

Course Contents

Category	Title	Code	Credits-4 C			Theory Papers
HS-3	Entrepreneurship and Management Concepts	AU/CM/FT/IP/ME/TX 501	L	T	P	Max.Marks-100
			3	1	-	Min.Marks-35 Duration-3hrs.

Unit-I: System Concepts: Types, definition & characteristics; supra & subsystems, key component; boundary & interface complexity; feedback (pull) & feed forward (push) controls, open flexible-adaptive system, computer as closed system, law of requisite variety; system coupling, stresses and entropy; functional & cross functional system; Steven Alter's nine element work system model and its comparison with IPO (input-processing-output) model, structure and performance of work systems leading to customer delight.

Unit-II: Management: Importance, definition and functions; schools of theories, knowledge driven learning organization and e-business; environment, uncertainty and adaptability; corporate culture, difficulties and levels of planning, BCG matrix, SWOT analysis, steps in decision making, structured and unstructured decision; dimensions of organizations, size/specialization, behavior formalization, authority centralization, departmentalization, span and line of control, technology and Minzberg organization typology, line, staff & matrix organization, coordination by task force, business process reengineering and process of change management, HR planning placement and training, MIS; attitudes and personality trait, overlap and differences between leader & manager, leadership grid, motivation, Maslow's need hierarchy and Herzberg two factor theory, expectation theory, learning process, team work and stress management.

Unit-III: Marketing: Importance, definition, core concepts of need want and demand, exchange & relationships, product value, cost and satisfaction (goods and services) marketing environment; selling, marketing and societal marketing concepts; four P's, product, price, placement, promotion; consumer, business and industrial market, market targeting, advertising, publicity, CRM and market research.

Finance: Nature and scope, forms of business ownerships, balance sheet, profit and loss account, fund flow and cash flow statements, breakeven point (BEP) and financial ratio analysis, pay-back period, NPV and capital budgeting.

Unit-IV: Productivity and Operations: Productivity, standard of living and happiness, types of productivity, operations (goods and services) Vs project management, production processes and layouts, steps in method improvement, time measurement, rating and various allowances; standard time and its utility, predetermined motion and time method, product and process specification, TQM, cost of quality, introduction to lean manufacturing (JIT), QFD, TPM & six sigma quality.

Unit V: Entrepreneurship : Definition and concepts, characteristics, comparison with manager, classification, theories of entrepreneur, socio, economic, cultural and psychological; entrepreneur traits and behavior, roles in economic growth, employment, social stability, export promotion and indigenization, creating a venture, opportunity analysis competitive and technical factors, sources of funds, entrepreneur development program.

References:

- 1- Daft R; The new era of management; Cengage.
- 2- Bhat Anil, Arya kumar; Management: Principles ,Processes and Practices; Oxford higher edu.
- 3- Davis & Olson; Management Information System; TMH.
- 4- Steven Alter; Information systems, Pearson, www.stevenalter.com
- 5- Kotler P; Marketing management;
- 6- Khan, Jain; Financial Management;
- 7- ILO; Work study; ILO.
- 8- Mohanty SK; Fundamental of Entrepreneurship; PHI.

Course Contents

Category	Title	Code	Credits-4C			Theory Papers
Departmental Core DC-8	Reliability and Maintenance	AU/IP 502	L	T	P	Max.Marks-100
			3	1	0	Min.Marks-35 Duration-3hrs.

Unit 1 Basic Concepts of Reliability: Probability distributions used in maintenance engineering- Binomial, Poisson, Exponential, Normal, Log-normal, Gamma and Weibull distribution; failure rate, hazard rate, failure modes, MTTR, MTBF, MTTF

Unit 2 System Reliability Models: System reliability–n-component series systems, m-component parallel systems and combined system; standby systems; K-out-of-m systems; redundancy techniques in system design; event space, decomposition (Key Stone), cut and tie sets, Markov analysis, reliability and quality, unreliability, maintainability, availability

Unit 3 Maintenance Concepts and Strategies: Introduction, maintenance functions and objectives, maintenance planning and scheduling, maintenance organization.

