Weber theory. Choice of city, Suburban and country locations.

Plant Layout – Definition, Objectives, Salient features of product, process and fixed position layouts. Material Handling – Definition, Objectives, Classification of material handling equipment and factors influencing their selections

UNIT – III

Sales forecasting – need, Classification moving average exponential smoothing and linear regression technique.
Production Planning and Control – Objectives, Salient features of functions of PPC.

UNIT – IV

Work study – Definition, objectives and uses. Method study – definition. Objectives procedure and uses. Time study – Definition, needs, functions, and basic concepts of break down, preventive, predictive and total productive maintenance.

UNIT – V

Safety in industry – need safety programs, accident prevention, economic aspects, causes of accidents, accident prevention.Industrial disputes – Causes and methods of settling Labour participation in management concept. Types and advantages A brief outline of Factories Act, Industrial disputes Act and Workmen's Compensation Act.

TEXT BOOKS:

1. Khanna O P: Industrial Engineering And Management , 7th Edition, Dhanpat Rai & Sons, 2002
2. Panner Selvam R , Production and Operation Management
3. Ralph Barnes: Principles Of Motion And Time Study, Tata McGraw Hill, 1956
4. Joseph G Monks: Operation Management, 3rd Edition, McGraw-Hill, 1987

REFERENCES:

1. Adam & Edbert: Production/Operation Management, 5th Edition, Prentice Hall, 1992
2. Chary S.N.: Production and Operation Management,14th Reprint, Tata McGraw Hill, 2007
3. Buffa E S: Modern Production/Operation Management, 8th Edition, Wiley India, 2007
4. Clade S. George Jr : Management For Business Industry,1972

MEPETE18 Mechatronic Systems
B.Tech V Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

COURSE OBJECTIVE:

(i) To understand the structure of microprocessors and their applications in mechanical devices
(ii) To understand the principle of automatic control and real time motion control systems, with the help of electrical drives and actuators
(iii) To understand the use of micro-sensors and their applications in various fields

Course Contents:

UNIT-I

Introduction: Definition of Mechanical Systems, Philosophy and approach; Systems and Design: Mechatronic approach, Integrated Product Design, Modeling, Analysis and Simulation, Man-Machine Interface.

UNIT-II

Sensors and transducers: classification, Development in Transducer technology, Opto- electronics-Shaft encoders, CD Sensors, Vision System, etc.;

UNIT-III

Drives and Actuators: Hydraulic and Pneumatic drives, Electrical Actuators such as servo motor and Stepper motor, Drive circuits, open and closed loop control; Embedded Systems: Hardware Structure, Software Design and Communication, Programmable Logic Devices, Automatic Control and Real Time Control Systems;

UNIT-IV

Smart materials: Shape Memory Alloy, Piezoelectric and Magneto-strictive Actuators: Materials, Static and dynamic characteristics, illustrative examples for positioning, vibration isolation, etc.;

UNIT-V

Micro mechatronic systems: Microsensors, Microactuators; Micro-fabrication techniques LIGA Process: Lithography, etching, Micro-joining etc. Application examples; Case studies Examples of Mechatronic Systems from Robotics Manufacturing, Machine Diagnostics, Road vehicles and Medical Technology.

Course Outcomes:

Upon completion of this course, students will get an overview of mechatronics applications and the use of micro-sensors and microprocessors.

Text Books:

1) Mechatronics System Design, Devdas Shetty & Richard A. Kolk, PWS Publishing Company (Thomson Learning Inc.)
2) Mechatronics: A Multidisciplinary Approach, William Bolton, Pearson Education
3) A Textbook of Mechatronics ,R.K.Rajput, S. Chand & Company Private Limited
4) Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, William Bolton, Prentice Hall.

MEPCP507 Machine Tools & Automation Lab
B.Tech V Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:1.5**

List of Experiments:

1. Force Measurement on Lathe.
2. Power Measurement on Lathe.
3. Production of Single point cutting tool using and cutter grinder.
4. Differential Indexing.
5. Fit Exercise on Capstan Lathe.
6. Alignment Test on Lathe.
7. Alignment Test on Radial Drilling Machine.
8. Thrust and Torque Measurement in Drilling Operation.
9. Study of tool wear (flank wear)
10. Study of Weld Bead generator in Arc.
11. Measurement of Forces in Milling.
12. Study of Impact strength tests on Welding joints.

MEPCP508 Metrology Lab
B.Tech V Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:1.5**

List of Experiments:

1. Calibration of any two of the following instruments: (using slip gauges)
    i. Calibration of Micrometer.
    ii. Calibration of Mechanical Comparator.
    iii. Calibration of Vernier Caliper.
    iv. Calibration of Dial Gauge.
2. Measurement of taper angle using
    i. Bevel Protractor
    ii. Dial Gauge
    iii. Sine-Bar
    iv. Auto-Collimator.
3. Alignment tests:
    i. Parallelism of the spindle
    ii. Circularity & Concentricity of the spindle
    iii. Trueness of running of the spindle.
4. Gear testing: To find;
    i. diameter, pitch/module
    ii. pitch circle diameter
    iii. pressure angle
    iv. tooth thickness.
5. Check the straightness of a surface plate
    i. Using spirit level
    or
    ii. Using Auto-collimator
6. Check the flatness of a surface plate using one of the above methods.
7. Using light wave interference:
    i. Study of flatness of slip gauges
    ii. To find the height of a slip gauge.
8. Tool Maker's Microscope:
    i. Establish the thread details
    ii. To find the cutting tool angles.

EOHST601 ECONOMICS
B.Tech VI Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

UNIT – I

Introduction – Nature and Scope of Managerial Economics, Economic Theory and Managerial Economics.

UNIT – II

Demand Analysis and Forecasting – Demand Determinants, Demand Distinctions, Demand Forecasting: Methods of Demand Forecasting. Minimum average method and exponential method.

UNIT – III

Cost Analysis – Cost Concepts, Classifications and Determinants; Cost-output Relationship, Economies andDiseconomies of scale, Cost Control and Cost Reduction.

UNIT – IV

Price and output Decisions Under Different Markets Structures – Perfect Competition, Monopoly and Monopsony; price Discrimination, Monopolistic Competition, Oligopoly and Oligopsony.

UNIT – V

Pricing Policies and Practices – Pricing Policies, Pricing Methods, Specific Pricing Policies, Price Discountsand Differentials; Product-line Coverage and Pricing; Price Forecasting.

