

PRODUCTION ENGINEERING 3RD SEMESTER

A. Theory

SL. NO	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE03C14	Mathematics III	3	0	0	3	3
2	UPE03B01	Engineering Thermodynamics	4	0	0	4	4
3	UPE03B02	Solid Mechanics	3	0	0	3	3
4	UPE03B03	Fluid Mechanics & Machinery	3	0	0	3	3
5	UPE03B04	Manufacturing Processes - I	3	0	0	3	3
6	UPE03B05	Electrical Machines	3	0	0	3	3
Total of Theory						19	19

B. Practical

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE03P11	Solid Mechanics Laboratory	0	0	3	3	2
2	UPE03P12	Fluid Mechanics Laboratory	0	0	3	3	2
3	UPE03P13	Manufacturing Processes - I	0	0	3	3	2
4	UPE03P14	Electrical Machines Laboratory	0	0	3	3	2
Total of Practical						12	8
Total of 3rd Semester						31	27

UPE03B01: Engineering Thermodynamics.

Introduction, Survey of units and dimensions, Zeroth Law, forms of energy and energy interaction, heat and work, phase rule, ideal and real gases, equations of state, First law of thermodynamics for closed loop system, internal energy and enthalpy, first law for control volumes, steady flow and unsteady flow applications.

Second law of thermodynamics, statements and corollaries, entropy, concept, of reversibility and irreversibility. Second law analysis for control volumes, concept of entropy generation, reversible work, Availability and Irreversibility. Tds relations, Maxwell equations, clapeyron equation, clausius clapeyron equation, Joule Thompson coefficient, compressibility and expansion coefficient. Air standard Engine cycle – Otto, Diesel, Dual combustion, Brayton and stirling cycles. Steam power cycle – Rankine cycle, P-V & T-S plots, Rankine efficiency. Vapour compression Refrigeration cycle. Third law of thermodynamics.

Introduction to psychometric properties, Psychometric relation, Psychometric chart, Psychometric processes, Thermodynamics of Human body, comfort conditions, Air-conditioning system.

Text Books:

1. Nag. P.K, “Engineering Thermodynamics”, Tata McGraw Hills Co. Ltd.

References:

1. Mayhew, A and Rogers, B, “Engineering Thermodynamics”, Longman Green & Co. Ltd, London, E.L.B.S. Edition, 1990.
2. Van Wylen, G.J. and Sonntag, R.E., “Fundamentals of classical Thermodynamics (S.J. Version)”, Second Edition, 1986.
3. Bacon, D.H., “Thermodynamics”, Butter worth & Co., London, 1989.
4. Saad, M.A, “Thermodynamics for Engineers”, Prentice-Hall of India Pvt. Ltd. 1989.
5. Reynolds, “Thermodynamics”, Int. student Edn., McGraw Hill book co. Ltd., 1990.
6. Wark Kenneth, “Thermodynamics”.
7. Onkar singh, “Applied Thermodynamics”, New Age International Publishers.
8. Arora C.P., “Refrigeration and Air conditioning”, Tata McGeaw Hill.

UPE03B02: Solid Mechanics

1. **Introduction:** Internal forces – stresses and strains Elasticity – Hooke’s law – Poisson’s ratio – Elastic constants and their relationship – stress-strain diagram for ductile materials- Definition of Creep, fatigue and stress relaxation-statically determinate and indeterminate problems.
2. **Bending of Beams:** Beams- Loads-shear force and bending moment diagrams for simply supported and cantilever beams-Pure bending- Bending stresses in straight beams-shear stresses in bending of rectangular and I-section beams – Beams of uniform strength.
3. **Torsion and Columns:** Torsion of circular shafts stresses and twist in solid and hollow shafts – Definition of columns – Types of columns – Equivalent length – slenderness ratio – Rankin’s formula.
4. **Biaxial Stresses:** Analysis of biaxial stresses – Mohr’s circle – Principle stresses and maximum shear stress – Deductions from Mohr’s circle – stresses in thin walled pressure vessels – combined bending and torsion.
5. **Deflection of Beams:** Differential equation of the elastic axis – Double integration and area moment methods – strain energy in tension, compression, shear, bending and torsion- Castigliano’s theorems.

References

1. Timoshenko; S and Young D.H., “ Elements of strength of materials,” Vol. I and Vol. II, T. van Nostrand Co., Inc., Princeton, N.J., 1988.
2. Malhotra, D.R. and Gupta, H.C, “The strength of Materials”, Satya Prakasan Tech. India Publications, New Delhi,1987.
3. Kazimi S.M.A., “ Solid Mechanics”, Tata McGraw Hill, 1976.
4. Dym. C.L. and shames I.H., “Solid Mechanics”, McGraw Hill Kogakusha, Tokyo, 1973.
5. Khurmi R.S., “Strength of materials”, S.C. Chand and Co., 1998.

UPE03B03: Fluid Mechanics & Machinery

Introduction: Definition of fluid, Concept of Continuum, Fluid Properties Fluid Static's: Body and surface forces, stress at a point, state of stress in fluid at rest and in motion, pressure distribution in hydrostatics, manometers, forces on plane and curved surfaces, Buoyancy and the concept of stability of floating and submerged bodies.

Fluids Kinematics: Scaler and vector fields, Eulerian and Lagrangian approaches, Material derivation, velocity and acceleration, streamline, streak line and path line, Deformation, rotation and velocity, Deformation rate and strain rate tensor, circulation.

Fluid Flow: System and control volume approaches, Transport theorems, Continuity equation, Euler's equation, Bernoulli's equation, Momentum equations for stationary, moving and rotating control volumes, Application of Bernoulli's equation, static and dynamic pressure.

Fluid measurements: Pitot tube, Siphon, Venturimeter, Orificemeter, Mouth piece, Sudden expansion in a pipe, weirs and notches.

Viscous Incompressible flow: Introduction to Navier stokes equation, Boundary layer flow, Drag and lift, Laminar and turbulent flow, Couette flow, Plane Poisuille and Hagen Poisuille flow.

Internal Viscous flow: Reynold's experiment, critical Reynold's number, Darcy-Weisbach and fanning friction factor, Moody's diagram, Minor losses and flow through simple network of pipes. Classification of Notches and Weirs; Discharge over a Rectangular Notches or Weir; Discharge over Triangular Notches or Weir; Advantages of Triangular Notches or Weirs over Rectangular Notches or Weirs; Discharge over a Trapezoidal Notches or Weir and problems.

Principle of Similarity: Physical similarity, Dimensional Analysis, Buckingham pi theorem, Model studies and dimension less parameters, Froude number, Euler number, Mach number, Weber number.

Flow through Pipes: Loss of Energy in pipes, Loss of energy due to friction; Minor energy losses; Hydraulic gradient and total energy line and problems.

References

1. Shames, I.H., “Mechanics of fluids”, Kogakusha, Tokyo, 1998.
2. Ratha Krishna, E., “Introduction to fluid mechanics”, Prentice-Hall, India, 1987.
3. Yuan S.W., “Foundation of Fluid Mechanics”, Prentice-Hall, 1987.
4. Milne Thomson, L.M., “Theoretical Hydro-dynamics”, McMillan, 1985.
5. Kumar, K.I., “Fluid mechanics”, Eurasia Publishing House, 1990.
6. Introduction to Fluid Mechanics and Fluid machines by S.K. Som and G. Biswas.
7. Fluid Mechanics by Victor L. Streeter.
8. Fluid Mechanics by Frank M. White.
9. Introduction to Fluid Mechanics by James A. Fay.

10. Fluid Mechanics and Hydraulics by J. Lal.

11. Fluid Mechanics by A.K. Jain.

Fluid Machinery

1. Dynamics of Fluid Flow

Introduction, Impulse Momentum Principle, Forces Exerted on Pressure Conduits, Force Exerted on a Stationary Vane or Blade. Absolute and Relative Velocity Relations, Force on a Moving Vane or Blade, Torque on Rotating Wheel, Forces Exerted by the Jet on a stationary vertical, Inclined Flat plate, Curve plates, moving plates, hinged plates

2. Hydraulic Turbines

Introduction, Hydraulic Power Plant, Classification of Turbines, Similitude and Model Testing, Model and Prototype, Unit Quantities, Turbine Efficiencies, Euler Turbine Equation, Components of Power Produced Pelton Turbine, Power Development, Torque and Power and Efficiency Variation with Speed Ratio, Reaction Turbines, Francis Turbines, Axial Flow Turbines, Cavitation in Hydraulic Machines, Governing of Hydraulic Turbines

3. Rotodynamic Pumps

Introduction, Centrifugal Pumps, Impeller, Classification, Pressure Developed by the Impeller, Manometric Head, Energy Transfer by Impeller, Slip and Slip Factor, Losses in Centrifugal Pumps, Effect of Outlet Blade Angle Pump Characteristics, Operation of Pumps in Series and Parallel, Specific Speed and Significance, Cavitation, Axial Flow Pump, Power Transmitting Systems, Fluid Coupling, Torque Converter

4. Reciprocating Pumps

Introduction, Comparison, Description and Working, Flow Rate and Power, Slip, Indicator Diagram, Acceleration Head, Minimum Speed of Rotation of Crank, Friction Head, Air Vessels, Flow into and out of Air Vessel, Rotary Positive Displacement Pumps, Gear Pump, Lobe Pump, Vane Pump.

Reference Books:

1. Fluid Machinery by Terry Wright
2. Fluid Mechanics by Joseph H. Spurk and Nuri Aksel
3. Fluid Mechanics by Frank M. White
4. Jain, A.K., "Fluid Mechanics" Khanna Publishers.
5. Rajput, R.K., "Fluid mechanics & Hydraulic machines"

UPE03B04: Manufacturing Processes I

Types of Production and production processes, Product configuration and manufacturing requirements. Pattern making, allowances and core making.

Casting processes of ferrous and non-ferrous metals including die casting, investing casting, centrifugal casting, loan moulding, transfer moulding. Solidification Principles, design of moulds, risering, sprues and gating system, casting defects.

