List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Industrial and Production Engineering*

Programme Name : *B.Tech.*

Academic Year : 2020-21

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

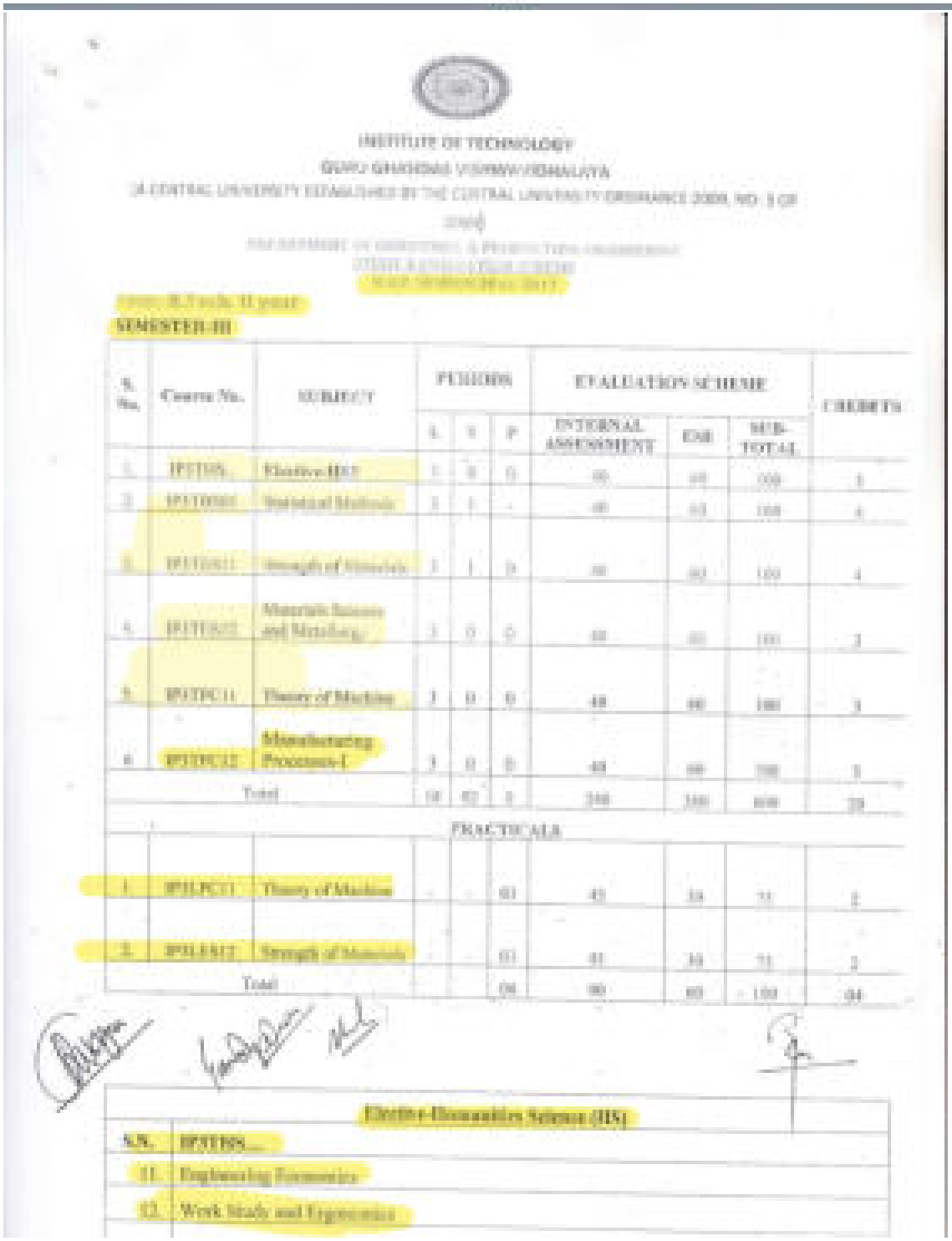
Sr. No.	Course Code	Name of the Course
01.	IP3TBS01	STATISTICAL METHODS
02.	IP3TES11	STRENGTH OF MATERIALS
03.	IP3TES12	MATERIAL SCIENCE AND METALLURGY
04.	IP3TPC11	THEORY OF MACHINE
05.	IP3TPC12	MANUFACTURING PROCESSES - I
06.	IP3LPC11	THEORY OF MACHINE LAB
07.	IP3LES12	STRENGTH OF MATERIALS LAB
08.	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 HELATH AND SAFETY
19	IP4TPE13	BUSSINESS 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*

Scheme and Syllabus



INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009, NO. 3 OF 2009)
PROCEEDINGS OF GOVERNANCE & PROTECTION ENGINEERING
STUDIES (PEGS) FOR CREDIT
SCALE SESSION 2016-2017

Course: B.Tech. II year

SEMESTER-III

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IP3TDS	Elective-HS?	3	0	0	40	60	100	3
2.	IP3TDS01	Statistical Methods	3	1	-	40	60	100	4
3.	IP3TDS11	Strength of Materials	3	1	0	40	60	100	4
4.	IP3TDS12	Materials Science and Metallurgy	3	0	0	40	60	100	3
5.	IP3TPC11	Theory of Machine	3	0	0	40	60	100	3
6.	IP3TPC12	Manufacturing Processes-I	3	0	0	40	60	100	3
		Total	18	02	3	240	360	600	20
		PRACTICALS							
1.	IP3LPC11	Theory of Machine	-	-	03	45	30	75	2
2.	IP3LES12	Strength of Materials	-	-	03	45	30	75	2
		Total			04	90	60	150	04

Elective-Humanities Science (HS)

S.N.	IP3THS...
11.	Engineering Economics
12.	Work Study and Ergonomics

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMESTER

IPTHBS12 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 measurement through physiological tools. Work physiology. Paced and unpaced work performance, Data logging, data collection, data reduction and analysis techniques, Gross human anatomy, Anthropometry, Bio mechanics, muscle strength and exertion potential of different limbs.

Unit III
Workspace, Environmental effects, exercises for evaluation of manual flows and work spaces, Environmental conditions including temperature, illumination, noise and vibration.

Unit IV
Perception and information processing, design of displays, hand control, typography, and readability, layout and composition.

Unit V
Exercises in evaluation of human response toproduct interface, product safety and product liability, Design considerations for appearance, colour, texture andforms.

Recommended Books:
1. D. C. Alexander, *Applied Ergonomics*, Taylor & Francis.
2. Ian Dul, *Ergonomics for Beginners*, Taylor & Francis.
3. David Pye, *The Nature & Aesthetics of Design*, Cambium Press.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMESTER

IPITBM01 STATISTICAL METHODS

UNIT-I

Introduction to statistics , mathematical statistics , variable , frequency distribution , exclusive and inclusive class intervals type of series graphical representation histogram frequency polygon give measure of central tendency variation type of average, Mean median mode for grouped and un grouped data , geometric mean , harmonic mean , measure of description Skewness and Kurtosis.

UNIT- II

curve fitting and Method of least square – straight line parabola correlation – scatter diagram's Karl Pearson's coefficient of correlation. Limits for correlation coefficient. Coefficient of correlation for bivariate frequency distribution, rank correction. Regression linear regression, Equation to 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. Use of binomial theorem.

UNIT- IV

Theoretically Distribution – Binomial Distribution Mean, Standard deviation and Pearson's β 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 test of significance based on Chi square, T, F, and Z Distribution Degree of freedom, condition for applying

UNIT- V

Simulation Basic concept 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 Statistic
3. A.A. AFFI – Statistic Analysis
4. Probability & Statistics by Biswal, PHI

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMESTER

IP3THS13 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: Conventions, ID Act, Trade Union Act

UNIT-II

Trade unionism: Trade Union Development and Functions,Trade Union Structure and Recognition,Managing Trade Unions,Managerial Unionism,Employers' Organizations

UNIT-III

Collective bargaining: Nature and Content of Collective Bargaining,Negotiation Skills,Issues and Trends in Collective Bargaining

UNIT- IV

Employee involvement: Evolution, Structure and Process,Design and Dynamics of Participative Forums,Strategies for Implementing Participation

UNIT-V

Grievance Handling And Discipline: Grievance Function 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, Rachana Sharma, Atlantic Publishers & Distr
3. Industrial Relations And Personnel Management, Simon A George M V Pylee, Vikas Publishing House Pvt Ltd

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMESTER

(PTEE31) STRENGTH OF MATERIAL

UNIT-I

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

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

UNIT-II

Bending moment and shear force diagrams: Bending moments and shear force diagrams, S F and B M diagram for different types of loading under different conditions with problems.

Theory of bending stresses: Assumptions in the simple bending theory, derivation of formula; Application to beams of rectangular, circular and channel sections, composite/flitched beams, bending and shear stresses in composite beams.

UNIT-III

Slope and Deflection of beams: Definition, double integration, area moment method, Macaulay's methods,Conjugate beam 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 andconditions. Derivations of Euler's formula for elastic buckling load, equivalent length, Rankine Gordon's empirical formula.

UNIT-V

Thin pressure vessel: Derivation of formulae and calculations of hoop stress longitudinalstress in a cylinder, and sphere subjected to internal pressures 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 P F and Johnston (Jr) E R, "*Mechanics of Materials*", SI Version, Tata McGraw Hill, India.
3. Popov 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*", 5th Edition, East West Press, New Delhi.
5. Bedal U C, "*Introduction to Strength of Materials*", 5th Edition, Galgotia Publishing Private Limited New Delhi.

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

6. Strength of materials Ryder,I.H.,
7. Elements of Strength of material Timoshenko, East West press
8. Mechanics of solids, Popov, PHI Publications

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMESTER

BPTES32 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 dislocation, slip and twinning,
slip mechanism, strain hardening.

UNIT II

Phase Diagrams, Phases, phase rules, concept of equilibrium, Phase diagram, lever rule, eutectic, eutectoid, peritektic and peritectoid systems, iron-carbon diagram, and simplified IC diagram. Heat Treatment: Isothermal Transformation of austenite(TTT diagram), Transformation of austenite upon continuous cooling, annealing, normalizing, hardening, tempering, hardenability of steel, Surface hardening, tempering, 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.
Creep: Introduction to creep mechanism, creep curves,creep 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 coding
Non-ferrous: Aluminum, copper, nickel, chromium, zinc, lead, tin, tungsten, 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, friction conditions. Properties of green compacts and sintered compacts.
Machining, milling, atomization, electro-deposition, reduction from oxide, carbonyl process, production of alloy powders, New development.
Powder rolling, powder forging, powder extrusion and explosive forming technique.

Recommended Books:

1. Raghavan. Material Science and Engineering.
2. Swamp. Elements of Metallurgy
3. Vanvlack. Elements of Material Science and Engineering.
4. Aggarwal, B.K. Introduction to engineering Materials

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMESTER

IPSTPC31 THEORY OF MACHINE

UNIT- I

Basic Concepts: Kinematics of machine. 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, Gruebel's criterion and introduction to dimensional synthesis. Brief introduction to mechanism with lower pairs, pantograph, davis & 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 mechanisms, 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, forms of teeth, construction and properties of an involute, construction and properties of cycloidal teeth, effect of variation of centre 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 ofepicyclic 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 cams 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 diagrams. Fluctuation of speed and energy. Effect of centrifugal tension of flywheel, Inertia torque and its effects on Crank effort diagrams

UNIT-V

Governors: Distinction between function of a flywheel and governor, types of governor, Watt, porter proell, hartnell governor.

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

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMESTER

Recommended Books:

1. Bevan T, *"The Theory of Machines"*. CBS Publishers and Distributors.
2. Shigley J.E and Vishar J.J. *"Theory of Machines and Mechanism"*. McGraw Hill, New Delhi.
3. Wilson C and Sadler J. *"Kinematics and Dynamics of Machine"*. Prentice Hall.
4. Ratan S.S. *"Theory of Machines"*. 1st Edition, Tata McGraw Hill, New Delhi.
5. Rao J.S and Dukkipati R.V. *"Mechanism and Machine Theory"*. New Age International (P) Limited, Delhi.
6. Mechanisms & machines by Ghosh and Mallick, East west Press
7. Theory of machine by Ratnan ld T.M.G.H. Publications

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

BPITPC 12 MANUFACTURING PROCESSES-I

UNIT-I

Lathe: Lathe design and terminology. Specification, types of Lathe: center lathe, capstan and turret lathe, various operations performed on lathe, operating conditions calculation of material removal rate.

Drilling: Fundamental 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 cutters, up and down milling, different operations on milling, indexing and types, calculation of MRR.

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

UNIT-II

Broaching: Introduction, Machines and processes.

Grinding: Classify grinding machines,constructional features 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, theories of Hot & Cold rolling, rolling mills & its types, two-hi, four-hi, six-hi and twenty-hi rolling mill, calculation of rolling parameter.& rolling defect.

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

Extrusion: Types, extrusion equipments & analysis of processes, drawing of rods, wire & 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 moulding, plastic design principles processes, machines and equipments, parameters and force calculations.

Recommended Books:

1 Raghavan, Material Science and Engineering.
2. Swamp, Elements of Metallurgy
3. Vanvlack, Elements of Material Science and Engineering.
4. Aggarwal, B.K Introduction to engineering Materials.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMESTER

BPELPC41 THEORY OF MACHINE LABORATORY

1. Study of Gyroscopic effect and determination of gyroscopic couple.
2. Determination of jump speed of cam-follower system.
3. Dynamic balancing of the rotating mass system.
4. To determine radius of Gyration "K" of given pendulum.
5. To study the free vibration and to determine the natural frequency of vibration of Torw-Rotor system. 6. To study the torsional vibration and to determine the natural frequency vibration of single rotor system.
6. Study of longitudinal 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 Π √l/g for a simple pendulum.
9. Determination of whirling speed of shafts.