Text Books

1. Varshney R L and Maheswari K L : Managerial Economics, 19th Edition, Sultan Chand and Sons, 2009.

Reference Book

1. Froeb L M and McCann B T: Managerial Economics A Problem Solving Approach, Second Edition, Cengage Learning, 2008**.**

MEPCT602 Machine Design
B.Tech VI Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:4**

UNIT-I
Mechanical springs
Helical springs-stress equation and deflection equation; spring materials; spring end formation; design against-static and fluctuating loads; Design of helical and Torsional springs; Compound springs ; equalized stress in spring leaves ; multi leaf springs; nipping and shot peening.

UNIT-II
Sliding Contact Bearings:
Classification of Bearings, Hydrodynamic lubricated bearings; Materials for sliding contact bearings; Lubricants – Properties and their selection Terminology used in Hydrodynamic journal bearings. Design procedure for journal bearings – Design of bearing caps and bolts. Heat in bearings.
Thrust Bearings: Design of footstep bearing and collar bearings.

UNIT-III
Rolling Contact Bearings:
Merits and demerits of rolling contact bearings over sliding contact bearings. Types of rolling contact bearings. Static and dynamic load capacities. Equivalent bearing load. Design for cyclic loads. Reliability of a bearing. Selection of radial ball bearings. Stribeck's equation.

UNIT-IV
Gears: Gears: Types of gears and their applications, gear materials allowable stresses. Law of gearing
Spur gears: Terminology, force analysis, Design of spur gears – Lewis equation. Check for dynamic load and wear load. Gear wheel proportion.
Helical Gears: Terminology, design of helical gears. Check for wear load. Force analysis.

UNIT-V
Engine parts:
Pistons, forces acting on pistons – Construction Design and proportions of Pistons.
Connecting rod: Thrust in Connecting rod – Stress due to whipping action on connecting rod ends – Cranks and Crank Shafts, Strength and proportions of overhang and centre cranks – Crank pins, Crank shafts.

TEXT BOOKS:

1. Lal G. K., Vijay Guptha, Venkata Reddy N.: Fundamental of Design and Manufacturing, Alpha Science International, 2005.

2. Bhandari V. B.: Design of Machine Element, Third Edition, Tata McGraw Hill, 2010.

3. Shigley J. E: Mechanical Engineering Design, Third Edition, Tata McGraw Hill, 2010.

REFERENCES:

1. Allen Strickland Hall, Alfred R. Holowenko, Herman G. Laughlin: Machine Design, Schaum Series, Tata McGraw Hill, 2010
2. Faires V.M: Design of Machine Elements, Fourth Edition, Macmillan, 1965.
3. Sharma P.C. & Aggarwal D.K.: Machine Design, S. K. Kataria & Sons, 1997.
4. Jain R.K.: Machine Design, Fifth Edition, Khanna, 1988.

MEPCT603 Dynamics of Machinery
B.Tech VI Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

UNIT-I

FRICTION: Inclined plane ,pivot and collar, uniform pressure, uniform wear.
Friction circle and friction axis, lubricated surfaces, boundary friction, film lubrication.
CLUTCHES: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch,

BRAKES AND DYNAMOMETERS: Simple block brakes, Band brake, internal expanding brake, braking of vehicle. Dynamometers – absorption and transmission types. General description and methods of operation.

UNIT-II

GYROSCOPIC COUPLE AND PRECESSIONAL MOTION: Gyroscopic Couple –effect of precession on stability of moving vehicles such as motor cars, motor cycles, aero-planes and ships-Gyroscopic stabilization.

TURNING MOMENT DIAGRAMS AND FLYWHEEL: Construction of crank effort and diagrams-Fluctuation of energy and speed in flywheels-flywheel of an I.C. engine. Flywheel of a punching press

UNIT-III

CENTRIFUGAL GOVERNORS: Sleeve loaded and spring loaded governors. Hartnell, Hartung governors and governors with auxiliary springs - sensitiveness, Isochronism and hunting in governors. Governors effort and power-controlling force diagrams-stability, Friction and insensitiveness.

UNIT-IV

BALANCING: Static and dynamic balance, balancing of rotating masses - analytical and graphical methods. Balancing of reciprocating masses – Partial balancing – locomotive balancing – variation of tractive effort. Swaying couple and Hammer blow. single and multi cylinder in line engines – firing order.

UNIT-V

VIBRATION: Free and forced vibration of single degree of freedom system, Role of damping, whirling of shafts and critical speeds. Simple problems on free, forced and damped vibrations. Vibration Isolation

& Transmissibility. Transverse vibrations of beams with concentrated and distributed loads. Dunkerly's method, Raleigh's method. Torsional vibrations - two and three rotor systems.

MEPETE09 Refrigeration and Air Conditioning
B.Tech VI Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Objectives:

1. To familiarize with the terminology associated with refrigeration systems and air conditioning
2. To understand basic refrigeration processes
3. To understand the basics of psychrometry and practice of applied psychrometrics
4. To acquire the skills required to model, analyse and design different refrigeration as well as air conditioning processes and components

Course Content:

UNIT-I

Classification of refrigeration systems
Advanced vapour compression cycles, Refrigerants and their mixtures: properties and characteristics - Ozone depletion and global warming issues and solutions.

UNIT-II

Vapour compression System components: Compressors, Condensers, Expansion devices and Evaporators –Selection-matching of system components.

UNIT-III

Absorption refrigeration systems, their components-Numerical problems.

UNIT-IV

Review of Psychrometry and Air-conditioning processes - Comfort air conditioning and Cooling load calculations

UNIT-V

Applications of AC systems - Concept of enthalpy potential - Air washers, Cooling towers, Evaporative condensers, Cooling and dehumidifying coils.

Course Outcomes:

A student who has done the course will have a good understanding of the working principles of refrigeration and air-conditioning systems.

