

**List of Courses Focus on Employability/ Entrepreneurship/
Skill Development**

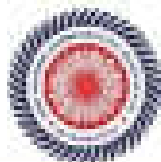
Department : Industrial and Production Engineering

Programme Name : B.Tech.

Academic Year : 2018-19

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	IP3TBS01	STATISTICAL METHODS
02.	IP3TES11	STRENGTH OF MATERIALS
03.	IP3TES12	MATERIAL SCIENCE AND METALLURGY
04.	IP3TPC11	THEORY OF MACHINE
05.	IP3TPC12	MANUFACTURING PROCESSES - I
06.	IP3LPC11	THEORY OF MACHINE LAB
07.	IP3LES12	STRENGTH OF MATERIALS LAB
08.	IP3THS11	ENGINEERING ECONOMICS
09.	IP3THS12	WORK STUDY AND ERGONOMICS
10.	IP4TBS02	NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING
11.	IP4TPC21	MACHINE DRAWING
12.	IP4TPC22	INDUSTRIAL ENGINEERING
13.	IP4TPC23	MANUFACTURING PROCESSES-II
14.	IP4TPC24	FLUID MECHANICS
15.	IP4LPC21	NACP
16.	IP4LPC24	FLUID MECHANICS LAB
17.	IP4TPE11	BUSINESS COMMUNICATION AND PRESENTATION SKILL
18.	IP4TPE12	OCCUPATIONAL HEALTH AND SAFETY
19.	IP4TPE13	BUSINESS ETHICS AND CORPORATE GOVERNANCE



20	IP5TPC31	METAL CUTTING
21	IP5TPC32	FLUID MACHINERY
22	IP5TPC33	MACHINE DESIGN- I
23	IP5TPE21	TURBO MACHINES
24	IP5TPE22	INTERNAL COMBUSTION ENGINE
25	IP5TPE23	MEMS AND NANO TECHNOLOGY
26	IP5TPE31	TOTAL QUALITY MANAGEMENT
27	IP5TPE32	INDUSTRIAL AUTOMATION
28	IP5TPE33	MECHATRONICS
29	IP5TOE11	FINANCIAL MANAGMENT
30	IP5TOE12	MANAGERIAL ECONOMICS
31	IP5TOE13	FINANCIAL ACCOUNTING AND COSTING
32	IP5LPC31	METAL CUTTING LAB
33	IP5LPC32	FLUID MACHINERY LAB
34	IP5LPC33	SEMINAR
35	IP6TPC41	MACHINE DESIGN- II
36	IP6TPC42	MEASUREMENT, METROLOGY & CONTROL
37	IP6TPC43	WELDING ENGINEERING
38	IP6TPE41	MATERIAL MANAGEMENT
39	IP6TPE42	PLANT LAYOUT AND MATERIAL HANDLING
40	IP6TPE43	MAINTANCE AND RELIABILITY ENGINEERING
41	IP6TPE51	Automobile Engineering
42	IP6TPE52	POWER PLANT ENGINEERING
43	IP6TPE53	HEAT & MASS TRANSFER
44	IP6TOE21	ENTERPRISE RESOURCE PLANNING



45	IP6TOE22	MANAGEMENT INFORMATION SYSTEM
46	IP6TOE23	SIX SIGMA AND DOE
47	IP6LPC42	MEASUREMENT AND METROLOGY LAB
48	IP6LPC43	WELDING ENGINEERING LAB
49	IP7TPC51	PRINCIPLES OF MANAGEMENT
50	IP7TPC52	PRODUCTION PLANNING AND CONTROL
51	IP7TPC53	CAD/CAM
52	IP7TOE31	PRODUCT DESIGN & DEVELOPMENT
53	IP7TOE32	ENTERPRENUERSHIP DEVELOPMENT
54	IP7TOE33	STRATEGIC MANAGEMENT
55	IP7TPE61	MACHINE TOOL DESIGN
56	IP7TPE62	REFRIGERATION AND AIR CONDITIONING
57	IP7TPE63	COMPOSITE MATERIALS AND TECHNOLOGY
58	IP7LPC53	CAD/CAM LAB
59	IP7LPC54	SEMINAR ON SUMMER TRAINING (ABOUT 30 DAYS)
60	IP7LPC55	MINOR PROJECT
61	IP8TPC61	OPERATION RESEARCH
62	IP8TPC62	MARKETING MANAGEMENT
63	IP8TOE41	SUPPLY CHAIN MANAGEMENT
64	IP8TOE42	SAFETY MANAGEMENT AND LABOUR LAW
65	IP8TOE43	FINITE ELEMENT METHOD
66	IP8TPE71	FLUID POWER AND CONTROL
67	IP8TPE72	ROBOTICS AND ROBOT APPLICATION
68	IP8TPE73	POWDER METALLURGY & CERAMICS
69	IP8LPS02	MAJOR PROJECT



70	IP8LPC01	COMPREHENSIVE VIVA
71	IP01TBS01	MATHEMATICS-II
72	IP01TBS02	CHEMISTRY
73	IP01TES01	PROGRAMMING FOR PROBLEM SOLVING
74	IP01TES02	ENGINEERING MECHANICS
75	IP01PBS01	CHEMISTRY LAB
76	IP01PES01	PROGRAMMING FOR PROBLEM SOLVING LAB
77	IP01PES02	WORKSHOP AND MANUFACTURING PRACTICES
78	IP01PES03	ENGINEERING MECHANICS LAB
79	IP01PMC01	INDUCTION TRAINING PROGRAMME
80	IP02TBS03	PHYSICS
81	IP02TES03	BASIC ELECTRICAL ENGINEERING
82	IP02TBS04	MATHEMATICS-I
83	IP02THS01	ENGLISH
84	IP02THS02	ENVIRONMENTAL SCIENCES
85	IP02PBS02	PHYSICS LAB
86	IP02PES04	BASIC ELECTRICAL ENGINEERING LAB
87	IP02PES05	ENGINEERING GRAPHICS AND DESIGN

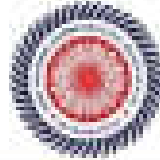
Head
Department of
Industrial & Production Engineering
(Institute of Science, Engineering & Technology
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.))
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

गुरु घासीदास विश्वविद्यालय
(विश्वविद्यालय अधिनियम 2008 का 20 से अर्जित प्राचीन संस्कृत विश्वविद्यालय)
कोनी, बिलासपुर - 495009 (छ.ग.)



Guru Ghasidas Vishwavidyalaya
(University established by the Government of M.P. in 2008)
Koni, Bilaspur - 495009 (C.G.)

Scheme and Syllabus



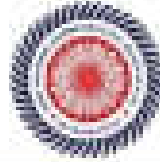
INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
 (A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY GOVERNMENT 2009, NO-1 OF
 2009)
 DEPARTMENT OF MECHANICAL & PRACTICAL COURSE
STATE ELECTRICIAN COURSE
(3 SEMESTER PROGRAM)

सत्र 3 का पाठ्यक्रम
SEMESTER III

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	EXTERNAL ASSESSMENT	END	SEM. TOTAL	
1.	EP2101	Electric Drive	1	0	0	40	40	100	1
2.	EP2102	Industrial Robotics	1	1	-	40	40	100	1
3.	EP2103	Biological Processes	1	1	0	40	40	100	1
4.	EP2104	Machine Design and Materials	1	0	0	40	40	100	1
5.	EP2105	Theory of Machine	1	0	0	40	40	100	1
6.	EP2106	Manufacturing Processes	1	0	1	40	40	100	1
Total			14	2	1	280	280	700	22
PRACTICALS									
1.	EP2107	Theory of Machine	-	-	20	40	20	70	1
2.	EP2108	Biological Processes	-	-	20	40	20	70	1
Total			-	-	40	80	40	140	2

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Electric Drive Course (EP)	
S.N.	EP2101
11.	Engineering Drawing
12.	Work Study and Ergonomics



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECH III SEMESTER

OPTIMAL WORK STUDY AND ERGONOMICS (Theory)

Unit I

Introduction to man-machine systems and ergonomics, Human factors in design and engineering, Needs of ergonomics and aesthetic design, Physiological aspects of work.

Unit II

Work assessment through physiological tests, Work physiology, Prolonged and repeated work performance, Data logging, time-motion, time-lapse and analysis techniques, Gross human anatomy, Anthropometry, Bio-mechanics, muscle strength and exertion potential of different limbs.

Unit III

Work capacity, Environmental effects, measures for evaluation of present, past and work space, Environmental conditions including temperature, Humidity, noise and vibration.

Unit IV

Perception and information processing; design of displays, text layout, typography, and multimedia, layout and composition.

Unit V

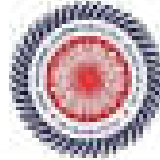
Emphasis on evaluation of human response regarding interface, product safety and product safety; Design considerations for appearance, colour, texture, softness.

Recommended Books:

1. D. C. Alexander, *Applied Ergonomics*, Taylor & Francis.
2. J. H. Dill, *Ergonomics for Engineers*, Taylor & Francis.
3. David Pye, *The Nature & Analysis of Design*, Clarendon Press.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING 3RD SEMESTER

IPTHSM STATISTICAL METHODS

UNIT-I

Introduction to statistics, tabular representation, variable, frequency distribution, qualitative and quantitative data, tabular type of series, graphical representation Histogram, frequency polygon give measure of central tendency, variable type of average, Mean, median, mode for grouped and ungrouped data, geometric mean, harmonic mean, measure of dispersion: Standard Deviation and Coefficient.

UNIT-II

Least Square and Method of least square - straight line, parabolic correlation - Spearman's Rank, Pearson's coefficient of correlation, Limit to correlation coefficient, Coefficient of correlation for bivariate frequency distribution, rank correlation, Regression: linear regression, Equation of the line of Regression, Regression coefficient, angle between two lines of Regression

UNIT-III

Theory of Probability - Mathematical and statistical definition of probability, Sample space, finite sample space, sample point, Events, Theorem of total probability, Sample and compound event, Conditional probability, Theorem of compound probability, Bay's theorem, Test of binomial theorem.

UNIT-IV

Theoretical Distribution - Binomial Distribution, Mean, Standard deviation and Poisson's λ and γ coefficient, Poisson distribution, mean, variance, normal Distribution.

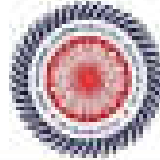
Unit V Random and simple sampling - mean and standard deviation in simple sampling of attribute, test of significance for large sample size of significance based on Chi square, T, F, and Z Distribution Degree of freedom, correlation for applying.

UNIT-V

Simulation: Basic concepts of simulation, applications of simulation, merits and demerits of simulation, Monte Carlo simulation, simulation of inventory system, simulation of Queuing system.

Recommended Books:

1. Mathematical Statistics by M. Hay
2. S. C. Gupta and Kapoor - Fundamental of Mathematical Statistics
3. A.A. Agresti - Statistic Analysis
4. Probability & Statistics by Ghosal, Pillai



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECH III SEMESTER

INDUSTRIAL EMPLOYEE RELATIONS (Elective)

UNIT-I

Conceptual Framework of employment relations: Concept, Scope and Approaches to Industrial Relations, Evolution of Industrial Relations and Current Developments, Constitutional and Legal Framework of Industrial Relations: Constitution, ID Act, Trade Union Act

UNIT-II

Trade Unions: Trade Union Development and Functions, Trade Union Structure and Recognition, Managing Trade Unions, Managerial Orientation, Employees' Organizations

UNIT-III

Collective Bargaining: Nature and Causes of Collective Bargaining, Negotiation Skills, Justice and Trends in Collective Bargaining

UNIT-IV

Employee Incentives: Evolution, Structure and Process, Design and Operation of Incentive Schemes, Strategies for Implementing Participation

UNIT-V

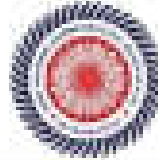
Discipline: Meaning and Discipline: Discipline: Functions, Prevention in Industrial Relations, Conciliation, Arbitration and Adjudication, Discipline in Industry

Recommended Books:

1. Employee Relations Management, Singh P. N., Pearson Education India
2. Personnel Management Theory And Practice, 3 Vols. Set, Arun Kumar, Bahadur Sharma, Atlantic Publishers & Dist.
3. Industrial Relations And Personnel Management, Arora A George M V Pyke, Vikas Publishing House Pvt Ltd

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECHNICAL DRAWING

STRENGTH OF MATERIAL

UNIT-I

Simple stresses and strains: Concept of stress and strain, concepts of stress and strain diagrams, Hooke's law, Young's modulus, Poisson ratio, stress at a point, stresses and strains in bars subjected to axial loading, Mechanics of elasticity, Relationship between elastic constants, stress produced in compound bars subjected to axial loading, Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound bars.

Compressed stresses and strains: Two dimensional systems: stress at a point on a plane, principal stresses and principal planes, Mohr's circle of stress and strain, Two dimensional stress-strain systems, principal strains.

UNIT-II

Bending moment and shear force diagrams: Bending moment and shear force diagrams, S-F and B-M diagrams for different types of loading under different conditions with problems. Theory of bending stresses: Assumption in the simple bending theory, derivation of formulae applicable to beams of rectangular, circular and channel sections, composite/built-up beams, bending and shear stresses in composite beams.

UNIT-III

Slope and Deflection of beams: Deflection, double integration, area moment method, Macaulay's method, Castigliano's theorem, method of superposition, Strain energy: Resilience, stress due to suddenly applied loads, Castigliano's theorem, Maxwell's theorem of reciprocal deflection.

UNIT-IV

Torsion: Derivation of torsion equation and its assumptions. Applications of the equation of hollow and solid circular shafts, torsional rigidity.

Close-coiled helical springs: Analysis and derivation of expression of closed coil helical spring and their problems.

Columns and struts: Columns under uni-axial load, Buckling of Columns, Slenderness ratio and conditions. Derivations of Euler's formula for elastic buckling load, equivalent length, Rankine Gordon's empirical formula.

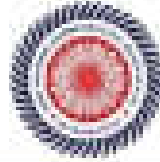
UNIT-V

Thin pressure vessels: Derivation of formulae and calculations of hoop stress longitudinal stress in a cylinder, and sphere subjected to internal pressure increase in diameter and volume.

Theories of Failure: Various theories with problems.

Recommended Books

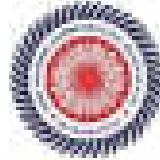
1. Pytel A H and Singer F L, "Strength of Materials", 4th Edition, Harper Collins, New Delhi.
2. Beer F P and Johnston (Jr) F R, "Mechanics of Materials", SI Version, Tata McGraw Hill, India.
3. Pappo E P, "Engineering Mechanics of Solids", SI Version 2nd Edition, Prentice Hall of India, New Delhi.
4. Timoshenko S P and Young D H, "Elements of Strength of Materials", 3rd Edition, East West Press, New Delhi.
5. Reddy J C, "Introduction to Strength of Materials", 3rd Edition, Galgotia Publishing Private Limited New Delhi.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING, 6TH SEMESTER

1. Strength of materials Euler, G.I.
2. Elements of Strength of material Tension, Shear, Torsion, Beam, Weld joints
3. Mechanics of solids, Paper, PHE Publications

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING II SEMESTER

INTERNAL MATERIAL SCIENCE AND METALLURGY

UNIT-I

Introduction: Classification of engineering materials, metals, non-metals, plastics, ceramics and composites. Crystalline structure of solids, concepts of unit cell and space lattice, Miller indices, crystal structure determination by X-ray diffraction. Crystal structure of ferrous and non-ferrous metals, crystal imperfections.

Plastic Deformation: Mechanisms of plastic deformation, role of dislocations, slip and twinning.

Slip mechanisms, strain hardening.

UNIT II

Phase Diagrams: Phases, phase rules, concept of equilibrium, Phase diagrams, lever rule, metallic, intermetallic, peritectic and peritectoid systems, iron-carbon diagram, and simplified Fe diagram: Iron Transition, Isothermal Transformation of austenite(TTT diagram).

Transformations of austenite upon continuous cooling, annealing, normalizing, hardening, tempering, hardenability of steel, surface hardening -carburizing, case hardening, Jominy test for hardenability, recovery, recrystallization and grain growth, Age hardening.

UNIT III

Corrosion: Principles of corrosion, forms of corrosion, factors affecting the rate of corrosion. Corrosive agents and protection against corrosion.

Crimp: Introduction to creep mechanisms, creep resisting resistant materials, introduction to

fatigue, cold working of metals and hot working.

UNIT IV

Engineering Materials

Ferrous: Cast irons, carbon and alloy steels and their casting.

Non-ferrous: Aluminium, copper, nickel, titanium, zinc, lead, tin, magnesium, etc. and their alloys.

Classification, structure, general properties and applications of polymers, ceramics and composites.

UNIT V

Powder Metallurgy: Characteristics of metal powder, Particle size, shape and size distribution. Characteristics of powder mass such as apparent density, tap density, flow rate, fusion conditions. Properties of green compacts and sintered compacts.

Machining, rolling, extrusion, electro-deposition, induction from oxide, cathodic process, production of alloy powders, New developments.

Powder rolling, powder forging, powder extrusion and explosive forming techniques.

Recommended Books:

1. Rajaram, Material Science and Engineering.

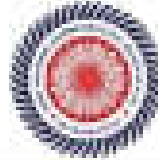
2. Swamy, Elements of Metallurgy

3. Vanhook, Elements of Metall Science and Engineering.

4. Agarwal, R.K. Introduction to engineering Materials

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING, 8TH SEMESTER

THEORY OF MACHINE

UNIT-I

Basic Concepts: Kinematics of machines, Kinematic link and their different types, types of kinematic pair, kinematic chain, mechanism and inversions of four bar chain and slider crank mechanism. Degree of freedom, synthesis of linkages - number synthesis, Gruebler's criterion and introduction to dimensional synthesis. Brief introduction to mechanism with lever, gears, pantograph, slider & Ackerman's steering mechanism.

UNIT-II

Velocity Analysis: Motion of a link, velocity of a point on a link by relative velocity method, velocities of slider crank mechanism, rubbing velocity at a pin joint, velocity of a point on a link by instantaneous center method, properties and types of I-Center, Kennedy theorem and methods of locating I-centers in a mechanism.

Acceleration Analysis: Acceleration of a point on a link, acceleration in slider crank mechanism, Coriolis component of acceleration, Quick return mechanism.

UNIT-III

Gears: Classification of gears, terminology used in gears, law of gearing, velocity of sliding, Form of teeth, construction and properties of an involute, construction and properties of epicyclic teeth, effect of variation of center distance on the velocity ratio of involute profile teeth gears, length of path of contact, arc of contact, number of pairs of teeth in contact, interference, minimum number of teeth, interference between rack and pinion, undercutting, terminology of helical and worm gears.

UNIT-III

Gear Trains: Definition of simple, compound, reverted and epicyclic gear trains, velocity ratio of epicyclic gear trains.

Clutch: Single plate and multi plate clutch, cone clutch.

Brakes: types and analysis by assuming uniform pressure and uniform wear theory, simple brake, band brake, block brake and internal shoe brake.

UNIT-IV

Cams and Followers: Types of cam and followers, Specified motion of followers, Uniform acceleration & deceleration, S.H.M, and uniform velocity Graphical construction of cam-profile.

Turning Moment of Flywheel:

Function of a flywheel, Crank effort diagram, Fluctuation of speed and energy, Effect of momental stress of flywheel, inertia torque and its effect on Crank effort diagram.

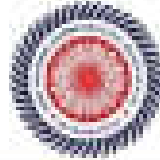
UNIT-V

Governors: Distinction between function of a flywheel and governor, types of governor.

Watt, porter, proell, harrison governor.

Balancing: Static and dynamic balancing, balancing of several masses in different planes.

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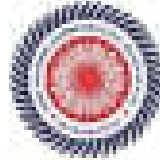
DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECH. IN BEMETEN

Recommended Books

1. Heaviside T. "The Theory of Machines", CBS Publications and Distributors.
2. Shigley J. E. and Mischke C. R. "Theory of Machines and Mechanisms", McGraw-Hill, New Delhi.
3. Wilson C. and Sadler J. "Kinematics and Dynamics of Machines", Prentice Hall.
4. Rattan S. S. "Theory of Machines", 1st Edition, Tata McGraw-Hill, New Delhi.
5. Rao J. S. and Dubikonda R. V. "Mechanisms and Machine Theory", New Age International (P) Limited, Delhi.
6. Mechanisms & machines by Ghosh and Mallick, East west Press
7. Theory of machines by Rattan by T.M.G.H. Publications

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING 3RD SEMESTER

IPTEP-12 MANUFACTURING PROCESSES-I

UNIT-I

Lathe: Lathe design and terminology; Specification, types of Lathe; work lathe, capstan and turret lathe, various operations performed on lathe, operating conditions, calculation of material loss.

Drilling: Fundamentals of drilling process, types of drilling machine, types of drills, geometry of twist drill, various operations performed on drilling machine.

Milling: Introduction, types and processes, Milling cutter, up and down milling, different operations on milling, indexing and types, calculation of MRR.

Boring: Introduction to boring, reaming, tapping and reaps, other hole making operations.

UNIT-II

Broaching: Introduction, Machines and processes.

Grinding: Classification grinding machines, conventional methods and working of various grinding and super finishing machines.

Honing, lapping, buffing & super-finishing processes with their applications.

Threads Manufacturing: Introduction, thread production processes and machines.

UNIT-III

Planing: Introduction, different operations and calculation of MRR.

Gear Manufacturing: Introduction to gear cutting process, gear forming, gear shaping, gear hobbing and gear finishing along with inspection.

Forming: Mechanism of forming process, elastic and plastic deformation.

UNIT-IV

Rolling: Classification, dynamics of Hot & Cold rolling, rolling mills & its types, two-tilt, four-tilt, six-tilt and twenty-tilt rolling mill, calculation of rolling parameter & rolling defect.

Forging: Classification of forging process, forging equipments, calculation of forging parameters, forging defect.

Extrusion: Types, extrusion equipments & analysis of processes, drawing of rods, wires & tube and their analysis, defects in extrusion & drawing.

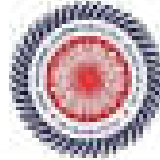
UNIT-V

Work Holding Device: Introduction to Jigs and Fixtures their types, design criteria for Jigs and fixtures, economic justification of jigs and fixtures.

Plastic Working: Plastic processing, injection, compression & Blow molding, plastic design principles processes, machines and equipments, parameters and force calculation.