BPELES41 STRENGTH OF MATERIALS LABORATORY

1. Determination of Young's modulus, tensile, strength and percentage elongation for steel, aluminum, 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 compressive 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, aluminum and fibre reinforced composite material at 25%, 50%, 60% and 75% of ultimate tensile strength of the specimen.
7. Preparation of specimen for hardness test.
8. Testing of prepared specimens for Brinell hardness and Rockwell hardness.
9. To study the behavior of steel and aluminum specimen under torsion.

Department of Industrial and Production Engineering

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DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING
STUDY & EVALUATION SCHEME
W.E.F. SESSION 2016-2017

B.Tech (4 year)
SEMESTER-IV

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IP4TPE1x	Elective-PE-I	3	0	0	40	60	100	3
2	IP4TH582	Numerical Analysis and Computer Programming	3	1	0	40	60	100	4
3	IP4TPC21	Machine Drawing	3	0	0	40	60	100	3
4.	IP4TPC22	Industrial Engineering	3	0	0	40	60	100	3
5	IP4TPC23	Manufacturing Processes-II	3	0	0	40	60	100	3
6	IP4TPC24	Fluid Mechanics	3	1	0	40	60	100	4
Total			18	02		240	360	600	20

			PRACTICALS						
1.	IP4LPC21	NACP	-	-	03	45	30	75	2
2.	IP4LPC24	Fluid Mechanics	-	-	03	45	30	75	2
Total			-		06	90	60	150	04

Elective-Professional Elective (PE)-I	
S.N.	IP4TPE1x
11.	Occupational Health and Safety
12.	Business communication and presentation skill
13.	Business ethics and corporate governance

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

IPAEB802 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-Siedel iteration 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 application in interpolation.

UNIT-III

Numerical Solution of Ordinary Differential Equations

Numerical Integration by Trapezoidal rule, Simpson's (1/3rd & 3/8th) rule and its error estimation. Application of difference relations 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 Solutions 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

I/O Statement, Mathematical Relational & Conditional statement & Expressions, Switch Loops 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 Kandasamy,K.Thilagavathy & K. Gunavathy-S Chand & Co.
3. Let us C-Yashwant kanitkar
4. Introductory Methods of Numerical Analysis-S.S.Sastry,3rd Edn.-PHI-New Delhi.
5. Numerical Methods Analysis-James B.Scarborough, Oxford & IBH Publishing Co.-New Delhi.
6. Theory & Problems in Numerical Methods-T Veerarajan,T. Ramchandran- TMH.
7. Numerical Methods for Engineers-Steven C. Chapra,Raymond P. Canale.
8. The Spirit of C-Henry Mullish & Herbert L.Cooper-Jaico Pub. House.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMESTER

IP4TPC23 MACHINE DRAWING

Unit- I

Drawing conventions, sectional views and sectioning, representation of machine parts such as external and internal threads, slotted heads, square ends, and flat radial ribs, slotted shaft, splined shafts, bearings, springs. Convention of gears in mesh, representation of geometrical tolerances on drawings.

Unit-II

Rivet heads and riveted joints: Lap and butt joint with single and double straps.
Welding joints and their representation, symbols of different joint.
Machining symbols, Surface roughness, grades , material symbols.

Unit- III

Screw thread and screw fastening, different types of thread profile and nuts, bolts.
Sectional views: keys, cotter joints, knuckle joints
Shaft coupling, flanged coupling, different types of shaft coupling.
Shaft bearing, pushed bearing, plumber block, foot step bearing.
Pulleys: fast & loose pulleys, stepped pulley's belt pulley, rope pulley.

Unit-IV

Assembly drawing of Engine parts like piston, stuffing box, cross-heads, eccentrics, connecting rod.
Assembly drawing of stop valve, fixed check valve, safety valve, blow off cock.
Assembly drawing of lathe tail stock post.

Unit- V

Concept of computer aided drafting(CAD), implementation of CAD, atleast five projects from the above specified topics using CAD software.

Recommended Books:

1. Shigley J.E; Machine Design; TMH
2. Sharma and Purohit; Design of Machine elements; PHI
3. Wentzell Timothy H; Machine Design; Cengage learning
4. Mubeen; Machine Design; Khanna Publisher
5. Ganesh Babu K and Sridhar k; Design of Machine Elements; TMH
6. Sharma & Agrawal; Machine Design; Kataria & sons
7. Maleev; Machine Design.

IP4TPC22 INDUSTRIAL ENGINEERING

Unit-I Introduction
History & Development of industrial engineering. Productivity definition, means of increasing productivity, work study definition, productivity and work study. Human factor in the fabrication. Work of F.W. Taylor, Frank and Lillian Gilbreth and their contribution.

Unit-II Method Study
Definition & basic procedure, selection of jobs, recording techniques, micro motion, study. Therbligs cyclegraph 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; two hand chart; Simo chart.

Unit-III Work Measurement:
Definition, objectives, application, number of cycle to be timed, 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 plans; Merrik's multiple piece rate system. Group incentive scheme.
Ergonomics, work space dimension, design of work place, environmental stresses & impacts on human work.

Unit-V
Value engineering: Introduction, concept of value, value analysis approaches, job plan, value team.
Industrial safety, analysis of cost 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. I.L.O., "Introduction to work study", Oxford Press.
2. Mundel, "Motion and time study", Prentices Hall India.
3. Ralph M. Barnes, "Motion and Time Study", John wiley and sons.
4. Industrial Engineering by M.I.Khan, New Age International Publication.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMESTER

IP4TPC23 MANUFACTURING PROCESSES-II

UNIT -I

Foundry:

Molding method and materials, Sand clay water system, Additives, pattern making and types, Pattern allowances & design considerations, types of molding sand & their properties, testing, cores and sand core boxes, core making, molding machine, Gaussin & design of gating system.

Melting furnaces and practices: Melting cast iron, steel and non ferrous material, cupola, charge calculation, open furnaces, converter and crucible furnaces, electric, direct arc furnace, induction furnace.

UNIT -II

Casting: Introduction to pattern and its types, allowances, Centrifugal and investment casting, shell, plastic and mould methods, melting of cast iron, elements of gating system, types and design of risers, solidification of casting, cleaning of casting, principle of die casting, gravity and pressure die Casting, Die casting considerations, casting defects.

UNIT -III

Welding: Classifications, principle and equipments, different type of welding process and their equipments, features, Arc Welding, Resistance welding, TIG, MIG, Submerged arc welding, friction welding, soldering, brazing and adhesive bonding, Welding defects.

UNIT -IV

Sheet - metal working: Role of sheet metal components, Cutting mechanism, Description of cutting processes like blanking, piercing, lancing etc. Description of forming processes like beading cup drawing, coining, embossing etc. Basic elements of Presses for sheet metal working, Part feeding systems, Punch and die clearances, die elements.

UNIT -V

Non-conventional machining: Introduction, Classification and comparison of different non-conventional

machining theory and analysis basics, and MRR of EDM, ECM, LBM, AJM, ECG, EBM.

Recommended Books:

1. Rao, P.N., Manufacturing Technology vol.1 TMGH
2. Ghose and Mallick, Manufacturing Science, East West Press
3. Roy, A. Lindberg ,Material and Process of manufacturing, PHI
4. Serope Kalpakjian , Manufacturing Engineering & Technology, Pearson.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMESTER

BPATPC24 FLUID MECHANICS

Unit-I

Review of Fluid Properties: Engineering units of measurement, mass, density, specific weight, volume and gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure, Fluid Statics: Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Pressure plane and curved surfaces (Problems on gravity dams and tainter gates); buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit-II

Kinematics of Flow: Types of flow-ideal & real , steady & unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streak-lines, streamlines and stream tube; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow nets their utility & 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, linear momentum equation for steady flow, momentum correction factor, The moment 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, mouthes, rectangular plates, orifice meter, nozzle meter, venturi-meter, weirs and notches).

Unit-IV

Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations in submerged bodies, partially submerged bodies, weirs, spillways, rotodynamic machines etc.).

Unit-V

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

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

Recommended Books:

1. Modi & Seth; Fluid Mechanics; Standard Book House, Delhi
2. Som and Biswas;Fluid Mechnics and machinery; TMH
3. Cengal; Fluid Mechanics; TMH
4. White ; Fluid Mechanics ; TMH
5. JNIK DAKE; Essential of Engg Hyd; Afrikan Network & Sc Instt. (ANSTI)
6. Franzini JED; A Text Book of fluid Mech. for Engg. Student
7. R Mohanty; Fluid Mechanics; PHI
8. Gupta; Fluid Mechanics; Pearson.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMESTER

IP4TPE31 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 liabilities andwork place injuries, Health and safety at work- the principle legal requirements, Healthand safety and Industrial relation law.

UNIT-II

Health 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, Majoraccidents and procedures, Health and safety training and communication, the cost ofaccidents, Principles of accident prevention, safe system of work, Surveys and audits.

UNIT-III

Occupational Health and Hygiene: The organization of working environment, temperature, lighting and ventilation, welfare amenity provision, cleaning and hygiene, Toxicology and health, Occupational disease and conditions: Occupational Audiometry, NIHL, Cardiovascular Disease, Physiological and psychological parameters, Occupational health practice, Noise and vibration, Dust and fumes, radiation and radiological protection, personal protection, Occupational hygiene practice, prevention and control strategies in occupational hygiene, manual handling, first aid, human factor and safety, stress, safety technology

UNIT-IV

Assessment of Exposure: Measurement of noise and vibration exposure, Noise and vibration indicators, Heat stress monitoring, dust exposure and respiratory health, Work Posture, Musculoskeletal disorders, Strain Index, Lifting Equation, Maximum acceptable weight limits, Occupational Audiometry, Cardiovascular health, Occupational determinants of heart rate variability, pulmonary functions and respiratory health

UNIT-V

Government schemes and issues related to health and nourishment, Policies of government in special context to Chhattisgarh state

Recommended Books:

1. Jeremy W. Stranks, "Handbook of Health and safety Practice" Pitman Publishing.
2. Dharmendra S Sengar, " Environmental law" Prentice Hall of India, New Delhi
3. Malcolm J Crocker, "Noise and Noise Control" CRC Press.
4. Marek Malik, " Clinical Guide to cardiac Autonomic Tests" Kulwer Academic Publishers.
5. Marek Malik,"Heart rate variability" Futura Publishing Co. NY
6. Cyril M Harris, "Handbook of Noise control" McGraw-Hill Book Company, NY
7. Maryanne Maltby, "Occupational Audiometry" Butterworth-Heinemann Imprint of Elsevier

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4TPS-12 BUSINESS COMMUNICATION AND PRESENTATION SKILL (Elective)

Unit- I

Business communication covering; Role of communication in information age; concept and meaning of communication; skills necessary for technical communication; Communications in a technical organization; Barriers to the process of communication and aids

Unit -II

Style and organization in technical communication covering; Listening, speaking, reading and writing as skills; Objectivity, clarity, precision as defining 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, cognition as a part of communication; Emotional Intelligence; Politeness and Etiquette in communication; Cultural factors that influence communication; Mannerisms to be avoided in communication; Language and persuasion; Language and conflict resolution;

Unit -IV

Language Laboratory emphasizing Listening and comprehension skills; Reading Skills; Sound Structure of English and intonation patterns;

Unit -V

Oral Presentation and professional speaking covering; Basics of English pronunciation; 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 thoaudience and context; Basics of public speaking; Preparing for a speech;

Recommended Books:

1. Fred Luthans, *Organizational Behaviour*, McGraw Hill
2. Leslie and petit, *Report writing for Business*
3. M. Ashraf Rizvi, *Effective Technical Communication*, McGraw Hill
4. Wallace and masters, *Personal Development for Life and Work*, Thomson Learning
5. Farhathullah, T. M. *Communication skills for Technical Students*
6. Michael Muckian, John Woods, *The Business letters Handbook*
7. Herta A. Murphy, *Effective Business Communication*
8. *MLA Handbook for Writers of Research Papers*

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMESTER

IP4TPE13 BUSINESS ETHICS AND CORPORATE GOVERNANCE(Elective)

UNIT-I
Introduction: Corporation, definition and characteristics, history of corporate form and models, corporate objectives, corporations and government, governance, corporate governance, definition, perspectives.

UNIT-II
Theoretical Foundations of Corporate Governance: Notion of conflict of interest, property rights theory, nexus of contracts, agency theory, Berle and Means' theory, concept of separation of ownership and control, shareholder, stakeholder debate.

UNIT-III
Pillars of Governance in Organizations: 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, succession planning, managerial myopia, institutionalinvestors, types, categories, features and role.

UNIT-IV
Work Ethos: Values and ethics, model of management in the Indian socio political environment, need for values in global change, Indian perspective, values for managers, holistic approach for managers in decision 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, applications of ethical theories to decision making, ethical issues related to employment, healthcare and advertisement.

Recommended Books:

1.Praveen B. Malla, Corporate Governance: Concept, Evolution and India Story, Routledge, 2010.

2.Sadri, Business Ethics: Concepts and Cases, Tata McGraw Hill, 1998.

3. Robert Monks, Nell Minow, Corporate Governance, Wiley Publications, 2008.

INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDHALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY
ORDINANCE 2009, NO. 3 OF 2009)
DEPARTMENT OF INDUSTRIAL &PRODUCTION ENGINEERING
STUDY & EVALUATION SCHEME
W.E.F. SESSION 2017-2018
Years B.Tech. III year

SEMESTER-V

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IP5TPC31	Metal Cutting	3	0	0	40	60	100	3
2	IP5TPC32	Fluid Machinery	3	0	0	40	60	100	3
3	IP5TPC33	Machine Design- I	3	0	0	40	60	100	3
4	IP5TPE2.	Elective-PE2	3	0	0	40	60	100	3
5	IP5TPE3.	Elective-PE3	3	0	0	40	60	100	3
6	IP5TOE1.	Elective-OE1	3	0	0	40	60	100	3
Total			18	0		240	360	600	18
PRACTICALS									
7.	IP5LPC31	Metal Cutting	-	-	03	50	50	50	2
8.	IP5LPC32	Fluid Machinery	-	-	03	50	50	50	2
9.	IP5LPC33	SEMINAR			03	50		50	2
Total					09	110	40	150	06

Elective-Professional Elective (PE)-2		Elective-Professional Elective (PE)-3		Elective- Open Elective (OE)-1	
S.N.	IP5TPE...	S.N.	IP5TPE...	S.N.	IP5TOE...
21.	Turbo Machines	31.	Total Quality Management	11.	Financial Management
22.	I.C. Engine	32.	Industrial Automation	12.	Managerial Economics
23.	MEMS and Nanotechnology	33.	Mechatronics	13.	Financial Accounting and Costing

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UNIT-I

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 signature.

