SYLLABUS FOR THE BATCH 2017-2021
## SYLLABUS FOR THE BATCH 2017-2021

### VII SEMESTER

**DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING**

**SCHEME OF TEACHING AND EXAMINATION**

**SEVENTH SEMESTER B.E (AUTONOMOUS SCHEME)**

<table>
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<th>Category</th>
<th>Contact Hrs. / Week</th>
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**Total Credits**

|        | 24 |

**Contact hours per week**

|        | 28 |

### Elective-II

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### VIII SEMESTER

**DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING**

**SCHEME OF TEACHING AND EXAMINATION**

**EIGHTH SEMESTER B.E (AUTONOMOUS SCHEME)**

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**Total Credits** 17

**Contact hours per week** 24

## Elective-IV

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OPERATIONS RESEARCH (4:0:0)

Course Code : IP 0422
Hrs/Week : 04
SEE Hrs : 03

CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

Course Objectives:

The objective of the course is to give an exposure to student in modeling, solving and analyzing problems using operations research models. Emphasis will be on basic concepts, applications and computer usage.

Unit 1
Introduction: Historical development of OR, definition of OR, models of OR, features of OR models.
Linear Programming: Definition, mathematical formulation, standard form, solution space, solution – feasible, infeasible, multiple, optimal, redundancy, degeneracy, graphical method.

SLE: Application of OR to engineering and managerial problems.

8 Hrs

Unit 2

SLE: Degeneracy problems.

8 Hrs

Unit 3
Assignment Problem: Formulation of the assignment problem, unbalanced assignment problem.
Transportation Problem: Formulation of transportation model, basic feasible solution using North-West corner, least cost, Vogel’s approximation method, optimality test by MODI method. unbalanced transportation problem, degeneracy in transportation problems, applications of transportation problems.

SLE: Traveling salesman problem

10 Hrs

Unit 4
Queuing Theory: Queuing system and their characteristics. The M/M/I queuing system, steadystate performance, analyzing of M/M/I queuing model, M/M/K/ Model.

SLE: Derivation of birth and death model (M/M/1): (∞/FCFS)

10 Hrs.
Unit 5


SLE: Resource smoothing, resource leveling.

Unit 6

Game Theory: Formulations of games, two person zero sum game, games with and without saddle point, dominance property, graphical solutions (2xn, mx2 game). 8Hrs

SLE: Solving problems using linear programming method.

Text Books:

References:

Link: https://www.youtube.com/watch?v=a2QgdDk4Xjw&list=PLjc8ejfjfgTf0LaDEHgL3bCHZYcNtsoX

Course Outcome:
Upon successful completion of the course, the students will be able to

1. Identify and develop operational research models that consider the key elements of the real world problem from the verbal description of the real system.
2. Solve the linear programming models for their optimal solution and interpret the model’s solution
3. Analyze and solve managerial problems in industry so that they are able to use resources more effectively using assignment and transportation model.
4. Select mathematical and computational modeling of real decision making problems, including the use of modeling tools and computational tools, as well as analytic skills to evaluate the problems under uncertainty
5. Design new simple models: CPM, PERT, to improve decision-making and develop critical thinking and objective analysis of decision problems.
6. Analyze and solve basic mathematical models of games with strategic considerations.
Mapping of COs to POs:

<table>
<thead>
<tr>
<th>Course Outcomes</th>
<th>Programme Outcomes that are satisfied by the COS</th>
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<td>PO1, PO2</td>
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<td>CO3</td>
<td>PO4</td>
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<tr>
<td>CO4</td>
<td>PO6</td>
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<td>CO5</td>
<td>PO11</td>
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<tr>
<td>CO6</td>
<td>PO4, PO7</td>
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MANAGEMENT AND ENTREPRENEURSHIP (4:0:0)

Course Code : IP0458
Hrs/Week : 04
SEE Hrs : 03

CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

Course Objective:

By this course, a student should diagnose a firm’s competitive situation based on real world situations and implement entrepreneurial knowledge to overcome various short range and long range problems.

Unit 1
Management: Introduction- meaning-nature and characteristics of management, scope and functional areas of management- management as a science, art or profession – management and administration – roles of management, levels of management, skills and competence for effective managing, development of management thought, classical approach and neo classical approach, social responsibility of manager, case studies.

SLE: Maslow's hierarchy theory

Unit 2
Planning and Decision Making: Nature and purpose of planning, types of plans, steps in planning, planning process, importance and limitations of rational decision making, approaches for selecting an “alternative”, Decision making under certainty, uncertainty and risk, case studies.

SLE: Modern approaches to decision making under uncertainty

Unit 3
Organizing and Staffing: Nature and purpose of organizing, formal and informal organizations, organization levels and the span of management, structure and process of organizing, organizing through departmentalizing, matrix organizations, authority and power, line and staff concepts, decentralization and delegation of authority, systems approach to staffing, systems approach to selection, case studies.

SLE: Basics of organizational behavior

Unit 4
Motivating and Leading technical people: Human factors in managing, creativity and innovation, motivation and motivators, overview on theories of motivation, special motivation technique, leadership and its ingredients, overview on theories of leadership, importance of communication, communication process model, barriers to communication, towards effective communication, case studies

International business management: International management in selected countries, International management and multinational corporations (MNCs).
SLE: Managerial functions in International Business, Global theory of Management.

Unit 5
Entrepreneurship: Meaning of entrepreneur, evolution of the concept, functions of an entrepreneur, types of entrepreneur, entrepreneur – an emerging class, concept of entrepreneurship – development of entrepreneurship, steps in entrepreneurial process, role of entrepreneurs in economic development. 6Hrs

SLE: Entrepreneurship in India and Barriers.

Unit 6
Micro small and Medium Enterprises (MSME): Definition, characteristics, need and rationale, objectives, scope, role of MSME in economic development. steps to start an MSME – Government policy towards MSME, impact of liberalization, privatization, globalization on MSME, effect of WTO/GATT

Feasibility study: Market Feasibility study, technical feasibility study, financial feasibility study and Social feasibility studies.