Metal joining processes: Soldering, brazing, fusion and non-fusion welding processes, various modern welding processes like TIG, MIG, Submerged Arc welding, friction welding. Welding defects.

Fundamentals of hot and cold working processes- Forging, extrusion and rolling.

1. Basic Joining Process

Types of welding –gas welding –arc welding –shielded Metal arc welding, GTAW, GMAW, SAW, ESW-Resistance welding (sport, seam, projection, percussion, flash type) –Atomic hydrogen arc welding –thermit welding –shouldering, brazing and braze welding,

2. Design of Weldments

Welding symbol – position of welding –joint and groove design –weld stress –calculation – design of weld size-estimation of weld dilution, heat input and preheat and post heat temperature – computer application in weld design .

3. Special welding process

Electron Beam and Laser beam welding –plasma arc welding – stud welding- friction welding- explosive welding- ultra sonic welding h-under water welding -roll bonding – diffusion bonding – cold welding –welding of plastic, dissimilar metal.

Text:

1. Khanna O.P., “ A Welding Technology”, Khanna Publishers.

References

1. Parmer R.S., “Welding process and technology,” khanna publisher s, 1994.
2. Little, “welding technology,” Tata McGraw Hill,1992.
- 3.Lancaster J.F., “metallurgy of welding”, George Allen and Unwin, 1991.
4. Metals hand book, vol-6,8/e, ASM,1971.
5. AWS welding and book, Vol 1to 4,AWS,

References

1. Manufacturing Technology: Foundry, Forming and Welding by P.N. Rao, TMH.
2. Principles of manufacturing Materials and processes, by James S. Campbell, TMH.
3. Welding Metallurgy by G.E. Linnert, AWS.
4. Production Engineering Sciences by P.C. Pandey and C.K. Singh, Standard Publishers Ltd.
5. Manufacturing Science by A. Ghosh and A.K. Mallick, Wiley Eastern.

UPE03B05: Electrical machines

D.C Generator and Motors: Principle, Construction and function of various parts, methods of excitation, armature reaction, characteristics of compound machines, motor torque equation, characteristics, starting and speed control application. Transformers: Principle, construction, emf equation, regulation and efficiency.

Induction Motor: Single phase I.M construction, principles of operation of different kinds of single phase I.M., construction, principle and speed control of 3- phase I.M.

Alternator: Principle and construction, excitation and voltage regulation. Synchronous motor: Principle, starting and speed control. Miscellaneous: Stepper Motor, Servo motor.

References

1. Electrical Machines by Nagrath I.J. and Kothari D.P., TMH
2. Electrical Machines by Fitzgerald, Kingsley, Kusko, Dumas, MGH, 4th Edition.
3. Electrical Machinery and Transformers by J.L. Kosow, PHI, 4th Edition.
4. Advanced Electrical by Cotton H., Wheeler & Co., 1995.

UPE03P11: Solid Mechanics Laboratory

Tension Test: Stress-strain diagram, determination of yield strength, ultimate strength, modulus of elasticity, percentage elongation and percentage reduction in areas; Compression Test; Hardness Test; Brinell and Rockwell tests; Impact test: Charpy and Izod tests; Bending test: determination of bending stresses; Fatigue test.

UPE03P 12: Fluid Mechanics Laboratory

Fluid flow measurements: Coefficient of discharge for venturimeter, Orifice meter, nozzle meter, weirs. Flow through pipes: Determination of pipes friction in laminar and turbulent flow remedies, Pitot tube experiments on viscous flows and boundary layer theory.

UPE03P13: Workshop Process

Pattern making, pattern material, pattern allowances and types of patterns.

Mould making practice: uses of moulding tools: green sand moulding, gating system, risering system, core making, study of cupola, basic Forging processes like upsetting, drawing down. Forge welding and gas welding.

UPE03P14: Electrical Machines Laboratory

Constructional features of DC machines, open circuit and load test of DC shunt generators, speed control and characteristics of DC shunt motor, OC and SC test, load test, regulation and efficiency of transformers, study of different parts of a 3 phase induction motor, speed control and load test on 3 phase I.M. Alternator performance determination, single phase induction motor starting and speed control.

PRODUCTION ENGINEERING 4TH SEMESTER**A. THEORY:**

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE04B06	Thermal power Engineering	3	0	0	3	3
2	UPE04B07	Numerical Methods and Computer Programming	3	0	0	3	3
3	UPE04B08	Plant layout and Material Handling	3	0	0	3	3
4	UPE04B09	Measurements and Instrumentation	3	0	0	3	3
5	UPE04B10	Mechanics of Machines	3	0	0	3	3
6	UPE04B11	Engineering Materials	3	0	0	3	3
Total of Theory						18	18

B. PRACTICAL

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE04P15	Thermal Power Engineering Laboratory	0	0	3	3	2
2	UPE04P16	Mechanics of Machine Laboratory	0	0	3	3	2
3	UPE04P17	Measurements and Instrumentation Laboratory	0	0	3	3	2
4	UPE04P18	Computer programming Laboratory	0	0	3	3	2
Total of Practical						12	8
Total of 4th Semester						30	26

UPE04B06: Thermal Power Engineering

Water tube and Fire tube boilers, Circulating principles, Forced circulation, Critical Pressure, Super heaters, Reheaters, Attemperators, Induced draught, Forced draught and secondary air fans, Boiler Performance analysis and heat balance. Combustion systems, Environmental Protection-ESP, Cyclone Separator, Dust collector etc.

Rotary Thermodynamic Devices- Steam turbines and their classification-Impulse and Reaction type turbines, Thermodynamics of compressible fluid flow, equation and continuity-Isentropic flow through nozzle, velocity diagram. Blade efficiency, Optimum velocity ratio, multistaging, velocity and pressure compounding, losses in turbines, erosion of turbine blades, turbine governing, performance analysis of turbine, condensing system, I C Engines-classification.-Regeneration- Reheating- Reheating, Isentropic efficiency. Combustion efficiency.

Introduction to Heat Transfer, Models of heat transfer, steady and un steady state heat Transfer, Fourier Law of Conduction, conduction of Heat through slab, Hollow Cylinder and sphere, convection and heat transfer co-efficient, Natural and Forced convection, Introduction to Radiation, concept of Black body, Monochromatic and Total emissive power, concept of gray body, Kirchoff's law of radiation, Heat transfer by radiation, Heat exchangers, overall heat Transfer coefficient.

References:-

1. Domkundwar, Kothandarman, Domkundwar, "A course in Thermal Engineering"(SI Units),Dhanpat Rai& co.
2. V.P. Vasandani, D.S. Kumar,"Trestise on heat Engineering", Metropolitan Book co.Pvt.Ltd.
3. J. Selwin rajadurai,"Thermodynamics and Thermal engineering", New Age International Publishers.
4. P.L. Ballaney,"Thermal Engineering" (in S I units) Khanna Publishers Delhi.
5. Shyam K.Agarwal, "International combustion Engines" New age International Publishers.
6. V.Ganeshan, " Internal combustion engines ",3rd ed; Tata Mc Graw Hill.
7. V.L. Maleev, "Internal combustion Engines", International Student edition.
8. Sharma & Mathur
9. R.Yadav, "Steam and Gas Turbines "(S.I. Units), Central Publishing House, Allahabad.
10. Gas Turbine V.Ganeshan
11. M. Necati Ozisik, "Heat Transfer –A Basic approach", Mc Graw Hill International Editions.
12. J. P. Holman, "Heat Transfer"- 8th ed , Mc Graw Hill
13. Steam Turbine Kearton
14. Fundamentals of Heat and Mass Transfer by F.P. Incropera and D.P. Dewitt, 4th ed; John Wiley & Sons.
15. Elements Of Heat Transfer by Vijay Gupta, 2nd; New Age international Publishers

UPE04B07: Numerical methods and computer Programming

1. Solution of Equation and Eigen value problems

Interactive methods , Newtons Raphson method for single variables and for simultaneous equations with two variables , solutes of a linear system by Gaussian, Gauss-Jordan , Jacobi and Gauss –Seidel methods . Inverse of matrix by Gauss –Jordan methods .Eigen value of a matrix by power and Jacobi methods.

2. Interpolation

Newton's divided difference formulae ,Lagrange's and Hermites polynomials . Newton forward and back difference formulae . Stirlings and Bessel's central difference formulae.

3. Numerical Differentiation and Integration

Numerical Differentiation with interpolation polynomial , Numerical integration by Trapezoidal and Simpson's (both $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ "rules .Two and three point Gaussian quadrature formulae. Double integral using Trapezoidal and Simpon's rule.

4.Initial value problem for ordinary Differential equation

Single step methods –Taylor series , Euler and modified Euler , Runga –kutta method of order four first and second order differential equation . Multistep methods –Milne and Adam's Bash forth predictor and corrector methods.

5.Boundary value problems for ordinary and Partial Differential Equation

Finite difference solution for the 2^{nd} order ordinary differential equation . Finite difference solution for one dimensional heat equation (both implicit and explicit) one dimensional wave equation and two dimensional Laplace and Poisson's equation.

6. Computer programming

Introduction to computer programming in C. Language Arithmetic expression ; simple programs. Dissection of the program line by li8ne ;concept of variables ; program statement and function calls from the library. C data types: int, char, float etc. C expression ,arithmetic operation ,relational and logic operation .c assignment statements , extension of assignment to the operation ; c primitive input output using get char and put char; exposure to the scanf and print f function. C statements ; conditional execution using if, else etc. Concepts of loops; Example of loops in C languages using for, while and do-while . One dimensional arrays and example of interactive programs using arrays; 2-dimenssinal arrays ; use in matrix computation . Concept of sub-programming; function ; Example of function ; argument passing mainly for the simple variables . pointers , relationship between Arrays and pointers ; Arguments passing arrays as Arguments . Strings and C string library . structure and unions ; Defining C structure ; passing structure as arguments; File I/O ; use of fopen ;f scan and fprintf routines.

