List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department : *Industrial and Production Engineering*

Programme Name : *B.Tech.*

Academic Year : 2017-18

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*

विभागाध्यक्ष/Head
औद्योगिक एवं उत्पादन अभियांत्रिकी
Industrial & Production Engineering
प्रौद्योगिकी संकाय/Engineering & Technology
गुरु घासीदास विश्वविद्यालय, बिलासपुर (छ.ग.)
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Scheme and Syllabus

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 2016-2017

Prog: B.Tech. II year
SEMESTER-III

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IP3THS.	Elective-HS3	3	0	0	40	60	100	3
2.	IP3TBS01	Statistical Methods	3	1	-	40	60	100	4
3.	IP3TES11	Strength of Materials	3	1	0	40	60	100	4
4.	IP3TES12	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	0	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					06	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 SEMSTER

IP3THS11 ENGINEERING ECONOMICS (Elective)

Unit 1: Basic Concepts and Definitions, Methodology of Economics, Demand and Supply – elasticity,Theory of the Firm and Market Structure, Price and output determinations in different types of market

Unit 2: Public Sector Economics –Welfare economics, Central and commercial Banks and their functions, Industrial policies, theory of localization, weber &surgent Florence theory, investment analysis-NPV, ROI, IRR, Payback period, SWOT analysis.

Unit 3: Monetary and Fiscal Policy;Tools, impact on the economy , Inflation, Business Cycle, Cash Flow-2,3,4 Model.

Unit 4: Business Forecasting – Elementary techniques, Cost and Revenue Analysis, Capital Budget, Break Even Analysis.

Unit5: Indian economy; Urbanization, Unemployment–Poverty, Regional Disparities, Unorganized Sectors- Role of Plans, Reforms-Post Independent period.

Text Books:

1. Mankiw Gregory N.(2002), Principles of Economics, Thompson Asia
2. V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill
3. Misra, S.K. and Puri (2009), Indian Economy, Himalaya
4. PareekSaroj (2003), Textbook of Business Economics, Sunrise Publishers

Recommended Books:

1.Kapila U. Indian economy since Independence. Academic Foundation, New Delhi
2.Misra, S. K. and Puri V. K. Indian Economy — Its Development Experience. Himalaya
3.Publishing House, Mumbai
4.Dutt R. and Sundharam K. P. M. Indian Economy. S. Chand & Company Ltd., New Delhi.
5.Mathur R. Indian Economic Policy and Reform. RBSA Publisher, Jaipur
6.Jalan B. Indian Economic Policy. Penguin Books Ltd
7.Government of India, Economic Survey (Annual), Economic Division, Ministry of Finance, New Delhi.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3THS12 WORK STUDY AND ERGONOMICS (Elective)

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 tests, 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

Workcapacity, Environmental effects, exercises for evaluation of postural form 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 consideration for appearance, colour, texture andforms.

Recommended Books:

1. D. C. Alexander, ***Applied Ergonomics***, Taylor & Francis.
2. Jan 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 SEMSTER

IP3TBS01 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 diagrem'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. Boy'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. Ray
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 III SEMSTER

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' Organisations

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 & Distri
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 SEMSTER

IP3TES11 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 applications of axial loads and variation of temperature in single and compound walls.

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 strains.

UNIT-II

Bending moment and shear force diagrams: Bending moment 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: itsapplication to beams of rectangular, circular and channel sections, composite/fletched 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 thehollow 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 Dlehi.
5. Jindal U C, *"Introduction to Strength of Materials"*, 3rd Edition, Galgotia Publishing Private Limited New Delhi.

6. Strength of materials Ryder,G.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 SEMSTER

IP3TES12 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, peristaltic and peritectoid systems, iron–carbon diagram, and simplified IC diagram. Heat Treatment Isothermal Transformation of austenite(TTT diagram), Transformations 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. Aagarwal, B.K Introduction to engineering Materials

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3TPC11 THEORY OF MACHINE

UNIT- I

Basic Concepts: Kinematics of machine, Kinematic link and their different types, types ofkinematic pair, kinematic chain, mechanism and inversions of four bar chain and slider crank mechanism. Degree of freedom, synthesis of linkages – number synthesis, Grashof's criterion and introduction to dimensional synthesis. Brief introduction to mechanism with lower pairs, pantograph, devis & Ackermon'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, formsof teeth, construction and properties of an involute, construction and properties of cycloidal teeth, effect of variation of center distance on the velocity ratio of involute profile tooth 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, Walt, 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 SEMSTER