Preparation of Project: Meaning of project, project identification, project selection: project report, need and significance of report, contents, formulation, guidelines by planning commission for project report, network analysis, errors of project report, project appraisal. identification of business opportunities. 12Hrs

SLE: Institutional Support: Different Schemes, TECKSOK, KIADB, KSSIDC, KSIMC, DIC Single Window Agency: SISI, NSIC, SIDBI, KSFC.

Text books:

References:
Course outcomes:
Upon successful completion of the course, the student will able to:

1. Defines the meaning, nature, levels and characteristics of management.
2. Describes the nature, types, purpose of planning and taking decision under different conditions.
3. Defines the different organization structures and staffing policies and procedures.
4. Demonstrate the motivation, leadership theories and communication process model.
5. Define the entrepreneurship concept, process and barriers in entrepreneurship.
6. Demonstrate scope, role of MSME and guidelines to write project report.

Mapping of COs to POs:

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<td>CO6</td>
<td>PO11,PO12</td>
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FINANCIAL MANAGEMENT (4:0:0)

Course Code : IP0424
Hrs/Week : 04
SEE Hrs : 03

CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

Course Objective:
- To introduce the basic tools and techniques required in financial management, decision making, financing, dividend and working capital.

Unit 1
Introduction: Evolution of financial management, goals, scope, objectives, key activities, financial decisions in a firm, principles of finance, risk return trade-off.

SLE: Forms of Business

Unit 2
Financial statements: Balance sheet, profit and loss account, relationship, financial analysis, nature of ratio analysis, types of ratios.

SLE: users of Financial Analysis

Unit 3
Capital Budgeting: Techniques and problems, cost volume profit analysis, break even analysis, problems

SLE: Process of capital budgeting

Unit 4
Working capital management: Introduction to working capital, determination of operating cycle, types of operating cycles, budgets, purposes of budgeting, essentials of budgeting, types of budgets, problems.

SLE: Factors influencing working capital requirement

Unit 5
Long Term Sources of Finance: Shares, debentures, preference shares, term loans, primary and secondary markets, venture capital.

SLE: SEBI guide lines on capital issues, stock market in India

Unit 6
Dividend Policy: Introduction, reasons for payment of dividends, bonus shares and stock splits.
Mergers and Acquisitions: reasons, mechanics, takeovers, acquisitions, leasing, portfolio management, international financial management, hybrid financing.

SLE: Dividend policies in practice.
Text Books:

References:

Course outcome:
Upon successful completion of the course, the student will be able to

1. Understand the basic concepts of financial management.
2. Explain the financial statements with a case study.
3. Interpret different techniques in selecting a project using capital budgeting and concepts of Cost-Volume-Profit.
4. Recall the basic concepts of working capital management and prepare different types of budgets.
5. Interpret different sources of finance and knowledge of venture capital.
6. Interpret dividend policies and demonstrate the concept of mergers and acquisition for various firms.

Mapping of COs to POs:

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MACHINE TOOL AND FLUID POWER SYSTEMS LAB (0:0:3)

Sub Code : IP 0108
Hrs/Week : 03
SEE Hrs : 03

CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 50

Course Objectives:

- To conduct experiments on various machine tools to establish the cutting forces during machining using dynamometers.
- Know the components of machine tool parts by disassembling and assembling the same.
- To build hydraulic circuits to control the machine tool parts.

Experiments:

1. Acceptance tests on lathe, drilling machine, milling machine.
2. Determination of cutting forces during turning using lathe tool dynamometer.
3. Determination of thrust and torque during drilling with drill tool dynamometer.
5. Determination of chip-reduction ratio during orthogonal cutting on a lathe.
6. Assembly and disassembly of screw jack
7. Assembly and disassembly of tail stock
8. Assembly and disassembly of tool head of shaper
9. Assembly and disassembly of indexing head
10. Building up of hydraulic pressure intensification circuit.
11. Building up of hydraulic regenerative cylinder.
12. Comparison of tandem centre and closed centre directional control valve.
14. Study of will, travel and time dependent control in pneumatic systems.
15. Building up of AND and OR logic functions in pneumatic system.

Course Outcomes:

Upon successful completion of this course, the students will able to

1. Demonstrate how the machine tools can be tested for their accuracy by conducting acceptance tests.
2. Explain the important elements of a machine tool part by performing disassembly and assembly.
3. Evaluate the cutting forces during machining operations with the help of dynamometers.
4. Build hydraulic circuits to control the machine tool parts.

**Mapping of COs to POs:**

<table>
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SOFTWARE APPLICATION LABORATORY (0:0:3)

Course Code : IP0116
Hrs/Week : 03
SEE Hrs : 03
CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 50

Course Objectives:

Student learn Oracle/MS SQL server and use of software packages to solve linear programming problems, plotting appropriate charts and diagrams relevant to various industrial applications.

- Develop of simple MIS applications using Oracle / MS SQL server as the back-end, and VB6.0 / Developer 2000 as the front-end.
- Developing the applications for basic transactions. Purchase and sales using trigger conceptand on delete cascade.
- Use of software packages to solve assignment model problems. Transportation model Problems and Linear Programming Problems, Plotting appropriate charts and diagrams relevant to various industrial applications.
- Use of Mini Tab package

Text Books:

References:

Course Outcomes:
Upon successful completion of the course, the student will able to:

1. Explain the basic concepts of oracle and write the SQL queries for the given application
2. Demonstrate trigger and on delete cascade concept in developing banking application.
3. Solve the practical cases using TORA packages.

Mapping of COs to POs:

<table>
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<th>Course Outcomes</th>
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PROJECT WORK (PRELIMINARY) (0:0:4)

Course Code : IP0203       Mid Term Evaluation : 40 Marks
Hrs/Week : 04              Final Evaluation : 60 Marks
                           Max. Marks: 100

Course Objective:

Enabling the students to form heterogeneous group to carry out project work.