Text Books:

1. Gosney, W.B, Principles of Refrigeration, Cambridge University Press, 1982.
2. Stoecker, W.F. and Jones, J.W., Refrigeration and Air conditioning, Tata McGraw Hill, 1986.
3. Arora, C.P., Refrigeration and Air conditioning, Tata McGraw Hill, 2nd Edition, 2000.
4. Kuehn, T.H., Ramsey, J.W. and Threlkeld, J.L., Thermal Environmental Engineering, 3rd Edition, Prentice Hall, 1998

MEPETE10 Internal Combustion Engines
B.Tech VI Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Objectives:

1. To familiarize with the terminology associated with IC engines.
2. To understand the basics of IC engines.
3. To understand combustion, and various parameters and variables affecting it in various types of IC engines.
4. To learn about various systems used in IC engines and the type of IC engine required for various applications

Course Contents:

UNIT-I

Review of ideal cycles; Details of fuel-air cycles.

UNIT-II

Combustion in SI and CI engines, Combustion stages, Combustion chambers and abnormal combustion.

UNIT-III

Fuel supply systems in SI and CI engines, carburetors, Port fuel injection, Direct injection and Common rail injection. Ignition system.

UNIT-IV

Lubrication system and cooling system.

UNIT-V

Testing of IC engines. Engine emissions and control. Advanced IC Engine concepts.

Course Outcomes:

Students who have done this course will have a good idea of the basics of IC engines and how different parameters influence the operational characteristics of IC Engines

Text Books:

1. Obert E. F, "Internal Combustion Engines and Air Pollution", Harper and Row Publication Inc. NY, 1973.
2. Heisler H, "Advanced Engine Technology", Edward Arnold, 1995.
3. Heywood J. B, "Internal Combustion Engine Fundamentals", McGraw Hill Book Co. NY, 1989
4. Heldt P. M, "High Speed Combustion Engines", Oxford & IBH publishing Co. India, 1985.
5. Stockel M W, Stockel T S and Johanson C, "Auto Fundamentals", The Goodheart, Wilcox Co. Inc., Illinois, 1996.

EPETE11 Power Plant Engineering

B.Tech VI Semester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:03**

Objectives:

To provide an overview of power plants and the associated energy conversion issues

Contents:

UNIT-I

Coal based thermal power plants, basic Rankine cycle and its modifications, layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers. Subsystems of thermal power plants, fuel and ash handling, draught system, feed water treatment, binary cycles and cogeneration systems

UNIT-II

Gas turbine and combined cycle power plants, Brayton cycle analysis and optimization, components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.

UNIT-III

Basics of nuclear energy conversion, Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants

.

UNIT-IV

Hydroelectric power plants, classification, typical layout and components, principles of wind, tidal, Photovoltaic solar and thermal, geothermal, biogas and fuel cell power systems

UNIT-V

Energy, economic and environmental issues, power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including waste disposal options for coal and nuclear plants.

Course Outcomes:

Upon completion of the course, the students understand the principles of operation for different power plants and their economics.

Text Books:

1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.
2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.
3. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering, 2nd ed., McGraw Hill, 1998.

MEPETE12 Non Conventional Energy Sources
B.Tech VI Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

UNIT – I
Introduction: Role and potential of new and renewable sources – The solar energy option – Environmental impact of solar power.
Principles of Solar Radiation: Physics of the sun – The solar constant –Solar radiation on tilted surface – Instruments for measuring solar radiation and sun shine – Solar radiation data.

UNIT – II
Solar Energy Collection: Flat plate and concentrating collectors – Classification of concentrating collectors – Orientation and Thermal analysis – Advanced collectors.
Solar Energy Storage: Different methods – Sensible, Latent heat and Stratified storage – Solar Ponds
Solar Applications: Solar heating/cooling techniques – Solar distillation and drying - Photovoltaic energy conversion.

UNIT – III
Wind Energy: Sources and potentials – Horizontal and Vertical axis windmills – Performance characteristics.
Bio-Mass: Principles of Bio-conversion – Anaerobic/Aerobic digestion – Types of Bio-gas digesters – Gas yield – Combustion characteristics of bio-gas – Utilization for cooking, I.C. engine operation – Economic aspects.

UNIT – IV
Geothermal Energy: Resources – Types of wells – Methods of harnessing the energy – Potential in India.
OTEC: Principles – Utilization – Setting of OTEC plants - Thermodynamic cycles.
Tidal and Wave Energy: Potential and Conversion techniques – Mini-hydel power plants – Their economics
.
UNIT – V
Direct Energy Conversion: Need for DEC – Principles of DEC – Thermo-electric generators – Seebeck, Peltier and Joule Thompson effects – Figure of merit – Materials – Applications – MHD generators – Principles – Dissociation and Ionization – Hall effect – Magnetic flux – MHD accelerator – MHD engine – Power generation systems .
Fuel Cells: Principle – Faraday's laws – Thermodynamic aspects – Selection of fuels and Operating conditions.

TEXT BOOKS:

1. Rai G.D. : Non-conventionalEnergy Sources, Standard PublishersDistributors.
2. Ashok V Desai : Non-conventionalEnergy, New Age International.
3. K. Udayakumar, M. Anandakrishnan: Renewable Energy Technologies, Narosa, 1997.

REFERENCES:

1. Twidell and Weir: Renewable Energy Sources, 2nd Edition, Taylor & Francis, 2006.
2. Sukhatme: Solar Energy, 1st Edition, Tata McGraw-Hill Education, 2008
3. D. Yogi Goswami, Jan F. Kreider : Solar Power Engineering, 2nd Edition, Taylor & Francis, 2006.

MEPCP606 Strength of Materials & Fluid Mechanics laboratory
B.Tech VI Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:1.5**

List of Experiments:

1. Tension test on mild steel bar
2. Tension test on HYSD steel bar
3. Compression test on wood
4. Shear test on wood
5. Torsion test on steel
6. Test on close coiled helical spring
7. Bending test on rolled steel joist
8. Bending test carriage spring
9. Charpy impact test
10. Deflection test on a beam under Uniform Bending
11. Deflection test on simple supported beam
12. Deflection test on fixed beam

List of Experiments:

1. Discharge Measurements:
   (a) Small Orifice
   (b) Venturi Meter
   (c) Orifice Meter
   (d) Triangular Notch

2. Losses in Pipes:
   (a) Pipe Friction
   (b) Sudden Contraction
   (c) Gate Value

3. Determination of Efficiency in Pumps and Turbines:
   (a) 0.4 K.W Centrifugal Pump
   (b) 0.8 K.W Centrifugal Pump
   (c) 5.5 K.W Centrifugal Pump

MEPCP607 Heat Transfer Laboratory
B.Tech VI Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:1.5**