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

UNIT-II

Principal of metal cutting – Elements of machining, mechanism of chip formation, forces on the chips, merchant theory and other theories of metal cutting, stresses and strain in chips, shear and strain rate, power and energy calculations.

Theory of multipoint machining- mechanism of drilling, machining time, torque and thrust, power calculation in drilling , milling, and broaching

UNIT-III

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

Cutting fluids- functions characteristics and types of cutting fluids and their applications, criteria for selection of cutting fluids.

Cutting tool materials- requirements types and characteristics of various cutting tool materials, comparison and selections of cutting tools.

UNIT-IV

Tool failures and tool life – mechanism of tool failure, types of tool failure, tool wear and types, toll life and its measurement , taylors tool life equations , 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 principal of simple step type chip breakers. Working principal of chip breakers, effect of chip breaking.

UNIT-V

Machinability -definations ,evaluations , 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 PHI
2. Manufacturing Science, Ghosh Mallick, E.W.P.

4. Production Technology- Degarmo, P.H.I.
5. Text Book of Production Engineering- K.C. Jain & Chitale, P.H.I.
6. Machining & M/C Tools- A.B.Chattopadhyay- Wiley

NIT – 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 Lined and Bluff 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, Hinged Plate, Moving Plate and Moving Curve Vanes, Jet Propulsion of Ships.

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 Tanks, Governing of Reaction Turbine.

UNIT-IV

Centrifugal Pumps: Classification of Pumps, Centrifugal Pump, Construction, Working, Work Done, Heads, Efficiencies, Multistage 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 Vessels.

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

Text 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 Kothandraman & Rudra Mourthy,New Age Publication.

6. Experiment in Hydraulics & Hydraulic M/C- Shesha Prakash- PHI
7. Fluid Mechanics & Turbo M/C- Das- PHI
8. Fundamentals of Turbo M/C- Venkanna- PHI
9. Introduction to Hydraulics & Pneumatics- Jaego & Soundarajan- PHI

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UNIT-I

Steady stresses and variable stresses in machine member-introduction to the design process factors influencing machine design, selection of material based on mechanical properties, direct, bending and torsional stress equations, impact and shock loading, calculation of principle stresses for various load combinations, eccentric loading, design of curved beams, crane hook and 'C' frame ,factor of safety, theories of failure, stress concentration, fatigue design for variable loading, Soderberg, Goodman and Gerber relations.

UNIT –II

Riveted joints – failure of riveted join, strength and efficiency of riveted joint. Design of butt and lap joint for a boiler, eccentrically loaded riveted joint.

Design of thread joints, bolted joint in tension, torque requirement for bolt tightening, bolted joint under fluctuating load. Eccentrically loaded joint in shear, bolted joint with combined stresses.

UNIT-III

Design of cotter and knuckle joints, socket and spigot cotter joint, sleeve and cotter joint. Gib and cotter joint, design of knuckle joints.

Welded joints- stresses in butt and fillet welds, strength of welded joints, eccentrically loaded joint, welding joint subjected to Bending moment.

UNIT-IV

Design of Keys and coupling, flat and square keys, woodruff keys, splines, muff coupling, compression coupling, flange coupling, flexible coupling.

UNIT -V

Design of shafts: subjected to twisting moment, bending moment, combined twisting moment and bending moment, fluctuating loads, design of shaft on the basis of rigidity.

Text Books:

1. Machine Design-Bhandari, TMH
2. Machine Design Spott, TMH
3. Machine Design- J Shigley, TMH
4. Machine Design- Khurmi & Gupta, Khanna Publisher.
5. MC Design- Sharma & Agrawal, Dhanpat Rai Publications.
6. Design of MC Elements- Sharma & Purohit- PHI

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IP5TPE21 - Turbo Machinery

NIT-I

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

Steam Turbine Types: Steam turbine-principal of operation of steam turbine, types, impulse turbine, compounding 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 ratios 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 turbines with similar blade section and half degree of reaction (parson's turbine) Height of reaction, blade section.

Energy losses in steam turbine-internal and external losses in steam turbine.

UNITS –III

State points Locus & Reheat factors: Factor-stage, efficiency of impulse turbine, stage point locus of an impulse turbine, state point locus for multistage turbine reheat factor, Internal efficiency, overall efficiency, relative efficiency, Design procedures of impulse & impulse reaction turbine.

Governing of steam turbine: Throttle governing, nozzle governing, bypass governing, combination of throttle and nozzle, governing and combination of bypass 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 (Brayton cycle) for gas turbine. Optimum pressure ratios for maximum specific output in actual gas turbine, Regeneration, reheat and inter 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.

Books:

1. Steam and Gas Turbine – R. Yadav by C.P.H. Publication, Allahabad.
2. Turbine, Compressors and Fans – S.M. Yahya – TMH.
3. Gas Turbine – V. Ganeshan – TMH.
4. Fundamentals of Turbo Machinery- Venkanna, PHI.

IP5TPE22 - Internal Combustion Engine

UNIT-I

Introduction of internal combustion engines, classification of I.C. engines, engines components, basic engine nomenclature, four stroke S.I. and C.I. engine, two stroke engines, comparison of two stroke and four stroke engines, comparison of S.I. and C.I. engines, application of IC 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. Engine: Flame development and its propagation, ignition lag, effect of engine parameters on ignition delay, preignition, knocking in S.I. engines, variables affecting knock, combustion chambers.

Carburetor: Principle of carburetion, elements of carburetor, parameters affecting carburetion, air-fuel mixtures, expression for air-fuel ratio.

Fuel Ignition System: Battery and coil ignition system, magneto ignition system, firing order, spark advancing.

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

UNIT-III

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

Fuel Injection System: Air and solid injection, fuel pump and injectors.

UNIT-IV

Engine Friction and Lubrication: Total engine friction, blow by losses, pumping losses, factors effecting engine friction, mechanism of lubrication, lubrication system.

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

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

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IT-V

supercharging: effect of altitude on mixture strength and output of SI engines, low and high pressure supercharging, exhaust, gas turbo-charging, supercharging of two stroke engines.

Engine friction and lubrication, Engine cooling system.

Text Books:

1. Mathur M.L. and R.P. Sharma, A Course in IC Engines, Laxmi Publication.
2. Ganesan V., Internal Combustion Engines, TMGH Publication.
3. Taylor C.F., Internal Combustion Engines: Theory and Practice.
4. Stone, Richard, Introduction to IC Engine
5. Fundamentals of I.C. Engine- Gupta, PHI

IPSTPE23 - MEMS and Nanotechnology

UNIT- I

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

Micromachining, photolithography, structural and sacrificial materials, methods of lithography. Thin film deposition, and its developments process, LPCVD, PECVD, impurity doping , etching problem with bulk micromachining, vapour 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 electronics system, passive mechanical system.

UNIT- III

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

Thermal sensor and actuators – Introduction, thermocouple probe, micro hot plate gas sensors, micro thermo vessels, shape memory alloys.

UNIT- IV

Magnetic sensors and actuators- Different types and principals.

RF MEMS –Introduction, RF based communication system, MEMS inductors, and tuner filter, Resonator.

UNIT-V

NANOTECHNOLOGY – Introductions, nanotechnology materials, fullerenes, doping, CNT, SWCNT, MWCNT, development and application of CNT.

Text Books:

1. MEMS- Mahalik- McGrawHill.
2. MEMS & MOEMS Technology & Application- Rai Choudhary, PHI.

IPSTPE31 - 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 attribution 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, O-C curve & its construction, Sampling plans, single, doubles & 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, 5's, Quality function deployment

UNIT - IV

Introduction to ISO 9000: Various models of ISO 9000, Clauses 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, fault –tree-technique

Text Books:

1. SQC by Grant & Leavesworth - Tata Mc. Hill
2. Quality Planning & Analysis by Juran & Gryana - Tata Mc. Hill
3. Total Quality Control By A. Feigenbaum - Mcgraw Hill
4. SQC by M.Mahajan – Dhanpat rai publication
5. Total Quality Management – Besterfield Tata Mc. Hill
6. Total Quality Management – Purnima charantimath (LowPearson Education)
7. Total Quality Management – Krishnaiya-PHI
8. Total Quality Management – Sugandhi & Samuel-PHI

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IP5TPE32 - 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 Oil hydraulic circuits, their applications and their ISO symbols. Basic hydraulic circuits involving linear and rotary actuators (No sequential circuits).

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

Digital logic: Number systems; Logic Gates; Boolean Algebra, Simplification of Boolean equations using Karnaugh Maps.

UNIT –IV

Microprocessors and Microcontrollers (Only basic understanding and application) : 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 motors.

Text Books:

1. Industrial Production & Automation- Mikel P. Groover, PHI
2. Automation Production System and CIM- Mikel P. Groover, PHI

IP5TPE33 - 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

Microprocessor: Introduction architecture, pin configuration, instruction set, programming of Microprocessor using 8085 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, Mnemonics, Timers, Internal relays and Counters, Data handling, Analog input/output selection of a PLC.

UNIT-V

Design and Mechatronics: Stages 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.

Text Books:

1. HMT Ltd, "Mechatronics", Tata McGraw Hill Publishing Co.Ltd.,1998
2. Bradley D.A., Dawson D., Burn N.C. and Loader A.J., "Mechatronics", Chapman and Hall, 1993.
3. Gaonkar Ramesh S."Microprocessor Architecture, programming and Applications", Wiley Eastern, 1997
4. Mechatronics- Singh & Joshi-PHI

IPSTOE11 - 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: Principals, techniques, various methods of capital budgeting. Concept and measurement of cost and capital, and various approaches for measurement of cost of capital and computation.

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 combined leverage: Introduction, definition and concept and various approaches.

Text Books:

1. Financial Management by Khan and Jain, TMGH
3. Financial Management by Kuchhal, Vikas Publication
4. Financial Management- Paresh Shah-Wiley India Pvt. Ltd.

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IPSTOE12 - 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, ACMS Production Function, Investment Function.

Cost Analysis: Cost Concept, Opportunity Cost, Fixed Vs Variable Cost, Explicit Costs Vs Implicit Costs, Out of Pocket Costs 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 Policies: Element of Market , Types of Market, Concept of Market, Classification of Market based on the nature of competition, Types of Competition, Features of Perfect Competition, Feature 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, Administered Pricing

UNIT- IV

Forms of Business Organization: Introduction, Definition, Essential Element 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 Classifications, Need of Working Capital and its Assessment, Factors Affecting Working Capital, Fundamental 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).

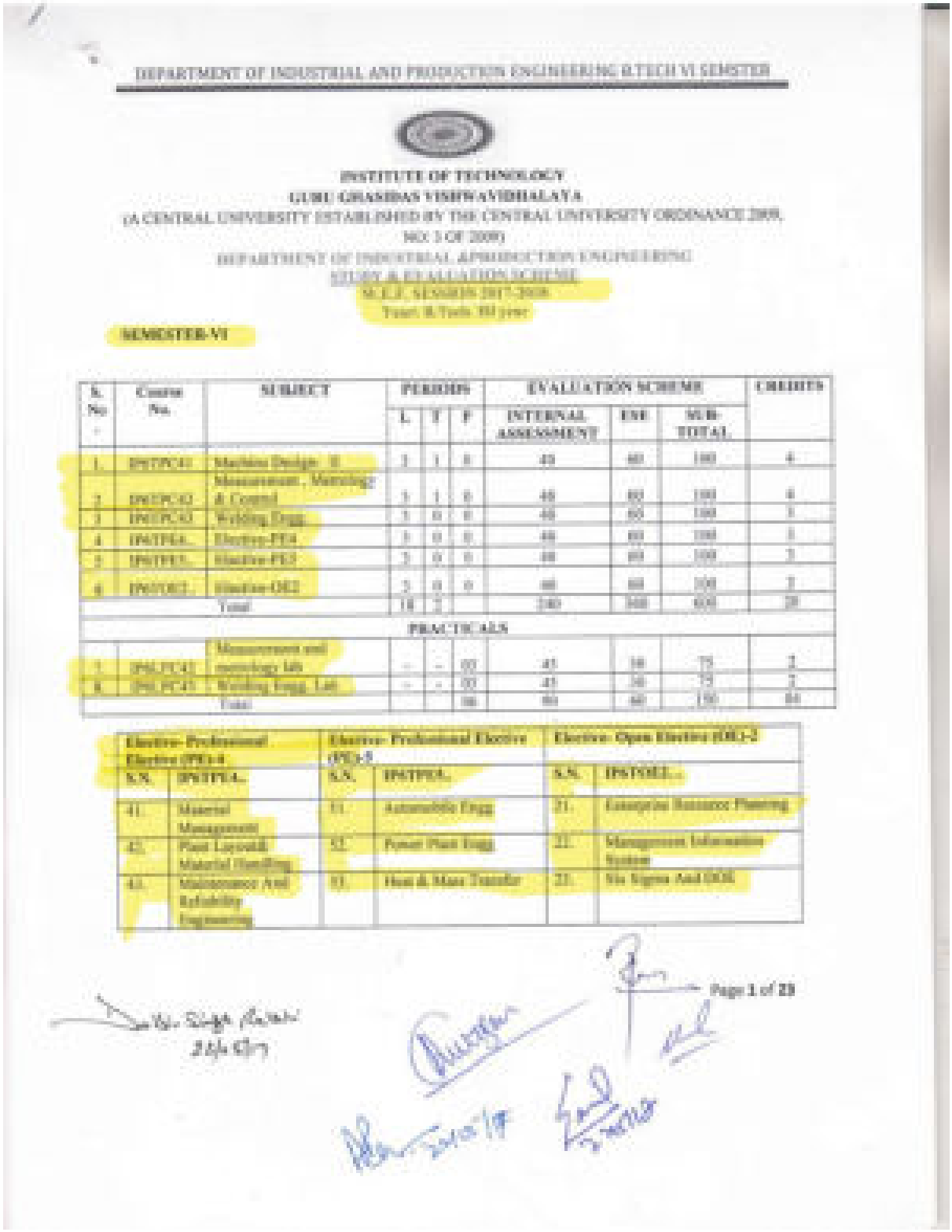
UNIT- V

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

ancial Analysis Through Ratios: Classification of Financial Ratios, Liquidity Ratios, verage 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, PHI
2. Managerial Economics By Joel Dean, PHI
3. Managerial Economics By Craig H. Petersen, W. Cris Lewis, Sudhir K Jain
4. Financial Accounting For Management By Ambrish Gupta, Pearson Eduction
5. Managerial Economics By H. Craig Peterson & W. Cris Lewis, PHI
6. Managerial Economics By Suma Damodaran, Oxford University Press
7. Managerial Economics and Financial Analysis By Aryasri, TMH