Recommended Books:

1. Highway, Material Science and Engineering.
2. Twigg, Elements of Metallurgy
3. Verrill, Elements of Material Science and Engineering.
4. Agarwal, B.K. Introduction to engineering Materials.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING ETCECH II SEMESTER

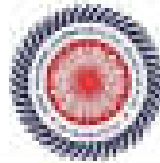
IPSPC-II THEORY OF MACHINE LABORATORY

1. Study of Gyroscopic effect and determination of gyroscope couple.
2. Determination of jump speed of cam-follower system.
3. Dynamic balancing of the rotating mass system.
4. To determine value of Gyration " K " of given pendulum.
5. To study the free vibration and to determine the natural frequency of vibration of Free-Body system. 6. To study the torsional vibration and to determine the natural frequency vibration of single rotor system.
6. Study of Integrated vibration and to determine the frequency of vibration.
7. To study the damped torsional vibration and determine the damping coefficient.
8. To verify the relation $T = 2\pi \sqrt{M/g}$ for a simple pendulum.
9. Determination of starting speed of shafts.

IPSPC-III THEORY OF MATERIALS LABORATORY

1. **Determination** of Young's modulus, tensile strength and percentage elongation for steel, aluminium, brass and cast iron specimens on universal testing machine. Also plot the stress strain diagram.
2. To perform the compression test for cast iron specimen on universal testing machine.
3. To determine the deflection for mild steel specimen and verify the beam formula for specimen in bending.
4. To determine the stiffness of the following:
(i) Cantilever beam (ii) Spring under compression and tensile loading
5. To measure the total energy absorbed in fracturing of the ductile specimen on Charpy and Izod setup.
6. To plot and study the S-N curve for steel, aluminium and fibre reinforced composite material at 25%, 50%, 65% and 75% of ultimate tensile strength of the specimen.
7. Preparation of specimens for hardness test.
8. Testing of prepared specimens for Brinell hardness and Rockwell hardness.
9. To study the behavior of steel and aluminium specimen under torsion.

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Department of Industrial and Production Engineering



INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
 (A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY CHARTERANCE 2004, NO. 3 OF 2004)
 DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING
STUDY & EVALUATION SCHEME
18.04.2020-2021

सत्र 4 का पाठ्यक्रम
SEMESTER-IV

Sl. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	END	SUB-TOTAL	
1.	IP4PEL1	Elective I (E) Numerical Analysis and Computer Programming	3	0	1	40	60	100	1
2.	IP4PC21	Machine Drawing Industrial Engineering	3	0	0	40	60	100	1
3.	IP4PC22	Engineering Manufacturing Processes II	3	0	0	40	60	100	1
4.	IP4PC23	Fluid Mechanics	3	1	1	40	60	100	1
Total			18	01	02	160	240	400	20

PRACTICALS									
1.	IP4PC21	NACP Fluid	-	-	01	40	20	75	1
2.	IP4PC23	Mechanics	-	-	01	40	20	75	1
Total			-	-	02	80	40	150	02

Elective Professional Elective (PE)-I

Sl. No.	IP4PEL1
11.	Occupational Health and Safety
12.	Business communication and presentation skill
13.	Business ethics and corporate governance

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECH IV SEMESTER

INTERMEDIATE NUMERICAL ANALYSIS & COMPUTER PROGRAMMING

UNIT-I

Approximation and errors in Computation

Approximation and round off errors, truncation errors and Taylor series, Determination of roots of polynomials and transcendental equations by Graphical methods and Bisection, Regula-Falsi, secant and Newton-Raphson methods, solution of Linear simultaneous, linear algebraic equations by Gauss Elimination (Gauss-Jordan and Gauss-Jordan) iterative method.

UNIT-II

Empirical Laws, Curve Fitting & Interpolation

Curve fitting Linear and non-linear regression analysis (Method of group average and least squares) Finite differences, Backward, Forward and central difference relation and their use in Numerical differentiation and integration and their applications in Interpolation.

UNIT-III

Numerical Solution of Ordinary Differential Equations

Numerical Integration by Trapezoidal rule, Simpson's $(1/3)^{rd}$ & $(3/8)^{th}$ rule and its error estimation, Application of difference solutions in the solution of partial Differential equations, Numerical solution of ordinary differential equations by Taylor's series, Euler, modified Euler, Runge-Kutta and Predictor-Corrector method.

UNIT-IV

Numerical Solution of partial differential Equations

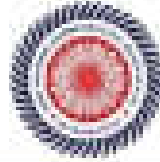
Introduction, classification of second order equations, finite difference approximations to partial derivatives, elliptic equations, solution of Laplace equation, solution by Poisson's equation, solution of elliptic equations by relaxation method, parabolic equations, solution of one-dimensional heat equation, solution of two-dimensional heat equation, Hyperbolic equations, solution of wave equation.

UNIT-V Computer Programming

1-D Statement, Mathematical Relations & Conditional statement & Expressions, Switch Case and Control Statement, Introduction to one dimensional array and two dimensional arrays, Basic of I/O file Handling.

Recommended Books:

1. Numerical Methods in Engineering & Science-Dr. B.S.Grewal-Khanna Publishers.
2. Numerical Methods-P. Chandrasekhar, K. Thilagavathi & K. Gunaratnam-S Chand & Co.
3. Let us C-Yadwant Kambhakar
4. Introductory Methods of Numerical Analysis-S.S.Hastey, 1st Edn.-PHI-New Delhi.
5. Numerical Methods Analysis-Ianain B.Scourbrough, Oxford & IBM Publishing Co.-New Delhi.
6. Theory & Problem in Numerical Methods-I Venkangan, T. Rameshwaran- TMH.
7. Numerical Methods for Engineers-Steven C. Chapra, Raymond P. Canale.
8. The Spirit of C-Henry Muller & Herbert I. Cooper-John Pub. House.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMESTER

IMPCCS MACHINE DRAWING

Unit-I

Drawing: ortho views, isometrical views and sectioning, representation of machine parts such as screw and tapered threads, thread limits, square ends, and flat end of rivet, thread limit, tapered shaft, bearing springs, Conversion of given isometric representation of geometrical figures in drawings.

Unit-II

Thread limits and tapered joints: Tap and die joint with single and double starts.
Welding joints and their representation, symbols of different joints.
Machining symbols, Surface roughness, grades, material symbols.

Unit-III

Notes: thread and screw fastening, different types of thread profile and size, VDM.
Keyways: keys, cotter joints, knuckle joints.
Shaft coupling: Rigid coupling, different types of shaft coupling.
Shaft bearing: radial bearing, parallel shaft, free end bearing.
Pulleys: belt & rope pulleys, stepped pulley's belt pulley, rope pulley.

Unit-IV

Assembly Drawing of Engine parts like piston, stuffing box, cross head, connecting rod assembly (view of slip valve, feed shaft valve, safety valve, blow off cock).
Assembly Drawing of ball and socket joint.

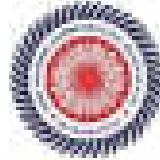
Unit-V

Concept of computer aided drafting/CAD, representation of CAD, extract free process from the above specified using any CAD software.

Recommended Books:

1. Shigley J.E. Machine Design, TMH
2. Shigley and Mischke, Design of Machine Elements, TMH
3. Wipacraft Jn. by D. Machine Design, Orange Learning
4. Johnson, Alan Jn. Design, Design Principles
5. Ganesan Jagan C and Krishna K. Design of Machine Elements, TMH
6. Harris & Arora, Machine Design, Learning & more
7. Malvern, Metal rivet Design.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING, B.TECH IN SEMSTER

IPETPC22 INDUSTRIAL ENGINEERING

Unit-I Introduction

History & Development of Industrial engineering, Productivity Definition, means of increasing productivity, work study definition, job analysis and work study, Human Factors in the laboratory, Work of L.M. Taylor, Frank and Lillian Gilbreth and their contribution.

Unit-II Method Study

Definition & basic procedure, selection of jobs, recording techniques, motion studies, study, Technique stopwatch and Chronocycle-graph, principle of Motion economy, design of work place layout, analysis in the form of chart, operation chart, flow process chart, flow diagram, string diagram, man-machine chart, use band chart, S-curve chart.

Unit-III Work Measurement

Definition, objectives, applications, number of cycle to be used, time study equipment, performance rating, allowances, number of cycle to be studied, determination of standard time, predetermined motion time systems, Conducting work sampling study & establishing standard time.

Unit-IV Wages & Incentives

Characteristics of a good wage or incentive system, method of wage payment, Concept of wage incentive schemes, Financial and non-financial, Taylor differential piece rate, Halsey premium plan, Merit's multiple piece rate system, Group incentive schemes, Engineering, work space division, design of work place, environmental stresses & impacts on human work.

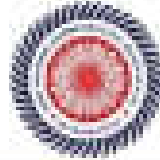
Unit-V

Value engineering: Introduction, concept of value, value analysis approaches, job plan, value term, Industrial safety, analysis of most of accident, hazards in various fields like fire, electrical shocks, chemical, organization for safety, plant safety, govt. legislation for safety, safety rules.

Recommended Books:

1. L.L.G., "Introduction to work study", Oxford Press.
2. Moudel, "Motion and time study", Prentice Hall India.
3. Ralph M. Barnes, "Motion and Time Study", John Wiley and sons.
4. Industrial Engineering by M.L.Khan, New Age International Publication

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING 3RD SEMESTER

INDUSTRIAL MANUFACTURING PROCESSES-II

UNIT-I

Foundry

Molding method and materials, types of sand moulds, Additive process making and types, Pattern allowances & design considerations, types of moulding sand & their properties, ladling, cores and sand ramming, core making, moulding machines, Cassettes & design of gating system.

Molding furnaces and practices: Making cast iron, steel and non-ferrous material, cupola, charge calculation, open furnace, converter and crucible furnaces, elements, direct and indirect, inductive furnace.

UNIT-II

Castings: Introduction to pattern and its types, allowances, Coreprint and investment casting, shell-mould and mould methods, section of cast iron, elements of gating system, types and design of riser, solidification of casting, chattering of casting, principle of die casting, gravity and pressure die casting, Die casting considerations, casting defects.

UNIT-III

Welding: Classification, principle and materials, different type of welding process and their applications, Arc Welding, Resistance welding, TIG, MIG, Submerged arc welding, flux cored welding, soldering, brazing and adhesive bonding, Welding defects.

UNIT-IV

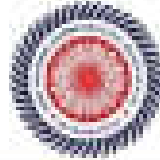
Sheet-metal working: Role of sheet metal components, Cutting techniques, Description of cutting processes like shearing, punching, blanking etc. Description of forming processes like bending, cup drawing, forming, embossing etc. Basic elements of Presses for sheet metal working, Part feeding systems, Punch and die clearance, die elements.

UNIT-V

Non-conventional machining: Introduction, Classification and comparison of different non-conventional machining, theory and analysis, basis, and MRR of EDM, ECM, LDM, AEC, ECG, ECM.

Recommended Books:

1. Rao, P.N., Manufacturing Technology vol.1 TMCPI
2. Ghose and Mallik, Manufacturing Science, East West Press
3. Ray, A. Lindberg, Material and Process of manufacturing, PHI
4. Suroop Kulkarni, Manufacturing Engineering & Technology, Pearson



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECH IV SEMESTER

INTERMEDIATE FLUID MECHANICS

Unit-I

Review of Fluid Properties: Distinguishing units of measurement, mass, density, specific weight, volume

and gravity, surface tension, capillary, viscosity, bulk modulus of elasticity, pressure and vapor pressure. **Hydrostatics:** Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Pressure gauge and curved surface (Problems on gravity dams and inclined pipe), buoyant force, stability of submerged submerged bodies, Relative equilibrium.

Unit-II

Kinematics of Flow: Types of flow (laminar & turbulent), steady & unsteady, uniform & non-uniform, one, two

and three dimensional flow; path lines, streak-lines, streamlines and stream tubes, continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, equation of flow, velocity & vorticity, velocity potential, stream function, flow nets and velocity & method of drawing flow nets.

Unit-III

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, losses in pipe flow, momentum correction factor. The concept of momentum equation, forces on fixed and moving vanes and their applications.

Flow Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.), flow measurement (orifices, nozzles, notch gauges, orifice meter, venturi meter, venturimeter, weirs and notches).

Unit-IV

Dimensional Analysis and Dynamic Similarity: Dimensional analysis, dimensional homogeneity, use

of Buckingham's theorem, calculation of dimensionless numbers, similarity laws, specific model investigations/submerged bodies, partially submerged bodies, weirs, spillways, aerodynamic machines etc.

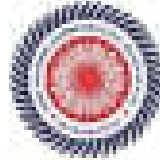
Unit-V

Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, velocity flow through circular pipes, velocity flow between parallel plates, laminar flow through porous media, Stokes law, sedimentation principles.

Turbulent Flow: Basics of turbulence, Reynolds stresses, Prandtl's mixing length hypothesis, friction velocity, law of walls.

Recommended Books

1. MgU & Soth: Fluid Mechanics, Standard Book House, Delhi
2. Soot and Howar: Fluid Mechanics and machinery, TMH
3. Cengel: Fluid Mechanics, TMH
4. White: Fluid Mechanics, TMH
5. INE DAGE: Essential of Engg Hydr. Airflow Network & So Instt. (ANSTI)
6. Francis and A. Text Book of Fluid Mech. for Engg. Student.
7. R Mohany: Fluid Mechanics, PHI
8. Cengel: Fluid Mechanics, Pearson.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TQM IN SEMESTER

INTEP01 OCCUPATIONAL HEALTH AND SAFETY (Elective)

UNIT-I

Introduction, Environmental law, Legal control of Hazardous substances and processes, Environmental issues and judicial trends, Health and safety law, common liability and work place injuries, Health and safety at work, the principle legal requirements, Health and safety and industrial relation law.

UNIT-II

Accidents and safety, Management, Safety, Management and policy, Investigation reporting and recording of accidents, Health and safety monitoring, Comprehensive exposure assessment, Principles of evaluating workers exposure, Risk assessment in the work place, Management and prevention, Health and safety training and communication, for non-employees, Principles of accident prevention, risk systems of work, Safety and audit.

UNIT-III

Occupational Health and Hygiene: The organization of working environment, ergonomics, lighting and ventilation, office security practices, cleaning and hygiene, Technology and health, Occupational disease and conditions, Occupational Audiology, NID, Cardiovascular Disease, Psychological and physiological protection, Occupational health practice, Noise and vibration, Dust and fumes, radiation and radiological protection, personal protection, Occupational hygiene practice, prevention and control manager in occupational hygiene, manual handling, Hot and cold, Safety factor and safety, stress, safety technology.

UNIT-IV

Assessment of Exposure: Measurement of noise and vibration exposure, Noise and vibration uncontrolled, Heat stress monitoring, dust exposure and respiratory health, Work Posture, Musculoskeletal Disorders, Strain Index, Lifting Equation, Maximum acceptable weight limits, Occupational Audiology: Cardiovascular health, Occupational assessment of heat rate variability, pulmonary function and respiratory health.

UNIT-V

Government schemes and services related to health and well-being, Policies of government in special context to Chemicals.

Recommended Books:

1. Jeremy W. Stranda, "Handbook of Health and safety Practice" Pitman Publishing.
2. Dharmendra S Sengupta, "Environmental law" Prentice Hall of India, New Delhi.
3. Markku J Conker, "Noise and Noise Control" CRC Press.
4. Mark Malik, "Clinical Guide to cardiac Autonomic Tests" Kluwer Academic Publishers.
5. Mark Malik, "Heat rate variability" Pitman Publishing Co. NY
6. Cyril M Harris, "Handbook of noise control" McGraw-Hill Book Company, NY
7. Maryanne Maitly, "Occupational Audiology" Butterworth-Heinemann Imprints of Elsevier.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING (TECH IV SEMESTER)

IPTEPE I: BUSINESS COMMUNICATION AND PRESENTATION SKILL (Theory)

Unit - I

Business communication covering: Role of communication in information age; average and meaning of communication; Aids necessary for technical communication; Communication as a technical requirement; Barriers to the process of communication and why.

Unit -II

Style and organization in technical communication covering: Listening, speaking, reading and writing skills; Clarity, directness, precision in delivery features of technical communication; Various types of business writing; Letters, reports notes, memos; Language and format of various types of business letters; Language and style of reports; Report writing strategies; Analysis of a sample report

Unit -III

Communication and personality: Development covering: Psychological aspects of communication, regarded as a part of communication; Emotional Intelligence, Personality and Effects in communication; Cultural factors that influence communication; Misconceptions to be avoided in communication; Language and persuasion; Language and conflict resolution;

Unit -IV

Language Laboratory organizing; Listening and comprehension skills; Reading Skills; Sound structure of English and literature patterns;

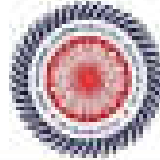
Unit -V

Oral Presentation and professional speaking covering: Basics of English presentation; Elements of effective presentation; Body Language and use of voice during presentation; Connecting with the audience during presentation; Projecting a positive image while speaking; Planning and preparing a model presentation; Organizing the presentation to suit the audience and context; Basics of public speaking; Preparing for a speech;

Recommended Books:

1. Fred Luthans, *Organizational Behaviour*, McGraw Hill
2. Leslie and path, *Report writing for Business*
3. M. Ashraf Rizvi, *Effective Technical Communication*, McGraw Hill
4. Wallace and gowers, *Personal Development for IIS and HIG*, Thomson Learning
5. Farhadullah, T. M. *Communication skills for Technical Students*
6. Michael Mackinn, John Woods, *The Business letters Handbook*
7. Heta A. Mungtia, *Effective Business Communication*
8. *MLA Handbook for Writers of Research Papers*

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING, 4TH SEMESTER

OPTPE-4 BUSINESS ETHICS AND CORPORATE GOVERNANCE-CRISIS

UNIT-I

Introduction: Corporation, definition and characteristics, forms of corporation, firm and trade, corporate objectives, corporations and government, government, corporate governance, definition, perspectives.

UNIT-II

Theoretical Foundations of Corporate Governance: Nature of conflict of interest, minority rights theory, nature of contracts, agency theory, debt and equity theory, concept of separation of ownership and control, stakeholder, stakeholder theory.

UNIT-III

Pillar of Governance & Organization: Owners, ownership structure, types of owners, ownership vs control, board of directors, types of directors, board roles and board attributes, board committees, executive management, role of CEO, economic planning, managerial reports, internationalization, types, categories, factors and role.

UNIT-IV

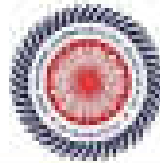
Work Ethics: Values and ethics, model of management in the Indian context, national development, need for values in global change, Indian perspectives, values by managers, holistic approach for managers in business making.

UNIT-V

Business Ethics and CSR: Corporation as a social institution, accountability and sustainability, relevance of triple bottom line reporting to CSR, codes of conduct, application of ethical theories to business making, ethical issues related to employment, health and safety.

Recommended Books:

1. Prafulla B. Mehta, Corporate Governance: Concept, Evolution and India Story, Knowledge, 2008.
2. John, Business Ethics: Concepts and Cases, Tata McGraw Hill, 1998.
3. Robert Monda, Neil Milner, Corporate Governance, Wiley Publications, 2008.



INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
 (A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY
 ORDINANCE 2009, NO. 3 OF 2009)
DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING
STUDY & EVALUATION SCHEME
W.E.P. SESSION 2017-2018
Year II, Term III (Fall)

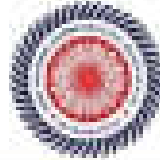
SEMESTER-V

S. No.	Course No.	SUBJECT	PERIODS		EVALUATION SCHEME			CREDITS
			L	T/P	INTERNAL ASSESSMENT	ISE	SUB-TOTAL	
1	IPSTPC11	Metal Cutting	3	0-0	40	60	100	3
2	IPSTPC2	Fluid Machinery	3	0-0	40	60	100	3
3	IPSTPC3	Machine Design-I	3	0-0	40	60	100	3
4	IPSTPE2	Elective-PE2	3	0-0	40	60	100	3
5	IPSTPE3	Elective-PE3	3	0-0	40	60	100	3
6	IPSTOR1	Elective-OR1	3	0-0	40	60	100	3
Total			18	0	240	360	600	18
PRACTICALS								
1.	IPSLPC11	Metal Cutting	-	-	05	30	35	2
2.	IPSLPC2	Fluid Machinery	-	-	05	30	35	2
3.	IPSLPC3	Mechanics	-	-	05	30	35	2
Total					09	110	145	6

Elective-Professional Elective (PE)-2		Elective-Professional Elective (PE)-3		Elective-Open Elective (OE)-1	
S.N.	IPSTPE...	S.N.	IPSTPE...	S.N.	IPSTOR...
11.	Auto Machines	11.	Total Quality Management	11.	Financial Management
12.	I.C. Engine	12.	Industrial Automation	12.	Managerial Economics
13.	MEMS and Nanotechnology	13.	Mechatronics	13.	Financial Accounting and Costing

Head of Department
 24/9/17

Registrar
 Page 3 of 18



Syllabus

Basic concepts - Definition and classification of metal cutting and tools, geometry of single point and multipoint cutting tools, and various angles of cutting tools and their functions, factors affecting tool geometry, Cutting tools nomenclature system, orthogonal and oblique cutting, cutting tool signatures.

Types of chips - continuous, discontinuous and segmented built up-edge and their formation and factors.

UNIT-II

Principles of metal cutting - Elements of machining, mechanism of chip formation, forces on the chip, Merchant theory and other theories of metal cutting, stresses and strains in chips, chip and waste rate, power and energy calculation.

Theory of multipoint machining: mechanism of drilling, machining time, torque and thrust, power calculation in drilling, reaming, and broaching.

UNIT-III

Heat generation and cutting temperature in machining: causes and sources of heat in cutting, heat distribution, their measurement, tool dynamometry and their types and working.

Cutting fluids: functions, characteristics and types of cutting fluids and their application, criteria for selection of cutting fluids.

Cutting tool materials: requirements, types and characteristics of various cutting tool materials, comparison and selection of cutting tools.

UNIT-IV

Tool failures and tool life - mechanism of tool failure, types of tool failure, tool wear and types, tool life and its measurement, Taylor tool life equation, relationship between tool life cutting speed, feed, depth of cut, factors affecting tool life.

Control of chips and chip breakers - methods of chip breaking, design principle of simple and type chip breakers, Working principle of chip breakers, effect of chip breaking.