General Introduction to Maintenance Types: Breakdown, emergency, corrective, predictive, and preventive; maintenance prevention; design-out maintenance, productive maintenance, shutdown maintenance and scheduled maintenance.

Unit 4 Condition Based Maintenance: Principles of CBM, pillars of condition monitoring, CBM implementation and benefits; condition monitoring techniques- visual monitoring, vibration monitoring, wear debris monitoring, corrosion monitoring, performance monitoring

Unit 5 Reliability Centered Maintenance (RCM):– Concept, methodology, benefits;

Total Productive Maintenance: Evolution of TPM, TPM objectives, concept, pillars of TPM.

Failure Modes and Effects Analysis (FMEA)/ Failure Modes, Effects and Criticality Analysis (FMECA): Overview, elements of FMECA, applications and benefits, risk evaluation, risk priority numbers, criticality analysis, process FMEA, qualitative and quantitative approach to FMECA; design FMEA and steps for carrying out design FMEA

References:

Modarre; Reliability and Risk Analysis, Marcel Dekker Inc
 Ebeling CE; An Introduction To Reliability & Maintainability Engg; John Wiley and Sons
 Davidson John; The Reliability of mechanical system; Institution of Mech. Engineers, London
 Patrick D.T and O.'Connor; Practical Reliability Engineerin; John Wiley and Sons
 Srinath L.S; Reliability Engineering; East West Press.
 Mishra R.C; Reliability and Maintenance Engineering; New age International publisher.
 Kelly Anthony; Maintenance Planning and Control
 R.C. Mishra and Pathak; Maintenance Engineering and Management;PHI.

Course Content

Category	Title	Code	Credits-6C			Theory Papers
Departmental Core DC -09	Metrology and Measurement	AU/IP 503	L	T	P	Max.Marks-100
			3	1	2	Min.Marks-35 Duration-3hrs.

Unit 1 General concepts of measurement: definition-standards of measurement, errors in measurement, limit-gauging, various systems of limits, fits and tolerance, interchangeability, ISI and ISO system. basic principles and design of standards of measuring gauges, types of gauges and their design, accuracy and precision, calibration of instruments, principles of light interference, interferometer, measurement and calibration.

Unit 2 Linear and angular measurements: Slip gauges, micrometers, verniers, dial gauges, surface plates, comparators- mechanical, electrical, pneumatic and optical comparator, angular measuring instruments- sine bar, angle gauges, spirit level, autocollimators, clinometers; measurement of straightness, flatness and squareness.

Unit 3 Measurement of surface finish and measuring machines: surface finish- definitions, types of surface texture, surface roughness measurement methods, comparison, profile-meters, pneumatic and replica, measurement of run out and concentricity, length bar measuring machine, optical projection, comparator, tool makers microscope.

Unit 4 Metrology of screw threads and gears: internal/external screw thread, terminology, measurement of various elements of threads, thread micrometer method, two wire and three wire methods; gear-terminology, measurement of various elements, constant chord method, base tangent method, plug method; gear tester, gear tooth measurement; rolling gear tester.

Unit 5 Computer aided and laser metrology: Co-ordinate measuring machine; applications; laser micrometer, laser interferometer, laser scanning gauge, non contact and in- process inspection, vision system.

References:

1. ASTE; Handbook of industrial metrology; Prentice hall of india ltd
2. Jain R.K.; Engineering metrology; Khanna publishers
3. Gupta. I.C. "A text book of engineering metrology", Dhanpat rai and sons;
4. Galye G.N et al; Metrology for engineers; elbs,
5. Rajput R.K; Engineering metrology and instrumentation; Kataria &sons publishers

List of Experiment (Pl. expand it):

1. Study and use of verniers, micrometer and dial gauges
2. Study and use of limit gauges
3. Study and use of slip gauges and sine bar
4. Study of Tool Makers Microscope
5. Measurement of straightness, flatness and squareness
6. Measurement of surface finish
7. Measurement of screw threads by one wire and two wire
8. Measurement of parameters of gear teeth
9. Study and use of profile projector
10. Study and use of comparators
11. Study and use of Coordinate measurement machines.