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMESTER

INSTITUTE OF TECHNOLOGY
GURU GHASIDAS VISHWAVIDHALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009,
NO(3 OF 2009)
DEPARTMENT OF INDUSTRIAL &PRODUCTION ENGINEERING
STUDY & EVALUATION SCHEME
W.E.F. SESSION 2017-2018
Years B.Tech. III year

SEMESTER-VI

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1	IPETPC41	Machine Design- II	3	1	0	40	60	100	4
2	IPETPC42	Measurement, Metrology & Control	3	1	0	40	60	100	4
3	IPETPC43	Welding Engg.	3	0	0	40	60	100	3
4	IPETPEA_	Elective-PE4	3	0	0	40	60	100	3
5	IPETPE5_	Elective-PE5	3	0	0	40	60	100	3
6	IPETOE2_	Elective-OE2	3	0	0	40	60	100	3
		Total	18	2		240	360	600	20
		PRACTICALS							
7	IPELPC43	Measurement and metrology lab	-	-	03	45	30	75	2
8	IPELPC43	Welding Engg. Lab	-	-	03	45	30	75	2
		Total			06	90	60	150	04

Elective- Professional Elective (PE)-4		Elective- Professional Elective (PE)-5		Elective- Open Elective (OE)-2	
S.N.	IPETPEA_	S.N.	IPETPEA_	S.N.	IPETOE2_
41.	Material Management	51.	Automobile Engg.	21.	Enterprise Resource Planning
42.	Plant Layout& Material Handling	52.	Power Plant Engg.	22.	Management Information System
43.	Maintenance And Reliability Engineering	53.	Heat & Mass Transfer	23.	Six Sigma And QRK

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMESTER

Note: After the completion of semester exams, students will have to join industrial training of about minimum 4 weeks (5day week and 8 hours a day) in industry. The presentation and report of this will be given in 7th sem during defined schedule by Head of Department. The due credit will be awarded in 7th semester.

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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 Failures, 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 Proportions, 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 Seales – Contact Type and Clearance Type.
Journal Bearings: Types of Lubrication, Viscosity, Hydrodynamic Theory of Lubrication, Sommerfield Number, Heat Balance, Self-contained 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 Tensions.

Text Books:
1. Design of Machine Elements V.B. Bhandari, TMH Publications.
2. Machine Design by Shigley – McGraw Hill Pub.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

3. Principles of Mechanical Design by R. Phelan – McGraw Hill Pub.
4. Machine Design By Spotts-PHI
5. Machine Design, by Norton

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IP&TPC42 Metrology, Measurement and Control

UNIT-I

Introduction to Measurement and Measuring Instruments, Generalized Measuring Systems and Functional Element, Static & Dynamic Performance Characteristic 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, Elastic Diaphragms, Measurement of Vacuum and Low Pressure, Various Low Pressure Gauges.

Measurement of Fluid Flow: Various Methods of Flow Measurement and Devices

Temperature Measurement: Bi-Metallic Thermometers, Thermocouples, Thermistors and Pyrometers.

UNIT-III

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

UNIT-IV

Interferometry: Principle and Uses 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 system and their mathematical modelling, response characteristics of components and systems through classical solution.

Text Books:

1. Beckwith and Buck, Mechanical Measurement
2. Jain RK Instrumentation
3. Raven H Automatic Control Engineering
4. Donal P Eckman Automatic Process Control
5. Nakra & Choudhary Instrumentation Measurement & Analysis
6. Nakra BC Theory & Application of Automatic Controls
7. Cooper Albert D Modern Electric Instrumentation PHI

IP6TPC43 Welding Engineering

UNIT-I
Classification of welding: gas welding, Arc Welding and Equipments, types of welding Flames, Welding Techniques, Welding Torches and Blowholers. Submerged Arc Welding, TIG, MIG, Plasma Arc Welding and its Application.

UNIT-II
Arc Welding: Arc Welding Power Sources, Selection Factor for Power Sources, 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, Butt Welding, Flash Butt Welding, Precision Welding.
Solid State Welding Process: Cold Welding, 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 Stresses, Types, Control of welding Distortion, Various discontinuities in welds, Trouble shooting.

UNIT-V
Design of Weldment: Weld Geometry, Eccentric Loading Designing Torsion 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.

Text Books:

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

IP6TPE41 - Materials Management

UNIT-I

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

Purchasing: Objective and function of purchasing department, purchasing procedure, negotiation, and source selection.

UNIT-II

Types of purchasing, buying seasonal 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,stores accounting and stock verification, obsolete, 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 spares and its classification, MUSIC-3D, view of spares, multi echelon spares inventory.

UNIT-V

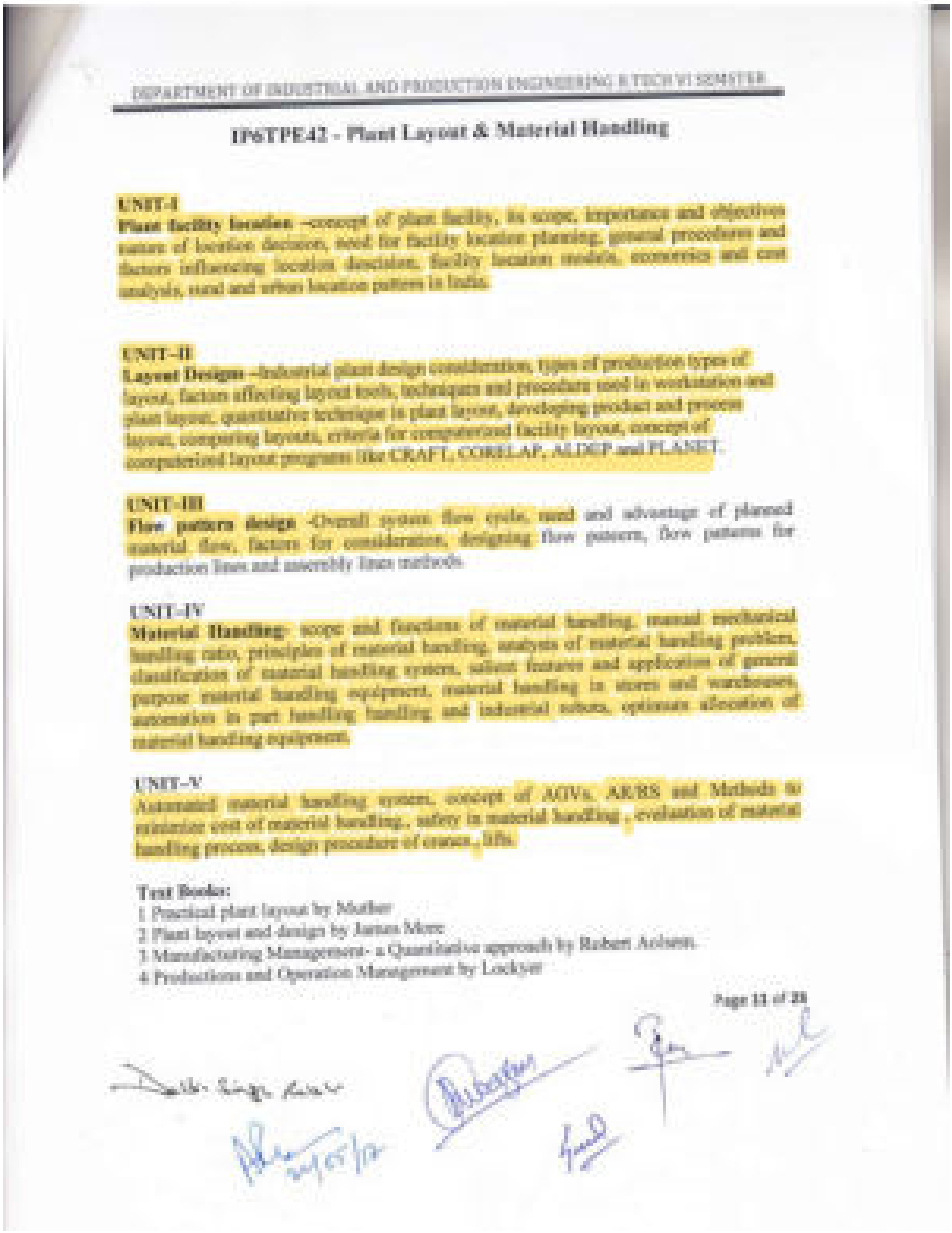
Value analysis: value importance, normal degree value analysis applied to purchase organizing for value analysis, cost analysis and value analysis aid purchase research. Material and process selection in VE design, material, process & supplier decisions.

Text Books:

1. Materials Management an integrated approach, Gopalkrishnan.P & Sundaresan.M (2002) Prentice Hall India Limited, NewDelhi.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

2. Materials Management Text and Cases, Chitale,A.K. & Gupta,R.C. (2009) Prentice Hall India Limited. NewDelhi.
3. Maintenance and Spare parts Management, Pathak () Prentice Hall India Limited. NewDelhi.
4. Production and Operations Management, Chary,S.N. ( ) Tata McGraw Hill.
5. Material management: An integrated approach, Datta ()



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

IP6TPE42 - 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, economics and cost analysis, rural and urban location pattern in India.

UNIT–II
Layout Design –Industrial plant design consideration, types of production types of layout, factors affecting layout tools, techniques and procedure used in workstation and plant layout, quantitative technique in plant layout, developing product and process layout, computing layouts, criteria for computerized facility layout, concept of computerized layout programs like CRAFT, CORELAP, ALDEP and PLANET.

UNIT–III
Flow pattern design -Overall system flow cycle, need and advantage of planned material flow, factors for consideration, designing flow patterns, 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, material 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, AR/RS 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 More
3 Manufacturing Management- a Quantitative approach by Robert Aolsem.
4 Productions and Operation Management by Lockyer

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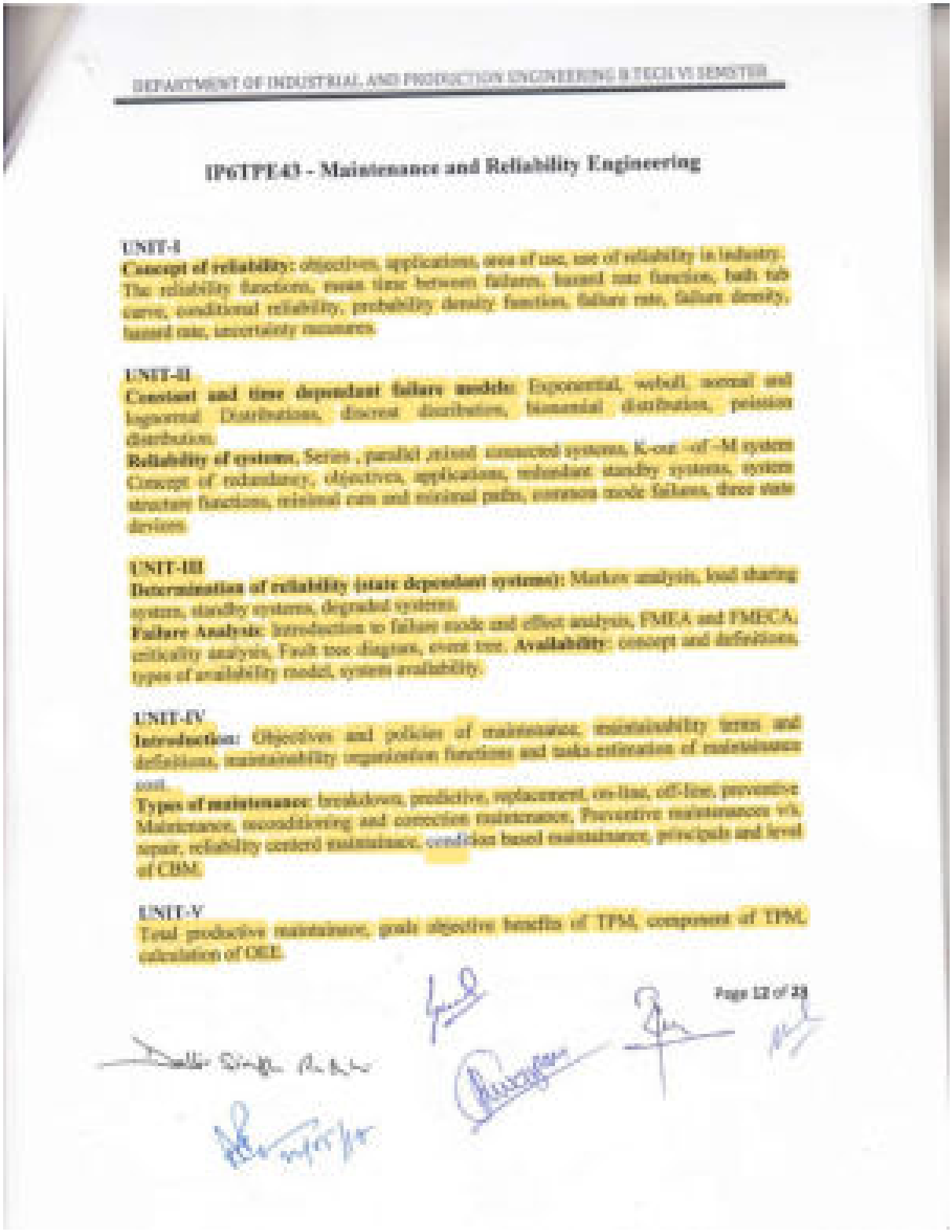

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMESTER

IP6TPE43 - Maintenance and Reliability Engineering

UNIT-I

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

UNIT-II

Constant and time dependant failure models: Exponential, weibull, normal and lognormal Distributions, discrete distribution, binomial distribution, poission distribution.