Text Books

1. Sastry S.s; "Introductory Methods of Numericals Analysis" 3/e , Prentice Hall of India New Delhi 1998

References

1. Kanda samy ; P. Thilakavthy , K. and Gunavathy . K, "Numerical Methods " , S.Chand & co. new Delhi 1999.
2. Grewal B.S , Grewal J.S , "Numerical methods in Engineering and science ". Khanna publisher , New Delhi
3. Jain M.K. Iyenger S.R K and Jain R. K. , "Numerical methods for Engineering and Scientific computation ," 3/e , New Age International (P) Ltd; New Delhi ,1995 .
4. General C.F; Wheatley P.O., "Applied Numerical Analysis "5/e , Adittion –Wesley , Singapore , 1998.

5. Narayanan S, Manickavachakam Pillai K. and Ramananiah G. “Advanced Mathematics for Engineering Students Vol2 ,” S. Viswanathanan Pvt. Ltd. Chennai, 1993.

UPE04B08: Plant Layout & Material Handling

Introduction: Objectives and criteria for facilities planning and industrial plant design. Site selection Factors of plant layout, Types of production activities, job shop, batch and mass production. Similar products special products, Fixed, process, and product type layout and their combinations.

Layout planning: Factors influencing plant layout, design considerations steps in planning. safety requirements.

Quantitative evaluation plant layout: Application of assignment models, queuing theory, transportation problems, engineering economy, cross-chart technique to plant layout problems.

Material Handling: Organization for material handling relation to plant layout, factors affecting material handling. Material handling analysis: Selection and replacement of material handling equipments, analysis of handling problems, application of quantitative tools.

Handling systems: Transportation elevating conveying transferring, self loading and bulk handling equipments, their selection and characteristics, auxiliary equipments, safety in operation.

References:

1. Plant layout and material handling by Apple Ronald.
2. Practical plant layout by Muther MC Graw Hill.

UPE04B09: Measurement and Instrumentation

Basic Concepts: Definition of terms, calibration, standards, generalized measurement systems, static and dynamic performance characteristics ; analysis of experimental data ;Instrumentation for measurement of position and displacement, force, pressure ,velocity , temperature, proximity and range. Concept of feedback; Open and Closed loop control system, Transducers and devices and devices for engineering application and processing.

Metrology: standards, slip gauges, Measurement of angles, tapers, threads, coordinates, inspection of straightness, flatness, alignment and surface finish, Gear measurements, measurements of various product feature using Mechanical, Pneumatic, Optical and Electronic instruments, interferometry and use of optical flats.

References:

1. Experimental Methods for engineers by J. Holman, 6th Ed, Mc Graw Hill.
2. Mechanical Measurement by T.G.Backwith, N.L. Buck and R.d.Maragoni, 3rd.ed, Narosa publishing house.
3. Measurement systems- application and design by E.O. Doebelin,4th.ed; MC Grawhill
4. Instrumentation, measurement & analysis by B.C. Nakra & K.K. Chaudhury, TMH.
5. Metrology for Engineers by J.W.F., Gallies and C.R. Shotbolt, Cassel.
6. Metrology by R.K. Jain

UPE04B10: Mechanics of Machines

1. Machine structure

Kinematic links, pairs and chain-constrain motion- Slider cranks and cranks rocker mechanisms –inversion –application –Kinematics analysis and synthesis of simple mechanisms-Determination of velocity and acceleration in Degree of freedom –Grueblers criteria.

2. Friction

Friction in screw and nut –Pivot and collar –Thrust bearing –plate and disc clutches-Bell (Flat and V) and rope drives –Ratio of tension –Effect of centrifugal and initial Tension –condition for Maximum power transmission- open and Cross bell Drive –Jockey pulley- creep in Belts

3. Gearing and CAMS

Gear profile and geometry-Nomenclature of spur and helical gears –Law of Gearing – Interference –Requirement of minimum Number of teeth in gear -Gears trains –Simple and compound gears trains- Determination of Speed and torque in Epicyclical gear trains – cam profile- Different type of followers

4. Balancing

Static and Dynamic balancing –single and several masses in different planes – Primary and secondary balancing of reciprocation masses- single and multi cylinder engine-Inline V and W arrangements of engine.

5. Governor:

Introduction, Types of Governors, Centrifugal Governors, Terms used in Governors, Watt Governor, Porter Governor, Proell Governor, Hartnell Governor, Hartung Governor, Wilson-Hartnell Governor, Pickering Governor, Sensitiveness of Governors, Stability of Governors, Isochronous Governor, Hunting, Effort & power of Governors, Controlling force diagram, Coefficient of insensitiveness.

6. Vibration

Free, forced and damped vibration of single degree of freedom systems-Force transmitted to support – vibration isolation – vibration absorption-Torsional Vibration of shaft-Single and multi rotor system- Geared shafts- Critical speed of shafts.

Text Book

1. Ballancy.P.L., “Theory of machine” Khana publisher New Delhi 1998.
2. Sings, V.P., “Theory of machine”, Khana publisher New Delhi 1998.

References

1. Rao , J.S., and Dukkupati ;R.V., ‘Mechanism of Machine Theory’, Second Edition , Wiley Eastern Ltd., 1992.
2. Malhotra, D.R. and Gupta, H.C,” The Theory of Machine Satya Prakashan, Tech India publication, 1988.
3. Ghosh, A. and Mallick, A.K,” Theory of Machines and Mechanism,” Affiliated East West Press, 1989.
4. Shingley, J.E and Uicker (K),J.J., “Theory of Machines and Mechanisms,” McGraw Hill, 1980.
5. Burton Paul, “Kinematic and Dynamic of Planer Machinery,” Prentice Hall.1979

UPE04B11: Engineering Materials

Nature and properties of materials : crystal structures and lattices, crystal imperfection , slip and dislocations , plastic deformation , phase diagrams, solidification and structure of materials and alloys , Iron- carbon diagram, various types of bonds, mechanical, magnetic and electronic properties, binary phase equilibrium characteristics of alloy, ternary phase diagram.

Metallography : study of microstructures. Powder metallurgy. Heat treatment processes – general classifications, various heat treatment of steels, properties and applications of alloy steels, tool steels, stainless steels, 7 cast iron, different heat treatment furnaces.

Hot and cold working of metals, recovery, recrystallization and grain growth. Fracture, fatigue and creep phenomenon in metallic materials Non ferrous materials—copper and aluminium based alloys.

Mechanical, magnetic, electrical and electronics properties of metals, alloys, ceramics, semiconductors and composites.

References:

1. Material science and engineering by V. Raghavan, prentice Hall.
2. Introduction to Engineering Materials by B.K. Agarwal, TMH.
3. Mechanical Metallurgy by G.E. Dieter, Mc Graw Hill.
4. Physical Metallurgy principles by R.E. Reedhill, East- West publishers.
5. Principles of materials science by W.F. Smith, 3rd ed. , Mc Graw Hill.
6. Steel and its Heat Treatment by K.E. Theling, Butter worth.
7. Material science by J.C. Anderson, K.D. Leaver, R.D. Rawlings and J.M. Alexander , Chapman Hall, 4th Ed., 1992.

UPE04P15: Thermal power Engineering Laboratory

- 1.a. Study of cut off models – Lancashire boiler, Babcock and Wilcox boiler, Vertical Tube boiler, Cochran Boiler, Locomotive Boiler.
- b. study of cut off models – four stroke diesel engines, four stroke petrol engines, two stroke petrol engine.
2. load test on four stroke petrol and diesel engine by electric load box.
3. Load test on four stroke diesel engine by rope brake dynamometer.
4. Heat balance on four stroke diesel engine by rope brake dynamometer and electric load box.
5. Valve timing diagram on four stroke diesel engine model and four stroke petrol engine model.
6. Measurement of the quality of steam, enthalpy, and dryness fraction.
7. To find out the boiler performance, boiler efficiency and steam evaporation rate.
8. To visit a thermal power station and study the following:
 1. boiler
 2. steam pipe
 3. Steam Turbine
 4. Economizer
 5. Preheater
 6. Alternator
 7. Water treatment plant
 8. ESP

UPE04P16: Mechanics of Machines Laboratory

List of Experiments

1. Single degree of freedom vibratory system.
2. Static & Dynamic balancing of rotating masses.
3. Governors.
4. Gyroscope.
5. Cam Design and Analysis.

UPE04P17: Measurements and Instrumentation Laboratory

Lab experiments involving :

Measurements of position, displacement, velocity, force, temperature, proximity/range.

Measurements of various product features using mechanical, pneumatic, optical and electronic instruments, interferometer, surface roughness measurements, measurements of threads and gears. Laboratory experiments and exercises involving hardware and software modular based off-line and on-line product gauging and inspection, information recording and processing etc.

1. Estimation of accuracy of instruments -vernier and micrometer.
2. Calibration of dial gauge, micrometer and vernier.
3. Measurement of angles using sine bar, bevel protractors, spirit level.
4. Measurement of gear tooth thickness by various methods including profile projector.
5. Measurement of effective diameter, pitch and helix angle of screw threads.
6. Surface roughness measurement .
7. Measurement of run out and concentricity.
8. Measurement of internal and external angles, bores, concavity, convexity using standard balls, rollers, height gauge and depth micrometer.
9. Measurement using vision system.
10. Study of co-ordinate measuring machine.
11. study of digital measuring instruments.
12. Measurement of Straightness and Flatness.