UNIT-V

Machinability: definition, evaluation - factors affecting machinability, machinability index.

Economics of machining - cost analysis and optimization of machining, various parameters for calculation of machining cost.

Text Books:

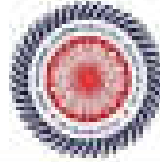
1. Manufacturing Technology Vol-II P.N. Rao PHD
2. Manufacturing Science, Ghosh Mallik, I.I.T.

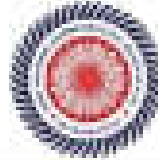
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UNIT - I

Boundary Layer Theory: Boundary Layer Definition and Characteristics, Momentum Equation, Laminar and Turbulent Boundary Layer, Total Drag, Separation and Control.

Flow Around Submerged Bodies: Force Exerted by Flowing Fluid on a Body; Drag and Lift; Stream Line and Stagnal Body, Drag on Sphere and Cylinder, Circulation and Lift on Circular Cylinder; Lift of an Air Foil.

UNIT - II

Impact of Free Jets: Impulse-Momentum Principle; Force Exerted by the Jet on Stationary Flat and Curved Plate, Moving Plate, Moving Plate and Moving Curved Vane, Jet Propulsion of Ship.

Impulse Turbine: Classification of Turbine; Impulse Turbine, Pelton wheel, Construction, Working, Work Done, Head Efficiency and Design Aspects, Governing of Impulse Turbine.

UNIT - III

Reaction Turbine Radial Flow Reaction Turbine, Francis Turbine: Construction, Working, Workdone, Efficiency, Design Aspect, Advantages & Disadvantages over Pelton Wheel.

Axial Flow Reaction Turbine: Propeller and Kaplan Turbine, Bulb or Tubular Turbine, Draft Tube, Specific Speed, Unit Quantities, Cavitation, Degree of Reaction, Performance Characteristics, Surge Turbine, Governing of Reaction Turbine.

UNIT-IV

Centrifugal Pumps: Classification of Pumps, Centrifugal Pump, Construction, Working, Work Done, Heads, Efficiency, Multiple Centrifugal Pump, Pump in Series and Parallel, Specific Speed, Characteristic, Net Positive Suction Head, Cavitation.

UNIT - V

Reciprocating Pumps: Classification, Component and Working, Single Acting and Double Acting, Discharge, Work done and Power Required, Coefficient of Discharge, Indicator diagram, Air Vessel.

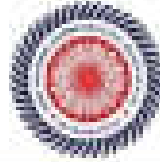
Fluid systems: Hydraulic Accumulator, Hydraulic Intensifier, Hydraulic Press, Hydraulic Crane, Hydraulic Lift, Hydraulic Ram, Hydraulic Coupling, Hydraulic Torque Converter, Air Lift Pump, Jet Pump.

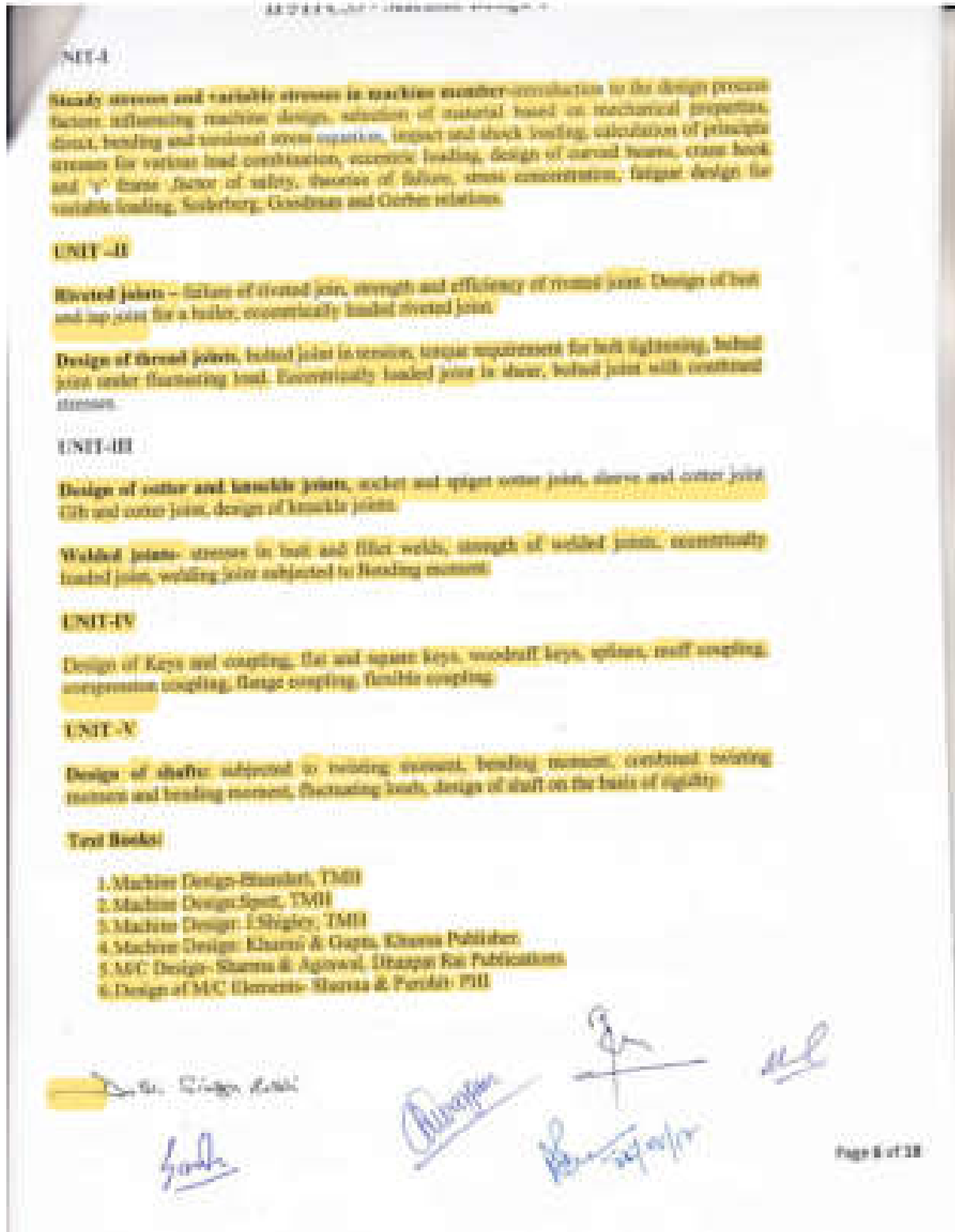
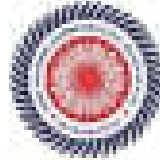
Test Books:

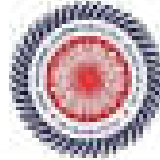
1. Mechanics of Fluid - Massey B.S. - English Language Book Society (U.K.)
2. Introduction to Fluid Mechanics and Fluid Machines - S.K. Som & G. Biswas - TMGH
3. "Fluid Mechanics & Machinery" by Agarwal, TMGH.
4. "Fluid Mechanics & Machinery" by Kirtanbharan & Bada Masrby, New Age Publication.

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IPSTPE11 - Turbo Machinery

UNIT-I

Nozzles & Diffusers: Nozzle & Diffuser types, their efficiency, critical pressure & velocity, relationship between area, velocity & pressure in nozzle flow.

Steam Turbine Types: Steam turbine-principle of operation of steam turbine, types, impulse turbine, compounded of steam turbine pressure compounded velocity compounded and pressure-velocity compounded impulse turbine.

Velocity diagram for impulse turbine: Force on the blade and work done, blade or diagram efficiency, gross stage efficiency, influence of action of blade to steam speed on blade efficiency in a single stage impulse turbine, impulse blade section, choice of blade angle.

UNIT-II

Impulse-reaction turbine: Velocity diagram, degree of reaction, Impulse-Reaction turbine with straight blade section and half degree of reaction (parker's turbine) Height of reaction, blade section.

Energy losses in steam turbine: Internal and external losses in steam turbine.

UNIT-III

Steam point Losses & Reheat factors: Factor-stage, efficiency of impulse turbine, stage point locus of an impulse turbine, steam point locus for reheat stage turbine reheat factor, internal efficiency, overall efficiency, relative efficiency, Design procedure of impulse & impulse-reaction turbine.

Governing of steam turbine: Throttle governing, nozzle governing, by-pass governing, combination of throttle and nozzle, governing and combination of by-pass and throttle governing, Effect of governing on the performance of steam turbine.

UNIT-IV

Gas turbine: Classification of Gas turbine, simple open cycle gas turbine, ideal and actual (dual cycle) for gas turbine, Optimum pressure ratio for maximum specific output in actual gas turbine, Regeneration, reheat and water cooling and effect of these modification on efficiency and output, closed cycle gas turbine.

UNIT-V

Turbo compressors: Introduction, classification of Centrifugal Compressor, Component working, velocity diagram, calculations of power and efficiencies, Slip factor, surging and choking, power and efficiencies.

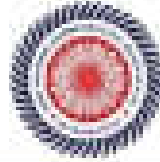
Axial Flow Compressor: Construction and working, velocity diagram, calculation of power and efficiencies, Degree of reaction, work done factor, stalling, comparison of centrifugal and axial flow compressor.

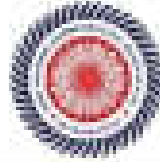
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IPSTPE22 - Internal Combustion Engine

UNIT-I

Introduction of internal combustion engine, classification of I.C. engine, engine components, basic engine nomenclatures, four stroke S.I. and C.I. engine, two stroke engine, comparison of two stroke and four stroke engines, comparison of S.I. and C.I. engines, application of I.C. engines.

Air Standard Cycle: Otto cycle, diesel cycle, dual cycle, comparison between Otto, diesel and dual cycles, fuel-air cycles and actual cycles, effect of variable specific heats and dissociation on indicator diagram.

UNIT-II

Combustion in S.I. Engines: Flame development and its propagation, ignition lag, effect of engine parameters on ignition delay, pre-ignition, knocking in S.I. engine, variables affecting knock, combustion chambers.

Carburetor: Principle of carburation, elements of carburetor, parameter affecting carburation, air-fuel mixture, expansion for air-fuel ratio.

Fuel Injection Systems: Battery and coil ignition system, magneto ignition system, firing order, spark advancing.

Combustion in S.I. Engines: Flame development and Propagation, ignition lag, effect of air density, temperature, engine speed, turbulence, and ignition timing, physical and chemical aspect of detonation, effect of engine and fuel variable on knocking tendency, knock rating of various fuels, octane number, H.U.C.R., Action of degree, pre-ignition, its causes and remedy, valve timing of various types of combustion chambers, valve timing and firing order.

UNIT-III

Combustion in C.I. Engines: Combustion phenomenon in C.I. engines, $p-v$ diagram and their study for various stage of combustion, delay period, detonation in C.I. engine, parameter affecting detonation.

Fuel Injection Systems: Air and solid injection, fuel pump and injection.

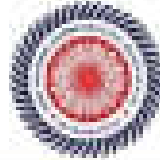
UNIT-IV

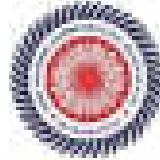
Engine Friction and Lubrication: Total engine friction, flow by losses, pumping losses, factors affecting engine friction, mechanism of lubrication, lubrication systems.

Cooling Systems: Piston and cylinder temperature distribution, parameter affecting engine heat transfer, principles and various methods of cooling.

Two Stroke Engines: Constructional details, scavenging parameters, stability and performance of scavenging system, advantages and disadvantages of two stroke engines.

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IPSTPEL23 - MEMS and Nanotechnology

UNIT-I

Introduction: Definition of micro electro-mechanical systems (MEMS), micro sensors, micro actuators, microelectronic fabrication, mechanical thermal and magnetic MEMS, radio frequency (RF) MEMS, MOEMS, MEMS design considerations.

Micromachining, photolithography, structural and surface materials, methods of lithography, Thin film deposition, and its development process, LPCVD, PECVD, inorganic doping, etching process with bulk micro-machining, vapor bonding, LIGA.

UNIT-II

System modelling and properties of material: System types and basic modelling elements in mechanical, thermal, fluid system. Translational and rotational pure mechanical system, hybrid system, analogy between mechanical and electrical system.

Passive components and systems: System on a chip, passive electronic system, passive mechanical system.

UNIT-III

Mechanical sensors and actuators: Introduction, principals, micro plates, capacity inputs, piezoelectric materials, and their properties, MEMS gyroscope.

Thermal sensor and actuators: Introduction, thermocouple probe, micro hot plate gas sensor, micro thermal sensors, shape memory alloys.

UNIT-IV

Magnetic sensors and actuators: Different types and principals.

RF MEMS: Introduction, RF based communication system, MEMS inductors, and thin film resonator.

UNIT-V

NANOTECHNOLOGY: Introduction, nanotechnology materials, fullerenes, doping, CNT, SWCNT, MWCNT, development and application of CNT.

Text Books:

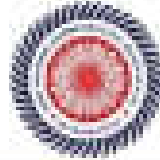
1. MEMS- Mahesh - McGrawHill.
2. MEMS & MOEMS Technology & Application- Raj Choudhary, PHI.

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IPSTEEM - Total Quality Management

UNIT - I

Basic concepts of Quality: Inspection definition of quality, quality control cost of quality, Value of quality, Statistical Quality Control, Need and advantages of SQC

Frequency Distribution: Variables & attributes, quality characteristics, Theory of control charts, control chart for variable X & R chart, Control chart for attribute p, np, C, Chart & process capability

UNIT - II

Quality Assurance: Quality assurance Manual, Quality Circle, characteristics of quality circle and the process of operation of quality circle, quality Policy & procedure & objectives

Acceptance Sampling: Concept of sampling, D-C curve & its construction, Sampling plans, single, double & multiple sampling plans

UNIT - III

Contribution of Various Quality Management Gurus: Juran Trilogy, Deming's 14 Points, P-D-C-A Wheel, Taguchi's philosophy, Design of experiment, old and new Seven QC Tool of Quality, Philip Crosby's zero defect, seven types of waste, F's, Quality function deployment

UNIT - IV

Introduction to ISO 9000: Various models of ISO 9000, Classes of 9000, Total Quality Control, Total Quality Management, Tool for TQC & TQM, Kaizen, 6 sigma quality, procedure of six sigma, TQM and Six Sigma

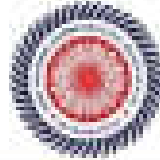
UNIT - V

Reliability: Definitions, Bathtub curve, design for reliability, Failures & causes of failures, FMECA, Maintainability & Availability, MTBF, Reliability Models, system with components in series & in parallel, mixed arrangement, hot-tru-technique

Text Books:

1. SQC by Grant & Leavenworth - Tata Mc. Hill
2. Quality Planning & Analysis by Juran & Gryzani - Tata Mc. Hill
3. Total Quality Control By A. Feigenbaum - McGraw Hill
4. SQC by M. Mahajan - Bharatiya publication
5. Total Quality Management - Butterfield Tata Mc. Hill
6. Total Quality Management - Parvina charaninath (Low-Pearson Education)
7. Total Quality Management - Krishnaya-PII
8. Total Quality Management - Sagarika & Sarma-PII

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IPSTPE32 - Industrial Automation

UNIT-I

Automation: Definition, Automation in production systems; Automation principles and strategies; Basic elements of an automated system; Advanced automation functions; Levels of automation; Types of automation; Benefits and Impact of Automation in Manufacturing and Process Industries; Architecture of Industrial Automation Systems.

UNIT-II

Pneumatic Control Systems: Overview of different types of valves and Actuators in Pneumatics, their applications and their ISO symbols; Design of Pneumatic circuits using Cascade method and Shift register method (up to 3 cylinders); Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves with and without grouping; Design of Pneumatic circuits using PLC Control (ladder programming only and up to 3 cylinders) with applications of Timers and Counters and concept of Flag and latching.

UNIT-III

Hydraulic Control Systems: Overview of different types of valves, Actuators and Accumulators used in GC hydraulic circuits, their applications and their ISO symbols; Basic hydraulic circuits involving linear and rotary actuators (One sequential circuit).

Fundamental concepts of digital and servo hydraulic controls; Comparison between proportional, digital and servo hydraulic control systems.

Digital logic transfer systems; Logic Gates; Boolean Algebra; Simplification of Boolean equations using Karnaugh Maps.

UNIT-IV

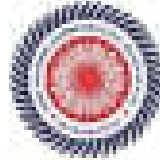
Microprocessors and Microcontrollers (Only basic understanding and applications): Concept of Microprocessor based control and its application; Parts of a Microprocessor system with block diagram of the general form of a microprocessor system; Data bus, Address bus and Control Bus; General Internal Architecture of a Microprocessor; Functions of constituent parts such as ALU, Various Registers and the Control unit; Difference between a Microprocessor and a Microcontroller; General Block diagram of Microcontroller.

UNIT-V

Sensors and Transducers: Fundamentals of displacement, position and Proximity sensors; Velocity and Motion Sensors; Force and Fluid Pressure Sensors; Liquid level and Flow sensors; Temperature and Light Sensors; Control of stepper motor.

Text Books:

1. Industrial Production & Automation: Mohit P. Gaurav, PhD
2. Automation Production Systems and CIM: Mohit P. Gaurav, PhD



IPSTPE33 - Mechatronics

UNIT-I

Introduction to Mechatronics: Sensors and actuators type, selection and interfacing, Digital electronics and microprocessors in Mechatronic systems, Mechatronic systems modeling, Analysis and control of analog, digital and hybrid systems, Mechatronic systems design principles.

UNIT-II

Introduction to Mechatronics Systems: Measurement systems control systems mechatronics approach.

Sensors and Transducers: Introduction performance terminology displacement, position and proximity, velocity and motion, Fluid pressure, temperature sensors, light sensors selection of sensors signal processing.

UNIT-III

Microprocessors: Introduction architecture, pin configuration, instruction set, programming of Microprocessor using 8086 instructions, interfacing input and output devices, interfacing D/A converters and A/D converters, applications, temperature control, stepper motor control, traffic light controller.

UNIT-IV

Programmable Logic Controller: Introduction, basic structure, Input/Output processing, programming, Timers, Internal relays and Counters, Data handling, Analog Input/output selection of a PLC.

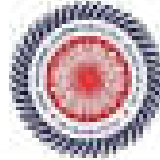
UNIT-V

Design and Mechatronics: Steps in Designing Mechatronic systems, Traditional and Mechatronic design, possible design solutions, case studies of mechatronic systems, pick and place robot, automatic car park system, engine, management system.

Test Books:

1. HIMT Ltd, "Mechatronics", Tata McGraw Hill Publishing Co.Ltd, 1998
2. Bradley D.A., Dawson D., Horn N.C. and Linder A.J., "Mechatronics", Chapman and Hall, 1993.
3. Ganesha Ramesh S. "Microprocessor Architecture, programming and Applications", Wiley Eastern, 1997
4. Mechatronics- Singh & Joshi-PH

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IPSTOCEII - Financial Management

UNIT-I

Introduction: Scope and objective, organization of finance function, Time value risk and return and valuation of money, valuation of long term securities various model of pricing

UNIT-II

Statement of changes in financial position: Sources and uses of working capital, cash flow statement, balance sheet, profit loss account and its process

Financial ratio analysis: Meaning, types, importance and limitations, calculation of various ratios

UNIT-III

Capital budgeting: Principles, techniques, various methods of capital budgeting, Concept and measurement of cost and capital, and various approaches for measurement of cost of capital and comparison

Analysis of risk and uncertainty: various approaches for risk evaluation

UNIT-IV

Theory of working capital management: Concept and definition of gross, working capital and net working capital, trade off between profitability and risk

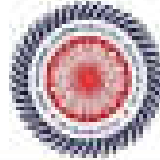
UNIT-V

Operating financial and cashflow leverage: Introduction, definition and concept and various approaches

Text Books

1. Financial Management by Khan and Jain, TMGH
2. Financial Management by Kuchhal, Vikas Publications
3. Financial Management- Parash Shah-Wiley India Pvt. Ltd.

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IPSTOEL - Managerial Economics

UNIT-I

Introduction to Managerial Economics, Different Area of Managerial Economics, Micro and Macro Economics, Nature and Scope of Managerial Economics- Demand Analysis, Law of Demand and its Exceptions, Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Supply Analysis, Law of Supply, Elasticity of Supply: Definition, Types, Measurement and Significance of Elasticity of Supply.

UNIT-II

Law of Return, Revenue Analysis, Theory of Production and Cost Analysis: Production Function, Cobb-Douglas Production Function, ACME Production Function, Investment Function.

Cost Analysis: Cost Concept, Opportunity Cost, Fixed Vs Variable Cost, Explicit Costs Vs Implicit Costs, Out of Pocket Cost Vs Imputed Costs, Break-even Analysis (BEA) - Determination of Break-even Point (Simple Problem) - Managerial Significance and Limitation of BEA.

UNIT-III

Introduction to Market & Pricing: Features: Elements of Market, Types of Market, Concept of Market, Classification of Market based on the nature of competition, Types of Competition, Features of Perfect Competition, Features of Imperfect Competition, Monopoly and Monopolistic Competition, Price-output Determination in case of Perfect Competition and Monopoly.

Objectives and Policies of Pricing: Introduction, Full Cost or Cost plus Pricing, Differential Pricing, Going Rate Pricing, Marginal Cost Pricing, Trade Association Pricing, Loss Leadership Pricing, Administrative Pricing.

UNIT-IV

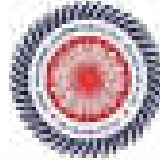
Forms of Business Organization: Introduction, Definition, Essential Elements of Good Organization, Principles of Organization, Formal and Informal Organization, Organization Structure, Concept of Ownership Organization, Types of Ownership: Partnership, Joint Stock Company, Types of Joint Stock Company, Co-Operative Organization, Public Sector Organization.

Capital and Capital Budgeting: Capital and its Classification, Need of Working Capital and its Assessment, Factors Affecting Working Capital, Fundamentals of Accounting: Types of Capital, Method and Sources of Raising Finance, Nature and Scope of Capital Budgeting, Features of Capital Budgeting: Proposals, Method of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (Simple Problems).

UNIT-V

Fundamentals of Financial Accounting: Nature of Accounting, Important Accounting Terminology, Accounts and Types of Accounts, Rules of Debit and Credit, Systems of Book Keeping, Book of Accounts, Journal, Ledger, Trial Balance, Final Accounts, Trading Account, Profit and Loss Accounts and Balance Sheet.