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

UNIT-III

Determination of reliability (state dependant systems): Markov analysis, load sharing system, standby systems, degraded systems.

Failure Analysis: Introduction to failure mode and effect analysis, FMEA and FMECA, criticality 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 definitions, maintainability organization functions and tasks estimation of maintenance cost.

Types of maintenance: breakdown, predictive, replacement, on-line, off-line, preventive Maintenance, reconditioning and corrective maintenance, Preventive maintenance v/s repair, reliability centerd maintainance, condition based maintainance, principals and level of CBM.

UNIT-V

Total productive maintainance, goals objective benefits of TPM, component of TPM, calculation of OEE.

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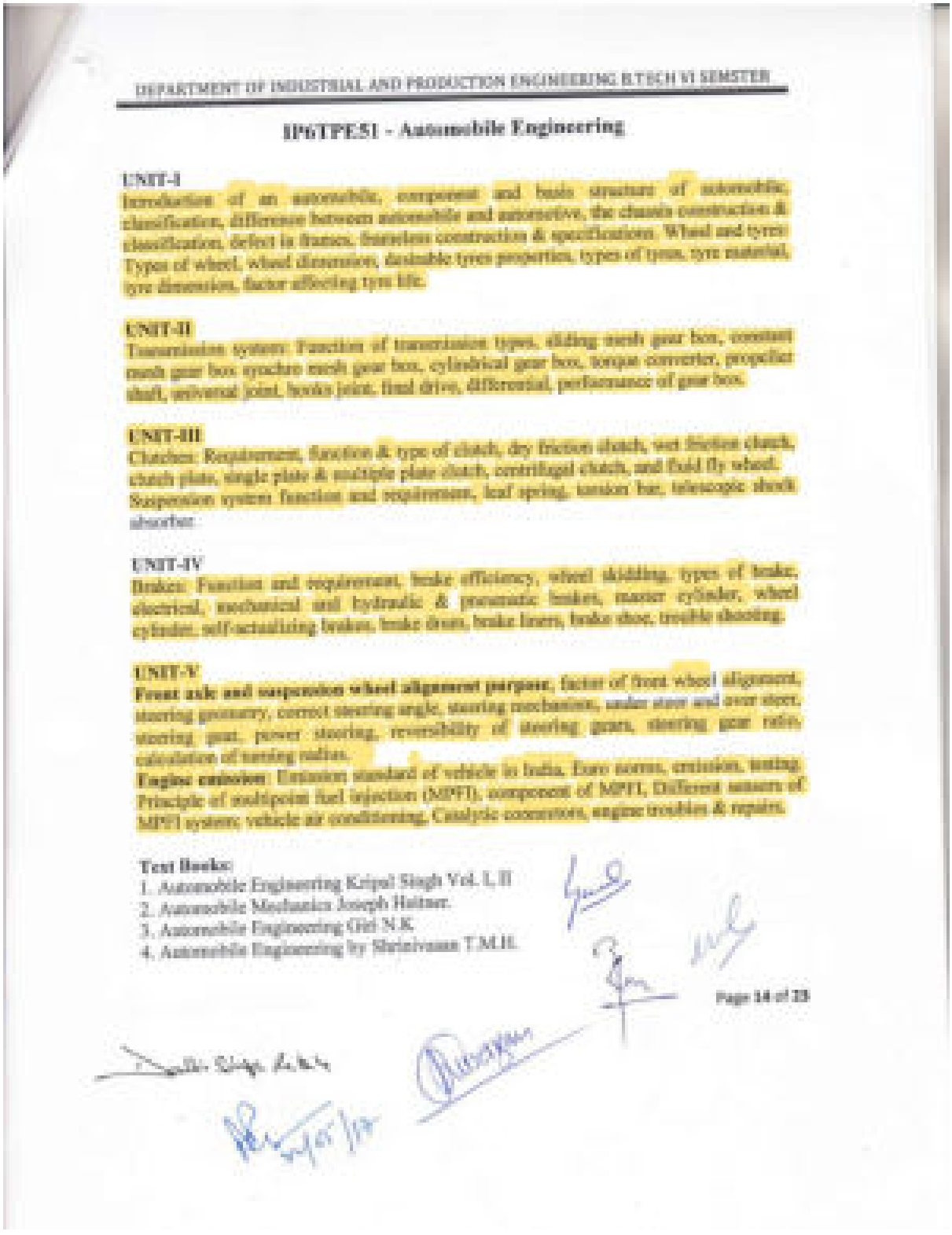
Training for maintainace personal, objective and level of training, types of training methodology, evaluation of maintenance department.

Text Books:

1. Clifton R H, "*Principles of Planned Maintenance*", McGraw Hill, New York, 2001.
2. Ebling CE. "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. Maintainace and spare parts management by P. Gopal krishnan PHI.



DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

IP6TPE51 - Automobile Engineering

UNIT-I
Introduction of an automobile, component and basic structure of automobile, classification, difference between automobile and automotive, the chassis construction & classification, defect in frames, frameless construction & specifications. Wheel and tyres: Types of wheel, wheel dimension, desirable tyres properties, types of tyres, tyre material, tyre dimension, 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, hooke joint, final drive, differential, performance of gear box.

UNIT-III
Clutches: Requirement, function & type of clutch, dry friction clutch, wet friction clutch, clutch plate, single plate & multiple plate clutch, centrifugal clutch, and fluid fly wheel. Suspension system function and requirement, leaf spring, torsion bar, telescopic shock absorber.

UNIT-IV
Brakes: Function and requirement, brake efficiency, wheel skidding, types of brake, electrical, mechanical and hydraulic & pneumatic brakes, master cylinder, wheel cylinder, self-actualizing brakes, brake drum, brake liners, 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 gears, 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 convertors, engine troubles & repairs.

Text Books:
1. Automobile Engineering Kripal Singh Vol. I, II
2. Automobile Mechanics Joseph Heitner.
3. Automobile Engineering Giri N.K
4. Automobile Engineering by Shrinivasan T.M.H.

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IP6TPE52 - 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, condenser 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 dryers, solar cookers, solar refrigeration systems, solar panel.

UNIT-III
Nuclear Energy: Introduction to Nuclear Engineering, Release of Energy by Nuclear Reaction, chain reaction, moderation, components of nuclear reactor, types of reactor, Pressured water reactor, CANDU reactor, Gas cooled reactor, Liquid metal cooled reactor, breeder reactor, Nuclear Materials.

UNIT-IV
Geothermal power plant. Wind energy: Type of Rotors, 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 Conversions: fuel Cells, Thermo-electric, Thermo ionic and MHD Systems (Magneto Hydrodynamic system), Economic analysis of Power plant tariffs.

Text Books:
1. Power plant Engineering, Domkundwar & Arora, Dhanpat Rai Publication.
2. Sukhatme, 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 Wakil, TMH

IP6TPE53 - 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 off solids, liquids and gases, factors in influencing conductivity measurement. The general differential equation of conduction, one dimensional study state conduction, linear heat flow through a plane and composite wall, tube and sphere critical thickness of insulation, effect of variable thermals conductibility, conduction with heat generation in flat and cylinders.

UNIT-II

Fins

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

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 mechanics of forced convection. Dimensional analysis for forced convection, velocity and thermal boundary, layer, flow over plates, flow across cylinders and spheres, flow in tubes, Reynolds's analogy.

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

UNIT-IV

Boiling and Condensation: Boiling heat transfer, pool boiling, boiling regimes and boiling curve, nust 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.

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

UNIT-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, radiation exchange between black surface, geometric configuration factors. Grey body relation exchange between surface of unit configuration factors.

Introduction to mass Transfer

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

Text Books:

1. Heat transfer-S.P. Sukhatme-TMH
2. Heat & Mass Transfer-Arora and Domkundwar-Dhanpat Rai
3. Heat Transfer-C P Arora, TMH
4. Heat & Mass Transfer-R.C. Sachdeva-New Age
5. Heat Transfer-J.P. Holman-TMH
6. Heat Transfer-A Practical Approach- Yunus A. Cengel

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, repository, RDBMS, Operating systems, Generic model of ERP system - Design tree node 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 : 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

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

Text Books:

1. Enterprise Resource Planning: Theory and practice by Rahul V, PHI Publication.
2. Enterprise Resource Planning: Concepts and practice by V.K. Garg, TMH Publication.
3. Enterprise Resource Planning by Alexis Leon, McGraw-Hill Publication

IP6TOE22 - 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 v/s 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- dataflow diagram, 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 working, 4GL, data administration

UNIT-III

Business application 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 & Other Presentation tools

IP6TOE22 - 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 v/s 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- dataflow diagram, 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 working. 4GL, data administration

UNIT-III

Business application 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 & Other Presentation 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 case studies.

Text Books:

1. O Brian, "Introduction to Information System", McGraw Hill.
2. O Brian, "Management Information System", TMH.
3. MIS by Rahul De' Wiley.
4. MIS Loudon and loudon PHI
5. Bansal, "Information System Analysis & Design", TMH.
6. Jawadekar, "Management Information System", TMH.
7. Murdick, "Information System for Modern Management", PHI.
8. Alexis Leon, "Enterprise Resource Planning", TMH.
9 MIS by Sadagopan, PHI

IP6TOE23 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, Attribute X'S, Customer Voice, Six Sigma for manufacturing, Six Sigma for service, Z score, Understanding Six Sigma organization, Leadership council, Project sponsors and champions, Master Black Belt, Black Belt, Green Belts.

UNIT-II

Methodology of Six Sigma: DMAIC, DFSS, Models of Implementation of Six Sigma, Selection 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 calculations.

UNIT-V

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

Text Book:

1. Issa Bass, Barbara Lawton, Lean Six Sigma Using Sigma XL and Minitab,

I/e, Tata McGraw-HIE, 2010.
2. DOE by Phillip Ross PHI.
3. P. Pande and L. Holpp, What is Six Sigma, I/e, Tata McGraw-Hill, 2002.
4. P. Pande, The Six Sigma Way, I/e, Tata McGraw-Hill, 2003.
5. R. Cavanagh, R. Neuman, P. Pande, What is Design for Six Sigma, I/e, Tata McGraw- Hill, 2005.
6. SIX SIGMA by KK BHOTE Mc-graw hill.
7. D.C. Montgomery, Design and Analysis of Experiments, 8th Edition, John Wiley.

INSTITUTE OF TECHNOLOGY (SCHOOL OF ENGINEERING & TECHNOLOGY)
GURU GHASIDAS VISHWAVIDHALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2009, NO: 3 OF 2009)
DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING
L.B.C.S. STUDY & EVALUATION SCHEME
W.E.F. SESSION 2018-2019
Years B. Tech. IV year

SEMESTER-VII

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IPTTPC31	Principles of Management	4	0	0	40	60	100	4
2	IPTTPC32	Production Planning and Control	3	1	0	40	60	100	4
3	IPTTPC33	CAD/CAM	3	1	0	40	60	100	4
4	IPTTOE3..	Elective-OE3	3	0	0	40	60	100	3
5	IPTTPE6..	Elective-PE6	3	0	0	40	60	100	3
Total			16	2	0	200	300	500	18
PRACTICALS									
6.	IPTLPC32	CAD/CAM lab	–	–	3	30	20	50	2
7.	IPTLPC34	Seminar on Summer Training (About 30 Days)**	–	–	3	50	–	50	2
8.	IPTLPC35	Major Project	–	–	4	50	–	50	2
Total			–		10	130	20	150	6
Grand Total			16	2	10	330	320	650	24

Department of Industrial & Production Engineering — 1

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

	Elective- Open Elective (OE)-3		Elective- Professional Elective (PE)-6
S.N.	IPT-TOE3..	S.N.	IPT-TPE6..
31	Product Design & Development	61	Machine Tool Design
32	Entrepreneurship Development	62	Refrigeration And Air Conditioning
33	Strategic Management	63	Composites Materials & Technology

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VII Sem	IPT/IPE31	Principal of Management	4	-	-	4	Max Marks-60 Min. Marks- Duration-3Hrs

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, sole proprietorship, partnership, company, public and private enterprises; Organization culture and environment; Current trends and issues in management.

UNIT-II

Nature and purpose of Planning, types of Planning, objectives, setting objectives, policies, Strategic Management, Planning Tools and Techniques, Decision making steps & processes.

UNIT-III

Nature and purpose of Organizing, formal and informal organization, 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 enrichment, 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.