UPE04P18: CP Lab

Introduction to computer programming in C. Language Arithmetic expression; simple programs. Dissection of the program line by line; concept of variables; program statement and function calls from the library. C data types: int, char, float etc.. C expression, arithmetic operation, relational and logic operation .c assignment statements, extension of assignment to the operation; c primitive input output using get char and put char; exposure to the scanf and print f function. C statements; conditional execution using if, else etc. Concepts of loops

PRODUCTION ENGINEERING 5TH SEMESTER

A. THEORY:

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE05B12	Materials Management	3	0	0	3	3
2	UPE05B13	Machining Principles and Technology	3	0	0	3	3
3	UPE05B14	Design of Machine Elements	3	0	0	3	3
4	UPE05B15	Ergonomics and Work System Design	3	0	0	3	3
5	UPE05B16	Operations Planning and Control	3	0	0	3	3
6	UPE05B17	Computer aided Design and Manufacturing	3	0	0	3	3
Total of Theory						18	18

B. PRACTICAL:

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE05P19	Machining Principle & Technology Laboratory	0	0	3	3	2
2	UPE05P20	CAD/CAM lab	0	0	3	3	2
3	UPE05P21	Ergonomics and Work System Design Laboratory	0	0	3	3	2
4	UPE05P22	Design Practice	0	0	3	3	2
Total of Practical						12	8
Total of 5th Semester						30	26

UPE05B12: Materials Management

- 1. Introduction:** introduction to material management and productivity, functions of material management, organization structures in material management, role of material management techniques in improved material productivity.
- 2. Material planning:** objectives, material requirement planning, manufacturing resource planning, JIT production planning, strategic material planning, material control: acceptance, sampling, inspection, make or buy decision, simple cost analysis, economic analysis, break even analysis, breakeven point theory, whether to add or drop a product line store management and warehousing, product explosion.
- 3. Purchasing:** importance of good purchasing system, organization of purchasing functions, purchase policy and procedures, responsibility and limitations, purchasing decisions, purchasing role in new product development, role of purchasing in cost reduction, negotiations and purchase, purchasing research: identification of right sources of supply, vendor rating, standardization, vendor certification plans, vendor and supply reliability, developing new source of supply.
- 4. Cost reduction:** cost control v/s cost reduction, price analysis, material cost reduction techniques, and analysis.
- 5. Inventory management:** inventory v/s stores, types of inventory, inventory control, inventory build –up, EOQ, various inventory models, inventory models with quantity discount, exchange curve concept, coverage analysis, optimal stocking and issuing policies, inventory management of perishable commodities, ABC – VED analysis, design of inventory distribution systems, surplus management, information system for inventory management, case studies.

Reference books:

1. Material management :- W. R. Stelzer Jr. (PHI)
2. Material management :- D. S. Ammer & Richard Erwin Inc.
3. Menon, K.S., “*Purchasing and Inventory Control*”, Wheeler Publication, New Delhi
4. Dobler and Lee, “*Purchasing and Material Management*”, Tata McGraw Hill, New Delhi

UPE05B13: Machining principles and Technology

1. Tool Nomenclature

Single Point tool- Signification of the various angle provided and nose radius- American, German CIRP and orthogonal system of tool nomenclature, conversion of rake angle from American to German and Vice- Versa, Nomenclature of drills, Milling cutters and broaches, Need for chip barker.

2. Machine of Metal Cutting

Mechanism of Formation of chips-types of chips and the condition conducive for the formation of each type-built-up edge, its effects, orthogonal Vs oblique cutting, Merchant's circle diagram-Force and velocity relationship, shear plane angle, Energy consideration in matching-Ernst Merchants theory of shear angle relationship-Original assumption and modification made,

3. Forces in Machining

Forces in turning, drilling, milling and grinding, Conventional Vs climb milling- mean and maximum cross sectional areas of chips in milling- Specific cutting pressure- specification horse power- requirement of tools dynamometer- construction and principle of operation of tools dynamometer for turning, drilling and milling,

4. Thermal Aspect in Machining

Sources of heat generation in machining- temperature in measurement technique in machining, Function of cutting fluid- Characteristic of cutting of fluid.

5. Tool Materials , Tools Wear and tool life

Requirement of tool materials- advances in tool materials-HSS,PM, HSS, coated HSS, carbides and coated carbides, ceramic, cold pressed, hot pressed, ceramic composites, CBN, Diamond properties, advantages and limitation- ISO specification for inserts and tools holders, Tool Wear, type , mechanism, tool life, machinability, economics of machining, charter in machining.

6. Machining Principal

Setting and machining operation on metal cutting machine- Lathe, Milling, shaping, slotting, planning, Drilling, Boring, Broaching, Grinding (cylindrical, surface, center less), Thread rolling and gear cutting machining.

7. **Tooling:** Jigs and Fixtures, Principals of location and clamping,

8. Batch Production

Machining on capstans and Turret lathe.

9. Mass production

Machining on single/ multi spindle automats.

10. Finishing

Micro finishing operations like honing lapping, super finishing.

UPE05B14: Design of Machine Elements

1. Product Development Concepts

Fundamentals of Machine Design - - Selection of materials --- Factor of safety--- Code and standards--- economic of Design --- Reliability--- safety and product liability – Product Development – Stages --- Sequential and concurrent engineering.

2. Static and Variable Stress Analysis

Static Strength --- Failure theories --- Stress Concentration – Fatigue strength—S-N Diagram – Lowcycle—High cycle fatigue--- Endurance limit—modifying factors--- Fluctuating stresses – Stresses due to combined loading.

3. Design of Mechanical Elements

Shafts—Design for static loads – Bending, torsion and axial loads—Reversed bending and steady torsion—Soderberg and Goodman approach—Design of couplings --- Muff flange, bushed pin types – Design of closely coiled helical springs.

4. Design of Transmission Elements

Design of Gears – Spur, helical, bevel and worm gears—Belt drives – Flat belts and V belts selection and specification – design of journal bearings – Selection and specification --- Design of journal bearings—Selection and specification of rolling contact Bearings.

5. Recent Advances

Synthesis design of multistage speed reducers—Design of typical special purposes machine – Design of Geneva Mechanism-- ratchet and pawl mechanism--- Soft ware Implementation in design--- CAD—product Modeling Concept.

Text Book

1. Joseph Edward Shigley, "Mechanical Engineering design," McGraw Hill.

References

2. Spotts M.F. "Design of Machine Elements", 7/e, 1997, Prentice Hall.
3. Robert L. Norton, "Machine Design" – an integrated approach", 1997, Prentice Hall.
4. Wilson, "Computer Integrated Machine Design", 1996, Prentice Hall.
5. Joseph. E. Shigley, "Standard Hand Book of Machine Design," McGraw Hill, 1996.

"Burr A.H and Cheathak. J.B."Mechanical Analysis and Design," 2/e, Prentice Hall.

UPE05B15: Ergonomics and Work System Design

Defining Human Factors in a Production system; Characteristics feature of man-machine system; human performance and reliability; Human sensory-motor system; Stimulus dimension, Human information processing; Noise and theory of signal detection (TDS); Quantitative and qualitative visual display; Human factors associated with speech communication; Introduction to biomechanics and bioengineering aspects of human motor activity; Performance of body members in making different types of movements; Energy expenditure in physical activities; Spatial movements and conceptual relationships of stimuli and responses; Continuous control systems; Types of control function, tools and related control devices.

Design of work place and work components; Applied anthropometry, activity analysis; Design of work place; Human Performance under heat, cold, Illumination, Vibration, Noise, Pollution, Static and dynamic conditions.

Application of results from human factors data and analysis in work study; work design; Method study and work measurement Techniques.

Reference:

1. Sanders M.S and McCormick, "Human Factors Engineering", Tata McGraw Hill.
2. Salvendy G, "Hand book of Human Factors and Ergonomics", John Wiley & Sons.
3. Kroemer KHE, "Ergonomics – How to Design for ease and efficiency", Prentice Hall Englewood Cliffs.
4. Indian Adaptation – introduction to work study. ILO, Geneva, Oxford & IBH Pub. Co. Pvt. Ltd.
5. Murrell, "Ergonomics at work".

UPE05B16: Operations Planning and Control

Demand forecasting: Long and short term demand forecasting methods, Regression analysis and Smoothing methods. Estimation of trend, cycle, seasonality components. Analysis of forecast error and computer control of forecasting systems. Plant location, capacity scheduling,

Warehouse location and capacity scheduling; Multiple Plant Production Facility Design. Aggregate Planning and Master Production Planning and Scheduling; Operations scheduling and Control: Basic Sequencing and scheduling techniques, Despatching rules; Chasing and updating of Production Schedules. Design of Production Planning and Control Systems: System Design for continuous and intermittent Production Systems; Integration of Master Production, Material Requirement and Shop Scheduling Systems. Diagnostic Analysis of Production Planning and Control Systems: Techniques of analysis and evaluation of system performance.

Textbook:

Operations Management, by Jay Heizer and Barry Render. Prentice Hall, 9th Edition.

References:

1. Stevenson, J. William, Operations Management 7th Edition, McGraw-Hill Irwin, 2002.
2. Plossl, G.W. Production and Inventory Control: Principles and Techniques, Englewood Cliffs, NJ, Prentice-Hall, Inc., 1985.
3. Monks, Joseph G., Operations Management, Theory and Problems, New York, NY, McGraw-Hill, 1987.
4. Production Systems Planning Analysis & Control by James L. Riggs, John Wiley & Sons
5. Modern Production / Operations Management by Elwood S. Buffa, Rakesh K. Sarin, John Wiley & Sons
6. Production / Operations Management : Concept, Structure & Analysis by Tersine R.J., North Holland

UPE05B17: Computer Aided Design and Manufacturing

Fundamentals of Design, Computers and controllers, Fundamentals of CAD, computer systems, use of computers in CAD/CAM system, CAD system Hardware, CAD system software, principles of interactive computer graphics, Transformation systems, wire frame modeling, surface modeling, Solid modeling, Finite Element Modeling and analysis.

Numerical control in production systems, computer control of NC machines, NC part programming and computer aided part programming, Group technology, computer aided process planning, computer aided inspection and Quality control, Machine vision, computer integrated production planning systems, Industrial Robots and automated Guided Vehicle systems, Flexible Manufacturing systems, Computer Integrated Manufacturing, Artificial Intelligence and Expert system, communication system in Manufacturing.

Text Book

1. Lalit Narayan. K. Mallikarjuna Rao.K, Sarcar M.M.M, "Computer Aided Design and Manufacturing", Prentice Hall of India (P) Ltd, 2008.