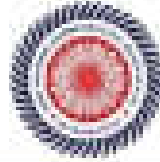
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Financial Analysis Through Ratios: Classification of Financial Ratios, Liquidity Ratios, Average Ratios, Activity Ratios, Profitability Ratios, Current Ratio, Acid-Test Ratio, Debt-Equity Ratio, Assets Coverage Ratio, Debt Service Coverage Ratio, Inventory Turnover Ratio, Debtor Velocity Ratio, Creditor Velocity Ratio, Gross Profit Ratio, Net Profit Ratio, Return-on-Equity Ratio.

Text Books:

1. Managerial Economics by Yogesh Maheshwari, PBI
2. Managerial Economics By Jas Deen, PBI
3. Managerial Economics By Craig H. Peterson, W. Cris Lewis, Sulbir K. Jain
4. Financial Accounting For Management By Anurish Gupta, Pearson Education
5. Managerial Economics By H. Craig Peterson & W. Cris Lewis, PBI
6. Managerial Economics By Satish Datta, Oxford University Press
7. Managerial Economics and Financial Analysis By Arjun, TMH



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMESTER



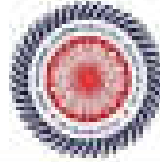
INSTITUTE OF TECHNOLOGY
 GURU GHASIDAS VISHWAVIDYALAYA
 (CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009,
 NO. 1 OF 2009)
 DEPARTMENT OF INDUSTRIAL, AGRICULTURAL ENGINEERING
 STUDY & EVALUATION SCHEME
 M.C.E. SEMESTER-VI, 2018
 Page 1 of 28

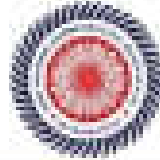
SEMESTER-VI

S. No.	Course No.	COURSE	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	END	SUB-TOTAL	
1	IPSTPC1	Machine Design - II Measurement, Storing	3	1	0	60	60	120	4
2	IPSTPC2	& Control	2	1	0	60	60	120	4
3	IPSTPC3	Welding Engg.	2	0	0	60	60	120	3
4	IPSTPC4	Electro-PE4	2	0	0	40	60	100	3
5	IPSTPC5	Electro-PE5	2	0	0	60	60	120	3
6	IPSTPC6	Electro-PE6	2	0	0	40	60	100	3
Total			18	2	0	340	360	700	20
PRACTICALS									
7	IPSTPC2	Measurement and Storing Lab	-	-	05	45	30	75	2
8	IPSTPC3	Welding Engg. Lab	-	-	05	45	30	75	2
Total			-	-	10	90	60	150	4

Electro- Professional Course (PE-4)		Electro- Professional Elective (PE-4)		Electro- Open Elective (OE) 2	
S.N.	IPSTPC4	S.N.	IPSTPE4	S.N.	IPSTOE2
01.	Material Management	01.	Automobile Engg.	15.	Computer Network Planning
02.	Plant Layout, Material Handling	02.	Power Plant Engg.	21.	Management Information System
03.	Maintenance And Reliability Engineering	03.	Heat & Mass Transfer	23.	Six Sigma And DMAI

Head of Department
 Lecturer
 Head of Institute
 Head of Section
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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECH V SEMESTER

IP6TPC41- Machine Design-II

UNIT-I

Spring: Spring Materials and Their Mechanical Properties, Equation for Stress and Deflection, Helical Coil Springs of Circular Section for Tension, Compression and Torsion, Dynamic Loading, Fatigue Loading, Wahl Line, Leaf Spring and Laminated Spring.

UNIT-II

Gears: Spur Gears / Gear Drives, Classification of Gears, Selection of Type of Gears, Law of Gearing, Force Analysis, Gear Tooth Failure, Selection of Material, Number of Teeth, Face Width, Beam Strength of Gear Tooth, Effective Load on Gear Tooth, Estimation of Module Based on Wear Strength, Lewis equation, Gear Design for Maximum Power Transmitting Capacity, Gear Lubrication.

UNIT-III

Helical Gears: Helical Gears, Terminology of Helical Gears, Virtual Number of Teeth, Tooth Properties, Force Analysis, Beam Strength of Helical Gears, Effective Load on Gear Tooth, Wear Strength of Helical Gears.

Bevel Gears: Bevel Gears, Terminology of Bevel Gears, Force Analysis, Beam strength of Bevel Gears, Wear Strength of Bevel Gears, Effective Load on Gear Tooth.

UNIT-IV

Ball & Rolling Contact Bearings: Types of Ball and Roller Bearings, Selection of Bearing for Radial and Axial Load, Bearing Life, Mounting and Lubrication, Shaft Scales – Contact Type and Clearance Type.

Journal Bearings: Types of Lubrication, Viscosity, Hydrodynamic Theory of Lubrication, Stribeck Number, Heat Balance, Self-corrected Bearings, Bearing Materials.

UNIT-V

Clutches and Brakes: Friction Clutches, Friction Materials, Torque Transmitting Capacity, Single & Multiple Plate Clutch, Centrifugal Clutches, Band and Block Brakes.
Belt Drive: Flat and V-belts, Belt Constructions, Geometrical Relationships for Length of the Belt, Analysis of Belt Tensions, Condition for Maximum Power, Selection of Flat & V-Belts, Adjustment of Belt Tension.

Text Books:

1. Design of Machine Elements V.R. Bhandari, TMH Publications.
2. Machine Design by Shigley - McGraw Hill Pub.

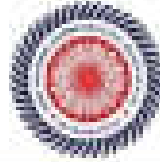
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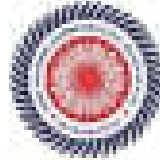
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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECHNICAL SERVICES

IP6TPC42 Metrology, Measurement and Control

UNIT-I

Introduction to Measurement and Measuring Instruments, Grounded Measuring Systems and Functional Elements, Static & Dynamic Performance Characteristics of Measurement Devices, Calibration, Concept of Error, Sources of Error, Analysis of Error.

Transducers: Types of Transducers and Their Characteristics, Measurement of Strain, Strain Gauges and Their Working, Gauge Factor, Strain Gauge Circuits, Strain Rosettes.

UNIT-II

Measurement of Pressure: Pressure Measuring Transducers, Diaphragm, Measurement of Vacuum and Low Pressure, Various Low Pressure Gauges.

Measurement of Fluid Flow: Various Methods of Flow Measurement and Device Temperature Measurement: Bi-Metallic Thermometers, Thermocouples, Thermistors and Pyrometers.

UNIT-III

Metrology: Standards of Linear Measurement: Line and End Standards System of Limit and Fit, Limit Gauges and Their Design, Measurement of Geometric Form: Line Straightness, Flatness, Roundness and Circularity: Measurement of Surface Texture, Quantitative Evaluation of Surface Roughness and Its Measurement, Introduction of CMM, Its Working and Application.

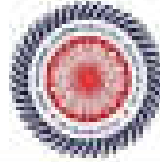
UNIT-IV

Interferometry: Principle and Use of Interferometry, Types of Interferometers: Comparators: Classification, Working Principle and Magnification: Range of Mechanical, Electrical, Optical, Electronic, Pneumatic Comparators, Measurement of Screw Threads & Gears, Two Wire and Three Wire Method.

UNIT-V

Fundamentals of Control System: Control system concepts, classification of control systems, mathematical representation of system equations, hydraulic, pneumatic, thermal and mechanical systems and their mathematical modeling, response characteristics of components and systems through classical relation.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING 8 TECH-VI SEMESTER

Text Books:

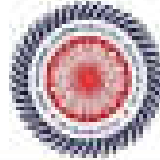
1. Beckwith and Bush, Mechanical Measurement
2. Jain RK Instrumentation
3. Raven H Automatic Control Engineering
4. Donald P Johnson's Automatic Process Control
5. Nates & Chowdhury Instrumentation Measurement & Analysis
6. Nates BC Theory & Application of Automatic Controls
7. Cooper Albert D Modern Electric Instrumentation PPI

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING, B.TECH VI SEMESTER

IP6TPC45 Welding Engineering

UNIT-I

Classification of welding: gas welding, Arc Welding and Equipments, types of welding fluxes, Welding Techniques, Welding Torch and Electrodes, Submerged Arc Welding, TIG, MIG, Plasma Arc Welding and its Application.

UNIT-II

Arc Welding: Arc Welding Power Sources, Selection Factor for Power Source, DC Generator, rectifiers, Constant Current & Constant Voltage Machines, welding Transformers

Welding Electrodes: Types, Electric Coating, Selection of Electrode, Classification, Coating of Mild steel and Alloy steel Electrode, Metal Transfer in Arc Welding.

UNIT-III

Resistance welding Process: Spot Welding, Seam, Projection, Hot Welding, Flash Butt Welding, Projection Welding.

Solid State Welding Process: Cold Chilling, Diffusion Welding, Ultrasonic Welding, Explosive Welding, and Friction Welding.

Radiant Energy Welding Process: Electrical Beam Welding, Laser Beam Welding.

UNIT-IV

Brazing, Soldering and their Application: Weld ability of Metals: Introduction, Welding of Cast Iron, Stainless Steel, Aluminium, Copper and its Alloys, Hydrogen Induced Cracking.

Welding Distortion: Distortion and Residual Stress, Types, Control of welding Distortion, Various distortions in welds, Trouble shooting.

UNIT-V

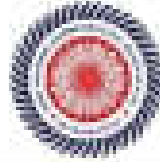
Design of Weldment: Weld Geometry, Eccentric Loading, Designing Tension and bending, Designing welding fixtures.

Testing, Inspection and Specification: Destructive and Non-destructive methods of testing Weldment, WPS, PQR, and ASME section IX Welding.

Robotics and Automation in Welding: Modes of Automation, Positioners, Welding Fixtures, and Arc Motion Devices, Under Water Welding.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECH VI SEMESTER

Text Books:

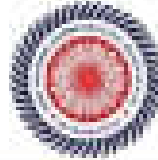
1. American Welding Society, Hand Book VII Edition Vol. II.
2. Sadkari S.V., Modern Arc Welding.
3. Welding Engg. - Little, TMGH.
4. Khanna C.P., Welding Technology, Dhanpat Rai & Sons.
5. Parmar R.S., Welding Processes & Technology, Khanna Publishers.
6. Parmar R.S., Welding Engg. - B Technology, Khanna Publishers.
7. P.N.Rao, Manufacturing Technology Vol-I, TMH

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING (I.TECH) SEMESTER

IP6TPE41 - Materials Management

UNIT-I

Introduction: Definition and scope, concept of integrated materials management, materials research, materials planning and budgeting, coefficients, standardization.

Purchasing: Objective and function of purchasing department, purchasing procedure, negotiation, and contract-conditions.

UNIT-II

Types of purchasing, buying national commodities, purchasing under uncertainty, purchasing of capital equipment, international purchasing, public buying, legal concept in buying, insurance buying, price forecasting.

UNIT-III

Stores management, stores system and procedure, incoming material control system accounting and stock verification, obsolescence, surplus and scrap management.

UNIT-IV

Basic inventory system, concept of inventory, types of inventory, relevant costs of inventory, economic order quantity, inventory control techniques, basic models of inventory.

Spare parts management: definition of spare and its classification, MUMC-3D, view of spare, stock control spare inventory.

UNIT-V

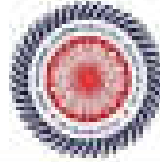
Value analysis: value importance, normal degree value analysis applied in purchase engineering for value analysis, cost analysis and value analysis and purchase research. Material and process selection in VE design, material, process & supplier decisions.

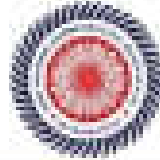
Text Books

1. Materials Management an integrated approach, GopalKrishnan.P & Sundaresan.M (2002) Prentice Hall India Limited, New Delhi.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING, UTECH VI SEMESTER

IP6TPE43 - Plant Layout & Material Handling

UNIT-I

Plant facility location - concept of plant facility, its scope, importance and objectives, nature of location decision, need for facility location planning, general procedures and factors influencing location decision, facility location models, economic and cost analysis, rural and urban location patterns in India.

UNIT-II

Layout Design - industrial plant design considerations, types of production types of layout, factors affecting layout work, techniques and procedure used in workstation and plant layout, quantitative techniques in plant layout, developing pre-layout and process layout, comparing layouts, criteria for comparison facility layout, concept of computerized layout programs like CRAFT, CORELAP, ALSEP and PLANET.

UNIT-III

Flow pattern design - Control system flow cycle, need and advantage of planned material flow, factors for consideration, designing flow pattern, flow patterns for production lines and assembly lines methods.

UNIT-IV

Material Handling - scope and functions of material handling, manual mechanical handling ratio, principles of material handling, analysis of material handling problem, classification of material handling system, salient features and application of general purpose material handling equipment, manual handling in stores and warehouses, automation in part handling handling and industrial robots, optimum allocation of material handling equipment.

UNIT-V

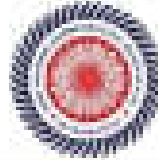
Automated material handling system - concept of AGVs, AHS and Methods to minimize cost of material handling, safety in material handling, evaluation of material handling process, design procedure of cranes, lifts.

Text Books:

- 1 Practical plant layout by Mather
- 2 Plant layout and design by James Mize
- 3 Manufacturing Management: a Quantitative approach by Robert Ashurst.
- 4 Production and Operation Management by Lockyer

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING (TECH VI SEMESTER)

IPGTPE43 - Maintenance and Reliability Engineering

UNIT-I

Concept of reliability: objectives, applications, area of use, use of reliability in industry. The reliability function, mean time between failures, hazard rate function, bath tub curve, conditional reliability, probability density function, failure rate, failure density, hazard rate, life expectancy measures.

UNIT-II

Constant and time dependent failure models: Exponential, Weibull, normal and lognormal Distributions, gamma distribution, binomial distribution, poisson distribution.

Reliability of systems, series, parallel, series-parallel systems, K-out-of-M system. Concept of redundancy, objectives, applications, redundant standby systems, system structure functions, minimal cut and minimal paths, common mode failures, three state devices.

UNIT-III

Determination of reliability (state dependent systems): Markov analysis, hot starting system, standby systems, degraded systems.

Failure Analysis: Introduction to failure mode and effect analysis, FMEA and FMECA, root cause analysis, Fault tree diagram, event tree. Availability: concept and definitions, types of availability model, system availability.

UNIT-IV

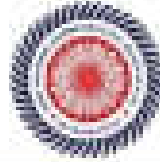
Introduction: Objectives and policies of maintenance, maintainability terms and definition, maintainability organization functions and task estimation of maintenance cost.

Types of maintenance: breakdown, predictive, replacement, on-line, off-line, preventive Maintenance, overhauling and correction maintenance. Preventive maintenance via repair, reliability centered maintenance, condition based maintenance, principles and level of CBM.

UNIT-V

Total productive maintenance, goals, objective benefits of TPM, components of TPM, calculation of OEE.

Page 12 of 21



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMESTER

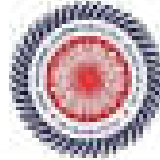
Training for maintenance personnel, objective and level of training, types of training methodology, evaluation of maintenance department.

Text Books:

1. Gilhae R.H. "Principles of Planned Maintenance", McGraw Hill, New York, 2001.
2. Fling C.L. "An introduction to Reliability and Maintainability Engineering" Tata McGraw Hill.
3. Srinath L.S "Reliability Engineering", Affiliated East-West Press Limited, New Delhi, 2002.
4. Dhillon B.S. "Engineering Maintainability", Prentice Hall of India, New Delhi, 2000.
5. Maintenance and spare parts management by P. Gopal Krishna PHD.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECH VISHWAKSRA

IP6TPE51 - Automobile Engineering

UNIT-I

Introduction of an automobile, comparison and basic structure of automobile, classification, difference between automobile and automotive, the chassis construction & classification, detail of frame, suspension construction & specifications. Wheel and tyre: Types of wheel, wheel dimensions, desirable tyre properties, types of tyre, tyre material, tyre dimensions, factor affecting tyre life.

UNIT-II

Transmission system: Function of transmission types, sliding mesh gear box, constant mesh gear box, synchro mesh gear box, cylindrical gear box, torque converter, propeller shaft, universal joint, bevel joint, final drive, differential, performance of gear box.

UNIT-III

Clutch: Requirement, function & type of clutch, dry friction clutch, wet friction clutch, clutch plate, single plate & multiple plate clutch, centrifugal clutch, and fly wheel. Suspension system: function and requirements, leaf spring, torsion bar, telescopic shock absorber.

UNIT-IV

Brake: Function and requirement, brake efficiency, wheel skidding, types of brake, electrical, mechanical and hydraulic & pneumatic brakes, master cylinder, wheel cylinder, self-actuating brakes, brake drum, brake lining, brake shoe, trouble shooting.

UNIT-V

Front axle and suspension: wheel alignment purpose, factor of front wheel alignment, steering geometry, correct steering angle, steering mechanism, under steer and over steer, steering gear, power steering, reversibility of steering gear, steering gear ratio, calculation of turning radius.

Engine emission: Emission standard of vehicle in India, Euro norms, emission, testing. Principle of multipoint fuel injection (MPFI), component of MPFI, Different sensors of MPFI system: vehicle air conditioning, Catalytic converters, engine troubles & repair.

Test Books

1. Automobile Engineering Kripal Singh Vol. I, II
2. Automobile Mechanics Joseph Holden
3. Automobile Engineering G.D. N.K.
4. Automobile Engineering by Shivraman T.M.R.

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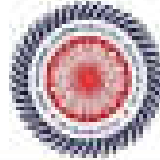
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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMESTER

IPSTPE52 - Power Plant Engineering

UNIT-I

Introduction:

Sources of energy, present power position in India, non-conventional energy and their application, steam power plant, High-pressure boilers and their classification and working, Boiler accessories and mountings, condensers and their types.

UNIT-II

Solar Energy: Solar Insolation Calculation, Flat plates and concentrating collectors for liquid and gases, construction.

Collector Area Calculation: heat removal factor, Efficiency.

Solar System: Power plants, low-temperature and high temperature plants, solar dryer, solar cookers, solar refrigeration systems, solar pond.

UNIT-III

Nuclear Energy: Introduction to Nuclear Engineering, Release of Energy by Nuclear Reaction, chain reaction, moderators, components of nuclear reactor, types of reactor, Pressurized water reactor, CANDU reactor, Gas cooled reactor, Liquid metal cooled reactor, Insulator reactor, Nuclear Materials.

UNIT-IV

Geothermal power plant, Wind energy: Type of Towers, horizontal axis and vertical axis systems, system design and site selection, blade material, Wind power scenario in India, Bio Gas Plant: Types, parameters affecting plant performance, plant design.

UNIT-V

Direct Energy Conversion: Fuel Cells, Thermo-ionic, Thermionic and MHD

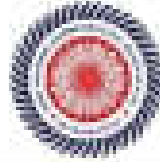
Systems (Maglev Hydrodynamic system), Economic analysis of Power plant tariffs.

Text Books:

1. Power plant Engineering, Dambudhar & Arora, Dhanpat Rai Publication.
2. Sakhera, S.P., Solar energy, TMH Publication.
3. Duffie and Beckman, Solar Energy Thermal Processes, John Wiley.
4. P.K.Nag, Power plant Engineering.
5. Power Plant Engineering by Warkil, TMH

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING, I.TECH VI SEMESTER

IPSTPES3 - Heat and Mass Transfer

UNIT-I

Introduction

Various modes of heat transfer, Fourier's, Newton's and Stefan Boltzmann's law, combined modes of heat transfer, thermal transfer, thermal diffusivity, overall heat transfer coefficient.

Conduction

The thermal conductivity of solids, liquids and gases, factors in influencing conductivity measurement. The general differential equation of conduction, one-dimensional steady state conduction, linear heat flow through a plane and composite wall, cube and sphere critical thickness of insulation, effect of variable thermal conductivity, conduction with heat generation in flat and cylinders.

UNIT-II

Fin

Conduction-convection system, extended surfaces rectangular, triangular circumferential and pin fin, general conduction analysis, fin of uniform and non-uniform cross section area, heat dissipated by a fin, Effectiveness and efficiency of fin, Approximate solution, Design a fin for maximum heat transfer, Solution for different boundary conditions, Use of fin analysis for measuring temperature using of thermocouple.

Transient unsteady state heat conduction

Introduction to unsteady state heating and cooling system with negligible internal resistance, lumped capacity method and its validity, Unsteady state conduction through finite and semi-infinite slab without surface resistance, convection boundary conditions, Solution through Heisler's chart.

UNIT-III

Forced Convection: Physical mechanism of forced convection, Dimensional analysis for forced convection, velocity and thermal boundary, layer, flow over plate, flow across cylinder and sphere, flow in tubes, Reynolds's analogy.

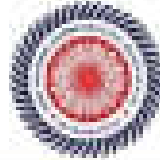
Natural Convection: Physical mechanism of natural convection, Dimensional analysis of natural convection, important relationship for natural convection.

UNIT-IV

Boiling and Condensation: Boiling heat transfer, pool boiling, boiling regimes and boiling curve, heat transfer, correlations in pool boiling, Condensation heat transfer, film condensation, derivation for the average heat transfer coefficient 'h' for the case of laminar film condensation over vertical.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMESTER

Heat Exchangers: Different type of heat exchanger. Determination of heat exchanger performance. Heat exchanger transfer unit. Analysis restricted to parallel and counter flow heat exchanger. (LMTD and NTU method).

ENY-V

Thermal Radiation

Introduction, absorption and reflection of radiant energy, emission, radiosity and irradiation, black and non black bodies, Kirchhoff's law, intensity of radiation, radiative exchange between black surface, geometric configuration factors, Gray body radiative exchange between surface of arbitrary configuration factors.

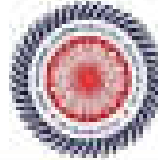
Introduction to mass Transfer

Mass and mole concentrations, molecular diffusion, eddy diffusion, convective diffusion from an evaporating fluid surface, introduction to mass transfer in laminar and turbulent convective combined heat and mass transfer.