Department of Industrial & Production Engineering

Text Books

1. Robbins S.P. and Coulter M., Management, Prentice Hall India, 10th ed., 2009.
2. Sisodia JAF, Freeman RE and Gilbert DR, Management, 6th ed., Pearson Education, 2004.
3. Tripathy PC & Reddy PN, Principles of Management, Tata McGraw Hill, 1999.
4. Essential of management, Koontz & O'Donnel, McGraw-Hill.
5. Organizational Behavior, Stephen P. Robbins, PHI.
6. Organization and Management, Agrawal R.D. TMH Principles of Management, Terry & Franklin, Richard – Irwin

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VII Sem.	IPT-TPC52	Production Planning And Control	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

PRODUCTION PLANNING AND CONTROL

UNIT - I

Introduction: Introduction to various Types of Production System viz. Mass Production, Job Shop, Batch Production System, Continuous Production System, Concept of Production and Operation 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, Pure and mixed strategies, methods.

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

Material Requirement Planning: objectives, functions, MRP, MRP-II, limitations.

Capacity Requirement Planning: Definition, Objectives, Process of CRP, Process Sheet, 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, Kilbridge western method.

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

UNIT - IV

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

UNIT-V

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

Text Books

1. Production and operation management, O.Panneerselvam, TMH.
2. Production and operation management, Adam Ebert
3. Production and operation management, Chuny S.N. TMH
4. Production and operations management Theory and practice Mahadevan.B
5. Production and operation management, Joseph .G. Monks, TMH
6. Handbook of Material Handling, Otis Horwood limited
7. Operations Management: Design Planning and control for the manufacturing and services Lawrence.P.Ritzm, James B. Dilworth Tata Mc Graw Hill
8. Production and Operations management, R.B Khanna, PHI.
9. Production operations management S.N.Badla, PHI.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VII Sem.	IPT-TPC53	Computer Aided Design And Manufacturing (CAD/CAM)	3	1	-	4	Max. Marks-60 Min. Marks- Duration-3Hrs

COMPUTER AIDED DESIGN AND MANUFACTURING (CAD/CAM)

UNIT-I

Basics of CAD: Basics fundamental of Computer Graphics, Principle of computer graphics, Product life cycle, Concept of Computer Aided Design (CAD) and architecture, Hardware and software, Color management, Raster graphics, Graphic primitives, lines and Circle Drawing algorithms, Software documentations, CAD standards GKS, OpenGL, Data exchange standards- IGES, STEP, CALS etc. Communication standards, Standards for exchange images

UNIT- II

Geometric Modeling of Curves, Surface and Solid: Basics representation of curves, Parametric and non-parametric curves, Mathematical representation of curves, Hermite curves, Bezier curves, B-spline curves and rational curves

Basic of Surface, Techniques of surface modelling, Plane surface, Rule surface, Surface of revolution and sweep, Coons and bi-cubic patches, concept of Bezier and B-spline surfaces, Basic concept of solid modelling technique, CSG and B-rep method for solid generation

UNIT – III

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

UNIT – IV

Basics of CAM: Basic concept of numerical control (NC) System, NC coordinate system, NC motion control, Application of NC, concepts of computer numeric 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

Advance Manufacturing System: Concept of distributed numeric 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 (AS/RS), Automated guided vehicle(AGV).

Text Books

1. Principles of Computer Graphics, W. M. Neumann and R.F. Sproul, McGraw Hill
2. Computer Graphics, D. Hearn and M.P. Baker, Prentice Hall Inc
3. Production System & Automation, Groover, Prentice Hall, India
4. CAD/CAD Theory & Practice-I.Zeid & R. Sivasubramanian, TMH
5. CAD/CAM, Groover & Zimmer, Prentice Hall, India
6. Computer Graphics & CAD, Ramamurthy, T.M.H.
7. Industrial Robotics & CIM, Surendra Kumar I.B.H.
8. CAD/CAM, P.N.Rao, Prentice Hall, India.
9. CAM T.C. Chang & Wang, Pearson
10. Mastering CAD CAM, Ibrahim Zeid, Tata McGraw Hill Publishing Co.
11. CAD/CAM Principles, C. McMahon and J. Browne, Pearson Education

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VII Sem.	IP7-TOE-31	Product Design & Development	4	-	-	4	Max Marks-60 Min. Marks- Duration-3Hrs

PRODUCT DESIGN & DEVELOPMENT

UNIT-I

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

UNIT-II

Product Design practice and Industry : Introduction, product strategies, time to market, analysis of the product, three S's, standardization, reward sense, simplification.

Designer: Role, Myth and reality, Industrial design organization, basic design considerations.

Industrial Designer: Problems, procedure for adoption, types of models, Role of aesthetics in product design, functional design practice.

UNIT-III

New products idea generation: modification, Product variants: adding, dropping, Formal testing: new products, concept, product testing, market tests, evaluation, adoption, expansion and forecasting.

Economic factors influencing 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.

UNIT - IV

Developing product strategy: Benefits of strategy, elements of a product strategy, setting objectives, selection of strategic alternatives, increasing sales/market share, 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.

Trademark: Introduction, historical development of the concept, Need for Protection, Kinds of Trademarks, and Well known Trademarks. Patents: Historical development, Concepts, Novelty, Utility, Inventiveness/Non-obviousness. Copyrights, Industrial design.

Text Books

1. Chitale A. K. and Gupta R. C.; Product Design and Manufacturing, PHI.
2. Gupta V., Lal G.K. and Reddy; Fundamentals of Design and manufacturing; Narosa Publishing.
3. James Garratt, Design and technology (1998) Published by Cambridge University Press
4. Donald R. Lehman, Russell S. Winer 3rd Edition, Product Management TMH.
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" – TMH – 3rd addition.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VII Sem.	IPTTOE...32	Entrepreneurship Development	4	-	-	4	Max Marks-60 Min Marks- 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, Tourism entrepreneurship, Agripreneurship, social entrepreneurship & family business – Factors affecting entrepreneurship growth

UNIT- II

Entrepreneurship Development: Entrepreneurship development programmes Objectives, contents and evaluation. Small Enterprises: Micro and macro units, 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 enterprises. Formulation of business plans and project appraisal. Contents of business plans, significance and formulation.

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

Department of Industrial & Production Engineering

UNIT- IV

Financing of Enterprise Source of finance: internal and external sources, capitalization, term loans- short term finance, venture capital, export finance: Institutional finance: commercial banks, other financial institutes, 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, directr industry centre, technical consultancy organizations

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

UNIT- V

Start-up Business: Why start a business, key considerations, start-up a process, presentation to investors, company considerations, equity considerations, key factors for success.

Government strategies: Growth of enterprises, Objectives of growth, stages and types of growth- Expansion diversification, joint venture, mergers and acquisitions, sub-contracting and financing.

Sickness in small industries: Meaning of industrial sickness, signals and symptoms of industrial sickness, causes and consequences, corrective measures to curb sickness, government policies on revival of sick units.

E-commerce: Basic concepts, advantages and disadvantages.

Text Books

1. Entrepreneurship, Roy, Rajiv, Univ. Press
2. Entrepreneurship,/ Hisrich, McGraw Hill
3. Entrepreneurship Development, Kumar, New- Age
4. Entrepreneurship Development, Kaulgud, Thomson Learning
5. Entrepreneurship: Theory & Practices, Saini, Wheeler
6. Entrepreneurship Development, Dr. S.S. Khanka S. Chand.

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.	IPT-TOE-33	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 Formation 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 competencies-core competencies-Low cost and differentiation Generic Building Blocks of Competitive Advantage- Distinctive Competencies-Resources and Capabilities durability of competitive Advantage- Avoiding failures 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 Kinsey's 7s Framework, GE 9 Cell Model, Distinctive competitiveness, Selection of matrix, Alance Score Card-case study.

UNIT- 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.

UNIT- V

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

Text Books

1. Thomas L. Wheelen, J.David Hunger 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, Biznotes, Wiley India,6th edition, 2007.
3. Azhar Kazmi, Strategic Management & Business Policy, Tata McGraw Hill, Third Edition.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VII Sem.	IPT-TPE...61	Machine Tool Design	3	1	-	4	Max Marks-60 Min. Marks- Duration-3Hrs

MACHINE TOOL DESIGN

UNIT - I

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

Regulation of speed and feed rates: objective of speed and feed rate regulation, design of speed box, general recommendation for developing the gearing diagram, determining the number of teeth 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 requirement, 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 bed.

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 aerostatic slide ways, design of anti-friction guide ways, design of power screws.

UNIT - IV

Design of spindles and spindle supports: function of spindle unit and requirements, material of spindles, effects of machine tool compliance on machining accuracy, design calculation of spindles, design of jigs and fixtures: principles of jigs and fixtures design, locating and clamping, jig bushes, drilling jigs.

UNIT - V

Press work die design: Classification of presses and dies, cutting action in dies, clearances and cutting forces, shear, center of pressure, method of mounting punches, design of blanking dies, drawing die design.

Text Books

1. Machine Tool Design by NK Mehta 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. Push, V.E., Design of Machine Tools, Mashinostroenie Publishers, Moscow., 1977.
5. Machine Tool Design, vols. I-IV, Mir Publishers, Moscow, 1968.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VII Sem.	IPT-TPE...62	Refrigeration & Air Conditioning	3	1	-	4	Max Marks-80 Min Marks- Duration-3Hrs

REFRIGERATION & AIR CONDITIONING

UNIT – I

Carnot Refrigerator & Heat pump: air refrigeration systems, bell Coleman air refrigeration cycle, Air craft system & its performance.

Vapour compression refrigeration: simple cycle, t-s and p-h charts analysis of vapor compression cycle, factors effecting performance of vapor compression cycle, actual vapour compression cycle, multi stage compression system.

UNIT – II

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

Refrigeration equipment: constructional details, 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-thermo-electric refrigeration, vortex tube, steam jet refrigeration system.

Refrigerants: classification, properties & selection of refrigerants.

Department of Industrial & Production Engineering

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UNIT – IV

Psychometrics: Psychometry 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 calculations & design of a.c. system- different heat sources, design of air conditioning system, bypass factors, effective sensible heat factor, cooling coils.

UNIT – V

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

Automotive air conditioning: system location 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 – Manohar Prasad – New-Age International Pub
3. Refrigeration and Air Conditioning – Arora & Domkundwar – Dhanpat Rai & Sons
4. Refrigeration and Air Conditioning – P.L. Ballaney – Khanna Pub.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VII Sem.	IPIPET...63	Composite Materials and Technology	3	1	-	4	Max Marks-60 Min. Marks- Duration-3Hrs

COMPOSITE MATERIALS AND TECHNOLOGY

UNIT – I

Introduction to Composites Definitions. 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 flaws, 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 organics, ceramics. Fibre coating to achieve compatibility with matrix. Use of statistical methods to characterise 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 moulds), including: hand and spray lay-up, press moulding, injection moulding, resin injection, RRIM, filament winding, pultrusion, centrifugal casting, autoclave, pressing and other "starting" materials, etc. Machine methods for manufacture of composites.Cutting, drilling and other finishing operations.

Department of Industrial & Production Engineering

UNIT – IV

Engineering properties Stiffness and Strength: Geometrical aspects, volume and weight fraction. Unidirectional continuous fibre systems; stiffness and strength. Discontinuous fibres. Short fibre systems; length and orientation distributions. Woven reinforcements. Hybrids. Failure theories for unidirectional lamina. Micro mechanics theories.

UNIT – V

Mechanical Testing: Determination of stiffness and strengths of unidirectional composites; tension, compression, flexure and shear. Typical standard methods. Use of photo elastic, holographic and other methods of strain measurement.

Metal Matrix Systems: Metals and alloys; solidification processes, diffusion bonding, mechanical properties. Boron fibre reinforced aluminium and titanium alloys. Alumina fibre reinforced aluminium alloys. Silicon carbide fibre reinforced aluminium alloy. Particulate systems.

Text Books

1. Introduction to Composite Materials Design, Ever J Barbero Taylor and Francis.
2. Mechanics of Composite Materials Robert Jones Second Edition 1999 Taylor and Francis.
3. Composites and Processing Methods Ed. Venkatesan Narosa Publications.

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 VISHWAVIDHALAYA
(A CENTRAL UNIVERSITY ESTABLISHED BY THE CENTRAL UNIVERSITY ORDINANCE 2008, NO: 3 OF 2009)
DEPARTMENT OF INDUSTRIAL & PRODUCTION ENGINEERING
STUDY & EVALUATION SCHEME
W.E.F. SESSION 2018-2019
Years B.Tech. IV year

SEMESTER-VIII

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IPBTPC61	Operation Research	3	1	0	40	60	100	4
2	IPBTPC62	Marketing Management	4	0	0	40	60	100	4
3	IPBTPE7...	Elective-PE7	4	0	0	40	60	100	4
4	IPBTOE4...	Elective-OE4	4	0	0	40	60	100	4
		Total	15	1	0	160	240	400	16
PRACTICALS									
6.	IPBLPS02	Project	-	-	12	120	80	200	6
7.	IPBLPC01	Comprehensive Viva	-	-	-	-	50	50	2
		Total	-	-	12	120	130	250	8
		Grand Total	15	1	12	280	370	650	24

Department of Industrial & Production Engineering

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

Elective- Open Elective (OE)-4		Elective- Professional Elective (PE)-7	
S.N.	IPS-OE1...	S.N.	IPS-PE1...
41	Supply Chain Management	71	Fluid Power Control
42	Safety Management And Labour Law	72	Robotics and Robot Applications
43	Finite Element Method	73	Powder Metallurgy & Ceramics

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VIII Sem	IPR-TPC61	Operation Research	3	1	–	4	Max Marks-80 Min Marks- Duration-3Hrs

OPERATION RESEARCH

UNIT-I

Introduction to linear programming, graphically solution to linear programming problem, solving linear problem by simplex method, optimization problem, maximization & minimization function with or without constraints, 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 salesman problem.