References

1. Radhakrishnan.P and Subramanyam, S, " CAD, CAM, CIM" , New Age International Publishers.
2. G. Rankey, Paul, " Computer Integrated Manufacturing" , Prentice Hall.
3. J.Jr. Harrington, " Computer Integrated Manufacturing " Industrial Press Inc, New York.
4. Rathmill. K and Macconal. P, " Computer Integrated Manufacturing". IFS publications.
5. Deb, S.R, " Robotics Technology and Flexible Automation" , Tata McGraw Hill.

UPE05P19: Machining Principles and Technology Laboratory

List of Experiment in Metal Cutting

1. Study of influence of cutting parameters on surface roughness in turning
2. Tool life study on a single point turning tool.
3. Measurement of cutting forces in turning using lathe tool dynamometer.
4. Measurement of shear plane angle using chip- thickness ratio criteria.
5. Acceptance test on RAM type milling machine as per ISI test chart.
6. Measurement of single point to angle .

UPE05P20: CAD/CAM Laboratory

1. Two Dimensional Geometry creation and modification using standard drafting package.
2. Detailing and documentation of a typical production drawing.
3. Attributes and Data extraction from a drawing.
4. Creation of simple solid models using CSG and B-Rep approach.
5. Surface Modeling Types.
6. Interfering a programming language with a typical drafting package.
7. Interfering database package with typical drafting package.
8. Object Modeling and Mesh generation using simple elements.
9. Analysis of typical machine elements.
10. Kinematic analysis of simple mechanisms.
11. Software project consisting of development of algorithms and programs in the field of manufacturing applications.

UPE05P21: Ergonomic and Works system Design laboratory

List of Experiment

1. Work study
2. Work measurement
3. Anthropometry
4. Kinesiology
5. Comfort Analysis
6. Fatigue Bio Engineering

UPE05P22: Design Practice

Exercises on 2-D and 3- D Modelling of Mechanical components and assembly system using software packages like AUTOCAD, CATIA etc.

Design Project

1. Jigs and Fixture design
2. Die design
3. Automation using hydraulic, Pneumatic, electrical, Electronic and Mechanical devices.

Text Book: Junija B.L and Sekhon, G.S. “Fundamentals of Metal cutting and Machine tools,” New Age International (P) Ltd.1995.

References:

1. Shaw M.C., "Metal Cutting Principles", Oxford Clarendon Press, 1984.
2. Bhattacharya a. "Metal Cutting theory and practice", New Central Book Agency (P) Ltd. Calcutta, 1984.
3. Venkatesh V.C. and Chandrasekaran.H. "Experimental Techniques in Metal Cutting", Prentice Hall of India, 1982.
4. Xing Sheng Li & Low. I.M., Editors, "Advanced ceramic tools for machining Applications", I Transtech Publications, 1994.
5. Kuppaswamy. G. "Principle of Metal Cutting", University Press, 1996.
6. G.Boothroyd, "Fundamentals of Metal Cutting & Machine Tools", Tata McGraw Hill.
7. HMT Publication, "Production Technology", Tata McGraw Hill.
8. Ghosh. A and Mallik.A.K. "Manufacturing Science" Wiley Eastern.
9. Maslow, "Manufacturing Process", Mir Publishers.

PRODUCTION ENGINEERING 6TH SEMESTER**A. THEORY:**

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE06B18	Manufacturing Process II	3	0	0	3	3
2	UPE06B19	Machine Tool Design	3	0	0	3	3
3	UPE06B20	Operations Research	3	0	0	3	3
4	UPE06B21	Communications	3	0	0	3	3
5	UPE06B22	Elective I	3	0	0	3	3
Total of Theory						15	15

B. PRACTICAL:

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE06P23	Manufacturing Process II Lab	0	0	3	3	2
2	UPE06P24	Machine tool System Laboratory	0	0	3	3	2
3	UPE06P25	Condition Monitoring Lab	0	0	3	3	2
4	UPE06P26	Seminar on Assigned Topics	0	0	2	2	1
Total of Practical						11	7
Total of 6th Semester						26	22

UPE06B18: Manufacturing Process II

1. Theory of Metal Forming

Metallurgical aspect of metal forming- Slip –twining-Mechanics of plastic deformation- Effect of temperature, strain rate –microstructure and friction in metal forming-yield criteria and their significance-classification of metal forming processes.

2. Forging and Rolling process

Principal-Classification-equipment, tooling-processes, parameters and calculation of force during forging and rolling process-Ring compression tests-Post forming heat treatment-Defect (cause and remedy)-application

3. Extrusion and Drawing Process

Classification of extrusion process –tool, equipment principal of this process –influence of friction –Extrusion forces calculation –Defects and analysis –Rod /Wire drawing –tools, Equipment and principal of process –defects –Tube drawing and sinking processes –Mannesmann processes of seamless pipe manufacturing ,

4. Sheet Metal Forming Processes

Classification –Conventional and HERF processes –Presses –Type and selection of presses –formability of sheet metal –principal, Process, parameters, equipments and application of the following process –

Deep Drawing, spinning, stretch forming, plate banding, press brake forming –Explosive forming, electro hydraulic forming, magnetic pulse forming

5. Recent Advances

Super plastic forming –electroforming –fine balancing, P/M forging –Isothermal forging – High Speed, hot forging –high velocity extrusion

Text books

1. Narayanasamy, R., “Metal working Technology”, Prentice Hall (1997).

References

1. Dieter, “Mechanical Metallurgy”, Revised Edition, 1992.

3. George E,”Dieter –Engineering Design (A Materials and processing Approach)” McGraw Hill-Edition II- University of Maryland-1991

4. SEROPE KALPAKJIAN, “Manufacturing Engineering and Technology,” Edition –III – addision—Wesley Publishing co.1985,

5. William F.Hosford and Robert M, Caddel , “Metal forming ,” (Mechanics and Metallurgy), Prentice Hall Publishing co, 1990.

6. Sinha and Prasad, “Theory of metal forming and metal cutting ,” Dhanpat Rai Pub,(P)Ltd.,1999

7. Rao P.N,” Manufacturing Technology,” TMH Ltd 1998(Revise Edition).

UPE06B19: Machine Tool System

Principles of generations of various surfaces in machine tools; Conformable Kinematic Synthesis for tracing, Forming, Enveloping and Generation; Kinematic Structure of Gear and step less Drive for machines; Designing Discrete step Drives for Machine Tools speed and feed; Step less Drive; Design Principles of Machines Tool Gear Boxes; hydraulic and Electric drives and control; Machine tool structures; Principles of design of Machine tool elements like bearings spindles and slides; Automation and control features of Machine tools; special tools and attachment. Elements of unit build machines and Transfer lines; Selection and acceptance testing of Machine tools.

References:-

1. Principles of Machine tools by A. Bhattacharya and G.C. Sen., Central Book Agency, Kolkata.
2. Machine Tools vol.-I, II, III, IV BY Acharkan, Mir publishers.

UPE06B20: Operations Research

1. Linear Models

The phases of Operations research study- linear programming – Graphical methods – Simplex algorithm—Duality – Transportation Problems – Assignment problems--- Applications to problems with discrete variables.

2. Network Models

Network Models--- shortest route--- Minimal spanning tree --- Maximum flow models--- Project network---- CPM and PERT networks--- Critical path scheduling--- Sequencing models.

3. Inventory Models

Inventory models----Economic order quantity models---- Quantity discount models--- Stochastic Inventory models---- Inventory control models in practice.

Queuing Theory

Queuing models--- Queuing system and structures --- Notation---Parameter --- Single Server and multi--- Notation --- Parameter --- Single Server and multi server models--- Poisson input --- Exponential service --- Component rate service --- Infinite population --- Simulation.

4. Decision Models

Decision Models--- Game Theory--- Two person Zero sum Game--- Graphical solution --- Algebraic solution --- Linear programming solution – Replacement Models--- Models based on service life --- Economic life --- Single or multivariable search techniques--- Application or Models --- Case studies

Text Books

1. H.A.Taha “Operation Research” Prentice Hall of India 1999 6th Edition
2. S.Bhaskar “Operation Research” Anuradha Publishers Tamil Nadu 1999

References

1. Shennoy, Srivastava "Operation Research for Management" Wiley Eastern -1994.
2. N.J.Bazara, Jarvis, H. Sherali " A linear programming and Network Flows" , John Wiley 1990.
3. Philip and Ravindran "Operational Research " , John Wiley , 1992.
4. Hiller and Lieberman "Operation Research " Holden Day 1986.
5. Frank, S. Budnick, Dennis Mcleavy :Principals of Operation Research for Management" Richard D Irwin -1990.
6. Sharma J.K. "Operation Research' , Macmillan

UPE06B21: Communications

Listening and Speaking Skills: Listening Skills and Problems, Types of Listening Comprehension, Listening Skills, Non-Verbal Listening, Advantages of Listening, Listening Span and Barriers to Listening, Tips for Effective Listening, Effective Speaking : A Skill, Speak Correctly, Speak Appropriate Words, Speaking Different Situations, Non-Verbal Communication, Barriers to Effective Speaking, Tips to Speak Effectively

Reading and Writing Skills: Intensive Reading, Use of Mental Skills, Reading Speed and Comprehension, Motivation, Writing Technique, Organizing the Materials, Developing the Outline, Beginning the Article, Developing the Article, Ending the Article, Grammar for the Clarity and Correctness, Vocabulary Building, Simple Spelling Rules, Letter Writing, Review

Communication and Your Career: Writing at Work Differs from Writing at School, At Work; Writing Is an Action, Qualities of Effective On-the-Job Communication: Usability and Persuasiveness, Communicating Ethically.

Reader Centered Communication Process: Writing Your Resume, Electronic Resumes Special Considerations, Writing Your Job Application Letter, Ethical Issues in the Job Search, Writing for Employment.

Drafting: Begin by announcing your topic, Present your generalizations before your details, Move from most important to least important, and remember the human consequences of what you are drafting.

Beginning a Communication: Give audience a reason to pay attention, State your main point, tell your audience what to expect, Encourage openness to your message,

Developing an Effective Style: Creating your Voice, Find out what's expected Consider the roles your voice creates for your readers and you, Consider how your attitude toward your subject will affect your readers, Say things in your own words, Use words with appropriate associations, Choose plain words over fancy ones, Use inclusive language.