Text Books:

1. Heat transfer-S.P. Sukhatme-TMH
2. Heat & Mass Transfer-Arora and Deydasdwar-Changal Rai
3. Heat Transfer-C.P. Arora, TMH
4. Heat & Mass Transfer-K.C. Soodhara-New Age
5. Heat Transfer-J.P. Holman-TMH
6. Heat Transfer-A Practical Approach- Yousif A. Cengel

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TOCH VI SEMESTER

IP6TOE21 - Enterprise Resource Planning

UNIT-I

Introduction to Enterprise resource planning, Evolution of ERP, MRP, MRP-II, e-ERP, Generic business model with reference to ERP, Structure of ERP. Two tier architecture client, server, Three tier architecture, repositories, EDI/SMS, Operating systems, Generic model of ERP system - Design the code structure, Design of Role/Activity Diagrams, Benchmarking, Types of Benchmarking, Process of Benchmarking.

UNIT-II

Introduction to Business Process Re-engineering, Procedure of BPR, Principle of BPR, Process Improvement Process redesign.

UNIT-III

Introduction to Supply chain Management and ERP, understanding the supply chain with case examples, Supply chain performance with measures, Achieving strategic fit and scope, Supply chain drivers, Supply chain obstacles, ERP Vs SCM, Benefits of supply chain improvement, Introduction of Logistics Types of Logistics, Types of Logistics, Benefits of Logistics.

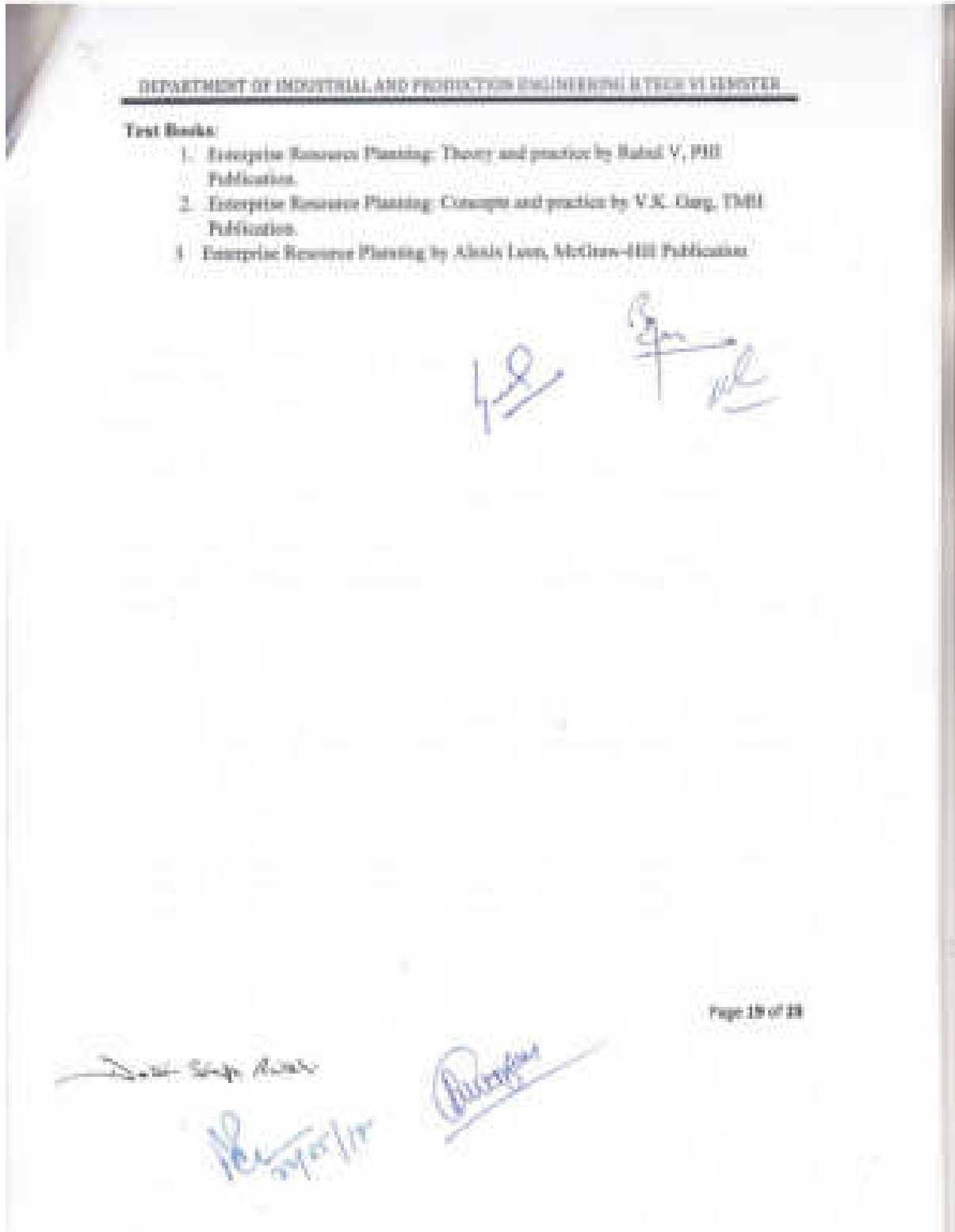
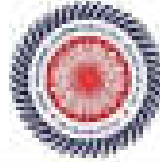
UNIT-IV

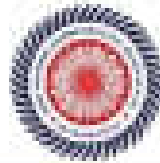
Integrated SAP model, Integrated Data, Master Data, Transactional Data, Integrated processes, Evolution Electronic Data Interchange (EDI), Use of EDI and Benefits of EDI, Selection of ERP, Introduction Opportunities and problems in ERP selection, Approach to ERP selection of ERP.

UNIT-V

Origin of SAP, SAP's Market, SAP architecture and integration, SAP Business structure, Customization of SAP, SAP R/3 module Management, Sales and Distribution, Production, Plant Maintenance, Quality Management, Methodology for ERP implementation, Implementation phases, Implementation of Life cycle.

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMESTER

IP6T0E22 - Management Information System

UNIT-I

Organization & Types, Decision Making, Cost & value of information, Introduction to information in business, types of information systems, need, importance, scope and characteristics of information systems, Components of information systems, developing information systems.

MIS concept evaluation and characteristics structure of MIS, MIS vs data processing, MIS and DBS

UNIT-II

Solving Business Problems with Information Systems, Concept of Balanced MIS, Effectiveness & Efficiency Criteria, Tool and Techniques of MIS- flowchart, flow chart etc.

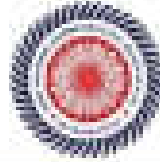
Data base technology: introduction, data base and enterprise management, data independence-data base approaches, data base architecture, data models, DBMS SQL and modeling

UNIT-III

Business applications of information technology: electronic commerce Internet, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information system for managerial Decision Support, Information System for Strategic Advantage

UNIT-IV

Managing Information Technology, Enterprise & Global Management, Security & Ethical Challenges, Planning & Implementing Change Reports: Various types of MIS reports, GUI, AI, CRM, Presentation tools.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECH VI SEMESTER

IP6T0E22 - Management Information System

UNIT-I

Organization & Types, Decision Making, Cost & value of information, Introduction to information in business, types of information system, need, importance, scope and characteristics of information system, Component of information system, developing information system.

MIS concept evaluation and characteristics structure of MIS, MIS vs data processing, MIS and DSS

UNIT-II

Solving Business Problems with Information System, Concept of Balanced MIS, Effectiveness & Efficiency Criteria, Tool and Techniques of MIS- dendron diagram, flow chart etc.

Data base technology: introduction, data base and enterprise management, data independence data base approaches, data base architecture, data models: DDM, D2D and modeling

DDL

DML

data administration

UNIT-III

Business application of information technology: electronic commerce Internet, Intranet, Extranet & Enterprise Solution, Information System for Business Operations, Information system for managerial Decision Support, Information System for Strategic Advantage

UNIT-IV

Managing Information Technology, Enterprise & Global Management, Security & Ethical Challenges, Planning & Implementing Change Reports: Various types of MIS reports,

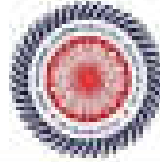
GUI

AI

OMIS

Personalization

tools



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMESTER

UNIT-V

Advanced concepts in information system: Enterprise Resource Planning: introduction, various modules like Human Resources, Finance, Accounting, Production & Logistics, Supply Chain Management, CRM, Procurement, Management System, Object Oriented modeling

Text Books

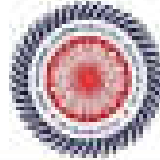
1. O.Bolan, "Introduction to Information System", McGraw Hill.
2. O.Bolan, "Management Information System", TMH.
3. MIS by Rafael De Wiley.
4. MIS Leaden and Isuden PH
5. Basral, "Information System: Analysis & Design", TMH.
6. Jzwediger, "Management Information System", TMH.
7. Mandick, "Information System for Modern Management", PH.
8. Aloisio Lavin, "Enterprise Resource Planning", TMH.
9. MIS by Sadagopan, PH

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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING & TECH VI SEMESTER

IP6T0E23 Six Sigma and DOE

UNIT-I

Quality Perception / Quality in Manufacturing, Quality in Service Sector, Differences between Conventional and Six Sigma concept of quality, Probability Distribution: Normal, Binomial, Poisson distribution, Basics of Six Sigma: Concept of Six Sigma, Defects, DPMO, DPU, Attainment X₁₂₃, Customer focus, Six Sigma for manufacturing, Six Sigma for service, 2 sigma, Understanding Six Sigma organization, Leadership model, Project sponsors and champions, Master Black Belt, Black Belt, Green Belt.

UNIT-II

Methodology of Six Sigma: DMAIC, DFSS, Models of Implementation of Six Sigma, Structure of Six Sigma Projects, Introduction to software for Six Sigma, Understanding Minitab, and Graphical analysis of Minitab plots.

UNIT-III

Six Sigma Tools: Project Charter, Process mapping, Measurement system analysis, Hypothesis Testing, Quality-Function deployment, Failure mode effect analysis.

UNIT-IV

Design of Experiments: Applications of experimental Design, basic principles, design guidelines, statistical design and problems, Experimental design: statistical analysis of data: Loss function and its applications.

UNIT-V

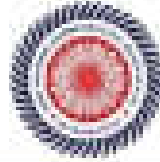
Comparative Experiments: Statistical concepts, sampling and sampling Distribution, Inferences about the differences in means, randomized design, and inferences about differences in means paired comparison design, inferences about the variances of normal distributions, problems: Experiments with single factor: the analysis of variance (ANOVA), analysis of fixed effects models, model adequacy checking, practical interpretation of results, sample size power, determining the sample size, illustrating the dispersion effect, the regression approach to the ANOVA, and non-parametric method in the ANOVA.

Text Book:

1. Jim Dem, Barbara Loomis, Learn Six Sigma Using Sigma XL and Minitab.

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INSTITUTE OF TECHNOLOGY (SCHOOL OF ENGINEERING & TECHNOLOGY)
GURU GHASIDAS VISHWAVIDYALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009, NO-3 OF 2009)

DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING
C.I.C.S. STUDY & EVALUATION SCHEME

W.E.P. SEMESTER 2018-2019
Year - II, Tech. IV course

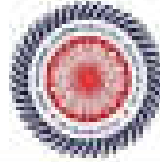
SEMESTER-VII

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1	IP71PCM	Principles of Management	4	0	0	40	60	100	4
2	IP71PCS	Production Planning and Control	1	1	0	40	60	100	4
3	IP71PCS	CAD/CAM	1	1	0	40	60	100	4
4	IP71PCA	Electric DFD	3	0	0	40	60	100	3
5	IP71PFA	Electric PFA	1	0	0	40	60	100	2
Total			10	2	0	200	300	500	18
PRACTICALS									
6	IP71PCM	CAD/CAM Lab	-	-	2	30	30	60	2
7	IP71PCS	Seminar on Seminar Training (About 20 Days)**	-	-	2	30	-	30	2
8	IP71PCS	Minor Project	-	-	4	30	-	30	2
Total			-	-	8	90	30	120	4
Grand Total			10	2	8	330	330	660	24

Department of Industrial & Production Engineering

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Head of Department
Industrial & Production Engg
Institute of Technology
G.G.V.V. Bilaspur, District H.N. 13



Elective: Open Elective (OE)-2		Elective: Professional Elective (PE)-6	
S.N.	IP1-TOE2	S.N.	IP1-PE6
01	Product Design & Development	01	Machine Tool Design
02	Entrepreneurship Development	02	Refrigeration And Air Conditioning
03	Waste Management	03	Composites Materials & Technology

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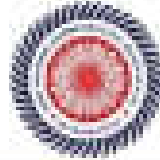
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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH-VII Sem	IP17P05	Principals of Management	4	-	-	4	Max. Marks-60 Min. Marks-25/60

PRINCIPLES OF MANAGEMENT

UNIT-I

Definition of management, science or art, manager vs entrepreneur; Types of managers; managerial roles and skills; Evolution of management: scientific, human relations, system and contingency approaches; Types of Business Organizations, with proprietorship, partnership, company; public and private companies; Organizational culture and environment; Current trends and issues in management.

UNIT-II

Mean and purpose of Planning; types of Planning; objectives, setting objectives, policies, Strategic Management; Planning Tools and Techniques; Decision making: steps & processes

UNIT-III

Mean and purpose of Organizing; formal and informal organizations; organization structure, types, line and staff authority, departmentalization, delegation of authority, centralization and decentralization, job design; human resource management; HR planning; Recruitment selection; Training & Development; Performance Management; Career planning and Management

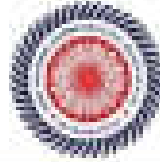
UNIT-IV

Directing: individual and group behavior; motivation; motivation theories; motivational techniques; job satisfaction; job commitment; leadership: types & theories of leadership; effective communication

UNIT-V

Controlling: system and process of controlling; budgetary and non-budgetary control techniques; use of computers and IT in management control; productivity, problems and management control and performance; direct and preventive control; reporting.

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Test Books

1. Robbins S.P. and Coulter M., Management, Prentice Hall India, 10th ed., 2009.
2. Stoner JAF, Freeman RE and Gilbert DR, Management, 6th ed, Pearson Education, 2004.
3. Tripathy PC & Raibly PN, Principles of Management, Tata McGraw Hill, 1999.
4. Essentials of management, Kotter & O'Donnel, McGraw-Hill.
5. Organizational Behavior, Stephen P. Robbins, PII.
6. Organization and Management, Agarwal R.D. TMI/Principles of Management, Terry & Franklin, Richard - Froin

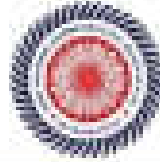
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Category of Course	Course Code	Course Title	Partials/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. & TECS-VII	IPJ-IPCO	Production Planning and Control	1	1	-	4	Max. Marks-80 Min. Marks- Duration-3hrs

PRODUCTION PLANNING AND CONTROL

UNIT - I

Introduction: Introduction to various types of Production Systems like, Mass Production, Job Shop, Batch Production System, Continuous Production System, Concept of Production and Operative Management, Objective & Functions of PPC.

Forecasting: Time Series method, moving average, weighted average, Trend, Seasonality, Regression Technique, Delphi Method.

UNIT - II

Aggregate Planning: Definition, Strategies, Formal and informal strategies, methods.

Master Production Schedule: objective and functions, Design of MPS, Bill of Materials.

Material Requirements Planning: objectives, functions, MRP, MRP II, limitations.

Capacity Requirement Planning: Definition, Objectives, Process of CRP, Present Status, Rough Cut Capacity Planning, Loading, and Preparation of CRP chart.

UNIT - III

Scheduling: Types, Single Machine Scheduling, Job shop Scheduling, Flow Scheduling.

Sequencing: various priority rules, Line of Balancing, Rank and positional weight method, Koltridge number method.

Facility location and facility location problems: Factors affecting plant location, single facility location problems and its methods.

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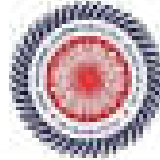
Department of Industrial & Production Engineering

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UNIT - IV

Types of layout/ layout design procedure such as CORELAP, CRAFT etc., Material handling system & classification, principles JIT & KANBAN, Depreciation & methods of depreciation.

UNIT V

Maintenance Management: Types of maintenance strategies, Overhaul and Preventive Maintenance, Predictive and Total Productive Maintenance, Condition monitoring, Individual and group replacement process, Make or Buy Decision, concept of original equipment effectiveness.

Text Books

1. Production and operation management, G.Panurchon, TMH
2. Production and operation management, Adam Dietz
3. Production and operation management, Chary S.S, TMH
4. Production and operation management Theory and practice Mahalingam.B
5. Production and operation management, Joseph C. Morik, TMH
6. Handbook of Material Handling, Ellis Horwood Limited
7. Operations Management: Design Planning and control for the manufacturing and service, Lawrence.P,Allen, James B. Delworth Tata Mc Graw Hill
8. Production and Operations management, H.N Khanna, PHI.
9. Production operations management S.S Batta, PHI.

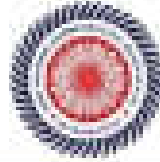
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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg B.TECH-VII Sem	IP5-IP023	Computer Aided Design And Manufacturing (CAD/CAM)	3	1	-	4	Max Marks-60 Min. Marks-20 Duration-75m

COMPUTER AIDED DESIGN AND MANUFACTURING (CAD/CAM)

UNIT-I

Basics of CAD: Basics fundamental of Computer Graphics, Principles of computer graphics, Product life cycle, Concept of Computer Aided Design (CAD) and applications, Hardware and software, Color management, raster graphics, Graphic primitives, lines, and Circle Drawing algorithms, Software documentation, CAD standards GKS, OpenGL, Data exchange standards- IGES, STEP, CALS via Communication standards, Standards for exchange images

UNIT-II

Geometric Modeling of Curves, Surface and Solid: Parametric and non-parametric curves, Mathematical representation of curves, Bézier curves, B-spline curves, B-spline surfaces and rational curves

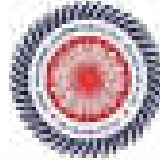
Basics of Surface: Techniques of surface modelling, Plane surface, Free surface, Surface of revolution and sweep, Conic and bi-cubic patches, concept of Bezier and B-spline surfaces, Basic concept of solid modelling techniques, CSG and Sweep method for solid generation.

UNIT-III

Geometric Transformation: Computer Aided Design (CAD) methodology, Coordinate systems, Theory and applications, 2D and 3D geometric transformations, Homogeneous transformation, Concatenation, Assembly modelling, Invariance of position and orientation, tolerance analysis, mass property calculation, Visual realism- hidden line surface-solid removal algorithms, shading, coloring, computer animation, Concurrent Engineering

Dr. H. Singh, 20/11/19

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UNIT - IV

Basics of CAME: Basic concept of numerical control (NC) System, NC coordinate system, NC machine control, Application of NC, concepts of computer numerical control (CNC) system, problems with conventional NC, CNC.

Part Programming: Introduction to NC part programming, manual part programming, Computer assisted part programming, Automatically Programming Tool (APT) language, statements and code of APT, programming methods, advantages of CAD/CAM programming.

UNIT-V

Advanced Manufacturing System: Concept of distributed numerical control (DNC) system, and its advantages and disadvantages of over NC and CNC, Concept of computer integrated method (CIM), Flexible manufacturing system (FMS), benefits and applications of CIM and FMS, Group Technology (GT), parts classification and coding systems, benefits and applications of GT, automated storage and retrieval system (ASRS), Automated guided vehicle (AGV).

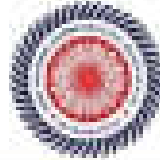
Text Books

1. Principles of Computer Graphics, W. M. Newman and R.F. Sproul, McGraw Hill
2. Computer Graphics, D. Evans and M.P. Baker, Prentice Hall Inc.
3. Production System & Automation, Geometer, Prentice Hall, India.
4. CAD/CAM Theory & Practice (2nd & R. Sivasubramanian, TMH
5. CAD/CAM: Drucker & Zisser, Prentice Hall, India
6. Computer Graphics & CAD, Ramaswamy, T.M.H.
7. Industrial Robotics & CIM, Sanyal & Kumar IB.II.
8. CAD/CAM, P.N.Rao, Prentice Hall, India.
9. CAM T.C. Chang & Wang, Pearson.
10. Managing CAD/CAM, Ibrahim Zaid, Tata McGraw Hill Publishing Co.
11. CAD/CAM Principles, C. McManus and J. Brown, Pearson Education

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Department of Industrial & Production Engineering

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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B.TECH- VII Sem.	IPS-106-11	Product Design & Development	4	-	-	4	Max. Marks-40 Min. Marks- Duration-3hrs

PRODUCT DESIGN & DEVELOPMENT

UNIT I

Product Design : Definition, Design by evolution, Innovation, essential factors of product design, production-construction cycle, flow and value addition in the production – manufacturing cycle, the morphology of design, primary design phases and flow charting, role of standards, concurrent engineering.

UNIT II

Product Design practice and Industry : Introduction, product strategies, time to market, analysis of the product, value S's, manufacturing, mould series, simplification.

Designers Role, Style and ethics: Industrial design organization, basic design considerations.

Industrial Designer's Problems, procedure for solution, types of problems, Role of aesthetics in product design, functional design practice.

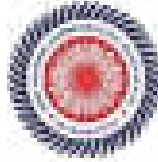
UNIT III

New products Idea generation: modification, Product variants- adding, dropping, Formalizing new products, concept, product testing, market tests, evaluation, selection, expansion and Termination.

Economic factors (following design): Product value, economic analysis, profit and competitiveness.

Product design for environment: Introduction, Importance of DfE, environmental factors, scope of environmental impact, design guidelines for DfE.

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UNIT - IV

Developing product strategy; Benefits of strategy, elements of a product strategy; setting objectives; selection of strategic alternatives; formulating advertisement plans; increasing profitability; Design for manufacturing and Design for assembly; Ergonomics in design; Modular versus integral design.

Human Engineering Considerations in product design; Introduction; Anthropometry; Design of controls; The Design of Displays; Man/Machine Information exchange.

UNIT - V

Intellectual property systems; Definition; Concept of Intellectual Property; Kinds of Intellectual Property; Economic importance of Intellectual Property; Importance of IPR, TRIPS and its implications.

Trademarks; Introduction; Historical development of the concept; Need for Protection; Kinds of Trademarks; and Well known Trademarks; Patent: Historical development; Concepts; Novelty; Utility; Invention/Non-obviousness; Copyright; Industrial design.