List of Experiments:

1. Test on Conduction in Composite Slab System.
2. Test on Thermal Conductivity of Solids.
3. Test on Emmissivity Measurement Apparatus.
4. Test on Lagged Pipe Apparatus.
5. Test on Steffan-Boltzman Apparatus.
6. Test on Concentric Tube Fin Type-Heat Exchanger.
7. Test on Natural Convection Apparatus.
8. Test on Forced Convection Apparatus.
9. Test on Drop-wise Condensation Apparatus.
10. Determination of COP of vapor compression refrigeration system

MEPET701 Automobile Engineering
B.Tech VII Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Objectives:
Tounderstandtheconstructionandworkingprincipleofvariouspartsofanautomobile

Unit-I

Introduction

Components of four wheeler automobile – chassis and body – power transmission – rear wheel drive, front wheel drive – types of engines, engine construction, turbo charging and super charging – engine lubrication, splash and pressure lubrication systems, Arrangement of cylinders, types valve arrangements, Liners- dry and Wet type, function and constructional details, combustion chambers for petrol and diesel engines.

Unit-II

Fuel Supply System:

S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pump, carburetor: types, Air cleaners and types.

C.I. Engines: Requirements of diesel injection systems, types of injection systems, fuel pump.

Emission from Automobiles: Pollution standards - Emission norms (Euro & BS), Pollution Control, Techniques, Multipoint fuel injection system, Common rail diesel injection system, Gasoline direct injection system and Alternative energy sources,

UNIT III

Cooling System : Cooling Requirements, Air Cooling, Liquid Cooling, Thermo, water and Forced Circulation System, Radiators: Types, Cooling Fan, water pump, thermostat, antifreeze solutions.

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage, battery, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker

UNIT IV

Transmission Systems:

Clutch: Function of clutch, single plate and multiple plate, and centrifugal clutches and clutch materials, fluid coupling, torque converter.

Gear box: Need, sliding type, constant and synchromesh type. Automatic transmission. Propeller shaft; need and constructional details.

UNIT V

Suspension System: Objects of suspension systems – torsion bar, shock absorber.

Braking System: Mechanical brake system, Hydraulic brake system, Pneumatic brakes and antilock braking system (ABS).

Steering System: Steering mechanism, Ackerman steering mechanism, Davis steering mechanism. Power Steering System

Course Outcomes:

Upon completion of this course, students will understand the function of each automobile Component and also have a clear idea about the overall vehicle performance.

TEXT BOOKS:

1. Automobile Engineering : Narang G.B.S.
2. Automobile Engineering Vol. I & II : Kirpal Singh.
3. Automobile Engineering : R.K. Rajput
4. Automobile Engineering : Dr. G. Devaradjane
5. Internal Combustion Engines : V. Ganesan

REFERENCES:

1. Automotive Mechanics : Heitner J.
2. I.C.Engines : Mathur M.L. & Singh R.P.

MEPETE04 Robotics
B.Tech VII Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

UNIT –I

Fundamentals of robotics – Automation and robotics, Robot Anatomy, Four common robot configurations – Robot motions – Robot wrist – Robot work volumes – Robot characteristics – Spatial resolution, Accuracy, Repeatability.

UNIT-II

Control Systems and components – Basic control systems components and models –Mathematical models, transfer function – Block diagrams, Characteristic equations – Controllers – Proportional control , Integral control, Proportional and Derivative (PD) control, Proportional and Integral (PI) control and PID Control – Analysis of robot joint axis – Open loop and closed loop control systems

UNIT-III

Drive systems and sensors –Servo controlled and non-servo controlled robots. Direct drive and indirect drive Drives – Hydraulic, Pneumatic and Electric drives – Robot joint control design. Types of sensors – Contact and non – contact type sensors – Position sensors – velocity sensors – force sensors – torque sensors – Tactile sensor – proximity and range sensors – Use of sensors in robotics.

UNIT-IV

Robot end – effectors – grippers and tools – Mechanical grippers – types of gripper mechanisms – gripper force analysis – vacuum grippers – magnetic grippers – Tools as end – effectors – Robotic sensory gripper – Remote centre compliance device (RCC).

UNIT-V

Robot programming and applications – programming methods – Off – line programming and on – line programming – teach box or control box, Lead through programming – Use of robot programming languages – VAL. Applications of robot – Material handling, Machine loading/unloading, Assembly, Inspection etc., Work cell layout – Robot Work cells. Economic analysis.

TEXT BOOKS:

1. Mikell P. Groover, Mitchell Weiss, Roger N. Nagel and Nicholas G. Odrey, 'Industrial Robotics Technology, Programming and Applications', Mc Graw Hill Book company, 1986

2. R.K. Mittal and I.J. Nagrath, Robotics and Control, McGraw Hill Education (India) Private Ltd., 2014.

3. Deb S.K, Deb.S,"Robotics Technology and Flexible Automation", Tata McGraw-Hill Education Private Limited, 2009.

4. Ganesh S. Hegde, A text book on Industrial Robotics, Laxmi Publications (P) Ltd., 2007.

REFERENCES:

1. John J. Craig, Introduction to Robotics Mechanics and Control, Second Edition, Addison Wesly Longman Inc. International Student edition, 1999

2. Mark W. Sponge & Vidya Sagar M.,"Robot Dynamics and Control" ,Wiley; 1st edition (1989)
3. Tsuneo Yohikwa, Foundations of Robotics Analysis and Control, Prentice Hall of India Pvt. Ltd., 2001

MEPETE05 Nanotechnology and Surface Engineering
B.Tech VII Semester
Effective from- 2018-19

UNIT-I

Introduction to Surfaces

Surfaces and Interfaces – Importance of Surfaces in Nano Regime – Thermodynamics of surfaces – surface energy – notation of surface structures – surface reconstruction – Surface and interfacial tension and measurement– contact angle and wetting –surfactants, and interfacial forces – Review of Surface Characterization Techniques – optical, topographic, chemical and mechanical properties (XPS, PIXE, RBS, SIMS, LEED, RHEED)

UNIT-II

Processes at Solid Surfaces

Adsorption – Physisorption and Chemisorption – Adsorption isotherms (Langmuir and BET) – Reaction Mechanism (Langmuir-Hinshelwood and Eley-Rideal) – Sticking Probability –Types of Catalyst – Homo vs Hetero - Properties and preparation of Catalyst – TON, TOF, E factor - Surface and electronic properties of metal and metal oxide catalyst and its principle behind catalysis – Sabatier Principle – Bronstedt –

Polanyi relation - Role of Surfaces, Interfaces, Morphology in Catalysis– Active sites incatalysis & determination – porous materials

UNIT-III

Role of Surfaces in Bio-nano interactions Adhesion and its importance – Adhesion vs cohesion – Work in adhesion and cohesion - Theories on adhesion (Bradley, Hertz, JKR) - Methods of adhesion measurement (Scotch Tape, Peel test, Scratch, Blister, Ultrasonic and acoustic micro cavitation methods) – Adhesion measurement in cell (observational, probing and counting techniques) - Surface modification and adhesion - Adhesion of nanoparticles, cells and between nanoparticle & cells - Cancer cell surface interaction.