Students will form teams with a maximum of four in each group. They identify Industry / Institute to carry out Project work. The students will carry out a detailed literature survey and arrive at the objectives and methodology for the same.

Course Outcomes:

Upon the successful completion of the Industry Internship, the student will be able to:

- Identify their areas of interest, carry out literature survey and explore the possibility of carrying out live projects in Industries
- Arrive at the objective and scope of the project
- Decide upon methodology and modern tools to be used
- Appreciate the need for team work and understand the ethics of doing things

Mapping of COs to POs:

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Department of I & P Engg, NIE, Mysuru
INDUSTRIAL VISIT /INTERNSHIP

Sub Code : IP0113

SEE : 50Marks

Course Objective:
To expose students to industrial working environment. Students should undergo minimum of two weeks of industrial training in a reputed company at the end of fourth/fifth/sixth semester examination and submit a report during the beginning of sixth semester followed by presentations.

Course Outcomes:
Upon successful completion of the course, students will be able to:

- Understand the working environment in the Industry.
- Know the modern tools, techniques and procedures adopted in the Industries

Mapping of COs to POs:

<table>
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Electives- II

THEORY OF METAL CUTTING (3:0:0)

Course Code : IP 0310
Hrs/Week : 03
SEE Hrs : 03
CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

Course Objective:
To introduce to the students theory of metal cutting through mechanism of metal cutting, Tool geometry, cutting..

Unit 1
Geometry of Cutting Tools: Nomenclature of a single point cutting tool, cutting parameters and tool geometry, nomenclature of a drill bit, significance of different tool angles, recommended tools and geometry for different work materials.
Tool Materials: Importance of Tool materials - composition and structure. desirable properties of tool materials, composition and structure of: high carbon steel, high speed steel, cemented carbides, ceramics, coated tools, poly crystalline cubic boron nitride and diamond tools, recommended cutting speeds for the above tools and their applications.

SLE: CV&Dand PVD Coating Techniques and their applications. 8Hrs

Unit 2
Mechanism of Metal Cutting: Orthogonal and oblique cutting, mechanism of chip formation, different types of chips like continuous, discontinuous and continuous chips with built up edge, cutting ratio, determination of shear plane angle, force components in orthogonal cutting, Merchant’s circle diagram and analysis, velocity relationship, power and energy relationship, problems on the above.

SLE: Chip flow direction, Stabler’s law, slip line field -theory a simple concept. 7Hrs

Unit 3
Measurement of Cutting Forces: Introduction, Forces involved in machining, requirements of tool dynamometers, different types of force measurement, thermal aspects, economics, machine tool dynamometers, dynamometers for lathe, drilling and milling operations.

SLE: Importance of Piezo Electric Dynamometer, riding Tool Dynamometers 7Hrs

Unit 4
Thermal Aspects in Metal Cutting: Heat sources during metal cutting, factors influencing tool temperature, techniques for temperature measurement, temperature in chip formation.
Cutting Fluids: Importance of cutting fluids in metal cutting, desirable properties of cutting fluids, different types of cutting fluids, their properties and composition, selection of cutting fluids for different application, recommended cutting fluids, methods of applications.

SLE: Experimental determination of tool temperature. 8Hrs
Unit 5
**Tool Wear and Tool Life:** Types of tool wear, mechanism of tool wear like adhesion, abrasion, diffusion, crater wear and flank wear, tool wear criterion, Taylor’s tool life equation, effect of process parameters on tool life, numerical problems.

**SLE: Machinability of Materials.**

Unit 6
**Economics of Machining:** elements of production cost like material, labor and overhead costs, tool cost, cutting speed for maximum productivity, numerical examples.

**SLE: Cutting speed for minimum cost.**

Text Books:
1. *Fundamentals of Metal Cutting and Machine Tools* by B L Juneja and G S Sekhon
   New age International. 2nd edition 2012,

References:

**Course Outcomes:**

Upon successful completion of the course, the student will be able to

1. Understand the geometry of cutting tools and the different types of tool materials and their applications.
2. Explain mechanics of metal cutting supported by relevant theories.
3. Demonstrate the cutting force measurement technique in different machining operations.
4. Comprehend the importance of temperature build up during metal cutting and means of reducing the same with the application of cutting fluids.
5. Explain the wear types and the mechanisms involved, Taylor's Tool life equations and the parameters involved.
6. Understand the need for achieving economy in machining through relevant models.

**Mapping of COs to POs:**

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INDUSTRIAL ROBOTICS (3:0:0)

Course Code : IP 0311
Hrs/Week : 03
SEE Hrs : 03

CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

Course Objective:
To imbibe in students the basic concepts, mechanism and controls of robot system for developing robotic program used in manufacturing systems.

Unit 1
Introduction: Automation and robotics, brief history of robotics, social and economic aspects of robots, advantages and disadvantages of using robots in industries.

Classification and structure of robotic system: Classifications, geometrical configurations, wrist and its motions, end effectors and its types, links and joints.

Robot drive systems: Hydraulic, electric and pneumatic drive systems, resolution, accuracy and repeatability. 8Hrs

SLE: Overview of robots – present and future applications and advantages and disadvantages of drive systems

Unit 2
Control Systems and Components: Basic control system concepts and models, transformation and block diagram of spring mass system, controllers – ON and OFF, proportional integral, proportional and integral, transient and response to second order system.

6Hrs


Unit 3
Robot Arm Kinematics: Rotation matrix, composite rotation matrix, rotation matrix about an arbitrary axis, Euler angels, representation, homogeneous transformation, links, joints and their parameters, D – H representation. 8Hrs

SLE: Kinematics – Introduction, direct and inverse kinematics

Unit 4
Robot Arm Dynamics: Lagrange – Euler Formulations, Joint velocities, kinetic energy, potential energy and motion equations of a robot manipulator.