Course Contents

Category	Title	Code	Credits-6C			Theory Papers
Departmental Core DC-10	Computer Aided Design and Engg	IP 504	L	T	P	Max.Marks-100
			3	1	2	Min.Marks-35 Duration-3hrs.

Unit I: Fundamental of CAD, computer graphics, hardware and software, interactive hardware/software techniques, geometry creation, drawing standards, dimensioning and text writing, concept of layers, advanced concepts of CAD software- blocks, UCS, 3D-line, 3D object, DXF & DXB file formats.

Unit-II Geometric modeling- introduction, wire frame model, data structures for computer graphics, review of vector algebra, lines, circle, ellipses, parabolas, hyperbolas, conics, parametric representation of synthetic curves: hermite cubic splines, bezier curve, b spline curves, rational curves.

Unit-III 2D and 3D geometric transformations, homogenous coordinates, translation, rotation, scaling, reflection, shear, and transformations between coordinate systems, affine transformations. 3-D geometric transformations, 3-D viewing operations and graphics projections, visual realism, hidden line removal, shading and color models.

Unit-IV Extending the capability of CAD- rapid prototyping, stereo lithography, selective laser sintering, 3d printing, introduction to finite element analysis, solution of finite element equation-higher order and iso-parametric elements, equilibrium problems in structural mechanics, eigen value problems, overview of modeling software like- PRO-E, IDEA, CATIA, SOLID EDGE

Unit V introduction to optimization & its applications, classification of optimization problem, single variable optimization, multivariable optimization with no constraints, multivariable optimization with inequality constraints, One dimensional minimization methods, elimination method (unrestricted search), exhaustive search (Fibonacci method)

References:

1. Rao P N; CAD/CAM – Principle and application; TMH
2. Gokhle Nitin et al; Practical Finite Element Analysis; Finite to Infinite, 686 BudhwarPeth, Pune
3. Zeid Ibrahim, Sivasubramanian R; CAD/CAM; TMH
4. Alavala CR; CAD/CAM; PHI
5. Rogers and Adams; Mathematical Elements for Computer Graphics; McGraw-Hill
6. Hearn and Baker; Computer Graphics (C Version); Prentice Hall,
7. Foley, Van Dam, Feiner, Hughes; Computer Graphics: Principles and Practice; Addison Wesley
8. Omura J; Mastering Auto Cad
9. Rao S. S; Optimization & its Application; Wiley Eastern

List of Experiment (Pl. expand it):

1. Preparation of 2-D drawings for machine components (bolts, nuts, flange coupling, connecting rod, Auto components).
2. 3-D modeling - solid, surface, wireframe using standard CAD packages - Assembly of standard parts created using 3-D model.
3. Creation of 2-D drawings from 3-D models using CAD packages, different views, sections, Isometric view and dimensioning them.
4. Parametric modeling, creating standard machine parts, connecting rod, flange coupling, bearings
5. Analysis of simple machine parts by meshing into finite elements

Course Content

Category	Title	Code	Credits-6C			Theory Papers
Departmental Core DC-11	Metal Casting and Metal Forming	IP/ME 505	L	T	P	Max.Marks-100
			3	1	2	Min.Marks-35 Duration-3hrs.

Unit-1 Metal Casting Processes: Advantages and limitations, applications, casting terms, sand mould making procedure, pattern allowances, core prints, pattern materials, types of patterns, moulding-sand composition, testing sand properties, sand preparation, casting technique of cast iron, steels and nonferrous alloys.

Unit-2 Melting Practices Cupola, capacity of a cupola, cupola operation, zones of cupola, cupola efficiency, melting furnaces for non –ferrous metals, classification of crucible furnaces, gating system, pouring basin, sprue, runner, gates, types of gates, riser, gating design, numerical simulation, main consideration in design and position of risers, types of risers, feeder location and shapes use of exothermic materials, use of chills.