UNIT-IV

Tribological Aspects of Surfaces

Tribological aspects of adhesion, friction and wear – Friction and Friction Types – Theories of Macro (Amontons, Coulomb) and Nanoscale friction (Tomlinson, FrenkelKontorova, Bowden and Tabor models)– Difference between macro and micro/nano tribology- Wear – Wear Mechanisms and types – identification of different mechanisms – Wear theory (Archard, Rabinowictz, Bassani and D'Acunto Theory)– Characterization techniques for friction and wear – Tribometer, Friction Force Microscopy,

Nanoindentation and Nanoscratching – Methods to reduce wear and Friction –Fracture –Lubrication –Surface Coatings.

UNIT-V

Surfaces in Multidisciplinary Applications

Colloids– Optical and Electrical properties – Colloids in Drug Delivery – Electrical and Electronic properties of Surfaces –zeta potential - Corrosion – Coatings for corrosion protection –High temperature issues - New coating concepts in multilayer structures – thermal barrier coatings. Bioinspired materials – Tribology in

Human Body, Artificial organs and Medical devices –Nanosurfaces in Energy, Environmental, Automobile and Industrial Applications.

TEXT BOOKS

1. Gabor A. Somorjai, Yimin Li, Introduction to Surface Chemistry and Catalysis, John Wiley & Sons, New Jersey, 2010.
2. HaraldIbach, Physics of Surfaces and Interfaces, Springer-Verlag, Berlin, 2006.
3. Pankaj Vadgama, Surfaces and interfaces for biomaterials, First Edition, CRC Press, Boca Raton, 2005.
4. Peter J. Blau, Friction Scienceand Technology- From concepts to applications, Second Edition, CRC Press, Boca Raton, 2009
5. B. Bhusan, Modern Tribology Handbook, CRC Press, Boca Raton, 2005.
6. N. Birks, G. H. Meier, F. S. Pettit, Introduction to the high temperature oxidation of metals, Second edition, Cambridge University Press, 2006.

REFERENCE BOOKS

1. I. Chorkendorff, J.W. Niemantsverdriet, Concepts of Modern Catalysis and Kinetics, First Edition, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, 2003.
2. Didier Astruc, Nanopaticles and catalysis, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, 2008.
3. Ryan Richards, Surface and Nanomoecular Catalysis, Taylor & Francis, Boca Raton, 2006.
4. Jeremy Ramsden, Biomedical Surfaces, Aptech House, Inc., Boston, 2008.
5. Renate Forch, HolgerSchonherr, and A. Tobias A. Jenkins, Surface Design: Applications in Bioscience and Nanotechnology, Wiley -VCH Verlag GmbH & Co.
KGaA, Weinheim, 2009.

MEPEP704 CAD/CAM Laboratory
B.Tech VII Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:1.5**

CAD Laboratory

The following drafting tools should learn by the student using any Drafting software and using these tools the student should be able to plot orthographic projections and 3D assembly drawing

Introduction to AUTOCAD-Co-ordinate system, Object snap, Draw Tools -Line, Polyline, Rectangle, circle, spline, Ellipse, Point, Hatch, Text, Modify Tools - Erase, copy, Mirror, Offset, Array, Move Rotate, Trim, Fillet, Dimensions - Dimension Variables, Linear, Aligned, Radius and diameter, Angular Dimensions

Exercise on the above commands limited to 2D plotting.

Using above drawing tools, drawing of machine components and Production drawing of mating components with limits and fits are given as exercises. Minimum of 5 components of detailed drawings should be drawn.

CAM Laboratory

Minimum of three exercises to be performed.

Part programming on turning and milling machines and execution on simulator.

Exercises on coordinate measuring machine CMM; Determination of dimensions of the given object; determination of angle between two surfaces;

Text Books:

1. . Bhatt N D and VM Panchal, Engineering Drawing Revised Edition, Chrotar Publications, 2010
2. Dhananjaya A Jolhe, Engineering Drawing with an introduction to AutoCAD, Tata Mc- Graw Hill – 2009.
3. Gautam Pohit, Gautam Gosh – Machine Drawing with Auto Cad- Pearson Publishers
4. Production drawing , K.L. Narayana, P. Kannaiah and K. Venkata Reddy, New age International Publishers.

MEPETE03 Computer Aided Design and Computer aided manufacturing (CAD / CAM)
B.Tech VII Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Objectives:

To provide an overview of how computers can be utilized in mechanical component design

Unit – I

Fundamentals of Computer Graphics- Product cycle, sequential and concurrent engineering, Computer Aided Design, CAD system architecture, computer graphics, Coordinate systems, work station, CAD standards- Graphical Kernel System (GKS), standards for vexchange images, Open Graphics Library (OpenGL), Data exchange standards- IGES, STEP, CALS etc., Communication standards, DDA and Circle Algorithms.

Unit - II

2D and 3D transformations, viewing transformation, mathematical formulations, Geometric Modeling- representation of curves, Hermitecurves, Bezier curves, B-spline curves, rational curves, Techniques of surface modelling, surface patch, Coons and bicubic patches, Bezier and B-spline surfaces, Solid modelling techniques, CSG and B-rep.

Unit – III

Computer aided manufacturing, manufacturing planning and manufacturing control, computer integrated manufacturing, CAPP, Retrieval type and Generative type, types production and planning and control activities, fundamentals of MRP, MRP-2, ERP, ERP-2, shop floor control, automatic identification systems, machine loading and sequencial problem, factory data collection system, AIM, barcodes, RFID, magnetic tape, OCR, machine vision. Adaptive control machining systems, Types of Adaptive Control.