Text Books

1. Choudh A. K. and Gupta H. C.; Product Design and Manufacturing, PHI.
2. Gupta V., Lal O.K. and Reddy; Fundamentals of Design and manufacturing; Narosa Publishing.
3. James Darnall; Design and technology (1996) Published by Cambridge University Press
4. Donald B. Latham, Russell S. Wines 7th Edition, Product Management TMS.
5. Product Life Cycle Engineering and Management, CEP Lecture notes, Prof B Ravi, IIT Bombay
6. Karl T. Ulrich and Steven D. Eppinger "Product Design & Development" – TMS – 3rd edition

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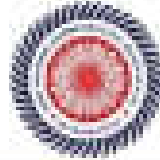
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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B.TECH- VU Sem.	IPTECH_02	Entrepreneurship Development	4	-	-	4	Max Marks-60 Min Marks-30 Duration-3Hrs

ENTREPRENEURSHIP DEVELOPMENT

UNIT-I

Entrepreneurship Concepts: Concepts of entrepreneurship, Characteristics of successful entrepreneurs, Functions of entrepreneurs, Types of entrepreneurs, Distinction between entrepreneur and manager, Growth of entrepreneurship in India and role of entrepreneurship in economic development.

Types of entrepreneurship: Women entrepreneurship, Rural entrepreneurship, Technical entrepreneurship, Agripreneurship, social entrepreneurship & family business - Factors affecting entrepreneurship growth.

UNIT-II

Entrepreneurship Development: Entrepreneurship development programmes: Objectives, contents and evaluation, Small Enterprises: Vision and main goals, scope of micro and small enterprises and their role in economic development - problems of micro and small enterprises - promotional packages.

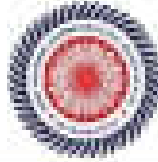
Types of Business Organization: Sole proprietorship, partnership joint stock company, cooperative organization, public sector organization.

UNIT-III

Opportunity: Product Identification: Business opportunities in various sectors, Identification of business, Opportunity- idea generation and opportunity selection, Steps in setting up of small business enterprise, Formulation of business plan and project appraisal, Contents of business plans, significance and formulation.

Guidelines for formulating project reports: Methods of project appraisal - economic, financial, market analysis, technical feasibility and managerial competency environmental clearance.

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UNIT-IV

Financing of Enterprise: Sources of finance: Internal and external sources, capitalization, term loans- short term finance, venture capital, export finance, institutional finance, commercial banks, other financial institutions, institutional support

Support Institutions: National small industries corporation Ltd, small industries development organization, small scale industry board, state small industry development organization, small industries service institutes, district industry centers, technical consultancy organizations

Government policy and taxation: Benefits to small scale industry, tax benefits, incentives and subsidies for small scale industries. Government policies for small scale enterprises and industrial policy evolution

UNIT-V

Startup Business: Why start a business, key considerations, setting a process, presentation to investors, company incorporation, equity considerations, key factors for success

Government strategies: Growth of enterprise, objectives of growth, stages and types of growth. Expansion diversification, joint venture, merger and acquisitions, sub-contracting and financing

Success in small industries: Meaning of industrial sickness, signs and symptoms of industrial sickness, causes and consequences, corrective measures to such sickness, government policies on revival of sick units

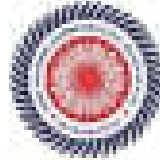
E-commerce: Basic concepts, advantages and disadvantages.

Text Books

1. Entrepreneurship, Key, Rajiv, Univ. Press.
2. Entrepreneurship/ Hirsch, McGraw Hill
3. Entrepreneurship Development, Ramji, New- Age.
4. Entrepreneurship Development, Kaulpal, Thomson Learning.
5. Entrepreneurship: Theory & Practice, Saini, Wheeler
6. Entrepreneurship Development, Dr. S.S. Khuria S. Choud

Dr. S.S. Khuria
24/10/18

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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B.TECH- VII Sem.	IPP-TUM-13	Strategic Management	4	-	-	4	Max Marks-60 Min Marks- Duration-3hrs

STRATEGIC MANAGEMENT

UNIT-I

Strategy and Process | Conceptual Framework for strategic management, the Concept of Strategy and the Strategy Formulation Process | Stakeholders in business - Vision, Mission and Purpose- Business Definition, Objectives and Goals | Corporate Governance and Social responsibility-case study.

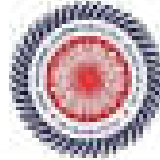
UNIT- II

Competitive Advantage | External Environment | Porter's Five Forces Model-Strategic Groups- Competitive Changes during Industry Evolution- Globalization and Industry Structure | National Context and Competitive advantage Resources-Capabilities and competences-case competences- Low cost and differentiation Cases- Building Blocks of Competitive Advantage- Distinctive Competences- Resources and Capabilities durability of competitive Advantage- Avoiding Imitation and Sustaining competitive advantage-Case study.

UNIT- III

Strategies | The generic strategic alternatives, Stability, Expansion, Retrenchment and Combination- Business level strategy, Strategy in the Global Environment, Corporate Strategy, Vertical Integration- Diversification and Strategic Alliances, Building and Restructuring the corporation- Strategic analysis and choice- Environmental Threat and Opportunity Profile (ETOP), Organizational Capability Profile- Strategic Advantage Profile, Corporate Portfolio Analysis, SWOT Analysis, GAP Analysis, Mc Clelland's 7s Framework, GE 4 Cell Model- Distinctive competences, Selection of markets, Alliance- Some Case-study.

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ENIT-IV

Strategy Implementation & Evaluation - The implementation process, Resource allocation, Designing organizational structure-Designing Strategic Control Systems, Matching structure and control to strategy-Implementing Strategic change-Politics/Power and Conflict, Techniques of strategic evaluation & control-case study.

ENIT-V

Other Strategic Issues - Managing Technology and Innovation, Strategic Issues for Non-Profit organization, New Business Models and strategies for Internet Economy-case study

Text Books

1. Thomas L. Whetten, J.David Henge and Krish Rangarajan, Strategic Management and Business policy, Pearson Education., 11th edition, 2007.
2. Charles W.L.Hill & Gareth R.Jones, Strategic Management Theory, An Integrated approach, Business, Wiley India,6th edition, 2007.
3. Arun Kumar, Strategic Management & Business Policy, Tata McGraw Hill, Third Edition.

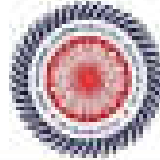
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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Professional Degree B.TECH-VII Sem.	IPP- IPD-41	Machine Tool Design	3	1	-	4	Max. Marks-60 Min. Marks-20 Duration-3hrs

MACHINE TOOL DESIGN

UNIT - I

Introduction to machine tool design and mechanism; definitions, classification and general requirements of machine tool, working and auxiliary motions in machine tools, parameters defining working motion of a machine tool, layout of machine tools.

Regulation of speed and feed rates; objective of speed and feed rate regulation, design of speed box, general recommendations for developing the gearing diagram, determining the number of mesh of gear boxes, mechanical step less regulation of speed and feed rates.

UNIT - II

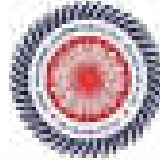
Design of machine tool structures; function of machine tool structures and their requirements, design criteria for machine tool structures; material of machine tool structures, static and dynamic stiffness, profile of machine tool structures, basic design procedure of machine tool structures, design of tool.

UNIT - III

Design of guide ways and power screws; function and types of guide ways, design of slide ways, design criteria and calculation for slide ways, guide ways operating under liquid friction conditions. Design of screwless slide ways, design of anti-friction guide ways, design of power screws.



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UNIT -IV

Design of spindles and spindle supports; function of spindle and requirements, material of spindles, effects of machine tool vibrations on machining accuracy; design calculation of spindles, design of jig and fixtures; principle of jig and fixture design, locating and clamping; die holder, drilling jig;

UNIT -V

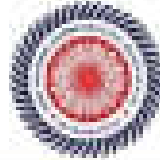
Press work; die design; Classification of presses and dies, cutting action in die, clearance and cutting forces, shear, angle of presses; method of mounting punches; design of blanking die; drawing die design;

Text Books

1. Machine Tool Design by NK Mehra Tata McGraw Publication.
2. Basu, S.K., Design of Machine tool, Allied Publishers, New Delhi.
3. Koenigsberger, F., Design Principles of Metal cutting machine Tools, Pergamon Press, Oxford, 1964.
4. Pugh, V.E., Design of Machine Tools, Machine Tools Publishers, Moscow, 1977.
5. Machine Tool Design, vols. I-IV, Mir Publishers, Moscow, 1988.

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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Subsidiary B Production Engg. B.TECH-VII Sem	BP-701 - 62	Refrigeration & Air Conditioning	3	1	-	4	Max.Marks-60 Min. Marks- Deduction-10%

REFRIGERATION & AIR CONDITIONING

UNIT - I

Carnot Refrigerator & Heat pump, air refrigeration systems, Bell Coleman air refrigeration cycle, Air split system & its performance.

Vapour compression refrigeration: single cycle, h_s and $p-h$, thermodynamic analysis of vapour compression cycle, factors affecting performance of vapour compression cycle, actual vapour compression cycle, multi stage compression system.

UNIT - II

Vapour absorption refrigeration system: description of system components, vapour ammonia and water lithium bromide systems, its merits & advantages over vapour compression system.

Refrigerative equipment: construction, limits, capacity, control and performance of compressors, condensers, evaporators, expansion devices, thermostatic expansion valve.

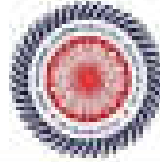
UNIT - III

Production of low temperature: cascade system, Joule Thomson effect & liquefaction of gases, liquefaction of hydrogen & helium, application of cryogenics.

Nonconventional refrigeration system: thermoelectric refrigeration, vortex tube, Stirling jet refrigeration system.

Refrigerants: classification, properties & selection of refrigerants.

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UNIT - IV

Psychrometric: Psychrometry, and psychrometric properties, psychrometric relations, psychrometric chart and its use, psychrometric processes: human comfort, factors affecting comfort, comfort chart

Requirements of comfort air conditioning: thermodynamics of human body, comfort chart, factors governing optimum effective temperature

Cooling load calculation & design of a.c. system- Different load sources, design of air conditioning system, space factors, effective sensible heat factor, cooling ratio

UNIT - V

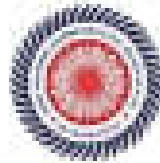
Duct flow, duct design & air distribution system- various losses in duct flow, different methods of duct design & arrangement system, air distribution system & ventilation system

Automotive air conditioning: system layout and layout, components, system maintenance
Car, Railway air conditioning & marine air conditioning

Text Books

1. Refrigeration and Air Conditioning C. P. Arora - TMH
2. Refrigeration and Air Conditioning - Merit Press - New-Age International Pub
3. Refrigeration and Air Conditioning - Arora & Dhandhakar - Dhanraj Rai & Sons
4. Refrigeration and Air Conditioning - P. L. Ballary - Khanna Pub.

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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VII Sem.	IPPECE- 03	Composite Materials and Technology	3	1	-	4	Max. Marks-60 Min. Marks-30

COMPOSITE MATERIALS AND TECHNOLOGY

UNIT - I

Introduction to Composites: Definition, Typical reinforcements and matrices, Typical properties of fibre composites, mechanical, weight, chemical resistance, etc., compared with "standard" materials. Particular composites. Quality assurance, outline of manufacturing methods. Economic aspects. Dependence of properties on manufacturing route, typical manufacturing defects. Applications: Fibre strengthening, fibre fibres, critical length, critical volume fraction. Natural composites (wood, bone, etc.)

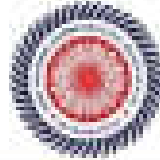
UNIT - II

Fibres: Manufacturing methods; Physical and chemical characteristics. Mechanical and other properties of commonly used fibres - carbon, glass, aramid and other organic, aromatic. Fibre coating to enhance compatibility with matrix. Use of statistical methods to characterize fibre behaviour. Naturally-occurring (cellulose) fibres. Whiskers, typical properties, Manufacturing methods.

UNIT - III

Manufacture of Polymer Matrix Composites: Principles of manufacturing processes (open and closed mould), including hand and spray lay-up, prepreg, moulding, injection moulding, resin injection, RIM, filament winding, pultrusion, centrifugal casting, sand casting, pressing and other "casting" materials, etc. Machine methods for manufacture of composites. Cutting, drilling and other finishing operations.

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UNIT - IV

Engineering properties: Stiffness and Strength: Geometrical aspects, volume and weight factors. Unidirectional continuous fibre systems; stiffness and strength. Discontinuous fibres: Short fibre systems; length and orientation distributions. Woven reinforcements. Hybrid. Matrix Resins for unidirectional laminar. Matrix mechanics theories.

UNIT - V

Mechanical Testing Determination of stiffness and strength of unidirectional composite laminar, compression, flexure and shear. Typical standard methods. Use of photo elastic techniques and other methods of stress measurement.

Matrix Matrix Systems Matrix and alloy, solidification processes, diffusion bonding, mechanical properties. Resin fibre reinforced elastomer and matrix alloys. Alloys fibre reinforced elastomer alloys. Matrix matrix fibre reinforced elastomer alloy. Particulate systems.

Text Books

1. Introduction to Composite Materials Design: Eusebio Barbero Taylor and Francis
2. Mechanics of Composite Materials: Robert Jones Second Edition 1999 Taylor and Francis
3. Composites and Processing Methods: E.E. Yezzerkanon Narosa Publications.

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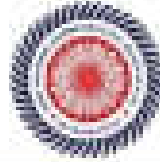
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Head of Department
Industrial & Production Engg
Institute of Technology
G.G.V.V. Koni, Bilaspur (C.G.)



INSTITUTE OF TECHNOLOGY (SCHOOL OF ENGINEERING & TECHNOLOGY)
GURU GHASIDAS VISHWAVIDYALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009, NO. 3
OF 2009)

DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING
CURRY & EVALUATION SCHEME

B.E.P. SEMESTER 2008-2009
Year III, Part IV year

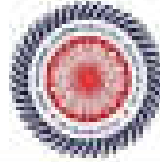
SEMESTER VIII

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SEM-TOTAL	
1.	IPSTP04	Operative Research	3	1	0	40	60	100	4
2.	IPSTP02	Marketing Management	4	0	0	40	60	100	4
3.	IPSTP03	Elective-PE3	4	0	0	40	60	100	4
4.	IPST004	Elective-PE4	4	0	0	40	60	100	4
Total			15	1	0	160	240	400	16
PRACTICALS									
5.	IPSLP04	Project	-	-	12	120	80	200	8
6.	IPSLP01	Comprehensive Viva	-	-	-	-	50	50	2
Total			-	-	12	120	130	250	10
Grand Total			15	1	12	280	370	650	26






 Head of Department
 Department of Industrial & Production Engineering
 Institute of Technology
 G.G.V. Area, Bilaspur (C.G.)



Elective- Open Elective (OE)-4		Elective- Professional Elective (PE)-7	
XX	IPS-OET	XX	IPS-PE1
41	Supply Chain Management	71	Plant Power Control
42	Safety Management And Labour Law	72	Robotics and Robot Applications
43	Finite Element Method	73	Powder Metallurgy & Coatings

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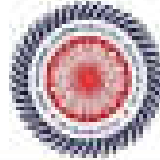
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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B.TECH./B.E./B.Arch	IPR-TPCH	Operation Research	1	1	1	4	Max. Marks-80 Min. Marks-35/40

OPERATION RESEARCH

UNIT-I

Introduction to linear programming, graphical solution to linear programming problem, solving linear problem by simplex method; optimization problem, maximization & minimization function with or without constraint, slack surplus & artificial, variable method, degeneracy problem

UNIT-II

Mathematical statement of the transportation problem, the transportation model, method for basic feasible solution, Degeneracy & unbalance problem, Mathematical statement of the assignment problem, solution of assignment problem, traveling sales-man problem.

UNIT-III

Game theory: role of game, Method of solving game, graphically & Algebraic, saddle point, A without saddle point, dominance method, mixed strategies 2 X 2 game, 2 X N game, M X N 2 game, 3 X 3 game (Method of matrix, method of linear programming etc)

Inventory: Introduction, classification, function, level, control techniques, models, various cost associated, EOQ, system inventory

UNIT-IV

Introduction of queueing theory, elements of queueing system, operating characteristics of a queueing system, Poisson arrival & exponential service time, waiting time & M/M/1 system, single channel queueing theory.

Replacement problem, replacement policy, replacement of items, machinery various items, joint replacement policy, MAPI method

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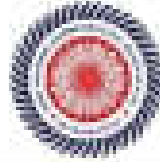
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UNIT-V

Network analysis, Introduction of PERT & CPM, computation of PERT, Time estimation, measures of deviation & variation, probability of completing project, Arrow diagram & critical path method, Scheduling, cost analysis & crashing of network

Text Books

1. Sharma & S.D. Bhatnagar - Operations Research, Ramesh & Co. Meerut
2. Operations Research, Srinivasa Varadan
3. Operations Research - H. D. Vohra - TMH Publications
4. Operations Research - Hira & Gupta - S. Chand & Co.
5. Operations Research - H. Gilmore - TMH, New Delhi
6. Operations Research - M. Taha - TMH, New Delhi
7. Operations Research - Philip Bhatnagar - Wiley Publications

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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg B. TECH - 101 Sem	09E-10502	Marketing Management	4	-	-	4	Max Marks-60 Min Marks- Question-Mix

MARKETING MANAGEMENT

UNIT-I

Introduction to marketing management: what is marketing? The core concepts, need, scope, demands, product, value and its functions.

Marketing management: Evolution concepts product concept and selling, marketing concept, role of marketing in modern organization, marketing philosophies.

UNIT-II

The nature of high performance business, corporate and division strategy planning, business strategy planning, marketing process, Analyzing consumer markets & buying behavior.

UNIT-III

The product life cycle: conditions and strategies in different phases; Marketing strategies through PLC.

New Product Decisions: Definitions and factors contributing to new product development, new product development process.

UNIT-IV

Deciding on the marketing Program: Product, promotion, pricing, place (Distribution Channel), Managing Advertising, sales promotion, & public relation, developing & managing development program, sales promotion, public relation.

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M. Singh

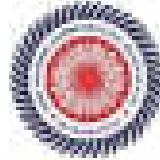
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UNIT-V

Managing retailing, whole selling and logistic- types of retailers and levels of services, trends in retailing, types of whole selling, market logistics.

The role of marketing communication: communication process model and developing effective communication, characteristics of marketing communication mix, factors in setting the communication mix.

Text Books

1. Product Design and Manufacturing, Choksi & Gupta, PHI.
2. Marketing Management, Philip Kotler, PHI Publication.

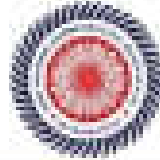
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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. II, TECH- VII Sem.	IPR-CET...4	Supply Chain Management	4	-	-	4	Max Marks-60 Min Marks-Duration-3hrs

SUPPLY CHAIN MANAGEMENT

UNIT-I

Building a Strategic Framework to Analyse Supply Chains: What is a Supply Chain? The Objective of a Supply Chain, The Importance of Supply Chain Decisions, Decision Process in a Supply Chain, Process View of a Supply Chain, Examples of Supply Chains, Supply Chain Performance: Achieving Strategic Fit and Scope, Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope, Supply Chain Drivers and Metrics, Drivers of Supply Chain Performance, Framework for Structuring Drivers, Facilities, Inventory, Transportation, Information, Sourcing, Pricing.

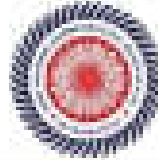
UNIT-II

Designing the Supply Chain Network: Designing Distribution Networks and Applications to e-Business, The Role of Distribution in the Supply Chain, Factors Influencing Distribution Network Design, Design Options for a Distribution Network, e-Business and the Distribution Network, Distribution Networks in Practice.

Network Design in the Supply Chain: The Role of Network Design in the Supply Chain, Factors Influencing Network Design Decisions, Framework for Network Design Decisions, Models for Facility Location and Capacity Allocation, The role of IT in Network Design, Making Network Design Decisions in Practice.

Network Design in an Uncertain Environment: The Impact of Uncertainty on Network Design, Discounted Cash Flow Analysis, Approximation of Uncertainty, Evaluating Network Design Decisions Using Decision Trees, AM-TIME Evaluation of Supply Chain Design Decisions Under Uncertainty, Risk Management and Network Design, IT/Making Supply Chain Decisions Under Uncertainty in Practice.

Department of Industrial & Production Engineering



UNIT-III

Planning Demand and Supply in a Supply Chain: Demand Forecasting in a Supply Chain, The Role of Forecasting in a Supply Chain, Characteristics of Forecasts, Components of a Forecast and Forecasting Methods, Basic Approach to Demand Forecasting, Time-Series Forecasting Methods, Measures of Forecast Error, Forecasting Demand at Various Levels, The Role of IT in Forecasting, Risk Management in Forecasting, Forecasting in Practice

Aggregate Planning in a Supply Chain: The Role of Aggregate Planning in a Supply Chain, the Aggregate Planning Problem, Aggregate Planning Strategies, Aggregate Planning Using Linear Programming, Aggregate Planning in Excel, The Role of IT in Aggregate Planning, Implementing Aggregate Planning in Practice

Planning Supply and Demand in a Supply Chain: Managing Probable Variability, Responding to Probable Variability in a Supply Chain, Managing Supply, Managing Demand, Implementing Solutions to Probable Variability in Practice

UNIT-IV

Planning and Managing Inventories in a Supply Chain: Managing Economies of Scale in a Supply Chain, Cycle Inventory, The Role of Cycle Inventory in a Supply Chain, Economies of Scale to Explain Fixed Costs, Economies of Scale to Explain Quantity Discounts, Short-Term Discounting, Trade Promotions, Managing Multistage Cycle Inventory, Justifying Cycle Inventory-Related Costs in Practice

Managing Uncertainty in a Supply Chain: Safety Inventory, The Role of Safety Inventory in a Supply Chain, Determining Appropriate Level of Safety Inventory, Impact of Supply Uncertainty on Safety Inventory, Impact of Aggregation on Safety Inventory, Impact of Replenishment Policies on Safety Inventory, Managing Safety Inventory in a Multistage Supply Chain, The Role of IT in Inventory Management, Justifying and Managing Safety Inventory in Practice

Determining the Optimal Level of Product Availability: The Importance of the Level of Product Availability, Factors Affecting Optimal Level of Product Availability, Managerial Levers to Improve Supply Chain Profitability, Setting Product Availability for Multiple Products under Capacity Constraints, Setting Optimal Levels of Product Availability in Practice

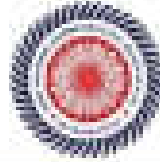

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UNIT-V

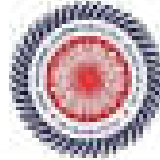
Designing and Planning Transportation Networks: Transportation in a Supply Chain, The Role of Transportation in a Supply Chain, Modes of Transportation and Their Performance Characteristics, Transportation Infrastructure and Policies, Design Options for a Transportation Network Trade-Offs in Transportation Design, Tailored Transportation, The Role of IT in Transportation Risk Management in Transportation, Making Transportation Decisions in Practice

Managing Cross-Functional Drivers in a Supply Chain, Sourcing Decisions in a Supply Chain, The Role of Sourcing in a Supply Chain, In-House or Outsource, Third- and Fourth-Party Logistics Providers, Supplier Sourcing and Assessment, Supplier Selection-Attributes and Negotiation Contracts and Supply Chain Performance, Design Collaboration, The Procurement Process, Sourcing Planning and Analysis, The Role of IT in Sourcing, Risk Management in Sourcing, Making Sourcing Decisions in Practice

Text Book

1. Supply Chain Management: Janet Shah, Pearson Publications 2010.
2. Supply Chain Management: Saul Chopra and Meha del, Fourth Edition, PHI 2014.
3. Supply Chain Management: A.S.Ahluwalia PHI Second Ed.2006.
4. Logistics Management: James Stock and Douglas Lambert, McGraw Hill International Ed.2006.
5. Supply Chain Management for Global Competitiveness: Ed.B.S.Sabag McMillan Publication: 2000.
6. Emerging Trends in Supply Chain Management: Ed.B.S.Sabag McMillan Publication 2000.
7. Logistics Management: Bowersox TMB 2004.