Recommended Books:

1. Bevan T, *"The Theory of Machines"*. CBS Publishers and Distributors.
2. Shigley J E and Vickar 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 Rattan lal T.M.G.H. Publications

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3TPC12 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

Planning: 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. Aagarwal, B.K Introduction to engineering Materials.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH III SEMSTER

IP3LPC11 THEORY OF MACHINE LABORATORY

1. Study of Gyroscopic effect and determination of gyroscopic couple.
2. Determination of jump sped 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 Tow-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 $T = 2 \Pi \sqrt{1/g}$ for a simple pendulum.
9. Determination of whirling speed of shafts.

IP3LES11 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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STUDY & EVALUATION SCHEME
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Batch: B.Tech. II year
SEMESTER-IV

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IP4TPE1..	Elective-PE-I	3	0	0	40	60	100	3
2	IP4TBS02	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.	IP4TPE1..
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 SEMSTER

IP4TBS02 NUMERICAL ANALYSIS & COMPUTER PROGRAMMING

UNIT-I

Approximation and errors in Computation

Approximation and round of errors, truncation errors and Taylor series, Determination of roots of polynomials and transcendental equations by Graphical methods and Bisection, Regula-falsi, secant and Newton-Raphon 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 ($1/3^{rd}$ & $3/8^{th}$ 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 Analyisi-S.S.Sastry,3rd Edn.-PHI-New Delhi.
5. Numerical Methods Analysis-James B.Scarborough, Oxford & IBH Publishing Co.-New Delhi.
6. Theory & Problem 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 SEMSTER

IP4TPC21 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, bushed 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, feed check valve, safely 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 Srithar 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 Gilberth and their contribution.

Unit-II Method Study
Definition & basic procedure, selection of jobs, recording technique; micro motion, study; Therbligs; cyclograph and Chronocyclo-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 plane; Merric'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 tests.
Industrial safety, analysis of cost of accident, horzards in various fields like fire, electrical shocks, chemical, organization for safety, plant safety, govt. legistion 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 SEMSTER

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, Elements & 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, inductive furnace.

UNIT -II

Casting: Introdution to pattern and its types, allowances, Centrifugal and investment casting, shell, plastic and mould methods, melting of cast iron, element of gating system, types and design of riser, solidification of casting, clearing of casting, principle of die casting, gravity and pressure die Casting, Die casting consideration, 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 bending 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-conventinal 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 SEMSTER

IP4TPC24 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. FluidStatic's : Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forceson plane and curved surfaces (Problems on gravity dams and tainter gates); buoyant force, Stability of floatingand 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 tubes; 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 andother applications.

Flow Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.), flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venture-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(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. Franiss JRD; 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 SEMSTER

IP4TPE11 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, Majorincidents 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 andcontrol, 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 norms 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,"Hear 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 Immprint of Elsevier.

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH IV SEMSTER

IP4TPE42 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 sola

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 theaudience and context; Basics of public speaking; Preparing for a speech;

Recommended Books:

1. Fred Luthans, *Organizational Behaviour*, McGraw Hill
2. Lesikar 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 SEMSTER

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, 2009.

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
Year: 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	30	20	50	2
8.	IP5LPC32	Fluid Machinery	-	-	03	30	20	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

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 calculation.

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 application, 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.Chattopodhyay- Willey

Dalli- Singh Rajhara

22/05/12

UNIT – I

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

Flow Around Submerged Bodies: Force Exerted by Flowing Fluid on a Body: Drag and Lift; Stream 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 Ship.

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

UNIT – III

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

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

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

24/8/17

NIT-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 equation, impact and shock loading, calculation of principle stresses for various load combination, 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. M/C Design- Sharma & Agrawal, Dhanpat Rai Publications.
6. Design of M/C Elements- Sharma & Purohit- PHI

IP5TPE21 - Turbo Machinery

UNIT-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 ration 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. Engines: 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. Engines: 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. Engines: 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.