UNIT – IV

Numerical Control – NC, NC Modes, NC Elements, NC machine tools and their structure, Machining centre, automatic tool changers, Turning and Milling machine centres, Controls in NC, CNC, and DNC systems. CNC Part Programming – Fundamentals, Open loop and closed loop, tape formats, Canned Cycles, cutter radius compensation, length compensation, manual part programming, Creating manufacturing database, Computer Assisted Part Programming using APT; Geometry statements, motion statements, PTP – Contour /Continuous interpolation methods, Post process statements, auxiliary statements, macro statement program for simple components on CNC Turning and Milling machines.

UNIT – V

Group Technology and FMS:, benefits. Machinability data systems, Computer generated time standards, Capacity planning, Shop Floor Control, CIM concepts, topology concepts. Automated Material Handling Systems: Robot configurations and robots in material handling, Part Family.

Classification and Coding, advantages and limitations. Group technology machine cells – FMC, FMG, FMS, and Agile manufacturing.

Course Outcomes:

Upon completion of this course, the students can use computer and CAD software for modelling mechanical components

Text Books:

1. Ibrahim Zeid, Mastering CAD CAM, Tata McGraw Hill Publishing Co. 2007.
2. C. McMohan and J. Browne, CAD/CAM Principles, II edition, Pearson Education, 1999.
3. W. M. Neumann and R.F. Sproul, Principles of Computer Gra[hics, McGraw Hill, 1989.
4. D. Hearn and M.P. Baker, Computer Graphics, Prentice Hall Inc., 1992.
5. Mikell P. Groover, Automation, Production Systems, and Computer-integrated Manufacturing, prentice Hall

MEPETE06 Mechanical Vibrations
B.Tech VII Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

UNIT – I

Oscillatory motion – Harmonic motion and periodic motion – conservation of energy and Newton's second law. Theory of the single degree – of – freedom oscillator – Free vibrations – Forced vibrations – Harmonic excitation. The undamaped system – The damped system.

UNIT – II

Free vibration with viscous damping – Forced vibration with viscous damping – Logarithmic decrement – response to simple forcing functions – Steady – state response to sinusoidal forcing – Properties of the dynamic amplification factor (DAF).

UNIT – III

Vibration of two – degree – of – freedom system – free response of an undamped 2 – DOF system – Use of Rayleigh's method and fundamental natural frequency – Natural frequency and mode shape shapes of undamped spring – mass system.

UNIT – IV

Normal mode analysis of undamped multi – degree – of – freedom system – Orthogonality properties of an undamped multi – degree – of – freedom system – Orthonormal modes. Decoupling forced vibration equations – Modal damping forced vibrations.

UNIT – V

Vibration of continuous systems – Vibrating string – Longitudinal vibration of rods – Torsional vibration of rods. Approximation methods in vibration analysis.

Text Books

1. W.T. Thomson and M.D. Dahleh, Theory of vibration with applications, Pearson Education, Inc, 2007.
2. Max Irvine, Structural dynamics, Allen and Unwin, 1980

Reference books

1. Denhartog Mechanical Vibrations, John Wiley and Sons, 2008.
2. Benson H. Tongue, Principles of vibration, 1st Edition, ASME, 1993.

MEPETE07 Finite Element Analysis
B.Tech VII Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Objectives:

To illustrate the principle of mathematical modeling of engineering problems

To introduce the basics and application of Finite Element Method

UNIT –I

Historical Background, Mathematical modeling of field problems in engineering, governing equations, discrete and continuous models, boundary and initial value problems, Weighted Residual Methods, Variational formulation of boundary value problems, Ritz technique, Basic concept of Finite Element Method.

UNIT -II

One dimensional second order equation, discretization, linear and higher order elements, derivation of shape functions, Stiffness matrix and force vectors, assembly of elemental matrices, solution of problems from solid mechanics. Thermal Analysis: Heat transfer, longitudinal vibration and mode shapes, fourth order beam equation, transverse deflections and natural frequencies.

UNIT – III

Two dimensional equations, variational formulation, finite element formulation, triangular elements- shape functions, elemental matrices and RHS vectors; Application to thermal problems, torsion of non-circular shafts, quadrilateral and higher order elements. Plane stresses and plane strain problems, body forces and thermal loads, plate and shell elements.

UNIT -IV

Natural coordinate systems, isoparametric elements and shape functions, numerical integration and application to plane stress problems, matrix solution techniques, solution of dynamic problems, introduction to FE software.

UNIT -V

Computational Fluid Dynamics (CFD): Introduction – Benifts of CFD – Usage and Applications – CFD Analysis and related available Software – Elementary Treatment

Course Outcomes:

Upon completion of the course, students will understand the FEM formulation and its application to simple structural and thermal problems

Text Books:

1.Reddy J.N., An Introduction to Finite Element Method, 3rd ed., Tata McGraw Hill, 2005.
2. Seshu P., Text Book of Finite Element Analysis, Prentice Hall, New Delhi, 2007.
Rao S.S., The Finite Element Method in Engineering,3rded., Butterworth Heinemann,2004

3.Chandraputla & Belegundu, Introduction to Finite Elements in Engineering, 3rd ed., Prentice Hall, 1990.
4.Desai, Y.M., Eldho, T.I., and Shah, A.H., Finite Element Method with Applications, Pearson Publications, 2011.

5.Jiyuan, Tu., Guan, H. Yeoh and Liu, Ch., Computational Fluid Dynamics – A Practical Approach**,** Butterworth Heinemann, 2008.

MEPCT802 Automation in manufacturing
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Objectives:

1. To understand the importance of automation in the of field machine tool based manufacturing
2. To get the knowledge of various elements of manufacturing automation – CAD/CAM, sensors, pneumatics, hydraulics and CNC
3. To understand the basics of product design and the role of manufacturing automation

Course Contents:

Unit – I

Introduction: automation, definition, types of automation, reasons for automation, types of production, functions of manufacturing, Current trends, CAD, CAM, CIM; Organisation and information processing of manufacturing, automation strategies, types of plant layout and break-even analysis

Unit – II

Low cost automation: Mechanical & Electro mechanical Systems, Pneumatics and Hydraulics, Illustrative Examples and case studies

CNC-Adaptive Control, Automated Material handling, automated flow line – methods of work path transportation, linear and rotatary transfer mechanisms, automation for machining processes – design and fabrication considerations.