Checking and Reviewing Drafts: Performing your own Quality Check, Check from your readers' point of view, Check from your employer's point of view, Distance yourself from your draft, Read your draft more than once, changing your focus each time, Use computer aids to find (but not to cure) possible problems,

Communicating Electronically: Email and Web Sites: Using Email, Observe the email conventions where you work, Keep your messages brief, Make your messages easy to read on screen, Provide an informative, specific subject line, Take time to revise, Remember that email isn't private.

Creating and Delivering Oral Presentation: Define your presentation's objectives, Select the form of oral delivery best suited to your purpose and audience, Focus on a few main points, Use a simple structure-and help your listeners follow it, Use a conversational style, Look at your audience, Prepare for interruptions and questions-and respond courteously, Fully integrate graphics into your presentation, Rehearse, Accept your nervousness-and work with it, Making Team Presentations, Conclusion, Exercises

Creating Communications with a Team: Select the most effective structure for your team's collaboration, Create a consensus on the communication's objectives, Involve the whole team in planning, Make a project schedule, Share leadership responsibilities, Make meeting efficient, Encourage, discussion, debate, and diversity of ideas, Be sensitive to possible cultural and gender differences in team interactions, Use computer support for collaboration when it's available,

Books: Technical Communication : A Reader Centered Approach, Anderson, 5th 2003 SYE 0-1550-7421-0 Thomson Learning

UPE06B22: ELECTIVE I

List of Electives

1. Optoelectronics and laser materials processing

Basic laser optics; Laser: electromagnetic radiation, reflection, refraction, laser beam characteristics, focusing with a single lens, optical components. Types of laser –CO₂ laser, co laser, solid state, diode, excimer lasers, application of laser, laser cutting, laser welding, laser treatment. Theory of heat flow, laser automation and in-process sensing, laser safety. Theory of heat flow, laser automation and in-process sensing, laser safety.

References

- 1.A text book on light by K.G Majumdar, Modern book agency private Ltd.
- 2.A text book on optics by Subramanyan and Brijlal.S.Chand &Company ltd.
- 3.Laser material processing by William M.Steen, Springer –Verlag.

2. Management Information System (MIS)

Data Information and knowledge concepts, concepts of information representation: storage, dissemination, discrimination and transmission

Data base management system, design and implementation of RDBMS for managerial applications, retrieval aspects, security and privacy aspects.

Specification and configurations of computer based systems, manufacturing management information systems-its subsystems and outputs; Costing and performance audit applications
MIS

References

1. Management information systems, organization and technology by London and London 4th ED, Pretice Hall
2. Management information systems by James Obien

3. Total Quality Management

1. **Introduction:** definition of quality, dimensions of quality, quality planning, quality costs – analysis techniques for quality costs, basic concepts of total quality management, historical review, principles of TQM, leadership – concepts, role of senior management, quality council, quality statements, strategic planning, deming philosophy, barriers to TQM implementation.

2. **TQM Principles:** Customer satisfaction – customer perception of quality, customer complaints, service quality, customer retention, employee involvement – motivation, empowerment, teams, recognition and reward, performance appraisal, benefits, continuous process improvement – juran trilogy PDSA cycle, 5s, kaizen, supplier partnership – partnering, sourcing, supplier selection, supplier rating, relationship development, performance measures – basic concepts, strategy, performance measure.

3. **Statistical process control (SPC):** The seven tools of quality, statistical fundamentals – measures of central tendency and dispersion, population and sample, normal curve, control charts for variables and attributes, process capability, concepts of six sigma, new seven management tools.

4. **TQM Tools:-** Bench marking – reasons to benchmarking, benchmarking process, quality function deployment (QFD) – house of quality, QFD process, benefits, taguchi quality loss function, total productive maintenance (TPM) – concepts, improvement needs, FMEA – stages of FMEA.

5. **Quality systems:-** Need for ISO 900 and other quality systems, ISO 9000: 2000 quality system – elements, implementation of quality system, documentation, quality auditing, QS 9000, ISO 14000 – concept, requirements and benefits.

Text Book:

1. Dale H. Besterfield, et al., Total Quality Management, Pearson Education Asia, 1999.(Indian reprint 2002).

Reference:

1. James R.Evans & William M. Lidsay, The Management and Control of Quality (5th Edition), South-Western (Thomson Learning), 2002 (ISBN0-324-06680-5).
2. Feigenbaum. A.V. “Total Quality Management”, McGraw Hill, 1991.
3. Oakland .J.S. “Total Quality Management”, Butterworth-Heinemann Ltd., Oxford,1989.
4. Narayana V. and Sreenivasan, N.S. “Quality Management – Concepts and Tasks”, New Age International 1996.
5. Zeiri, “Total Quality Management for Engineers” Wood head Publishers, 1991.
6. Arora. K.C., “Total Quality Management”,
7. Paul James, “Total Quality Management – An Introductory Text”, Prentice Hall.
8. Housen & Ghose, “Quality control and Applications”.
9. Khanna, O.P., “Industrial engineering Management.”

UPE06P23: MANUFACTURING SIMULATION LAB.

General system modeling and simulation exercises using ARENA 2. Robot work cell simulation using UGRIO 3. CNC Machine simulation using Virtual NC 4. Manufacturing system modeling and simulation exercises using GPSS 5. Manufacturing system modeling and simulation using QUEST 6. Machine monitoring system.

UPE06P24: MACHINE TOOL SYSTEM LABORATORY

Study of speed structure (Ray Diagram) of lathes, determination of apron constant, measurement of cutting forces and tool wear experiments are also to be done to study principles of metal cutting; Alignment tests of drilling machines, quick return motion mechanism on shaper are to be undertaken; Laboratory exercises involving machining of complex product configurations, machining of spur and helical gears, copying and contouring, finishing processes and grinding of tools and cutters are to be done.

UPE06P25: Condition Monitoring Laboratory

1. Ferrography and condition monitoring by Oil Analysis.
2. Bearing Health Analysis to optimize its life span.
3. Alignment and Balancing Test Rigs to provide Exposure to latest Alignment and Balancing Techniques.
4. Wear Particle Analysis for Quantitative and Qualitative study.
5. Lubricant contamination Analysis for Quantitative and Qualitative study.

The following equipments can be monitored –

i) Compressor, ii) Engine, iii) Exhauster, iv) Fan, v) Gear Box, vi) Generator, vii) Hydraulic, viii) Motor, ix) Paper Machine, x) Pump, xi) Turbine.

6. Vibration condition Monitoring.

UPE06P26: Seminar on Assigned Topics

Each student will be required to give a seminar take along with a report on any current topic with audio visual aids, graphs, charts, and models as assigned to them on individual basis.

PRODUCTION ENGINEERING 7TH SEMESTER

A. THEORY:

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE07B23	Reliability Engineering and Plant Maintenance	3	0	0	3	3
2	UPE07B24	Non Traditional Manufacturing	3	0	0	3	3
3	UPE07B25	Production and Quality Management	3	0	0	3	3
4	UPE07B26	Financial Management and Costing	3	0	0	3	3
5	UPE07B27	Elective II	3	0	0	3	3
Total of Theory						15	15

B. PRACTICAL:

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE07P27	Quality Engineering lab	0	0	3	3	2
2	UPE07P28	Non Traditional Manufacturing Laboratory	0	0	3	3	2
3	UPE07P29	Project (Part I) With Defence of Project	0	0	6	6	6
4	UPE07P30	Industrial Training	0	0	0	0	1
Total of Practical						12	11
Total of 7th Semester						27	26

UPE07B23: Reliability Engineering and Plant Maintenance.

Reliability: Definition and basic concepts; Failure data, failure modes, and Reliability in terms of hazard rate and failure density functions; Hazards models and bath tub curve; applicability weibul distribution. Reliability calculations for series, parallel and parallel series systems; Reliability calculations for maintained and stand by systems.

Maintenance - - its rules and scope in total organizational context. Objectives and characteristics of maintenance; basic guidelines for design of organization structures for maintenance; Centralized Vs de centralized maintenance ; Types of maintenance – corrective planned, preventive and predictive maintenance; Factors affecting maintenance; opportunistic maintenance; measurement of maintenance work; rating and allowances. Maintenance cost budgets. Maintenance planning and scheduling;

Noise and Vibration technology, Infra – Thermography, Laser alignment and in situ balancing, Ultrasonics, Acoustic Emissions, High end Corrosion Mapping System, Lube and Wear Analysis, Residual Life Assessment, Oil Analysis and indigenization

References

1. Carter, ADS, “Mechanical Reliability Engineering”, Macmillan.
2. Belington Roy & Allen R.N, “Reliability Evaluations of Engineering Systems” Pitman.
3. Dhilan & Singh, “Introduction to Reliability Engineering’.
4. Doty, L.A, “Reliabilities for the Technologies”, Industrial Press Inc.
5. Basu S.K & Bhadury B, “ Terrotechnology – Reliability Engineering and Maintenance Management”.

UPE07B24: Non-Traditional Manufacturing

Introduction to new methods of production; Need and capability analysis of various processes; Classification and selection of non-traditional machining technologies. Abrasive processes of machining including Abrasive Jet machining (AJM), Water Jet Mechining (WJM) and ultrasonic machining (USM). Chemical machining (CHM), Electrochemical machining (ECM): Electrochemical deburring and honing: Electrochemical Grinding (ECG); Electrochemical Arc Machining (ECAM). Electrical discharge machining (EDM); wire EDM, Electrochemical Discharge Machining (ECDM); Electron beam machining (EBM); Plasma arc machining (PAM); Laser beam machining (LBM); Ion beam machining (IBM), Netural particle etching. Cryogenic machining; Hot machining, stretched turning; Dynamic cutting; Magnetic cutting; Oscillating turning; Ballistic machining. Selecting the most suitable process for a product; Economic analysis of non-traditional machining processes.