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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg B.TECH- VIII Sem	IPS-OET - 02	Safety Management And Labour Law	4	-	-	4	Max Marks-80 Min Marks-100 Duration-1Hrs

SAFETY MANAGEMENT AND LABOUR LAW

UNIT-I

Safety Management: Concepts, Evolution of modern safety concepts, Safety policy, Safety Organization, Hire and staff functions for safety, Safety Committee, Budgeting for safety, Techniques Incident Root Cause Technique (TRC), disaster control, Job Safety Analysis (JSA), safety culture, safety inspection, safety sampling, Safety Audit.

Safety in Material Handling: Ergonomic considerations in material handling, design, installation, operation and maintenance of Conveying equipment, hoisting, hoisting and stacking mechanisms.

UNIT-II

Design of Air Pollution Control System: Industrial sources of Air Pollution, Emission factors, Regulations Control Strategies, Policies, Common Pollution control: Gas absorption in tray and packed towers, Absorption with & without chemical reaction, Removal of SO₂, Absorption in fluid beds, Breakthrough, Removal of HCs (VOCs) - HCs removal - Wet scrubbers.

Integrated Air pollution control systems: Pollution Control in Process Industries, Pollution control in process industries like cement, paper, petroleum, petroleum products, textile-ceramics-thermal power plant dyeing and pigment industries - non-flammable energy.

UNIT-III

Safety in Metal Working Machinery and Wood Working Machines: General safety rules, principles, maintenance, Inspection of turning machines, boring machines, milling machines, planing machine and grinding machines, CNC machines, Wood-working machinery, types, safety principles, electrical guards, work area, material handling, inspection, standards and codes, uses, types, benefits.

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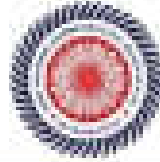
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4. UNIT-IV

Fire Prevention and Protection: Sources of ignition, fire triangle, principles of fire extinguishing, active and passive fire protection systems – various classes of fires, A, B, C, D, E, types of fire extinguishers, fire stoppers, hydrant pipes, hoses, nozzles, fire watches, layout of stand pipes – fire alarm-fire alarm and alarm, maintenance of fire trucks, fire generators, escape from fire alarm operations, fire drills, active fire and fire alarm.

UNIT-V

Explosion Protection System: Principles of explosion-generation and blast wave-explosion, parameters – Explosion Protection, Containment, Flame Arrestors, isolation, suppression, venting, explosion relief of large machines-explosion venting-blast panel, plant for generation of inert gas vapour also to prevent vessels and lines explosion, suppression system based on carbon dioxide (CO₂) and halon-halons in LFC, ammonia (NH₃), Solenoid device (SDS), Inerting (ICL2) etc.

Text Book

1. "Accident Prevention Manual for Industrial Operations", N.S.C. Chicago, 1982.
2. Halsey H.W. "Industrial Accident Prevention" McGraw-Hill Company, New York, 1988.
3. Gupta, R.S., "Hand Book of Fire Technology" Orient Longman, Bombay 1977.
4. "Accident Prevention manual for industrial operations" N.S.C., Chicago, 1982.
5. Datta Tubat; "Fire and explosion protection"

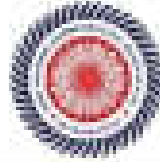
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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg B. TECH- VII Sem	IP-421 ... 4	Finite Element Method	1	1	-	4	Max Marks-60 Min. Marks- Duration-3hrs

FINITE ELEMENT METHOD (FEM)

UNIT-I

Basic Concept of FEM: Historical background, Basic concepts and steps in FEM; Mathematical modeling of 2D problems in engineering; Governing equations, Discrete and continuous models, Boundary and initial value problems; One dimensional second order equation; discretization; Linear and higher order elements; Introduction of FEM software and steps.

Matrix displacement formulation: Matrix displacement equations, solution of matrix displacement equations, techniques of saving computer memory requirements; Finite element formulation

UNIT-II

Natural Coordinate systems and Shape function: Basic concepts of natural coordinates, 1-D and 2-D natural coordinates; Concept of shape functions; Convergence requirements; Pascal triangle; Shape function for linear and plane elements; Shape functions using Lagrange polynomials; Shape functions for isoparametric family elements; Degrading technique for nodes.

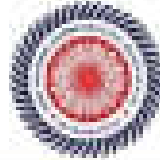
UNIT-III

Stress displacement matrix: Stress-displacement matrix for linear and plane element; Stress-displacement matrix for beam, Linear and plane elements.

Stiffness Matrix: Concept of element stiffness matrix for linear and plane elements; Stiffness matrix for bar & beams; Stiffness matrix for linear and plane elements; Force vectors; Body forces and thermal loads; Plane and shell elements; Force representation of arbitrary nodes; Element aspect ratio;

Quadrilateral and higher order element vs mesh refinement.

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UNIT-IV

Assembly of stiffness Matrix; Assembly of element matrices, boundary conditions and solution; Direct approach; Stress energy; Castigliano's first theorem; Minimum potential energy; Galerkin's method; Galerkin's method applied to elasticity problems; Weighted Residual Methods; Variational formulation of boundary value problems; BEM technique; Parametric Formulation

UNIT-V

Finite element Solutions; Numerical integration and application to plane stress problems; Solid mechanics and heat transfer; Logarithmic variation and wedge shapes; Fourth order beam equation; Transverse deflections and natural frequencies; Bar, Trusses & Beams; Plane stress and plane strain problems; Use of higher order elements; Solution of dynamic problems application to thermal problems; Issues of non-linear statics

Text Books:

1. R.H. Cooker, and E.A. Thorton, "The Finite Element Methods for Engineers" John Wiley & Sons.
2. R.D. Cook, Malkin, D.S. and Plesha, M.L., "Concepts and Applications of Finite Element Analysis", 3rd Ed., John Wiley & Sons.
3. S.S. Rao, Finite Element Method in Engineering, Butterworth Heinemann.
4. Bhatta, K.J., "Finite Element Procedures", Prentice Hall of India, New Delhi.
5. Zienkiewicz, O.C. and Taylor, R.L., "The Finite Element Methods", Vol.1 and Vol.2, McGraw Hill.
6. S.S.Rao (Ed), Finite element analysis, New Age Pub.
7. J.N. Reddy, An Introduction to Finite Element Method, Tata McGraw Hill.
8. P. Sethi, Text Book of Finite Element Analysis, Prentice Hall, New Delhi.

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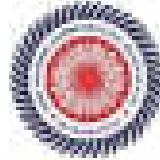
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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VIII Sem	IP6-PE1-101	Fluid Power Control	1	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

FLUID POWER CONTROL

UNIT-I

Introduction – what is fluid power, application of fluid power, component of fluid-power system. Force pressure and load, specific weight, density, specific gravity, bulk modulus, viscosity, viscosity index.

Energy and Power in Hydraulic System Pascal's law, continuity equation, conservation of energy, hydraulic power, Bernoulli's equation, Torricelli's theorem, the siphon. Energy power and flow rate in the SI units.

UNIT-II

Hydraulic pumps Introduction, pumping theory, pumps classification, gear pump, vane pump, piston pump, pump performance, pump noise, pump selection, pump performance rating in SI unit.

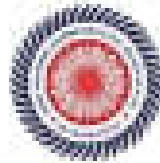
Hydraulic Cylinders and actuators Introduction, Hydraulic Cylinders operating features, Cylinder mounting and mechanical failure, Cylinder leak due to moving weights, special cylinder design, cylinder loading through mechanical linkage, Hydraulic cylinder cushions, and Hydraulic shock absorber.

UNIT-III

Hydraulic motors Introduction, limited rotation Hydraulic motor, gear motor, vane motor, Hydraulic motor developed torque, power and flow rate, Hydraulic motor performance, Hydraulic maintenance, Hydraulic motor performance in metric unit.

Hydraulic valve/ Hydraulic components pressure-flow-direction control valve – proportional, servo, spring loaded valve, Hydraulic filter.

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UNIT-IV

Hydraulic Connector and Fittings: Introduction, sealant using for flow rate requirement, pressure rating of connectors, steel pipe, steel tubing, plastic tubing, flexible hoses, quick disconnect couplings, metric seal tubing.

Hydraulic Circuit Design and Analysis: Introduction, control of single and double acting hydraulic cylinder, pump hydraulic system, circuit, valve application, speed control of motor and cylinder, meter-linking system, analysis of hydraulic system

UNIT-V

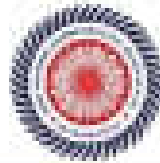
Pneumatics: Air preparation & compressors: Introduction, compressor, fluid condition, analysis of moisture removal from air, air control valves, Pneumatic actuators

Pneumatic circuits and applications: Design combination, pressure losses in pipe from, circuits, vacuum system, analysis

Text books

1. Fluid power with application by Anthony Esposito by PHI publication
2. Oil hydraulic system by Majumdar by TMC publication

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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg B-Tech-VIII Sem	IPS-PIE-22	Robotics and Robot Applications	3	1	--	4	Max Marks-60 Min Marks- Duration-180

ROBOTICS AND ROBOT APPLICATIONS

UNIT - I

Introduction to Robotics: Evolution of robots and robotics, progressive advancement in robots, definitions and classifications, laws of robotics, robot anatomy and related attributes, operability, accuracy and precision, human arm characteristics, robot specifications and notation, concept of robot programming, the future program.

UNIT - II

Coordinate Frames, Mapping and Transformations : Coordinate frames, Spatial description and transformations, Fundamentals of translation, rotation and transformations, deriving a homogeneous transform, fundamental rotation matrices, yaw, pitch and roll, yaw, pitch and roll transformations, coordinate angle.

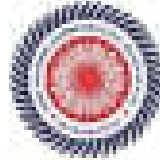
UNIT - III

Symbolic Modeling of Robots, Direct Kinematic Model: Mechanical structure and notation, description of links and joints, kinematic modeling of the manipulator, Denavit, Hartenberg (D-H) representation, Kinematic relationship between adjacent links, manipulator, transformation matrix, Arm equation.

UNIT - IV

Robotic Sensors and Vision: The meaning of sensing, sensors in robotics, kinds of sensors used in robotics, robotic vision, industrial applications of vision controlled robotic systems, process of imaging, architecture of robot, vision systems, image acquisition, description of other components of vision system, image representation, image processing, Artificial Intelligence (AI) in robotics.

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UNIT - V

Robot Controller & Applications/Linear control of robot manipulation, Feedback and state space control, Second-order linear systems, Trajectory following control, Modeling and control of single joint, Architecture of industrial robots, controllers, Artificial intelligence, Industrial and non-industrial applications, robotic application for sustainable development & social issues.

Text Books

1. Robotics & Control - R.K. Mital & L.J. Nagarkar - TMH Publications
2. Robotics for engineers - Yoram Kazian- McGraw Hill Co.
3. Industrial Robotics Technology: programming and Applications - M.P. Conway, M. Weiss,
4. Robotics Control Sensing, Vision and Intelligence - K.S.Fa, R.C.Gonzalez, C.S.G. Lee- McGraw Hill Book co.
5. Kinematics and Synthesis of Linkages - Hertzberg and Denavit - McGraw Hill Book Co.
6. Kinematics and Linkage Design - A.S. Hall - Prentice Hall
7. Kinematic and Dynamics of Machinery - J.H.Holten - McGraw HillBook Company

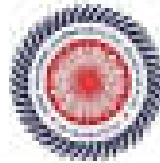
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Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg B.TECH-VII sem	IPM-PTC... 21	Powder Metallurgy and Ceramics	3	1	+	4	Min. Marks/40 Min. Marks/ Duration/1hr

POWDER METALLURGY AND CERAMICS

UNIT - I

Introduction: Scope of powder metallurgy, advantages, applications, limitations and recent trends.

Powder production methods and Properties: Metal production methods: Atomization, Mechanical (Milling), Electro Deposition, Spray drying, Powder Treatment: Screening, classifying, blending, and lubrication. Powder treatment and handling, coating and preservatives, storage.

UNIT - II

Characterization of metal powder: Sampling of metal powder, particle size and size distribution, Particle shape analysis, surface area, density and porosity, apparent density, tap density.

Compaction and shaping: powder pressing, compaction method, classification of parts, Cold-chamber compaction, powder rolling, High temperature compaction & principle of pressure casting.

UNIT - III

Sintering and consolidation: Sintering, types of Sintering, theory of Sintering, Sintering of multi components, effect of Sintering, porosity in sintered part, Sintering atmosphere, Sintering stresses, metallographic of sintering part.

PM Products and their Applications: Electrical and magnetic applications (Resistor, welding electrode, Metal-graphite brushes, Tungsten and PM porous parts, PM friction materials, Metal bearings, Dispersion strengthened materials, Cutting tool materials, Coated carbides and tools, cement.

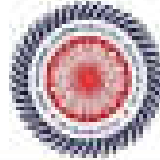
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UNIT-IV

Ceramics: Introduction and major applications, Nature and structure of ceramic, types and general characteristics of ceramic - Oxide ceramics, carbides, nitrides, silica, glasses, graphite and diamond

UNIT-V

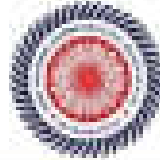
Advanced powder metallurgical process: techniques, classification and its types, process parameters and characteristics, mechanical alloying, process types and parameters, rapid injection molding, super-incompressible design application and defect.

Microarray sintering of metals: Applications in electrical and electronics including high temperature superconductors, frictional ceramics, refractory, Fabrication methods of ceramics.

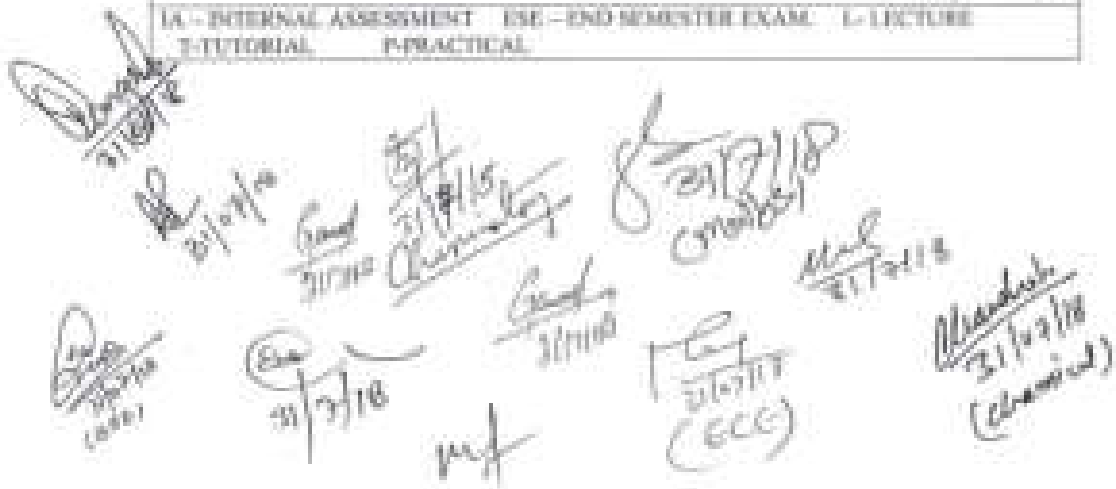
Text Books:

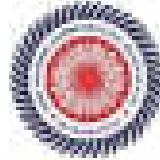
1. Powder metallurgy by P.C. Singh, R. Subramanian by PHI publication.
2. Fundamentals of Powder Metallurgy: G.S. Upadhyaya Cambridge International Science Publishing 1998
3. Fundamentals Principles of Powder Metallurgy: W.B. Jones Edward Arnold Publishing
4. First Course in Powder Metallurgy: Honey Hauser Chemicals Publishing Company
5. Handbook Of Powder Metallurgy : Harnett F.H and Mel M.K. Second Edition , Chemical Publishing Company
6. Metals Handbook Vol 7 Powder Metallurgy - ASM 1998

Head of Department
Industrial & Production Engg.
Institute of Technology
G.B.M.V. Koni, District C.G. U.P.



SCHEME OF EXAMINATION									
B.TECH (FOUR YEAR) DEGREE COURSE									
FIRST YEAR, INDUSTRIAL PRODUCTION ENGINEERING									
SEMESTER II (COURSE-A)									
EFFECTIVE FROM SESSION 2018-19									
Sl. No.	SUBJECT CODE	SUBJECTS	PERIODS/WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	PH02PH01	PHYSICS	3	1	0	30	70	100	4
2	PH02PH02	BASIC ELECTRICAL ENGINEERING	3	1	0	30	70	100	4
3	PH02PH03	MATHEMATICS-I	3	1	0	30	70	100	4
4	PH02PH04	ENGLISH	3	0	0	30	70	100	5
5	PH02PH05	ENVIRONMENTAL SCIENCES	3	0	0	-	-	-	0
PRACTICAL									
1	PH02PH06	PHYSICS LAB	0	0	2	30	30	60	1.5
2	PH02PH07	BASIC ELECTRICAL ENGINEERING LAB	0	0	2	30	30	60	1
3	PH02PH08	ENGINEERING GRAPHICS & DESIGN	1	0	0	30	30	60	2.5
TOTAL									30
IA - INTERNAL ASSESSMENT ESE - END SEMESTER EXAM. L- LECTURE T-TUTORIAL P-PRACTICAL									


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Subject code/SUBJECT	L	T	P	Credit
IPN THM 604 MATHEMATICS-II	1	1	0	4

Module 1a: First order ordinary differential equations(6 hours)

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

Module 1b: Ordinary differential equations of higher orders (Prerequisite 2a, 4a) (8 hours)

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation, Power series solutions, Legendre polynomials, Bessel functions of the first kind and their properties.

Module 3c: Partial Differential Equations- First order(Prerequisite 3a-b) (6 hours)

First order partial differential equations, solutions of first order linear and non-linear PDEs.

Module 5d: Partial Differential Equations- Higher order(Prerequisite 3b-c) (10 hours)

Solution to homogeneous and non-homogeneous linear partial differential equations second and higher order by complementary function and particular integral method. Flows, vibrations and diffusions, second-order linear equations and their classification, initial and boundary conditions (with an informal description of well-posed problems), D'Alembert's solution of the wave equation; D'Alembert's principle for one dimensional wave equation. Separation of variables method to simple problems in Cartesian coordinates, The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables. Boundary-value problems: Solution of boundary-value problems for various linear PDEs in various geometries.

Textbooks/References:

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, 9th Edition, John Wiley & Sons, 2006.
2. W. E. Boyce and R. C. DiPrima, *Elementary Differential Equations and Boundary Value Problems*, 9th Edition, Wiley India, 2009.
3. S. L. Ross, *Differential Equations*, 3rd Ed., Wiley India, 1998.
4. E. A. Coddington, *An Introduction to Ordinary Differential Equations*, Prentice Hall India, 1981.
5. E. L. Ince, *Ordinary Differential Equations*, Dover Publications, 1958.
6. G.F. Simmons and S.G. Kravitz, *Differential Equations*, Tata McGraw Hill, 2007.
7. S. J. Farlow, *Partial Differential Equations for Scientists and Engineers*, Dover Publications, 1993.
8. R. Haberman, *Elementary Applied Partial Differential equations with Fourier Series and Boundary Value Problems*, 4th Ed., Prentice Hall, 1998.
9. Jan Nirenberg, *Elements of Partial Differential Equations*, McGraw Hill, 1964.
10. Manish Goyal and N.P. Hall, *Transforms and Partial Differential Equations*, University Science Press, Second Edition, 2010.
11. Division many differential equations, school publications.

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SUBJECT CODE/NAME	L	T	P	Credit
INTRODUCTION	1	1	0	4

Unit-I Concept of Quantum Energy and Spectroscopy: Quantization of Energy, Regions of spectrum, Electronic Spectroscopy, Electronic Transition, Woodward Fieser rules for calculating λ_{max} of conjugated dienes & α,β -unsaturated carbonyl compound, various shifts in λ_{max} and intensities. **Infrared Spectroscopy:** Conditions for Infrared Spectroscopy, Molecular vibrations & factors affecting Infrared frequencies. [14]

Unit-II Chemical Bonding in Molecules: Introduction of chemical bonding, VSEPR Theory, V.B. Theory and Molecular Orbital Theory, Energy level diagrams of diatomic molecules and ions. [16]

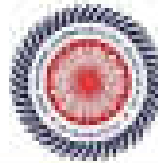
Unit-III Concept of Chirality, Enantiomers, Diastereomers, Mesocompounds and Racemic mixtures, Configuration of Acyclic hydrocarbons (Ethane, Propane & n-butane) and Cyclic hydrocarbon (Cyclohexane), Plane of symmetry, Center of symmetry, Absolute and Relative Configuration (R & S, D & L and E & Z). [14]

Unit-IV Reactivity of Organic Molecules, Factors influencing acidity, basicity and nucleophilicity of molecules, Kinetic vs Thermodynamic control of reactions. [12]

Unit-V Strategy for Synthesis of Organic Compounds, Reaction intermediates: Stability of Free Radicals, Carbocations and Carbanions, Introduction to reaction involving Addition, Elimination, Substitution and Ring opening and Cyclization. [16]

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Subject code/NAME	L	T	P	Credit
IP01TENTSPROGRAMMINGFOR PROBLEM SOLVING	3	0	0	3

Unit 1

Introduction to Programming (2 lectures)

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

Idea of Algorithm (2 lectures) : steps to solve logical and numerical problems.