Trajectory Planning: Introduction, general considerations on trajectory planning, joint interpolated trajectories, 4-3-4 trajectory examples. 6Hrs

SLE: Planning of Cartesian Path Trajectory.
Unit 5

**Robot programming:** Introduction, programming languages – VAL [Simple examples], graphical programming, storing and operating, Task programs.  
--- **6Hrs**

*SLE: Manual teaching, lead through teaching*

Unit 6

**Sensors:** Internal state sensors, tactile sensors, proximity sensing, range sensing, force and torque sensors, elements of computer vision, sensing and digitizing function in machine vision – image devices, lighting techniques – analog to digital signal conversion, sampling, quantization, encoding – image storage. image processing and analysis.  
--- **6Hrs**

*SLE: Features Extraction and Object recognition.*

**Text Books:**

**References:**

**Course Outcomes:**
Upon successful completion of the course, the student will able to

1. Outline the basics of robotics and its drives used for various motions.
2. Recall the concepts of control system and components used for robots.
3. Solve problems related to transportations and kinematics of robotics.
4. Understand the importance of Robotic arm dynamics and its trajectory planning
5. Learn different types of programming methods and languages of robots.
6. Understand the importance of various sensors and their applications in robots.

**Mapping of COs to POs:**

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FACILITY PLANNING AND DESIGN (3:0:0)

Course Code : IP 0312  
Hrs/Week : 03  
SEE Hrs : 03

CIE : 50% Marks  
SEE : 50% Marks  
Max. Marks: 100

Course Objective:

To make the students understand the importance of layouts in plants using models using appropriate design and computerized techniques.

Unit 1

Plant Location: Factors influencing plant location, theories of plant location, plant layout – objectives of plant layout, principles of plant layout, types of plant layout, their merits and demerits, facilities design function: objectives. Case studies on layouts layouts.

Introduction to Material Handling: Objectives and principles of material handling, unit load concept, Basic handling equipment types, Common material handling equipments. 7Hrs

SLE: Classification of material handling equipment.

Unit 2

Plant Design: Layout procedure, Immer, Nadler, Muther, Apple James and Reed’s approaches, systematic layout planning, the activity relationship chart, Constructing the activity relationship chart, Activity relationship diagram. 6Hrs

SLE: Space relationship diagram to plant layout.

Unit 3

Computerized Layout Planning: Computerized relative allocation of facility techniques (CRAFT), Plant layout Evaluation Techniques (PLANET), Computerized Relationship Layout Planning (CORELAP), Comparison of computerized layout techniques. 5Hrs

SLE: Automated layout design program (ALDEP), Criteria for a computerized layout program

Unit 4

Space Determination and Area Allocation: Factors for consideration in space planning, receiving, storage, production, shipping, tool room and tool crib, other auxiliary service actions, establishing total space requirement, area allocation factors to be considered, expansion, flexibility, aisles column, area allocation procedure, the plot plan.

Construction of the Layout: Methods of constructing the layout, evaluation of layout, efficiency indices, presenting layout to management. 9Hrs

SLE: Standardized office planning, Work place Design.
Unit 5
Quantitative approaches to facilities planning: Deterministic models, single and multi facility models, Conventional layout model: Block stacking, location allocation models. 7Hrs

SLE: Automated storage and retrieval systems

Unit 6
Layout Models: Warehouse layout models, waiting line models, Storage models. 6Hrs

SLE: Evaluation, selection and implementation of facilities plan.

Text books:

References:
4. Facilities planning –Tompkins white –wiley India Pvt ltd 3rd edition

Course Outcomes:
Upon successful completion of the course, the students will able to

1. Identify the planning strategies for implementation, evaluation and maintaining the facility.
2. Arrive at suitable layout for given situations having understand different approaches.
3. Demonstrates the ideas on various types of layout and evaluation techniques using computers.
4. Demonstrate the Space determination and area allocation procedure, construction of the layout.
5. Analyze the quantitative methods and models to determine for the plant location.
6. Explain the warehouse and waiting line models.

Mapping of COs to POs:

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FINITE ELEMENT METHODS (2:2:0)

Course Code : IP 0313
Hrs/Week : 04
SEE Hrs : 03

CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

Course Objective:

To learn the basic concept of Finite Element Method (FEM) and the theory of elasticity and apply effectively the FEM methods to problems in various structural engineering

Unit 1
Introduction to FEM and Theory of elasticity: Basic procedure of FEM. Application of FEM. Theory of Elasticity and 2D and 3D equations of equilibrium, principle stresses and strains, equations in cylindrical and polar coordinates. Axisymmetric bodies. Strain analysis, stress strain relations and generalized hooks law, plane stress and plane strain problems.

8Hrs

SLE: Theories of failures strain energy.

Unit 2

8Hrs

SLE: Principle of virtual work and Gelarkin method.

Unit 3

7Hrs

SLE: Properties of K-matrix and storage, convergence of solution

Unit 4
Truss Element: Local and Global Coordinate system, Transformation matrix. Stiffness matrix and assembly, stress calculation. Temperature stresses, numerical problems on simple truss structures.

6Hrs

SLE: Problems on real life truss element.

Unit 5

6Hrs
**SLE: Elementary beam theory**

**Unit 6**  
**Two Dimensional Analysis:** 2 D stress strain relations, constant strain triangle, nodes, DOF, displacement functions – Jacobian and B Matrix, Expression for Ke – Load vectors – stress calculation – temperature effects – Problems, modeling and Boundary conditions – simple problems.  

7Hrs

**SLE: study the basics of engineering vibrations.**

**Text books:**


**References:**


**Course Outcomes:**

Upon successful completion of the course, the student will able to

1. Formulate the three dimensional stress, strain equations using theory of elasticity.  
2. Evaluate engineering problems by Rayleigh-Ritz method.  
3. Solve the 1D problem using FEA.  
4. Evaluate trusses and beams using FEA.  
5. Evaluate beams using FEA.  
6. Solve the 2D problem by FEA.