Unit – III

NC and NC part programming, basic concepts of NC – coordinate system and machine motions, types of NC machines, machine control unit, NC systems and machine tool applications, basic machining processes, CNC and adaptive control.

Rigid automation: Part handling, Machine tools. Flexible automation: Computer control of Machine Tools and Machining Centers,

Unit - IV

FMS – What is FMS?, machine components of FMS, CNC, types of FMS, machine workstation, (machining center), FMC, FMG, FMS, agile manufacturing, automated material handling, types. AGV, Robots, ASRS. Communication and control, computer networking, introduction – general structure, basic elements in communication system, software and hardware components. Classification of computer networks, topology, LAN, MAN, WAN. Star, bus, ring and hybrid.

Unit - V

Introduction to Modeling and Simulation: Product design, process route modeling, Optimization techniques, Case studies & industrial applications.

CourseOutcomes:
Upon completion of this course, the students will get a comprehensive picture of computer based automation of manufacturing operations

Text Books:

(i)Mikell P. Groover, Automation, Production Systems, and Computer-integrated Manufacturing, prentice Hall

(ii) SeropeKalpakjian and Steven R. Schmid, Manufacturing – Engineering and Technology, 7th edition,Pearson

(iii) YoramKoren, Computer control of manufacturing system, 1st edition

(iv) Ibrahim Zeid , CAD/CAM : Theory & Practice, 2nd edition.

(v) P N Rao, CAD CAM fundamentals and applications, 2nd Edition.

MEPETE01 Tool Design
B.Tech VIII Semester
Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

UNIT –I

Cutting Tools Classification – Nomenclature of single point cutting tool – Differences between orthogonal and oblique cutting – Mechanism of metal cutting – Types of chips – chip breakers – Forces acting on a tool – Merchant circle diagram – Velocity relations – specific energy in cutting.

UNIT-II

Tool Wear – Tool life – Factors affecting tool life – Taylor's Tool life Equation – Tool wear mechanisms – Types of tool wear – Heat distribution in metal cutting – Measurement of temperature in metal cutting – Lathe tool Dynamometer – Cutting fluids – Selection and applications.

UNIT-III

Cutting Tool Materials- Requirements of tool materials, advances in tool materials, HSS, Coated HSS, Carbides ,Coated Carbides, Ceramics, Cold pressed, Hot Pressed , Ceramic composites, CBN, Diamond-properties, Advantages and limitations; Specifications for Inserts and tool holders. Design of single point cutting tool and form tool for NC Lathe work- Design of profile milling cutter and broach tools

UNIT- IV

Press Working and Economics of Machining: Press working operations- Press selection and Tonnage-Centre of Pressure- Cutting forces and clearances for Die Design – Compound and Progressive Die, Strip layout. Costs associated with machining operations- Optimum cutting speed for minimum cost and maximum production, cutting speed for minimum cost in Turning.

UNIT-V

Jigs & Fixtures- Uses- Locating devices, 3-2-1 principle of location – pin location- Radial location- 'V' location- Diamond locators. Types of clamping devices- principles of clamping. Design principles to Jigs & Fixtures – Drill Jigs, types- Drill Bushes, types- Fixtures for Turning, Milling and Welding.

TEXT BOOKS:

1. Fundamental of Tool Design – ASTME, Prentice Hall, New Delhi, 1987
2. Donaldson, Lecain and Goold - "Tool Design", McGraw Hill, New York, 1976

REFERENCES:

1. BLJuneja and GSSekhan, "Fundamental of Metal Cutting and Machine Tools", 2nd Edition, New Age International Publishers, New Delhi,2003
2. Milton C.Shaw, "Metal Cutting Principles", 1st Edition,CBS Publishers & Distributors Pvt.Ltd,2002.
3. Kempster, "In Introduction to Jig and Tool Design", ELBS, 1974.
4. Herman W. Pollack ,"Tool Design", Prentice Hall, New Delhi.

MEPETE14 QUALITY CONTROL AND RELIABILITY ENGINEERING

B.Tech VIII Semester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

Unit-I

Introduction to Inspection and Quality Control, Objectives of Statistical Quality Control, Chance and Assignable Causes of variation, Control chart basic principles, Choice of control limits, Sample frequency and rational subgroups.

Control charts for variables: X and R charts and σ charts, Interpretation of control charts.

Unit-II

Process Capability Analysis: Specification limits and Control limits, Natural tolerance limits, Specifications and Process Capability, Process Capability indices, setting tolerances on assemblies and components.

Control Charts for Attributes: P chart, C chart, U chart, Sensitivity analysis of P charts, Quality Rating System.

Unit-III

Acceptance Sampling Plans for Attributes: Types of Sampling Plans, Advantages and disadvantages of Sampling Plans, Evaluation of Sampling Plans – OC, Curve, Characteristics of OC Curve, Producer risk and Consumer risk, AOQ, AQL, ATI, ASN. Multiple and Sequential sampling plans. Brief introduction to Acceptance Sampling plans for continuous production and Acceptance sampling plan for variables.

Unit-IV

Reliability: Concepts of reliability, Scope, Importance of reliability, Reliability data collection-
Failure data analysis: MTTF, MTBF, Failure rate, Hazard rate, reliability, Failure rate curve,
Types of failures – Hazard models (Exponential and Weibull).
System Reliability: Series, Parallel and Mixed configurations.
Reliability Improvement: Active and Standby redundancies, Introduction to Fault Tree Analysis, Maintainability and Availability.

Unit-V

Quality Costs: Prevention, Appraisal, Internal failure and External failure costs, Quality and Productivity, Total Quality Management, Quality function deployment, Tools for continuous quality improvement. Quality Circles: Concepts, Objectives and advantages. Introduction to Six Sigma Concept. Features of ISO 9000 quality system- Classification, Need, advantages and limitations.

TEXT BOOKS:

1. Amitava Mitra, "Fundamentals of Quality Control and Improvement" Wiley publications, 3rd Edition, 2008.
2. Gupta, R.C., "Statistical Quality control", Khanna Publishers, 1997.