Representation of Algorithm: Flowchart/Pseudo code with examples

From algorithm to program: source code, variables (with data types) variables and memory location, Syntax and Logical Errors in compilation, object and executable code.

Unit 2

Arithmetic expressions and precedence (12 lectures)

Conditional Branching and Loops

Writing and evaluation of conditionals and consequent branching

Iteration and loops

Arrays (8 lectures) Arrays (1-D, 2-D), Character arrays and strings

Unit 3

Basic Algorithms (6 lectures)

Searching: concept of binary search etc. ; Basic Sorting Algorithms (Bubble sort etc.) Finding roots of equations, introduction of Algorithm complexity

Unit 4

Function (5 lectures)

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions; idea of call by reference binary search etc.

Recursion: functions (5 lectures) Recursion, is a different way of solving problems.

Example programs, such as Finding Factorial, Fibonacci series, etc.

Unit 5

Structure (4 lectures)

Structures, Defining structures and Array of Structures

Pointers (2 lectures) idea of pointers, Defining pointers, Use of Pointers in self-referencing structures, notion of linked list (no implementation)

Suggested Text Books

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

Suggested Reference Books

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

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SUBJECT CODE/SUBJECT	L	T	P	Credit
1911T02/ENGINEERING MECHANICS	1	0	0	1

ENGINEERING MECHANICS

UNIT-I

Introduction to Engineering Mechanics covering, Force Systems/Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar, Concurrent Forces, Components in Space- Resultant- Moment of Forces and its Application, Couple and Resultant of Force System, Equilibrium of System of Forces, Free Body Diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems.

UNIT-II

Friction covering, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies.

Basic Structural Analysis covering, Equilibrium in three dimensions; Method of sections; Method of Moments, Simple Trusses; Zero force members.

UNIT-III

Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Assessment of inertia; Definition, Moment of inertia of plane sections from first principles; Theorems of moment of inertia; Moment of inertia of standard sections and composite sections.

UNIT-IV

Virtual Work and Energy Method- Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degree of freedom, Active force diagram, mechanical efficiency.

Review of particle dynamics- Rectilinear motion; Newton's 2nd law (rectangular and path); Work-Kinetic energy theorem, potential energy; Impulse-momentum; Impact (Direct and oblique).

UNIT-V

Introduction to Kinetics of Rigid Bodies covering, Basic terms, general principles in dynamics; Types of motion, instantaneous centre of rotation in plane motion and simple pendulum; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation.

Text/Reference Books:

1. Irving H. Shames (2000), Engineering Mechanics, 4th Edition, Prentice Hall
2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II - Dynamics, 9th Ed, Tata McGraw Hill
3. Andy Ruess and Balraj Prasad (2011), Introduction to Statics and Dynamics, Oxford University Press
4. Shames and Rao (2008), Engineering Mechanics, Pearson Education,
5. Bansal H.K. (2010), A Text Book of Engineering Mechanics, Laxmi Publications
6. Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.
7. Tayal A.R. (2010), Engineering Mechanics, Umesh Publication

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SUBJECT CODE/INSTRUMENT	L	T	P	Credit
INSTRUMENT/INSTRUMENT LAB	0	0	3	1.3

List of Experiments:

Group – A:

1. Standardization of sodium bisulphate solution by standard potassium dichromate solution.
2. To determine the Normality and Strength (g/L) of given Ferric Ammonium Sulphate solution 'A' using standard Ferric Ammonium Sulphate (N/10) solution 'B' using K₂Cr₂O₇ solution as an intermediate.
3. To determine the concentration of hydro solution (H₂O₂, H₂O₂) individually with given ferrous (N/10) solution.
4. Find out the Temporary hardness of given water sample using 0.01M EDTA solution, buffer solution (pH=10) and EBT as an indicator.
5. To determine chloride ion in a given water sample by Argentometric method (Mohr's method).

Group – B:

6. Preparation of Oxalic Formaldhyde resin.
7. Acylation of Primary Amine: Preparation of Acetanilide.
8. Base Catalyzed Aldol Condensation: Synthesis of Dibenzalpropione.
9. [4+2] Cycloaddition Reaction: Diels-Alder reaction.
10. Preparation of Acryls and calculate its yield.

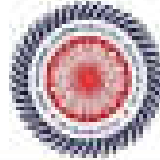
Group – C:

11. To calculate the λ_{max} of a given compound using UV-visible spectrophotometer.
12. To separate the metallic ions by paper chromatography.
13. To determine the surface tension of a liquid by stalagmometer.
14. To determine the percentage composition of the given mixture consisting of two liquids A and B (non interacting system) by viscosity method.
15. To determine the relative viscosity of given liquids by Oswald's viscometer.

Note: At least two Experiments from each group must be performed.

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SUBJECT COURSE NAME	L	T	P	Credit
PROBLEM PROGRAMMING FOR PROBLEM SOLVING LAB	0	0	1	1.1

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

Tutorial 1: Problem solving using computers
Lab 1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions
Lab 3: Problems involving if-then-else constructs

Tutorial 4: Loops, while and for loops
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and strings
Lab 6: Matrix problems, string operations

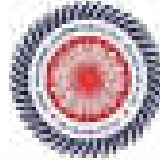
Tutorial 7: Functions, call by value
Lab 7: Simple functions

Tutorial 8 & 9: Numerical methods (Root finding, numerical differentiation, numerical integration)
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures

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SUBJECT CODE/NAME	L	T	P	Credit
INDUSTRIAL WORKSHOP & MANUFACTURING PRACTICES	1	1	1	2.3

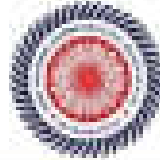
Lectures & video (18 hours)

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

Suggested Text/Reference Books:

- (i) Haim Chandhary S.K., Haim Chandhary A.K. and Nighar Roy S.K., 'Elements of Workshop Technology', Vol. I 2008 and Vol. II 2008, Media promoters and publishers private limited, Mumbai.
- (ii) Kalpakjian S. and Steven S. Schmid, 'Manufacturing Engineering and Technology', 4th edition, Pearson Education India Edition, 2002.
- (iii) Gouri P. Marthandan and A. Sarath Babu, 'Manufacturing Technology - I' Pearson Education, 2008.
- (iv) Ray A. Lindberg, 'Processes and Materials of Manufacture', 4th edition, Prentice Hall India, 1999.
- (v) Rao P.N., 'Manufacturing Technology', Vol. I and Vol. II, Tata McGraw-Hill House, 2017.

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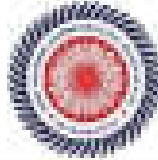
SUBJECT CODE/SUBJECT	L	T	P	Credit
IMP/IMP/ENGG/ENGG/MECHANICS LAB	0	0	0	1

Engineering Mechanics - Lab

List of Experiments

1. Verification of law of parallelogram of forces.
2. Verification of law of triangle of forces.
3. Verification of law of polygon of forces by universal force table.
4. Verification of law of moment by parallel forces apparatus.
5. Practical verification of forces in the member of jib crane.
6. Practical verification of forces in the member of the crane.
7. Determination of coefficient of friction between two given surfaces by inclined plane method.
8. Determination of efficiency of single screw jack.
9. Determination of efficiency of single purchase screw crab.
10. Determination of efficiency of double purchase screw crab.
11. Determination of efficiency of simple wheel and axle.

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SELECT COURSE(S) (PAPER/COURSES)	L	T	P	Credit
	1	1	2	4

Unit - 1: Optical Interference and Diffraction

Introduction, Young's experiment, Order of interference, Coherent and incoherent waves, Fresnel's biprism and Newton's ring experiment.

Diffraction of light, Fresnel and Fraunhofer's diffraction. Diffraction due to plane diffraction grating.

Unit - 2: Electromagnetic Theory

Coulomb's law, electrostatic field and potential, electric flux, Gauss' law, Poynting's and Laplace's equation, Equation of continuity for charge conservation, Ampere's and Biot-Savart's laws, Maxwell's Electrodynamics equations.

Unit - 3: Laser and Fiber optics

Introduction, elementary idea of spontaneous and stimulated emission, active medium, population inversion, Einstein coefficients, Types of laser and important applications of laser.

Introduction to optical fibers, basic principles of optical fibers, critical angle, numerical aperture, multimode waveguide, applications of optical fiber.

Unit - 4: Semiconductor Physics and Device

Formation of energy - in solids, Energy band gap of insulators and semiconductors, classification of semiconductors: intrinsic and extrinsic semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, Electrical conductivity in intrinsic and semiconductors, working of P-N Junction Diode and Bipolar Junction Transistor.

Unit - 5: Introduction to Quantum Mechanics

Introduction to Quantum Mechanics, Postulates (S.M., Dirac's effect, wave-particle duality, uncertainty principle, wave function, Orthogonal wave, phase and Group velocity), Dirac's and Gerner equations, Schrodinger wave equation, particle in a box (1-dimensional).

Text Books and References

- 1) Applied Physics - I and II by Brijmohan Gupta, Prentice Hall & Co.
- 2) Egg, Physics by S. K. Srivastava and K. A. Vaidya, New Age Pub. New Delhi
- 3) Egg, Physics by Uma Maheshwari, Narosa Publications.
- 4) Egg, Physics by M. N. Anandamathi, S. Chand Pub.
- 5) Electricity and Magnetism by Resnick and Halliday, Tata McGraw Hill, 1998
- 6) Concepts of Physics Part-II by H. C. Verma, Bharati Bhawan (P&G), 1998
- 7) Modern Physics by Serway, McGraw Hill Inc. New York, Publication 1995
- 8) Modern Physics by Misner and Meitner, East West Press Pvt. Ltd. 1998
- 9) Introduction to Electrodynamics, David Griffith
- 10) I. Singh, Semiconductor Optoelectronics: Physics and Technology, AdGoon-188 Inc. (1992)
- 11) S. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
- 12) S. M. Kim, Semiconductor Devices: Physics and Technology, Wiley (2000)
- 13) Saleh and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
- 14) P. Mahalingam, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
- 15) Online course: "Semiconductor Optoelectronics" by M. R. Shanay on NPTEL.
- 16) Online course: "Optoelectronic Materials and Devices" by Monica Kalra and Deepak Gupta on NPTEL.

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SUBJECT CODE/NAME	L	T	P	Credits
IP222EN01/BASIC ELECTRICAL ENGINEERING	3	1	0	4

Module 1: DC Circuits (8 Hours)

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

Module 2: AC Circuits (8 Hours)

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, complex 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.

Module 3: Transformers (8 Hours)

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

Module 4: Electrical Machines (8 Hours)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics, Loss components and efficiency, starting and speed control of induction motor, Single-phase induction motor: Construction, working, torque-speed characteristics and speed control of capacitor-started ac motor, Construction and working of synchronous generators.

Module 5: Power Converters (8 Hours)

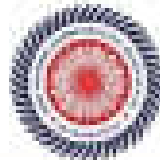
DC-DC Buck and boost converters, duty ratio control, Single-phase and three-phase voltage source inverters, sinusoidal modulation.

Module 6: Electrical Installations (8 Hours)

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.

Suggested Text / Reference Books

- GD.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
- GD.C. Kulkarni, "Basic Electrical Engineering", McGraw Hill, 2004.
- GD.L. S. Balaban, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
- GD/H. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
- GD/V. D. Toru, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.



Subject code	L	T	P	Credit
IPU/TECO/ MATHEMATICS-I	3	1	0	4

Calculus (Single Variable)

Module 1a: Calculus (6 hours)

Limits and Continuity, Evaluation of definite and improper integrals, Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolution; Approximate differentials, properties and problems.

Module 1b: Calculus (6 hours)

Euler's theorem, Mean value theorem, Taylor's and Maclaurin's theorems with remainders, Indeterminate forms and L'Hospital's rule; Maxima and minima.

Module 1c: Sequence and series: (Dyomante 2b) (18 hours)

Convergence of sequence and series, tests for convergence; power series, Taylor's series. Series for exponential, trigonometric and hyperbolic functions; Fourier series: Half range sine and cosine series; Fourier's theorem.

Textbooks/References:

- 1.G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Venkatesan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 Reprint, 2010.
4. N.P. Ball and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 11th Edition, 2008.

Multivariable Calculus

Module 1a: Multivariable Calculus (Differentiation) (Dyomante 2b) (18 hours) Limit, continuity and partial derivatives; direct and indirect partial derivatives; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multiplier; Gradient, curl and divergence.

Module 1b: Multivariable Calculus (Integration) (Dyomante 1a) (18 hours)

Multiple integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals; Change of variables (Cartesian to polar); Applications: areas and volumes by double integration; Center of mass and Gravity (constant and variable densities); Theorems of Gauss, Green and Stokes; orthogonal curvilinear coordinates; Simple applications involving cubes, spheres and rectangular parallelepipeds.

Textbooks/References:

- 1.G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Venkatesan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 Reprint, 2010.
4. N.P. Ball and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 11th Edition, 2008.

Matrices and Linear Algebra

Module 4a: Matrices (6x6 case vector spaces is not to be taught) (14 hours)

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Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem, System of linear equations, Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices, Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical form.

Module 4b: Matrices (in case vector space is to be taught) (8 hours)

Matrices, vectors: addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, Inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

Module 4c: Vector spaces (Paragraphs 4b) (10 hours)



Vector Space, linear dependence of vectors, basis, dimension, Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank-nullity theorem, composition of linear maps, Matrix associated with a linear map.

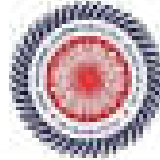
Module 4d: Vector spaces (Paragraphs 4b-c) (10 hours)

Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigenvalues, Diagonalization, inner product spaces, Gram-Schmidt orthogonalization.

Textbooks/References:

1. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
2. V. Krishnamurthy, V.P. Malra and J.L. Aosta, An introduction to Linear Algebra, Affiliated East West press, Reprint 2005.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. Venkatesh T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. N.P. Dutt and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.


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Subject code	L	T	P	Credit
190211801/ENGLISH	3	0	0	3

1. Vocabulary Building

The concept of Word Derivation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms, and standard abbreviations.

2. Basic Writing Skills

Sentence Structure, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in discourse, Techniques for writing practice.

3. Identifying Common Errors in Writing

1. Subject-verb agreement, Noun-pronoun agreement, Mismatch modifiers, Articles, Prepositions, Redundancies, Clashes.

4. Nature and Style of sensible Writing

Describing, Defining, Classifying, Providing examples or evidence, Writing Introduction and conclusion.

5. Writing Practices

Comprehension, Free Writing, Essay Writing.

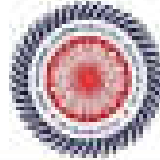
6. Oral Communication (This unit involves interactive practice sessions in Language Lab)

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

Suggested Readings:

- (i) Practical English Usage: Michael Swan, OUP, 1995.
- (ii) Remedial English Grammar: F.T. Wood, Macmillan, 2007
- (iii) On Writing Well: William Zinsser: Harper Resource Book, 2001
- (iv) Study Writing: Liz Hamp-Lyons and Ben Handy: Cambridge University Press, 2008.
- (v) Communication Skills: Sanjay Kumar and Pooja Lata, Oxford University Press, 2011.
- (vi) Exercises in Spoken English, Parts I-III: CEFL, Hyderabad, Oxford University Press

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SEM/SUBJECT	I	II	III	CREDIT
POSTMOL/ENVIRONMENTAL SCIENCES	I	B	B	3

ENVIRONMENTAL STUDIES

UNIVERSITY NAME: G.G.V. Bilaspur
 DATE: 10/11/2023

Introduction to environmental studies: Interdisciplinary nature of environmental studies, importance, Concept of sustainability and sustainable development, Ecosystems: Structure and function of ecosystems, Energy flow in an ecosystem: food chains, food webs and ecological succession. (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Natural Resources: Renewable and Non-renewable Resources: Land resources and land use change; Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on environment, floods, biodiversity and tribal populations; Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies. Biodiversity and Conservation: Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India.

Biodiversity patterns and global biodiversity hot spots, India as a mega-biodiversity centre; Endangered and endemic species of India. Threats to biodiversity: Habitat loss, poaching of wildlife, over wildlife activities, Biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, cultural, aesthetic and recreational values. Environmental Pollution: Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution. Human health and human health risks. Solid waste management: Control measures of urban and industrial waste. Pollution case studies: Environmental Policies & Practices: Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture. Environmental Laws: Environment Protection Act: Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD). Human resources, tribal populations and rights, human wildlife conflicts in Indian context. Human Communities and the Environment: Human population growth: impacts on environment, human health and welfare. Rehabilitation and rehabilitation of project affected persons; case studies. Disaster management: Floods, earthquakes, cyclones and landslides. Environmental movements: Chipko, silent valley, Bishnoi of Rajasthan. Environmental ethics: role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi). Field work: Visit to an area to document environmental issues: river forest ecosystems, etc. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural. Study of simple ecosystems: pond, river etc.

Suggested Readings:

1. Gluck, P. H. 1993. *Water in Crisis*. Pacific Institute for Studies in Dev., Environment & Society, Berkeley: San. Institute, United States Press.
2. Choudhury, R. Editorial, and Pandey, M.K. (Eds.). *Threats from India's Himalaya State*. Science, 1991: 16-17.
3. Sen Gupta, R. 2002. *Ecology and economy: An approach to sustainable development*. OUP.
4. Sathu, N.S., Gilman, L. & Raven, P.H. (eds) 2011, *Conservation Biology: Voices from the Tropics*. John Wiley & Sons.

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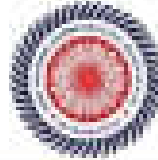


SUBJECT COURSE/SUBJECT	L	T	P	Credits
INTERMEDIATE PHYSICS LAB	0	0	3	1.5

List of Experiments:

1. To determine the wavelength of sodium light with help of Fresnel's biprism.
2. To determine the refractive index and dispersive power of the material of prism with the help of spectrometer.
3. To determine the sodium light by Newton's ring method.
4. To determine the wavelength of sodium light by plane diffraction grating using spectrometer.
5. To demonstrate the diffraction pattern and determine the wavelength of different colors of mercury (white) light using plane diffraction grating and spectrometer.
6. To determine the wavelength and number of lines per cm on a diffraction grating using monochromatic laser light.
7. To determine the specific rotation of sugar solution with the help of polarimeter.
8. Determine the width of the single slit and diameter of crystal aperture using Fraunhofer diffraction pattern produced by monochromatic laser light.
9. To determine the energy band gap (E_g) of a semiconductor material using P-N junction diode.
10. To determine the work function by Thomson's method.
11. To study the P-N junction diode characteristics, in forward and reverse bias conditions.
12. To study the Zener diode characteristics.
13. To study the characteristics and gain of Transistor in C-B and C-E mode.
14. Determine the Planck's constant.

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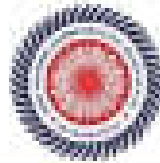


SUBJECT COURSE NAME	L	T	P	Credit
PREPARED BY: ELECTRICAL ENGINEERING LAB	8	8	2	1

List of experiments/demonstrations:

- Basic safety precautions. Introduction and use of measuring instruments—voltmeter, ammeter, multi-meter, oscilloscope. RLC-DC resistors, capacitors and inductors.
- Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (Transient may be observed on a storage oscilloscope).
- Steady-state response of R-L and R-C circuits: Impedance calculation and verification. Observation of phase differences between current and voltage. Resonance R-L-C circuits.
- Transformers: Observation of the no-load current waveform on an oscilloscope (non-inductive—highly inductive) flux waveform (inductive—highly non-inductive). Discussion about hysteresis. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
- Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).
- Phase shifts between the primary and secondary sides. Cumulative three-phase power in balanced three-phase circuits.
- Demonstration of cut-out sections of machines: dc machine (armature-brush arrangement), induction machine (cogged iron rotor), synchronous machine (field winding - slip ring arrangement) and single-phase induction machine.
- Torque-Speed Characteristics of separately excited dc motor.
- Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connection. Torque-Slip Characteristics of an induction motor. Generator operation of an induction machine driven at super synchronous speed.
- Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
- Demonstration of (a) dc-dc converters (b) dc-ac converters—PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switches.

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SUBJECT CODE/SUBJECT	L	T	P	Credits
19PSP001/ENGINEERING GRAPHICS & DESIGN I-48	1	0	1	2.0

ENGINEERING GRAPHICS & DESIGN

UNIT-I

Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, range of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only), Conoid, Ellipsoid, Hyperboloid and involute; Scales - Plain, Diagonal and Vernier Scales.

UNIT-II

Orthographic Projections

Principles of Orthographic Projections- Conventions - Projections of Points and lines inclined to both planes, Projections of planes and Inclined Planes - Auxiliary Planes.

Projections of Regular Solids

Inclined to both the Planes- Auxiliary Views; Draw simple associative, isometric and scale.

UNIT-III

Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone- Auxiliary Views; Development of surfaces of Right Angular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and drawings (foundation to slab only)

UNIT-IV

Isometric Projections covering

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

Overview of Computer Graphics

Getting the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software (such as: The Menu System, Toolbars (Standard/Quick Properties, Draw, Modify and Dimension), Drawing Area (Background, Coordinate/Coordinate System), Dialog boxes and windows, Shortcut menus (Status Bar), The Command Line (where applicable), The Status Bar, Different methods of joints as used in CAD, Select and erase objects), Isometric Views of lines, Planes, Simple and compound Solids).

Suggested Text/Reference Books

- (i) Bhat N.D., Paschal V.M. & Ingle P.B., (2014), Engineering Drawing, Charotar Publishing House
- (ii) Shah, M.H. & Hans B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
- (iii) Agrawal H. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
- (iv) Narayana, K.L. & P. Kanniah (2008), Text book on Engineering Drawing, Scitech Publishers
- (v) (Corresponding set of) CAD Software Theory and User Manuals

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