**Mapping of COs to POs:**

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Electives- III

DATABASE MANAGEMENT SYSTEM (3:0:0)

Course Code: IP 0314          CIE: 50% Marks
Hrs/Week: 03                  SEE: 50% Marks
SEE Hrs: 03                   Max. Marks: 100

Course Objective:

To make students understand the concepts of database management, models, relational models, writing simple and complex SQL queries, normalization and transaction in database system.

Unit 1
Database and Users: Introduction, characteristics of database approach, intended uses of a DBMS and advantages of DBMS.

Database Systems concepts and Architecture: Data models, schemas and instances, DBMS architecture and data independence, database languages and interfaces, database system environment, classification of database management systems. 6Hrs

SLE: Implications of database approaches.

Unit 2
Data Modeling: High level conceptual data models for database design, entity types, entity sets, attributes and keys, relationships, relationship types, roles and structural constraints, weak entity types, ER diagrams. 8Hrs

SLE: ER diagram for different applications.

Unit 3
Relational Data Model and Relational Algebra: A Brief discussion on codd rules, relational model concepts, constraints and schemas. Update operation on relations, basic and additional relational algebra operations and queries in relational algebra. 7Hrs

SLE: Writing queries in SQL for given application.

Unit 4
(SQL) Structured Query Language: Data definition in SQL2, basic and complex queries in SQL, insert, delete, update statements. 7Hrs

SLE: Views in SQL, embedded SQL.

Unit 5
Database Design: Design guidelines for relational schemas, functional dependencies, normalization – 1st, 2nd, 3rd, 4th and 5th normal forms, and database design process and guidelines for relational systems. 7Hrs

SLE: Factors influencing physical database design guidelines.
Unit 6

**Transaction:** Concepts, properties, schedules, based on serializability, transactional support in SQL—two phase locking, database recovery techniques.  

**SLE:** Concurrency control techniques

**Text Books:**

**References:**

**Course Outcomes:**
Upon successful completion of the course, the students will be able to

1. Understand data, database and characteristics, advantages and models of database.
2. Demonstrate the models, architecture, languages and classification of database management system.
3. Recall the relational data models and constraints and concepts.
4. Understand the basic concept of SQL and construct the queries for the given application.
5. Comprehend the Functional dependencies and normalization concepts in database design
6. Illustrate the transaction concepts, ACID properties and concurrency control to design the online transaction databases.

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MECHANICAL VIBRATIONS (3-0-0)

Sub Code : IP 0307  
CIE : 50% Marks
Hrs / Week : 03  
SEE : 50 %Marks
SEE Hrs : 03  
Max. Marks: 100

Course Objective:

To analyze and effect of mechanical vibration in simple components having degrees of freedom.

Unit 1
7Hrs

SLE: Effect of mass of spring,

Unit 2
Damped Free Vibrations: Single degree freedom systems, different types of damping, viscous damping concept of critical damping and its importance, study of response of viscous damped systems for cases of under damping, critical and over damping, logarithmic decrement.  
7Hrs

SLE: Coulomb Damping.

Unit 3
Forced Vibrations: Single degree freedom systems, steady state solution with viscous damping due to harmonic force, solution by complex algebra, concept of response, reciprocating and rotating unbalance, vibration isolation-transmissibility ratio, energy dissipated by damping, sharpness of resonance, base excitation. vibration measuring instruments: whirling of shafts with and without air damping, discussion of speeds above and below critical speeds.  
8Hrs

SLE: Accelerometer and Vibrometers.

Unit 4
Systems With Two Degrees of Freedom: introduction, principle modes and normal modes of vibration, co-ordinate coupling, generalized and principal co-ordinates, free vibration in terms of initial conditions, geared systems.  
8Hrs

SLE: Dynamic vibration absorber

Unit 5
Multi Degree of Freedom Systems and Continuous Systems: Governing differential equation for a MDOF system, introduction to continuous systems, vibration of string, longitudinal vibration of rods, torsional vibration of rods.  
6Hrs

SLE: Euler's equation for beams.
Unit 6
6Hrs

**SLE:** Maxwell reciprocal theorem.

**Text Books:**

**Reference Books:**

**Course Outcomes:**
Upon successful completion of this course, the students will be able to:

1. Identify and derive vibration characteristics of undamped free vibration systems using fundamental concepts of mathematics and physics.
2. Demonstrate and characterize the effect of damping on free vibration characterize.
3. Analyze and derive characteristics of forced vibrations and use various systems for vibration measurement.
4. Characterize two degree vibration systems in terms of natural frequency, mode shapes and coupling phenomena.
5. Demonstrate the characteristic of vibration of multi degree freedom systems of both translation and rotational vibrating systems.
6. Demonstrate the application of numerical methods to study the characterize of vibration of multi degrees of freedom systems.

**Mapping of COs to POs:**

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AUTOMATION IN MANUFACTURING (3:0:0)

Course Code : IP 0316  
Hrs/Week : 03  
SEE Hrs : 03  
CIE : 50% Marks  
SIE : 50% Marks  
Max. Marks: 100

Course Objective:  
Able to appreciate the methods of automating and controlling manufacturing systems.