Text:

1. Misra P.K., “ Non Traditional Machining Process”, Narosa Publishing House.

Reference:

1. Gary F Benedict, Non traditional machining.
2. Kalpakjian, “Non Traditional Machining”, Prentice Hall.

3. Jain V.K., "Advanced Machining Process", Allied Publishers (2005).
4. Pandey P.C., "Modern Machining Process", Tata McgrawHill.

UPE07B25: Production and Quality Management

Management functions, Evolution of Management Theory, Management approach to planning, Analysis and control function involved in a production system; Production cycles, planning functions; types of industry: Job, Batch, Continuous, Mass and flow production ; Organization and policies in respect of production planning and control; Product design and development; Fore-casting techniques; Scheduling, Sequencing and plant loading for optimal utilization; Queuing models and line balancing; Materials planning and control, Inventory Management; Value analysis; productivity Analysis, Mechanics of production control.

Quality Management: Introduction, Meaning, Quality Characteristics of Goods and Services, Juran"s Quality Trilogy, Deming"s 14 principles, Tools and Techniques for Quality Improvement, Statistical Process Control Chart, Quality Assurance, Total Quality Management (TQM) Model Concept of Six Sigma and its Application.

Acceptance Sampling – Meaning, Objectives, Single Sample, Double Sample and Multiple Sample Plans with sated risk, Control charts for variables – Averages and Ranges, Control Charts for Defectives – Fraction Defective and Numbers Defective.

References

1. Production and operational Management by S.N.Chary, TMH.
2. Essentials of Management by Koontz and Weihrich, TMH.
3. Modern Production/ Operational Management by E.S.Buffa and R.K.Sarin, John Wiley and sons.
4. Krajewski & Ritzman, Operations Management, 5th Pearson Education
5. Buffa & Sarin, Modern Production/Operations Management, 8th John Wiley
6. Chary, Production and Operations Management, Tata McGraw-Hill
7. Johnston R et al – Cases in Operations Management, Pitman
8. McGregor D – Operations Management, McGraw-Hill

UPE07B26: Financial Management and Costing

1. Finance function and financial accounting

The finance function – Indian financial system – financial planning – cost of capital – operating and financial level rages – financial statements – income statement – balance sheet.

2. Capital budgeting and working capital management

Different techniques of capital budgeting and investmetn analysis – cocept of present value – sources of long term finance – cash management – recievables management – sources of short term finance.

3. Inventory management

Purpose of inventoreis – costs related to inventories – basic EOQ model – variation in EOQ model – Finite production – stockout – quantity discounts – lots size under constraints – MRP inventory accouting.

4. Cost estimation and cost accounting

Importance and aims of cost estimation and costing – determination of materials cost, labour cost, cost of a product – overhead expenses – depreciation – methods – profit planning – analysis – cost – volume relationship – breakeven analysis.

5. Recent advances

Just in Time (JIT) system – MRP II – credit rating – leasing – Hire purchasing – venture capital – SEBI.

Text Book

1. Prasanna chandra, “ Financial management Theory and practice”, Tata Mc Graw Hill, 1998.

References

1. James C. Vanhorne, John M Wachowilz, “Fundamentals of Financial Management”, Prentice Hale of India, 1996.
2. T R Banga and S C Sharma , “ Mechanical Estimating and costing “, Khanna Publishers, 1993.
3. Monks J G – “Operation management theory and practice”, McGraw Hill, 1992.
4. I M Pandey, “Financial Management”, Vikas Publishing House, 1995.

UPE07B27: Elective II

List of Electives

1. Enterprise Resource Planning

Enterprise Resource Planning: Basic issues, approach and database implementation, ERP modules; Production planning, Sales and distribution, materials management, Plant maintenance, Quality management, Project management, Financial and costing and human concept of supply chain and its major components.

References

1. Enterprise Resource Planning by Ravisankar and S Jaiswal, Galgotia

2. Nanotechnology

1. General Introduction: Basics of Quantum Mechanics, Harmonic oscillator, magnetic Phenomena, band structure in solids, Mossbauer and Spectroscopy, optical phenomena bonding in solids, Anisotropy.
2. Silicon Carbide: Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, electron microscopy sintering of nano particles, Nano particles of Alumina and Zirconia: Nano materials preparation, Characterization, Wear materials and nano composites.
3. Mechanical properties: Strength of nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties.
4. Electrical properties: Switching glasses with nanoparticles, Electronic conduction with nano particles; Optical properties: Optical properties, special properties and the colored glasses
5. Process of synthesis of nano powders, Electro deposition, Important nano materials
6. Investigating and manipulating materials in the nanoscale: Electron microscopies, scanning

probe microscopies, optical microscopies for nano science and technology, X-ray diffraction.
7. Nanobiology : Interaction between biomolecules and nanoparticle surface, Different types of inorganic materials used for the synthesis of hybrid nano-bio assemblies, Application of nano in biology, nanoprobe for Analytical Applications-A new Methodology in medical diagnostics and Biotechnology, Current status of nano Biotechnology, Future perspectives of Nanobiology, Nanosensors.

8. Nano Medicines : Developing of Nano medicines Nano systems in use, Protocols for nano drug Administration, Nanotechnology in Diagnostics applications, materials for used in Diagnostics and Therapeutic applications, Molecular Nanomechanics, Molecular devices, Nano tribology, studying tribology at nanoscale, Nano Tribology applications.
TEXT BOOKS:

1. Nano Materials- A.K.Bandyopadhyay/ New Age Publishers.
2. Nano Essentials- T. Pradeep/TMH

3. Non Conventional Energy

4. Rapid Prototyping

1. Introduction: Basic concept – Overview of existing technologies of prototyping and tooling –Need for speedy design to market operations.
2. Product Development : State of the Technology – conceptual design – development – Detail design – Prototype – Tooling –Engineering Pilot – Limitations.
3. Accelerated Product Development : Application of CAD-Techniques – Procedures – Product slicing – software – Applications.
4. Rapid Prototyping Systems: Selective laser sintering – Working Principles – Advantages and limitation – stereo lithography – working principle – Application advantages and limitations.
5. Other systems: Laminated object modeling – Working principles application – Advantages and Limitations- fused deposition and modeling – direct shell production casting- application.

Text:

1. Ghosh Amitabha, “Rapid Prototyping-A Brief Introduction”, East-West Publishers

References:

1. PAUL F. JACOBS , “Rapid Prototyping and Manufacture , Fundamentals of stereo lithography “,1995
2. SOENEN,R and OILLING, “Advanced CAD/CAM systems “, Narosa Publishing House ,1995.
3. DURVENT , W.R, The lithographic Handbook, Narosa Publishing house,1995.
4. Rapid News, University of Warwick, U.K.1995.

UPE07P27: Quality-engineering lab

Single Sample, Double Sample and Multiple Sample Plans with stated risk, Control charts for variables – Averages and Ranges, Control Charts for Defectives – Fraction Defective and Numbers Defective.

UPE07P28: Non-Traditional Manufacturing Laboratory

One experiment on each machine

1. Abrasive Jet machining (AJM)

2. Ultrasonic machining (USM).
3. Electrochemical machining (ECM):
4. Electrical discharge machining (EDM);
5. Wire EDM,
6. Electron beam machining (EBM)
7. Laser beam machining (LBM)

UPE07P29: Project (Part I)

UPE07P30: Industrial Training

Students undergoing industrial training at the end of the semester will be given credit in semester. Students shall have to submit a project report to be signed by the industry training manager or lab-in-charge of R&D organization.

PRODUCTION ENGINEERING 8TH SEMESTER**A. THEORY:**

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE08B28	Automation, CNC & Robotics	3	0	0	3	3
2	UPE08B29	Mechatronics & Modern Control	3	0	0	3	3
3	UPE08B30	Entrepreneurship Development	3	0	0	3	3
4	UPE08B31	Human Relations	3	0	0	3	3
5	UPE08B32	Elective III	3	0	0	3	3
Total of Theory						15	15

B. PRACTICAL:

SL. NO.	CODE	SUBJECTS	CONTACTS (PERIODS/WEEK)				CREDIT POINTS
			L	T	P	TOTAL	
1	UPE08P32	Automation, CNC And Robotics Laboratory	0	0	3	3	2
2	UPE08P33	Mechatronics And Modern Control Laboratory	0	0	3	3	2
3	UPE08P34	Project (Part II) With Defence of Project	0	0	9	9	6
54	UPE08P35	Comprehensive Viva voce					4
Total of Practical						15	14
Total of 8th Semester						30	29

UPE08B28: Automation, CNC and Robotics

Basic principles of automation; Extending the capabilities of conventional machines through improved devices and manipulators; Basic principles and constructure of numerical control; CNC, DNC and machining centre; Methods of coding and programming; APT programming; Adaptive control; Economics of numerical control.

Introduction to Robotics: Synthesis of elements with movability constraints; Elements of robot anatomy; Hydraulic, pneumatic and electric manipulators; End-effectors and their design; controllers with microprocessors or fluidics; Robot sensors; Applications of industrial robotics.

Reference:

- 1.Craig J. J., "Introduction to Robotics", Addison – Wesley.
- 2.Koren Y. "Robotics for Engineers", McGraw Hill.
- 3.Del S. R., "Robotics Technology and Flexible Automation", Tata McGraw Hill.
- 4.Tewari N K., Kundra and Rao P. N., "CNC Machine".

UPE08B29: Mechatronics and Modern Control

Introduction to Mechatronics: Definition, Mechatronics in manufacturing, products and design. Comparison between Traditional and Mechatronics approach.

Electronics: review of fundamentals of electronics, logic gates and their operations, data conversion devices, sensors, micro-sensors, transducers, electrical contacts, actuators and switches, contactless input devices, signal processing devices; relays, output devices.

Drives: Stepper motors, servo-drives.

Mechanical: Ball screws, linear motion bearings, transfer systems.

Hydraulic: Hydraulic elements, actuators and various other elements. Design of hydraulic circuits.

Control systems: Open loop and closed loop control, block diagrams, transfer functions, Laplace transforms; Mathematical model of physical system; PI and PID controllers, 8085 microprocessor, PLC controller and Ladder diagrams, hydraulic and pneumatic controllers; Time domain analysis, , transient response of first and second order systems; Introduction to non-linear control; state space analysis, optimal design and fabrication of Mechatronics systems.