Unit-3 Solidification and Special casting process: Solidification of casting, permanent mould casting, slush casting, die casting, centrifugal casting, investment casting, continuous casting, casting defects and their remedies, cleaning of castings, repair of casting, inspection of casting. solid modeling of castings, design for castability.

Unit-4 Metal Forming: Nature of plastic deformation, stress-strain relation inelastic and plastic deformation, concept of flow stress, deformation mechanism, hot and cold working, rolling principal, rolling stand arrangement, roll passes, breakdown passes, roll pass sequence, analysis of rolling, sheet metal working processes.

Unit-5 Forging, Extrusion and other Processes: Forging operations, forging design, drop forging die design, die inserts; **Extrusion**-principle, forward and backward extrusion, impact extrusion, hydrostatic extrusion, extruding tubes **Wire drawing**- rod and tube drawing, tube making, swaging.

References:

- (1) Roa P.N; Manufacturing Technology-foundry, forming...;TMH
- (2) Ravi B; Metal casting- CAD and Analysis; PHI
- (3) Jain PL; principles of foundry technology; TMH
- (4) Hennie & Roshanthall; Metal casting; Mcgraw Hill New York
- (5) Chambell J.S; Manufacturing Science; Mcgraw Hill New York
- (6) Sharma S.K; Manufacturing Science; I.K.International New Delhi
- (7) Lindberg; Manufacturing Technology; Pretince Hall New Delhi

List of Experiment (Pl. expand it):

1. Solid modeling of casting parts using design for casting on software
2. Pattern making and sand molding using the solid model prepared in 1 above
3. Casting of molds prepared in 2 above
4. Design of Ggating system for casting using software and making physical models
5. Design and fabrication of metal forming parts
6. Design and fabrication of forging parts

Course Content

Category	Title	Code	Credits-3C			Practical
IT-4	RDBMS	IP 506	L	T	P	Max. Marks-50 Min. Marks: 25 Duration: 3 hrs.
					3	

UNIT-I

Introduction: Advantage of DBMS approach, various view of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, transaction management, Database administrator and users, data dictionary, overall system architecture.

ER model: basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

UNIT-II

Domains, Relations and keys: domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys.

Relational Algebra & SQL: The structure, relational algebra with extended operations, modifications of Database, idea of relational calculus, basic structure of SQL, set operations, aggregate functions, null values, nested sub queries, derived relations, modification of Database, join relation, DDL in SQL.

UNIT-III

Relational Dependencies and Normalization: basic definitions, trivial and non trivial dependencies, closure set of dependencies and of attributes, irreducible set of dependencies, introduction to normalization, non loss decomposition, FD diagram, first second, third Normal forms, dependency preservation, BCNF, multivalued dependencies and forms normal form dependency and fifth normal forms. **Distributed Database:** basic idea, distributed data storage, data replication, data fragmentation-horizontal, vertical and mixed fragmentation.

UNIT-IV

Emerging Fields in DBMS : object oriented Database-basic idea and the model, object structure, object class, inheritance, multiple inheritance, object identity, data warehousing-terminology, definitions, characteristics, data mining and it's overview, Database on www, multimedia Database-difference with conventional DBMS, issues, similarity based retrieved continuous media data, multimedia data formats, video servers.

Unit V

Storage structure and file organizations: Overview of physical storage media, magnetic disks-performance and optimization, basic idea of RAID, organization, organization of records in files, basic concepts of indexing, ordered indices, basic idea of B-tree and B+-tree organization.

Network and hierarchical models: basic idea, data structure diagrams, DBTG model, implementations, tree structure diagram, implementation techniques, comparison of the three models.

References:

1. A Silberschatz, H.F. Korth, Sudersan "Database System Concept"=, MGH Publication.
2. C.J. Date "An introduction to Database System"=6th ed.
3. Elmasri & Navathe "Fundamentals of Database system"- III ed.