Unit 1  
Automation in production systems: Introduction, automated manufacturing systems, computerized manufacturing support systems, reasons for automating, automation principles and strategies.  
SLE: Automation migration strategy.  
8Hrs

Unit 2  
Automated systems: Basic elements of automated system, advanced automation functions, levels of automation.  
Hardware components for automation: Sensors, actuators, analog to digital converters, digital to analog converter.  
SLE: Input/output devices for discrete data.  
7Hrs

Unit 3  
Numerical control (NC): Fundamentals of NC technology, computer numerical control, application of NC, advantages and disadvantages of NC.  
NC part programming: Manual part programming, NC part programming using CAD/CAM  
SLE: Computer assisted part programming.  
6Hrs

Unit 4  
Industrial Robotics: Introduction: Robot anatomy and related attributes, robot control systems, end effectors, industrial robot applications.  
SLE: Sensors in robotics  
7Hrs

Unit 5  
Discrete control: Discrete process control, concepts of logic control and sequencing, programmable logic controllers.  
SLE: Personal computers using soft logic.  
7Hrs

Unit 6  
Automatic Identification and Data Capture: Introduction, overview of automatic identification, Methods linear bar codes, radio frequency identification.  
SLE: Magnetic stripes. Optical character recognition (OCR), machine vision.  
7Hrs
Text Books:

References:

Course Outcomes:
Upon successful completion of the course, the student will able to

1. Apprehend the application of automation in manufacturing systems.
2. Interpret the basis of automation.
3. Recall the concepts of numerical control.
4. Outline the application of robots in automated manufacturing systems.
5. Identify the control mechanism in automation.
6. Select the appropriate automatic identification and data encoding systems for use in automated systems.

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TOTAL QUALITY MANAGEMENT (3:0:0)

Course Code : IP 0318
Hrs/Week : 03
SEE Hrs : 03

CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

Course Objective:
To understand the quality management imperatives and practice of quality systems, tools and techniques in industries.

Unit 1
Introduction of TQM: Definition, basic approach, Gurus of TQM, TQM framework, awareness, defining quality, historical review, obstacles, benefits of TQM

Leadership: Definition, characteristics of quality leaders, leadership concept, characteristics of effective people, ethics, The Deming philosophy, role of TQM leaders and various theories, implementation, core values, concepts, and framework, strategic planning, communication, decision making. 8Hrs

SLE: Role of quality in survival of an organization.

Unit 2
Customer satisfaction and Employee Involvement: customer satisfaction: customer and customer perception of quality, feedback, using customer complaints, service quality, translating needs into requirements, customer retention, case studies.
Employee Involvement – Motivation, employee surveys, empowerment, teams, suggestion system, recognition and reward, gain sharing, performance appraisal, unions and employee involvement, case studies. 8Hrs
SLE: Quality and employee satisfaction

Unit 3
Continuous Process Improvement: Process, the Juran trilogy, improvement strategies, types of problems, the PDSA Cycle, problem-solving methods, Kaizen, reengineering, six sigma, case studies.
Tools and Techniques: Benchmarking, information technology, quality management systems, environmental management system, and quality function deployment, quality by design, failure mode and effect analysis, product liability, total productive maintenance. 7Hrs
SLE: Case studies on benchmarking and QFD

Unit 4
Quality Management Tools: Why Why analysis, forced field analysis, nominal group technique, affinity diagram, interrelationship diagram, tree diagram, matrix diagram, prioritization matrices, process decision program chart, activity network diagram. 6Hrs
SLE: Case studies on various quality tools.
Unit 5
Statistical Process Control: Pareto diagram, process flow diagram, cause and effect diagram, check sheets, histograms, statistical fundamentals, control charts, state of control, out of control process, control charts for variables, control charts for attributes, scatter diagrams, case studies.

5Hrs

SLE: Problems on regression and correlation.

Unit 6
Building and sustaining performance Excellence in Organizations: Making the commitment to total quality, organizational culture and total quality, change management, sustaining the quality organization, self-assessment process, implanting ISO 9000, six sigma, a view toward the future.

Design for six sigma: Tools for concept developments, tools for design development, tools for design optimization and tools for design verification.

6Hrs

SLE: Case studies on ISO 14001, ISO 27001 and problems on six sigma.

Text books:

References:
3. Organizational Excellence through TQM, H Lal, New age pub, 2008

Course Outcomes:
Upon successful completion of the course, the student will be able to:

1. Demonstrate the principles of TQM and importance of their implementation in industry.
2. Understand the importance of customer satisfaction and employee involvement in the growth of organization.
3. Describe the concept of quality from customer view and motivate the employees towards achievement.
4. Imbibe them with knowledge on various tools and techniques of quality management.
5. Understand the concepts of statistical process, tools and techniques
6. Explain the implantation for 6 – σ and its importance.
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Course Code : IP0425  CIE : 50% Marks
Hrs/Week : 04  SEE : 50% Marks
SEE Hrs : 03  Max. Marks: 100

Course Objective:
This course is designed to address the key operations and logistical issues in service and manufacturing organizations that have strategic as well as tactical implications.

Unit 1
Operations Management Concepts: Introduction, historical development, the trend: information and non-manufacturing systems, factors affecting productivity,
Operations Decision Making: Introduction, management as a science, characteristics of decisions, framework for decision making, decision methodology, decision support systems, economic models, statistical models.

SLE: The environment of operations.

Unit 2
Forecasting Demand: Forecasting objectives and uses, forecasting variables, opinion and judgmental methods, time series methods, exponential smoothing, regression and correlation methods, application and control of forecasts.

SLE: Forecasting tools used in various types of industries.

Unit 3
System Design and Capacity: Introduction, manufacturing and service systems, design and systems capacity, capacity planning.
Material and Capacity Requirements Planning: Overview: MRP and CRP, MRP: underlying concepts, system parameters, MRP logic, capacity planning, capacity anagement, CRP activities.

SLE: Master scheduling methods

Unit 4
Aggregate Planning and Master Scheduling: Introduction to planning and scheduling, objectives of aggregate planning, aggregate planning methods, master scheduling objectives.
Scheduling and Controlling Production Activities: Introduction, PAC, objectives and data requirements, scheduling strategy and guidelines, scheduling methodology, priority controls.

SLE: Capacity control.
Unit 5

Inventory control: Introduction, types of inventory, inventory costs, factors involved in inventory analysis, inventory models, purchasing model with no shortage, purchasing model with shortage, manufacturing models with no shortage, manufacturing models with shortage, lead time, safety stock, buffer stock, ABC analysis.