UT- 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 G.F., Internal Combustion Engines: Theory and Practice.
4. Stone, Richard, Introduction to IC Engine
5. Fundamentals of I.C. Engine- Gupta, PHI

IP5TPE23 - 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, mems 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.

IP5TPE31 - 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.

Acceptances 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 Triology, 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 & Leowowworth - 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 – Suganthi & Sannuel-PHI

24/07/12

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

UNIT-V

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

Text Books:

1. Industrial Production & Automation- Mikel P. Grover, PHI
2. Automation Production System and CIM- Mikel P. Grover, 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 convertors 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, "Mehatronics", 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. Mechantronics- Singh & Joshi-PHI

IP5TOE11 - Financial Management

UNIT –I

Introduction: Scope and objective, organisation 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-Willey India Pvt. Ltd.

24/05/17

IP5TOE12 - 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.

aancial Analysis Through Ratios: Classification of Financial Ratios, Liquidity Ratios, .everage 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 SEMSTER

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
Year: B.Tech. III year

SEMESTER-VI

S. No.	Course No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	INTERNAL ASSESSMENT	ESE	SUB-TOTAL	
1.	IP6TPC41	Machine Design- II	3	1	0	40	60	100	4
2	IP6TPC42	Measurement , Metrology & Control	3	1	0	40	60	100	4
3	IP6TPC43	Welding Engg.	3	0	0	40	60	100	3
4	IP6TPE4..	Elective-PE4	3	0	0	40	60	100	3
5	IP6TPE5..	Elective-PE5	3	0	0	40	60	100	3
6	IP6TOE2..	Elective-OE2	3	0	0	40	60	100	3
		Total	18	2		240	360	600	20
		PRACTICALS							
7.	IP6LPC42	Measurement and metrology lab	-	-	03	45	30	75	2
8.	IP6LPC43	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.	IP6TPE4..	S.N.	IP6TPE5..	S.N.	IP6TOE2...
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 DOE

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.

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 Scales – Contact Type and Clearance Type.

Journal Bearings: Types of Lubrication, Viscosity, Hydrodynamic Theory of Lubrication, Summerfield 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.

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

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

IP6TPC42 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 Buch, 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

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

IP6TPC43 Welding Engineering

UNIT-I

Classification of welding: gas welding, Arc Welding and Equipments, types of welding Flames, Welding Techniques, Welding Torches and Blowholes. 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

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

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.

2. Materials Management Text and Cases, Chitlae,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, Dutta ()

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 descision, facility location models, economics and cost analysis, rural and urban location pattern in India.

UNIT–II
Layout Designs –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, comparing 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 pateern, 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 Muther
2 Plant layout and design by James More
3 Manufacturing Management- a Quantitative approach by Robert Aolsem.
4 Productions and Operation Management by Lockyer

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, webull, normal and lognormal Distributions, discreat distribution, bionomial 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 maintainance cost.

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

UNIT-V

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

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

Training for maintainace personal, objective and level of training, types of training methodology, evaluation of maintainance 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 basis 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, hooks 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 connectors, 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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DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

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 Insulation 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 Enginering by Wakil, TMH

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

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, convention boundary conditions. Solution through Heisler's chart.

UNIT-III

Forced Convection: Physical mechanics of forced convention. Dimensional analysis for forced convention, 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 convention, Dimensional analysis of natural convention, empirical relationship for natural convention.

UNIT-IV

Boiling and Condensation: Boiling heat transfer, pool boiling, boiling regimes and boiling curve, next 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 exchanger 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

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

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

DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING B.TECH VI SEMSTER

IP6TOE22 - Management Information System

UNIT-I

Organisation & 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.

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IP6TOE22 - Management Information System

UNIT-I

Organisation & 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.

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 Louden and lauden PHI
5. Bansal, "Information System Analysis & Design", TMH.
6. Jawadegar, "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, Attackson X'S, Customer focus, 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,

1/e, Tata McGraw-Hill, 2010.
2. DOE by Phillip Ross PHI.
3. P. Pande and L. Holpp, What is Six Sigma, 1/e, Tata McGraw-Hill, 2002.
4. P. Pande, The Six Sigma Way, 1/e, Tata McGraw-Hill, 2003.
5. R. Cavanagh, R. Neuman, P. Pande, What is Design for Six Sigma, 1/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.