References

- 1.Raven F. H., "Automatic control Engineering", 5/e McGraw Hill International.
- 2.Ogata K, "Modern Control Engineering", 3/e, Prentice Hall.
- 3.Kuo B. C., "Automatic control system", 6/e, Prentice Hall.
- 4.HMT Ltd, "Mechatronics", Tata McGraw Hill.
- 5.Kurtz G. W., Schueller J. K., Claar P. W., "Machine Design for mobile and industrial applications", SAE.
- 6.Bolton W., "Mechatronics", Addison Wesley.

UPE08B30: Entrepreneurship Development

1. Entrepreneurship

Entrepreneur- Traits of Entrepreneurs- Types of Entrepreneurs- Intrepeneur Difference between Entrepreneurs and Intrapreneur- Entrepreneurial Growth.

2. Motivation

Major motives influencing Entrepreneur- Achievement Motivation Training, Self Rating, Business game, Thematic Apperception Test- Stress Management. Entrepreneurship Development programs-Need, Objectives.

3. Business

Small Enterprises-definition, classification-characteristics, ownership structure- Project Formulation-Steps involved in setting up a Business- Identifying, Selecting a good business opportunity, Market survey and Research, Techno economic Feasibility Assessment- Preliminary Project Report- Project Appraisal- Sources of information- Classification of needs and Agencies.

4. Financing and Accounting

Need- Sources of Finance, Term Loans, Capital Structure, Financial Institutions, Management of working capital, Costing Break Even Analysis, Network Analysis techniques of PERT/CPM-Taxation-Income Tax, Excise Duty- Sales Tax.

5. Support to Entrepreneurs

Industrial support to Entrepreneurs- Sickness in smalllll business-concept, magnitude, causes and consequences, corrective measures- Government policy for small scale Enterprise- Growth strategies in small Industry- Expansion, Diversification, joint venture, Merger, Sub contracting.

Text Book:

1. Khanka S. S., "Entrepreneurial Development", S. Chand and Co. Ltd., 1997.

Reference:

1. EDII- "Faculty and external experts- A Hand Book for new Entrepreneurs: Publishers: Entrepreneurship Development", Institute of India, Ahmedabad, 1986.

UPE08B31: Human Relations

1. Engineering Ethics

Senses of 'Engineering Ethics'- variety of moral issues- types of inquiry- moral dilemmas- moral autonomy- Kohlberg's theory- Giligan's theory- consensus and controversy- professions and professionalism- professional ideas and virtues- theories about right action- self interest customs and religion-uses of ethical theories.

2. Engineering as social experimentation

Engineering as experimentation- engineers as responsible experimenters- codes of ethics- a balanced outlook on law- the challenger case study.

3. Engineer's Responsibility for safety

Safety and risk- assessment of safety and risk- risk benefit analysis- reducing risk- the Three Mile Island and Chernobyl case studies.

4. Responsibilities and Rights Collegiality and loyalty- respect for authority- collective bargaining- confidentiality- conflicts of interest- occupational crime- professional rights- employee rights- intellectual property rights (IPR) - discrimination.

5. Global Issues

Multinational Corporation- environmental ethics-Computer ethics-Weapons Development- engineer as managers –consulting engineer –engineer as expert witnesses and advisors – moral leadership –sample code of conduct.

Text Books:

1. Miki Martin and Roland Schinzinger, "Ethics in Engineering," Mc Graw Hill, New York 1996,

Reference:

1. Ethics in Engineering Profession by prof S.K. Chakraborty , IITM-Joka,
2. Charles D. Fleddermann,"Engineering Ethics," Prantice Hall , New Maxico 1999.
3. Laura Schlesinger," How could you do that: The Abdication of character, courage and conscience,"
Harper Collins, New York, 1996,
4. Stephen Carter," Integrity." Basic Books, Newyorks, 1996,
5. Tom Rush," The Power of Ethical persuasion: From Conflict to partnership at works and in Private
Life," Viking, New York 1993,

UPE08B32: Elective**List of Elective****1. Project Planning and Appraisal**

Project Definition : Venture analysis, Project management Features; Project organisation design; Operation planning and resource allocation; Plant location analysis models; Project scheduling; Gantt charts; Analysis of project networks - PERT and CPM. Scheduling under Resources constraint, Cash scheduling to multi-projects situation Project monitoring and control aspects; Decision making theories in Management under certainty, risk, uncertainty and competitive situations; applications of the methodologies and formulations in such project decision making problem solutions; Project capital, cost estimation; Breakeven Analysis, Cost Benefit Analysis; Profitability Analysis, Commercial and notional profitability. Project Engineering, procurement, storage and construction functions and other related management problems; Project wind up and technological obsolescence; Computer aided Project Management.

References :

1. Operations Research – An Introduction by Taha
2. Principles of Operations Research with Applications to Managerial Decision by Wagner

2. Supply Chain Management

Building blocks of a supply chain network. Business processes in supply chains. Types of supply chains and examples. Strategic, tactical, and operational decisions in supply chains. Supply chain performance measures. Supply chain inventory management: Newsboy, Base-stock, and (Q,R) models, multi-echelon supply chains, bullwhip effect. Performance modeling of supply chains using Markov chains and queuing networks. Mathematical programming models for supply chain planning, design, and optimization. Best practice supply chain solutions. Internet-enabled supply chains: e-marketplaces, e-procurement, e-logistics, e-fulfillment, customer relationship management, web services, Rosetta net, ERP and supply chains, supply chain automation, and supply chain integration.

Books

1. W.J. Hopp and M.L. Spearman. Factory Physics: Foundations of Manufacturing Management. Irwin, McGraw-Hill, 1996.
2. N. Viswanadham. Analysis of Manufacturing Enterprises. Kluwer Academic Publishers, 2000.
3. Sridhar Tayur, Ram Ganeshan, Michael Magazine (editors). Quantitative Models for Supply Chain Management. Kluwer Academic Publishers, 1999.
4. R.B. Handfield and E.L. Nichols, Jr. Introduction to Supply Chain Management. Prentice Hall, 1999.
4. N. Viswanadham and Y. Narahari. Performance Modeling of Automated manufacturing Systems. Prentice Hall of India, 1998.
6. Sunil Chopra and Peter Meindel. Supply Chain Management: Strategy, Planning, and Operation, Prentice Hall of India, 2002.
7. Jeremy F. Shapiro. Modeling the Supply Chain. Duxbury Thomson Learning, 2001.
8. David Simchi Levi, Philip kaminsky, and Edith Simchi Levi. Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies. Irwin McGrawHill, 2000.

4. Managerial Economics

Interaction between economic theory and production and managerial decision making; concept of firm, industry and economy. Consumer behaviour, utility, indifference curves and maps; consumer' supply, demand determinations, demand function. Production function, economy of scale, effect of technology, equilibrium condition, optimal expansion path. Short and long range cost functions. Perfect competition and monopoly, equilibrium of firm and industries, different models of firm. Determination of price, price discrimination, pricing of joint products.

References :

1. Modern Micro Ecomomics by Kou.
2. Managerial Economics by Peterson & Lewis

5. Soft computing in Decision Technology

Evolution of Decision Making Role of Cognitive Mind in Decision Technology. Decision Making under certain, uncertain and risk environments. Distributed Decision Making. Role of Fuzzy Sets and Systems in Decision Making. Multi Criteria Decision Making (MCDM). Fuzzy Multi Criteria Decision Making (FMCDM) Artificial Neural Network (ANN) and application of ANN in Decision Sciences. Genetic Algorithm (GA) and application of GA in Decision Sciences. Application of ELECTRE, AHP, Fuzzy AHP, TOPSIS ,Fuzzy TOPSIS in Decision Making in various engineering problems. Data Mining and Data Warehousing. Data Envelope Analysis (DEA). Particle Swarm Optimization (PSO) and Ant Bee Colony Optimization (ABC) Techniques.

Reference:

1. **Amit Konar**, Computational Intelligence-Princeples, Techniques and Applications-Springer.
2. **Kalyanmoy Deb**, Optimization for Engineering Design-Algorithms and Examples-PHI.
3. **S.S.Rao**, Engineering Optimization-theory and Practice-New Age International Publishers.

4. **Sankar K. Pal & Paul P. Wang**, Genetic Algorithms for Pattern Recognition-CRC Press.
5. **D.E. Goldberg**, Genetic Algorithms-Addison Wesley.
6. **K.V.Mitter**, Optimization
7. **Liu & Lee**, Introduction to Soft Computing-PHI.

UPE08P32: Automation CNC and Robotics Machines Lab

List of Experiments

- 1.A study of different control system and I,S and FANUC codes,
- 2.CNC Miller-Programming Exercise involving linear polation, circular interpolation and repeat cycle.
- 3.CNC Miller -Programming Exercise involving mirror image, tools seating, job setting and editing of tools.
- 4.CNC Miller -Programming Exercise involving canned cycles.
- 5.CNC –Lathe programming exercise for a simple component involving linear and circular – interpolation.
- 6.CNC- Lathe Programing Making use of subroutine and Do Loop.
- 7.CNC – Lathe Programming on hmt lathe in sinumeric system,
- 8.CNC programming on a retrofitted lathe.
- 9.CAM Software in CNC tutor, Master CAM,
10. Gegenerative machining in IDEAS,
11. Study of the geometry of the Robot Manipulations, grippers and exercises on Robot programming ,

UPE08P33: Mechatronics and Modern control Laboratory

List of Experiments

- 1.Open and Closed loop Positional control using positional and velocity feed back
- 2.Use of analog and digital servo system ,
- 3.PID control
- 4.Experiments in Pneumatic and hydraulic drives and actuators,
- 5.Use of logic gates, Microprocessor and PLC programming for simple control operations.

UPE08P34: Project (Part II) With Defense of Project

UPE08P35: Comprehensive Viva voce:

A student will have to appear at the comprehensive viva-voce examination on all the subjects covering the whole syllabus before a board of examiners including one external expert.