UNIT-III

Game theory: rule of game, Method of solving game , graphically & Arithmetic , saddle point & without saddle point , dominance method, mixed strategies 2 X 2game , 2 X N game , M X 2 game , 3 X 3game (Method of matric's, method of linear programming etc)

Inventory: Introduction, classification, function, level, control techniques, models, various costs associated, EOQ, optimum lot sizing

UNIT- IV

Introduction of queuing theory ,elements of queuing system ,operating characteristics of a queuing system ,Poisson arrivals & exponential service time , waiting time & idle time cost, single channel queuing theory

Replacement problems, requirement policy, replacement of items, machinery various theories, group replacement policy, MAPI methods

Department of Industrial & Production Engineering

UNIT-V

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

Text Books

1. Sharma & S D Kedarnath - Operation Research, Ramnath & Co Meerut
2. Operation Research, Sasieni Yaspan
3. Operation Research – N. D. Vohra – TMH Publication
4. Operation Research– Hira & Gupta – S. Chand & Co.
5. Operation Research – H. Gillette – TMH, New Delhi
6. Operations Research – M. Taha – TMH, New Delhi
7. Operations Research – Phillip Ravindran- Wiley Publications

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VIII Sem	IPR-TPC 82	Marketing Management	4	-	-	4	Max Marks-60 Min Marks- Duration-3Hrs

MARKETING MANAGEMENT

UNIT- I

Introduction to marketing management: what is marketing? The core concept, need, wants, demands, product, value cost its functions.

Marketing management: Production concept, 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 strategic planning, business strategic 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 production 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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Department of Industrial & Production Engineering

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 c communication, characteristics of marketing communication mix, factors in setting the communication mix.

Text Books

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

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VIII Sem	IPE-CET...41	Supply Chain Management	4	-	-	4	Max Marks-60 Min Marks- Duration-3Hrs

SUPPLY CHAIN MANAGEMENT

UNIT-I

Building a Strategic Framework to Analyze Supply Chains: What Is a Supply Chain? The Objective of a Supply Chain ,The Importance of Supply Chain Decisions, Decision Phases 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 ,Representations of Uncertainty ,Evaluating Network Design Decisions Using Decision Trees ,Alf Time Evaluation of Supply, Chain Design Decisions Under Uncertainty ,Risk Management and Network Design IT)Making Supply Chain Decisions Under Uncertainty in Practice

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 Tahoe Salt ,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 Predictable Variability, Responding to Predictable Variability in a Supply Chain, Managing Supply, Managing Demand, Implementing Solutions to Predictable 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 Exploit Fixed Costs, Economies of Scale to Exploit Quantity Discounts ,Short-Term Discounting: Trade Promotions, Managing Multiechelon Cycle Inventory ,Estimating 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 Multiechelon Supply Chain ,The Role of IT in Inventory Management ,Estimating 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

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 Scoring and Assessment, Supplier Selection-Auctions and Negotiations 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: Janat Shah, Pearson Publications 2010.
2. Supply Chain Management: Sunil Chopra and Mein del, Fourth Edition, PHI 2010.
3. Supply Chain Management: A.S.Altakar 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.Sahay McMillan Publication 2000
6. Emerging Trends in Supply Chain Management: Ed.B.S.Sahay McMillan Publication 2000.
7. Logistics Management: Bowersox TMH 2004.

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VIII Sem	IPE-OET...42	Safety Management And Labour Law	4	-	-	4	Max Marks-60 Min Marks- Duration-3Hrs

SAFETY MANAGEMENT AND LABOUR LAW

UNIT –I

Safety Management: Concepts Evolution of modern safety concepts- Safety policy – Safety Organization – line and staff functions for safety- Safety Committee- budgeting for safety. Techniques Incident Recall Technique (IRT), disaster control, Job Safety Analysis (JSA), safety survey, safety inspection, safety sampling, Safety Audit.

Safety in Material Handling: Ergonomic consideration in material handling, design, installation, operation and maintenance of Conveying equipment, hoisting, traveling and slewing mechanisms

UNIT -II

Design of Air Pollution Control System: Industrial sources of Air Pollution, Emission factors, Regulations Control Strategies, Policies, Gaseous Pollutant control: Gas absorption in tray and packed towers, Absorption with / without chemical reaction – Removal of SO2 – Absorption in fixed Mules Breakthrough. Removal of HCs / VOCs – NOx 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-tanneries-thermal power plants dying and pigment industries – eco-friendly energy

UNIT -III

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

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, monitors, fire watchers layout of stand pipes – fire station-fire alarms and sirens, maintenance of fire trucks, foam generators, escape from fire rescue operations, fire drills, notice fire aid for burns.

UNIT-V

Explosion Protecting Systems: Principles of explosion-detonation and blast waves-explosion parameters – Explosion Protection, Containment, Flame Arrestors, Isolation, suppression, venting, explosion relief of large enclosure-explosion venting-inert gases, plant for generation of inert gas rupture disc in process vessels and lines explosion, suppression system based on carbon dioxide (CO_2) and halons-hazards in LPG, ammonia (NH_3), Sulphur dioxide (SO_2), chlorine (Cl_2) etc.

Text Book

1. Accident Prevention Manual for Industrial Operations", N.S.C.Chicago, 1982.
2. Heinrich H.W. "Industrial Accident Prevention" McGraw-Hill Company, New York, 1980.
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. Dhake Tulsai, "Fire and explosion protection

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VIII Sem	IPE-OET...43	Finite Element Method	3	1	-	4	Max Marks-60 Min. Marks- Duration-3Hrs

FINITE ELEMENT METHOD (FEM)

UNIT-I

Basic Concept of FEM: Historical background, Basic concept and steps in FEM, Mathematical modeling of field 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 system and Shape function: Basic concept of natural coordinate, 1-D and 2- D natural coordinate, Concept of shape functions, Convergence requirements, Pascal triangle, Shape function for linear and plain elements, Shape functions using Lagrange polynomials, Shape functions for serendipity family elements, Degrading technique for nodes.

UNIT- III

Strain displacement matrix: Strain-displacement matrix for linear and plain element, Strain-displacement matrix for beam, Linear and plain elements.

Stiffness Matrix: Concept of element stiffness matrix for linear and plain elements, Stiffness matrix for bar & trusses, Stiffness matrix for linear and plain elements, Force vectors, Body forces and thermal loads, Plate and shell elements, Finite representation of infinite bodies, Element aspect ratio, Quadrilateral and higher order element vs mesh refinement.

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UNIT-IV

Assembling of stiffness Matrix: Assembly of elemental matrices, boundary conditions and solution, Direct approach, Strain 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, Ritz technique, Isoparametric formulations.

UNIT-V

Finite element Solutions: Numerical integration and application to plane stress problems, Solid mechanics and heat transfer, Longitudinal vibration and mode 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, torsion of non-circular shafts.

Text Books:

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

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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	IPR-PET…71	Fluid Power Control	3	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 head .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 cushioning Introduction, Hydraulic Cylinders operating features, Cylinders mounting and mechanical linkage, Cylinder loads due to moving weights, special cylinder designs, cylinder loading thought mechanical linkage, hydraulic cylinder cushions, and hydraulic shock absorbers

UNIT -III

Hydraulic motors: Introduction, limited rotation Hydraulic motors, gear motors, vane motors, Hydraulic motors theoretical torque, power and flow rate, Hydraulic motors performance, Hydraulic transmission, Hydraulic motors performance in metric unit.

Hydraulic valves: Hydraulic components -pressure flow direction controls valves –proportional, servo, cartridge (logic) valves, Hydraulic fluids

UNIT –IV

Hydraulic Conductor and Fittings: Introduction, conductor sizing for flow rate requirement, pressure rating of conductors, steel pipes, steel tubing, plastic tubing, flexible hoses, quick disconnect couplings, metric steel 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, motor braking system, analysis of hydraulic system

UNIT –V

Pneumatics: Air preparation & components: Introduction, compressor, fluid conditioner, analysis of moisture removal from air, air control valves, Pneumatic actuators.

Pneumatic circuits and applications: design consideration, pressure losses in pipe lines, 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

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VIII Sem	IPE-PET...32	Robotics and Robot Applications	3	1	-	4	Max Marks-60 Min Marks- Duration-3Hrs

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, repeatability, accuracy and precision, human arm characteristics, robot specification and notations, concept of robots programming, the future prospects.

UNIT – II

Coordinate Frames, Mapping and Transforms : Coordinate frames, Spatial descriptions and transformations, Fundamental of translation, rotations and transformations, inverting a homogeneous transform, fundamental rotation matrices, yaw pitch and roll, yaw pitch and roll transformation, equivalent angle.

UNIT – III

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

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 robotic vision systems, image acquisition, description of other components of vision system, image representation, image processing, Artificial Intelligence (AI) in robotics.

UNIT – V

Robot Controller & Applications: Linear control of robot manipulators, Feedback and close loop control, Second-order linear systems, Trajectory following control, Modelling and control of single joint, Architecture of industrial robotic controllers, Artificial intelligence, Industrial and non-industrial applications, robotic application for sustainable development & social issues.

Text Books

1. Robotics & Control – R.K. Mittal & I.J. Nagrath – TMH Publications
2. Robotics for engineers - Yoram Koren- McGrew Hill Co.
3. Industrial Robotics Technology programming and Applications - M.P.Groover, M.Weiss,
4. Robotics Control Sensing, Vision and Intelligence - K.S.Fu, R.C.Gonzalez, C.S.G.Lee- McGrew Hill Book co.
5. Kinematics and Synthesis of linkages - Hartenberg and Denavit - McGrew Hill Book Co.
6. Kinematics and Linkage Design - A.S. Hall - Prentice Hall
7. Kinematics and Dynamics of Machinery - J.Hinchhorn - McGrew HillBook Company

Category of Course	Course Code	Course Title	Periods/Week				Theory Paper
			L	T	P	C	
Industrial & Production Engg. B. TECH- VIII Sem	IPR-PET...73	Powder Metallurgy and Ceramics	3	1	-	4	Max Marks-60 Min. Marks- Duration-3Hrs

POWDER METALLURGY AND CERAMICS

UNIT – I

Introduction: Steps in powder metallurgy, advantage application limitation and recent trends

Powder production methods and Properties: Metal production methods: Atomization, Mechanical (Milling), Electro deposition, Spray drying. Powder Treatment- Screening, cleaning, annealing, and lubrication. Powder treatment and handling , coating and pyrophoricity, toxicity

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 Iso-static compaction, powder rolling. High temperature compaction – principle of pressure sintering

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 furnaces, metallographic of Sintering parts.

PM Products and their Application: Electrical and magnetic applications (Resistance welding electrode, Metal graphite brushes, Tungsten etc)PM porous parts, PM Friction materials, Metal bearings, Dispersion strengthened materials ,Cutting tool materials, Cemented carbides and tools, cermet.

UNIT – IV

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

UNIT – V

Advance powder metallurgical process – **Isostatic** – densification and its types , process parameters and characteristics, mechanical alloying , process types and parameter , metal injection molding , steps, requirement, design application and defect .

Microwave sintering of metals – Applications in electrical and electronics including high temperature superconductors. Sictional ceramics, refractory, Fabrication methods of ceramics.

Text Books:

1. Powder metallurgy by P.C angelo, R. subramanian by PHI publication
2. Fundamentals of Powder Metallurgy :G.S.Upadhaya Cambridge International Science Publishing 1998
3. Fundamentals Principles of Powder Metallurgy : W.B.Jones Edward Arnold Publishing
4. First Course in Powder Metallurgy: Henry Hausner Chemicals Publishing Company
5. Handbook Of Powder Metallurgy : Hausner H.H and Mal M.K. Second Edition , Chemicals Publishing Company
6. Metals Handbook Vol.7 Powder Metallurgy : ASM 1998

Head of Department
Industrial & Production Engg.
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SCHEME OF EXAMINATION

B.TECH (FOUR YEAR) DEGREE COURSE

FIRST YEAR , INDUSTRIAL PRODUCTION ENGINEERING

SEMESTER I (COURSE-II)

EFFECTIVE FROM SESSION 2018-19

SL. NO.	SUBJECT CODE	SUBJECTS	PERIODS/WEEK			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	TOTAL	
THEORY									
1	IP01T0501	MATHEMATICS-II	3	1	0	30	70	100	4
2	IP01T0502	CHEMISTRY	3	1	0	30	70	100	4
3	IP01T0503	PROGRAMMING FOR PROBLEM SOLVING	3	0	0	30	70	100	3
4	IP01T0504	ENGINEERING MECHANICS	3	0	0	30	70	100	3
PRACTICAL									
1	IP01P0501	CHEMISTRY LAB	0	0	1	30	20	50	1.5
2	IP01P0502	PROGRAMMING FOR PROBLEM SOLVING LAB	0	0	1	30	20	50	1.5
3	IP01P0503	WORKSHOP & MANUFACTURING PRACTICES	1	0	1	30	20	50	2.5
4	IP01P0504	ENGINEERING MECHANICS LAB	0	0	2	30	20	50	1
5	IP01PMC03	INDUCTION TRAINING PROGRAMME	-	-	2	-	-	-	-
								TOTAL	20.5

IA – INTERNAL ASSESSMENT ESE – END SEMESTER EXAM L- LECTURE
T-TUTORIAL P-PRACTICAL

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	IP02TH503	PHYSICS	3	1	0	30	70	100	4
2	IP02TE503	BASIC ELECTRICAL ENGINEERING	3	1	0	30	70	100	4
3	IP02TH504	MATHEMATICS-I	3	1	0	30	70	100	4
4	IP02TH501	ENGLISH	3	0	0	30	70	100	3
5	IP02TH502	ENVIRONMENTAL SCIENCES	3	0	0	–	–	–	0
PRACTICAL									
1	IP02PH502	PHYSICS LAB	0	0	3	30	20	50	1.5
2	IP02PE504	BASIC ELECTRICAL ENGINEERING LAB	0	0	2	30	20	50	1
3	IP02PE505	ENGINEERING GRAPHICS & DESIGN	1	0	4	30	20	50	2.5
								TOTAL	20