REFERENCES:

1. Besterfield D.H., “Quality Control– A Practical Approach”, Prentice Hall, 1993.
2. Grant E.L. “Statistical Quality Control” McGraw-Hill Science/Engineering/Math; 7th - edition (1996):Srinath, L.S., “Reliability Engineering”, Affiliated East west press, 1991.

MEPETE15 ANALYSIS AND CONTROL OF PRODUCTION SYSTEMS

B.Tech VIII Semester

Effective from- 2018-19

Lectures / Week: 3 periods **credits:3**

UNIT –I

The Production Paradigm – Production as a System – Types of Production Systems – Job type, Batch type, flow type and Project type – Group technology – Lean and Agile manufacturing

UNIT –II

Facility Location and Layout – Multi plant location – Locational dynamics – use of REL charts and Travel charts – Computer based layout technique viz. CRAFT, CORELAP etc.

UNIT –III

Planning – Manufacturing and Service Strategies – Aggregate Planning – Graphical Analysis - Forecasting – Moving Average, Exponential Smoothing. Assembly Line Balancing – Heuristics for Line Balancing.

UNIT –IV

Operations Scheduling – Job shops and flow shops: Sequencing n jobs – 2 machines, n jobs 3 machines, n jobs m machines – 2 jobs m machines. Priority Scheduling rules – Criteria and effectiveness – "Traveling salesman" Problem.

UNIT –V

Controlling – Project planning and Controlling with PERT / CPM – MRP, JIT, KANBAN systems – LOB technique – MRP-II

TEXT BOOKS:

1. Adam and Ebert : Production and Operations Management, 5th Edition, Prentice Hall, 1992
2. Buffa E S : Modern Production Management, 8th Edition, Wiley-India, 2010.

REFERENCES:

1. Groover M.P.: Automation, Production Systems and CIM, 3rd Edition, Prentice Hall, 2007.
2. Joseph Monks: Operations Management, 3rd Edition, McGraw-Hill, 1987.
3. Seetharama L. Narasimhan, Dennis W. McLeavey, Peter Billington: Production Planning and Inventory Control, 2nd Edition, Prentice Hall, 1995.
4. Elsayed A. Elsayed, Thomas O. Boucher:Analysis and Control of Production Systems, 2nd Edition, Prentice Hall, 1994.

MEPETE16 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS
B.Tech VIII Semester
Effective from- 2018-19

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Course objectives

i. To study the idea of intelligent agents , search methods, reasoning and decision making
ii. To construct plans and methods for generating knowledge.
iii. To study the concepts of expert systems.

UNIT-I

INTRODUCTION

Introduction to AI: Intelligent agents – Perception –
Natural language processing – Problem – Solving agents – Searching for solutions: Uniformed search strategies – Informed search strategies.

UNIT-II

KNOWLEDGE AND REASONING

Adversarial search – Optimal and imperfect decisions – Alpha, Beta pruning – Logical agents: Propositional logic – First order logic – Syntax and semantics – Using first order logic – Inference in first order logic.

UNIT-III

3. UNCERTAIN KNOWLEDGE AND REASONING

Uncertainty – Acting under uncertainty – Basic probability notation – Axioms of probability – Baye's rule – Probabilistic reasoning – Making simple decisions.

UNIT-IV

PLANNING AND LEARNING

Planning: Planning problem – Partial order planning – Planning and acting in non-deterministic domains – Learning: Learning decision trees – Knowledge in learning – Neural networks – Reinforcement learning – Passive and active.

UNIT-V

EXPERT SYSTEMS

Definition – Features of an expert system – Organization – Characteristics – Prospector – Knowledge Representation in expert systems – Expert system tools – MYCIN – EMYCIN.

TEXT BOOKS

1. Stuart Russel and Peter Norvig, 'Artificial Intelligence A Modern Approach', Second Edition, Pearson Education, 2003 / PHI.

2. Donald A.Waterman, 'A Guide to Expert Systems', Pearson Education.

REFERENCE BOOKS

1. George F.Luger, 'Artificial Intelligence – Structures and Strategies for Complex Problem Solving', Fourth Edition, Pearson Education, 2002.

2. Elain Rich and Kevin Knight, 'Artificial Intelligence', Second Edition Tata McGraw Hill, 1995.

3. Janakiraman, K.Sarukesi, 'Foundations of Artificial Intelligence and Expert Systems', Macmillan Series in Computer Science.

4. W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', Prentice Hall of India, 2003.

MEPETE17 Simulation and modeling
B.Tech VIII Semester
Effective from- 2018-19

UNIT-I

Systems: Models types, principles used in modelling, system studies, interacting subsystems andexample, simulation definition, examples, steps in computer simulation, advantages and disadvantagesof simulation, simulation study, classification of simulation languages.

UNIT-II

System Simulation :

Techniques of simulation, monte carlo method, comparision of simulation andanalytical methods, numerical compution techniques for continuous and descrete models, distributedleg models, cobweb models.

UNIT-III

Continuous system simulation :

Continuous system models, differential equation, analog computeranalog methods, digital analog simulators, CSSLS, CSMPIII language.

System Dynamics

: Historical background, exponential, Growth and decay models, modifiedexponentical growth models, logistic curves and generalization of growth models, system dynamicsdiagrams, dynamo language.

UNIT-IV

Probability concepts in simulation :

Stochastic variables, discrete and continuous probability function,constinuous uniform distributed and computer generation of random numbers, uniform randomnumber generator, non uniform contineously distributed random numbers, rejection method.

Discrete system simulation : Discrete events, representation of time, generation of arrivel patterns,simulation of telephone system, delayed calls, simulation programming tasks, gathering statistics,discrete simulation languages.

UNIT-V

Object Oriented approach in simulation, simulation in C++, Introduction to GPSS, generaldescription, action times, choice of paths, simulation of a manufacturing shop, facilities andstorage, program control statements, priorities and parameters, numerical attributes, functions,simulation of a supermarket transfer models, GPSS model applied to any application, simulationprogramming techniques like entry types.

Text books

1. G.Gordan "System Simulation" , 2ndEd, 2002 PHI.
2 Law & Kelton "Simulation Modelling and Analysis" 3rdEd., 2000, McGraw Hill

References :

1 T.A. Payer "Introduction to Simulation", McGraw Hill
2 W.A. Spriet "Computer Oriented Modeling and Simulation**".**
3 Narsingh Deo "System Simulation with Digital Computers", PHI.
4 V. Rajaraman "Analog Simulation", PHI