8 Hrs.

*SLE: Inventory model with probabilistic demand.*

Unit 6

Single Machine Scheduling: Concept, measures of performance, SPT rule, weighted SPT rule, EDD rule.

Flow-Shop Scheduling: Introduction, Johnson’s rule for jobs on 2 and 3 machines. n jobs on m machines.

Job-Shop Scheduling: Types of schedules, heuristic procedure, scheduling 2 jobs on ‘m’ machines.

*SLE: Minimizing the number of tardy jobs.*

Text Books:


References:


Course Outcomes:

Upon successful completion of the course, the students will be able to

1. Identify the roles and responsibilities of operations managers in different organizational contexts. Select and apply relevant concepts and tools to optimize the process/production system.
2. Demonstrate the skills needed to design and manage change in an organization using qualitative and quantitative tools, with due consideration for impact on human resource understanding of the global environment of business and use of business tools.
3. Optimize productions objective of maximizing profit using qualitative and quantitative techniques in the areas of job design, inventory control, material requirement planning, aggregate planning and scheduling.
4. Understand capacity management, apply techniques relating to resource planning, and recommend appropriate actions in a given situation.
5. Demonstrate the skill needed to control the inventory.
6. Describe advanced production models like lean manufacturing, just in time and review their contribution to profit.

Mapping of COs to POs:

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SEMINAR ON CONTEMPORARY TECHNICAL TOPICS (0:0:2)

Course Code:   IP0111                      Max.Marks: 50
                             Hrs/Week   : 02

Course Objective:

To enable the students to identify their area of interest, making them to carry out literature survey and arrive at a latest topic in the field for presentation.

Course Outcomes:
Upon successful completion of the course, the students will be able to

1. Identify contemporary technical topics for presentation.
2. Carry out literature survey to comprehend the topic.
3. Know the usage of modern tools and techniques.
4. Write reports and make effective presentations.
5. Understand the impact of engineering solutions on safety, environment and society.

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PROJECT WORK (0:0:12)

Course Code : IP0601

Max. Marks : 100
Hrs/Week: 12

Course Objective:

To initiate innovation, to undergo industrial exposure and develop team building, leadership qualities.
The students continue with the project work, bring the same to logical conclusions and submit a report followed by a seminar on the same.

Course Outcomes:

Upon successful completion of the course, the students will be able to

1. Identify the problem and carry out literature survey so as to comprehend the same.
2. Analyze, evaluate, formulate the problem and arrive at optimal solutions using modern tools taking into consideration societal and environmental factors.
3. Write comprehensive reports and give presentations.
4. Understand the need for team work and develop leadership qualities.

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Electives-IV

DIGITAL MANUFACTURING (3:0:0)

Sub Code : IP0334  
Hrs / Week : 03  
SEE Hrs : 3 Hrs  
CIE: 50 % Marks  
SEE: 50 % Marks  
Max. Marks: 100

Course objectives:  
Is to give an exposure of digital manufacturing and its techniques

Unit 1
CAD Modeling: Design process and role of CAD, Types and applications of design models, Three dimensional modeling schemes, Wire frames and surface representation schemes, Solid modeling.  
SLE: Parametric modeling, Assembly modeling.  
8 Hrs

Unit 2
Reverse Engineering: Need, Reverse engineering process, Reverse engineering hardware and software.  
SLE: Geometric model development.  
8 Hrs

Unit 3:
Concepts Modelers: Principle, Thermal jet printer, Sander's model market, 3-D printer. Genisys Xs printer HP system 5.  
SLE: Object Quadra systems  
6 Hrs

Unit 4:
Rapid Tooling: Indirect Rapid tooling -Silicone rubber tooling –Aluminum filled epoxy tooling Spray metal tooling, Cast kirksite, 3Q keltool, Direct Rapid Tooling Direct. AIM, Quick cast process, Copper polyamide, Rapid Tool, DMILS, Prometal, Sand casting tooling, laminate tooling.  
SLE: Soft Tooling vs. hard tooling  
8 Hrs

Unit 5
SLE: Virtual factory simulation.  
6 Hrs
Unit 6

**SLE: Issues in implementing IoT.**

**Text Books:**

**Course Outcomes:**
Upon successful completion of this course, the student will be able to:
1. Comprehend the growth of digital manufacturing and their advantages.
2. Understand CAM and reverse engineering.
3. Evaluate different Concept Modellers.
4. Distinguish direct and indirect tooling systems for Rapid Prototyping.
5. Understand digital factory and virtual manufacturing.
6. Comprehend the importance of Internet of Things.

**Mapping of COs to POs:**

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MACHINE TOOL DESIGN (3:0:0)

Course Code : IP 0319
Hrs/Week : 03
SEE Hrs : 03

CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

Course Objective:
To make students understand the principles of machine tool components design such as machine tool structures, guide ways and power - screws, spindles and spindle supports and the like.

Unit 1
Introduction to machine tool drives and mechanisms: working and auxiliary motions in machine tools, parameters defining working motions of a machine tool, machine tool drives, mechanical transmission and its elements, hydraulic transmission and its elements. general requirements of machine tool design.
Cutting force analysis and power requirement: Cutting force analysis and power requirement in turning, milling, drilling and broaching operation (with simple problems).

8Hrs

SLE: Technico-Economical prerequisites for undertaking the design of new machine tool.

Unit2
Regulation of Speed and Feed rates: Aim of speed and feed regulation, stepped regulation of speed, design of speed box, design of feed box, determining the number of teeth of gears, stepless regulation of speed and feed rates, hydraulic, electrical and mechanical stepless regulations.

8Hrs

SLE: Classification of speed and feed boxes.

Unit3
Design of Machine Tool Structures: Functions of machine tool structures and their requirements, design criteria for machine tool structures, materials for machine tool structures, static and dynamic stiffness, profiles of machine tool structures, basic design procedure for machine tool structures. design of beds, design of columns, design of housings, design of bases and tables.

8Hrs

SLE: Design of Cross rails, arms, saddles and carriages, design of rams.