IA – INTERNAL ASSESSMENT ESE – END SEMESTER EXAM L- LECTURE
T-TUTORIAL P-PRACTICAL

Subject code/SUBJECT	L	T	P	Credit
IP01TB501/MATHEMATICS-II	3	1	0	4

Module 5a: 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 5b: Ordinary differential equations of higher orders (Prerequisite 2c, 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 5c: Partial Differential Equations–First order(Prerequisite 5a-b) (8 hours)
First order partial differential equations, solutions of first order linear and non-linear PDEs.
Module 5d: Partial Differential Equations- Higher order(Prerequisite 5b-c) (10 hours)
Solution to homogeneous and non-homogeneous linear partial differential equations second and higher order by complimentary 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; Duhamel'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, 1984.
4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. G.F. Simmons and S.G. Krantz, 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. Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1964.
10. Manish Goyal and N.P. Bali, Transforms and Partial Differential Equations, University Science Press, Second Edition, 2010
11.Denian murry,differential equations ,oxford publications

31/7/18 31/7/18 31/7/18

SUBJECT CODE/NAME	L	T	P	Credit
PHYTOCHEMISTRY	3	1	0	4

Unit-I **Concept of Quantum Energy and Spectroscopy:** Quantization of Energy, Regions of spectrum. Electronic Spectroscopy: Electronic Transition, Woodward Fieshar rules for calculating λ_{max} of conjugated dienes & α,β-unsaturated carbonyl compound, various shifts in λ_{max} and intensities. Infra Red Spectroscopy: Conditions for Infra Red Spectroscopy, Molecular vibrations & factors affecting Infra Red frequencies. **[8 L]**

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

Unit-III Concept of Chirality, Enantiomers, Diastereomers,Meso compounds and Racimic mixtures. Conformation 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). **[8 L]**

Unit-IV Reactivity of Organic Molecules, Factors influencing acidity, basicity and nucleophilicity of molecules, kinetic vs thermodynamic control of reactions. **[12 L]**

Unit-V Strategy for Synthesis of Organic Compounds: Reaction intermediates: Stability of Free Radicle, Carbocation and Carbanion. Introduction to reaction involving Addition, Elimination, Substitution and Ring opening and Cyclization. **[16 L]**

31/7/18 31/7/18

Subject code/NAME	L	T	P	Credit
IPD(TESE)/PROGRAMMING FOR PROBLEM SOLVING	3	0	0	3

Unit 1

Introduction to Programming (3 lectures)

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

Idea of Algorithm (3 lectures): steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples.

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

Unit 2

Arithmetic expressions and precedence (12 lectures)

Conditional Branching and Loops

Writing and evaluation of conditionals and consequent branching

Iteration and loops

Arrays (6 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, as 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 (3 lectures) Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Suggested Text Books

(i) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

(ii) E. Balagurusworry, 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
IPO1TEN02/ENGINEERING MECHANICS	3	0	0	3

ENGINEERING MECHANICS

UNIT-I

Introduction to Engineering Mechanics covering, Force SystemsBasic 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;Couples and Resultant of Force System, Equilibrium of System of Forces, Free bodydiagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems.

UNIT-II

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

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

UNIT-III

Centroid and Centre of Gravity covering, Centroid of simple figures from firstprinciple, centroid of composite sections; Centre of Gravity and its implications; Areamoment 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 virtualwork for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, mechanical efficiency.

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

UNIT-V

Introduction to Kinetics of Rigid Bodies covering, Basic terms, general principlesin dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simpleproblems; 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 ofrigid body rotation;

Text/Reference Books:

1. Irving H. Shames (2006), 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 Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press
4. Shames and Rao (2006), Engineering Mechanics, Pearson Education,
5. Bansal R.K.(2010), A Text Book of Engineering Mechanics, Laxmi Publications
6. Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.
7. Tayal A.K. (2010), Engineering Mechanics, Umesh Publication

SUBJECT CODE/SUBJECT	L	T	P	Credit
INTERMEDIATE CHEMISTRY LAB	0	0	3	1.5

List of Experiments:

Group – A:

1. Standardization of sodium thiosulphate solution by standard potassium dichromate solution.
2. To determine the Normality and Strength (g/L) of given Ferrous Ammonium Sulphate solution 'A' using standard Ferrous Ammonium Sulphate (N/30) solution 'B' taking KMnO4 solution as an intermediate.
3. To determine the concentration of hypo solution ($Na_2S_2O_3.5H_2O$) iodimetrically with given Iodine (N/50) solution.
4. Find out the Temporary hardness of given water sample using 0.01M EDTA solution, buffer solution (pH9-10) 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 Urea Formaldehyde resin.
7. Acetylation of Primary Amine: Preparation of Acetanilide.
8. Base Catalyzed Aldol Condensation: Synthesis of Dibenzalpropanone.
9. [4+2] Cycloaddition Reaction: Diels-Alder reaction.
10. Preparation of Aspirin 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 Ostwald's viscometer.

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

SUBJECT CODE/NAME	L	T	P	Credit
IPH PES0 LPROGRAMMING FOR PROBLEM SOLVING LAB	0	0	3	1.5

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

Tutorial 1: Problem solving using computers
Lab1: 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 structures

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

SUBJECT CODE/NAME	L	T	P	Credit
IPG1PE502/ WORKSHOP & MANUFACTURING PRACTICES	1	0	3	2.5

Lectures & videos 10 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 moulding, glass cutting (1 lecture)
7. Metal casting (1 lecture)
8. Welding (arc welding & gas welding), brazing (1 lecture)

Suggested Text/Reference Books:

(i) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
(ii) Kalpakjian S. And Steven S. Schmid, 'Manufacturing Engineering and Technology', 4Th edition, Pearson Education India Edition, 2002.
(iii) Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology–I"Pearson Education, 2008.
(iv) Roy A. Lindberg,"Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
(v) Rao P.N., 'Manufacturing Technology', Vol. I and Vol. II, Tata McGraw Hill House, 2017.

SUBJECT CODE/SUBJECT	L	T	P	Credit
BPC/PESU/ENGINEERING MECHANICS LAB	0	0	2	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 truss.
7. Determination of coefficient of friction between two given surfaces by inclined plane method.
8. Determination of efficiency of simple screw jack.
9. Determination of efficiency of single purchase winch crab.
10. Determination of efficiency of double purchase winch crab.
11. Determination of efficiency of simple wheel and axle.

SUBJECT CODE/SUBJECT	L	T	P	Credit
PGTDSSPHYSICS	3	1	0	4

Unit - 1: Optics: Interference and Diffraction
Introduction, Young's experiment, theory of interference, Coherent and non-coherent sources, 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, electrostatics field and potential, electric flux, Gauss' law, Poisson's and Laplace's equations, Equation of continuity for charge conservation, Ampere's and Faraday's laws, Maxwell's Electromagnetic equations.

Unit - 3: Laser and Fiber optics
Introduction, elementary idea of spontaneous and stimulated emission, active medium, population inversion, Einstein's coefficients, Types of lasers and important applications of lasers.
Introduction to optical fibers, basic principles of optical fiber, critical angle, numerical aperture, maximum acceptance angle, classification of optical fiber.

Unit - 4: Semiconductor Physics and Devices
Formation of energy in solids, Energy band gap of metals, insulators and semiconductors, classification of semiconductor, Intrinsic and Extrinsic semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, Electrical conductivity in conductors and semiconductors, working of P-N Junction diodes and Bipolar Junction transistor.

Unit - 5: Introduction to Quantum Mechanics
Introduction to QuantumMechanics, Photoelectric effect, Compton effect, wave-particle duality, uncertainty principle, wave function, De-Broglie waves, Phase and Group velocity, Davisson and Germer experiment, Schrodinger wave equation, particle in a box (1-Dimensional).

Text Books and References

1) Applied Physics – I and II by Navneet Gupta, Dhanpat Rai & Co.
2) Engg. Physics by S. K. Srivastava and R. A. Yadav, New Age Pub. New Delhi
3) Engg. Physics by Uma Mukherjee, Narosa Publication
4) Engg. Physics by M. N. Avadhanulu, S. Chand Pub.
5) Electricity and Magnetism by Bangwala and Mahajan, Tata McGraw Hill, 1998
6) Concepts of Physics Part -II by H. C. Verma, BharatiBhawan (P&H), 1998
7) Modern Physics by Beiser, McGraw Hill Inc. New York, Publication 1995
8) Modern Physics by Mittal and Mehta, East-West Press Pvt. Ltd. 1998
9) Introduction to Electrodynamics, David Griffith
10) J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
11) B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., 2007).
12) S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
13) Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
14) P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
15) Online course: "Semiconductor Optoelectronics" by M R Shenoy on NPTEL.
16) Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL.

SUBJECT CODE/NAME	L	T	P	Credit
(PECTESE3) BASIC ELECTRICAL ENGINEERING	3	1	0	4

Module 1 : DC Circuits (8 hours)
Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. 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, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase
Balanced circuits, voltage and current relations in star and delta connections.

Module 3: Transformers (8 hours)
Magnetic materials, BH characteristics, Ideal and practical transformer, 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 characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc 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

(i)D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
(ii)D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
(iii)L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
(iv)E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
(v)V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Subject code	L	T	P	Credit
IPH1THS01/ MATHEMATICS-I	3	1	0	4

Calculus (Single Variable)

Module 2a: Calculus: (6 hours)

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

Module 2b: Calculus: (5 hours)

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

Module 2c:Sequences and series: (Prerequisite 2b) (10 hours)

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

Textbooks/References:

1.G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan 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. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

Multivariable Calculus

Module 3a:Multivariable Calculus (Differentiation) (Prerequisite 2b) (10 hours) Limit, continuity and partial derivatives, direct total derivat ives, total derivat ives; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

Module 3b: Multivariable Calculus (Integration) (Prerequisite 3a) (10 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 Green, Gauss and Stokes, orthogonal curvilinear coordinates, Simple
applications involving cubes, sphere and rectangular parallelopipeds.

Textbooks/References:

1.G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002.
2.Veerarajan 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. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
5.B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition,2000.

Matrices and Linear Algebra

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

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 forms.

Module 4b:Matrices *(in case vector spaces 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 (Prerequisite 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 (Prerequisite 4b-c) (10 hours)

Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigenbases. 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. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East-West press, Reprint 2005.
3.Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4.Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5.N.P. Bali 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.

Subject code	L	T	P	Credit
IP02TH501/ ENGLISH	3	0	0	3

1. Vocabulary Building

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

2. Basic Writing Skills

Sentence Structures , Use of phrases and clauses in sentences , Importance of proper punctuation , Creating coherence , Organizing principles of paragraphs in documents , Techniques for writing precisely

3. Identifying Common Errors in Writing

3.1 Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés

4. Nature and Style of sensible Writing

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

5. Writing Practices

Comprehension, Précis 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 Heasly. Cambridge University Press. 2006.
(v) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
(vi) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

CODE/SUBJECT	L	T	P	CREDIT
IPG2TMCD3/ENVIRONMENTAL SCIENCES	3	0	0	0

ENVIRONMENTAL STUDIES

Introduction to environmental studies: Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development. Ecosystems: Structure and function of ecosystem; 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, forests, 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 nation; Endangered and endemic species of India, Threats to biodiversity: Habitat loss, poaching of wildlife, man wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational value. Environmental Pollution: Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution. Nuclear hazards 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. Environment 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). Nature reserves, 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. Resettlement and rehabilitation of project affected persons; case studies. Disaster management: floods, earthquake, cyclones and landslides. Environmental movements: Chipko, silent valley, Bishnois 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 assets: river/ forest/ flora/fauna, etc. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds and basic principles of identification. Study of simple ecosystems-pond, river etc.

Suggested Readings:

1. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
2. Grumbine,R. Edward, and Pandit, M.K.2013. Threats from India's Himalaya dams. Science, 339: 36—37.
3. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
4. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.

SUBJECT CODE/SUBJECT	L	T	P	Credit
PHYSICS/PHYSICS LAB	0	0	3	1.5

List of Experiments

1. To determine the wavelength of sodium light with help of Fresnel's Bi-prism.
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 semiconductor laser diode.
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 circular aperture using Fraunhofer diffraction pattern produced by semiconductor laser diode.
9. To determine the Energy band gap (E_g) of a semiconductor material using P-N junction diode.
10. To determine the e/m ratio by Thomson's method
11. To study the P-N junction diode characteristics, in forwarded 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.

SUBJECT CODE/NAME	L	T	P	Credit
IPEPE504/ BASIC ELECTRICAL ENGINEERING LAB	0	0	2	1

List of experiments/demonstrations:

- Basic safety precautions. Introduction and use of measuring instruments--voltmeter, ammeter, multi-meter, oscilloscope. Real-life 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).
- Sinusoidal steady state response of R-L, and R-C circuits--impedance calculation and verification. Observation of phase differences between current and voltage. Resonancein R-L-C circuits.
- Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidalwave-shapeduetoB-Hourvenonlinearityshouldbeshownalongwitha discussion about harmonics). 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 side. Cumulative three-phase power in balanced three-phase circuits.
- Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
- Torque Speed Characteristic of separately excited dc motor.
- Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super synchronousspeed.
- 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 switchgear.

SUBJECT CODE/SUBJECT	L	T	P	Credit
IPE2PES05/ENGINEERING GRAPHICS & DESIGN LAB	1	0	3	2.5

ENGINEERING GRAPHICS & DESIGN

UNIT-I

Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments,lettering, Conic sections including the Rectangular Hyperbola (General method only);Cycloid, Epicycloid, Hypocycloid 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 inclined Planes - Auxiliary Planes.

Projections of Regular Solids

Inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioningand scale.

UNIT-III

Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone--Auxiliary Views; Development of surfaces of RightRegular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic viewsof geometrical solids, objects from industry and dwellings (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 IsometricViews to Orthographic Views and Vice-versa, Conventions.

UNIT-V

Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstratingknowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard,Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs,Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), TheCommand Line (where applicable), The Status Bar, Different methods of zoom as used inCAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compoundSolids].

Suggested Text/Reference Books:

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