Unit4
Design of guideways and power screws: functions and types of guideways, design of slideways, design criteria and calculations for slideways, design of anti friction guideways, design of aerostatic slideways, design of power screws.

6Hrs

SLE: Protecting devices for slideways.
Unit 5
**Design of Spindles and Spindle Supports:** Functions of spindle unit and requirements, materials of spindles, effect of machine tool compliance on machining accuracy, design calculations of spindles, antifriction bearings. 

*SLE: Sliding bearings.*

Unit 6
**Dynamics of Machine Tools:** Concept of dynamic cutting process, physical causes of chatter and vibrations, types of chatter, stability charts, chatter vibrations – lathes – drilling machines – grinding machines – milling machines, different methods for avoiding machine tool chatter and vibrations.

*SLE: Ergonomic considerations.*

**Text Books:**

**References:**

**Course Outcomes:**

Upon successful completion of the course, the students will be able to

1. Know the general requirement for machine tool design understanding the cutting forces and power requirement for various machining operations.
2. Understand the mechanism of stepped and stepless regulation of speeds and feeds.
3. Explain the design procedure for machine tool structures like beds, columns, housings etc.
4. Design the guide ways and power screws of machine tools.
5. Carry out design calculations for spindles.
6. Explain the dynamics of machine tool structures.

**Mapping of COs to POs:**

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JOINING PROCESSES AND NON DESTRUCTIVE TESTING (3:0:0)

Course Code : IP0335  
CIE : 50% Marks

Hrs/Week : 03  
SEE : 50% Marks

SEE Hrs : 03  
Max. Marks: 100

Course Objective:

To make students aware of latest welding surface techniques and their applications; also to introduce different destructive and non destructive methods of inspection of welds.

Unit 1

Metal surfaceing and spraying: Introduction, wear modes, types of surfacing process and procedure, selection of surfacing process and material, applications, Introduction to metal spraying, types, spraying techniques with oxyfuel and plasma coating characterestics and evaluation, applications.  8Hrs

SLE: Electric arc wire spraying method.

Unit 2

Welding in space and low gravity Environment: Need, principle of operation of electron beam welding, gas tungsten arc welding and their applications, metallurgy of these welds.  6Hrs

SLE: Advantages and limitations of gravity welds.

Unit 3

Solid state Welding: Introduction to solid state welding, Friction welding, ultrasonic welding, diffusion welding, principle of operation and applications, advantages and limitations.  7Hrs

SLE: Principles of explosive welding.

Unit 4

Welding of plastic and composites: Principle of welding plastics, common weldable plastics, welding joint design, surface preparation, plastic welding processes, principle of operation, equipment, Applications, methods of welding composites, induction welding, ultrasonic welding, gas tungsten arc welding (GTAM), Magnetically impelled arc butt welding (MIAB).  7Hrs

SLE: Advantages, limitations and of plastic welding.

Unit 5

Introduction to nondestructive testing: Need, selection of ND methods, visual inspection, liquid penetration inspection, magnetic particle inspection, ultrasonic inspection procedure, pulse echo techniques, through transmission system, resonance system.  6Hrs

SLE: A, B and C scanning methods.
Unit 6

Radiographic Inspection: Principles, radiation sources, x-rays and gamma rays, X rays tubes, radio graphic films, inspection of welds. 7Hrs

SLE: Electron neuron radiography applications.

Text books:


References:

1. ASM Hand book-vol-6, welding, brazing and soldering. 10th reprint - 2013.

Course outcomes:

Upon successful completion of the course, the students will be able to

1. Understand the need for metal surfacing thermal spraying and explain the spraying methods for producing the same .
2. Explain the various methods of welding to be used in space and low gravity simulations.
3. Identify the type of solid state welding techniques to be used for specific applications and know the procedure of the same.
4. Explain the various methods of plastic welding and procedure.
5. Understand the need for non-destructive testing of welds and know the procedure to conduct the same.
6. Explain in depth radiographic inspection of welds.

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Department of I & P Engg, NIE, Mysuru
PRODUCT DESIGN AND DEVELOPMENT (3:0:0)

Course Code : IP0322  
Hrs/Week : 03  
SEE Hrs : 03

CIE : 50% Marks  
SEE : 50% Marks  
Max. Marks: 100

Course Objective:

Students will learn to develop different design concepts of a product and will select an appropriate concept for further development.

Unit 1
Introduction to Product Development process and organizations: characteristics of successful product development, product development team, challenges of product development, generic development process, concept development, variants of generic product development process.Product development organization.  
7Hrs

SLE: Characteristics of different organizational structures.

Unit 2
Product Planning: The product planning process: identify opportunities evaluate and prioritize projects, allocate resources and plan timing, complete pre-project planning, reflect on the results and the process.  
6Hrs

SLE: A Case study on product planning.

Unit 3
Identifying Customer Needs: Gather raw data from customers, interpret raw data in terms of customer needs, organize the needs into a hierarchy, establish the relative importance of the needs, reflect on the result and the process.  
6Hrs

SLE: Hierarchical list of primary and secondary customer needs for different products.

Unit 4
Product Specifications: Specifications, specifications established, establishing target specifications: Prepare the list of metrics, collect competitive benchmarking information, set ideal and marginally acceptable target values, reflect on the results and the process, Setting the final specifications: develop technical models of the product, develop a cost model of the product, refine the specifications, making trade-offs where necessary, flow down the specifications as appropriate, reflect on the results and the process.  
8Hrs

SLE: Preparation of final specifications using the list of metrics for any product.

Unit 5
Concept Generation and Selection: The activity of concept generation: clarify the problem, search externally, Search internally, explores systematically, reflect on the solution and the process.
Concept Selection: Concept in an integral part of the product development process, all terms are some method for choosing a concept, a structured method offers several benefits, overview of methodology, concept screening, concept scoring.  

**SLE:** Concept selection methods be used to benchmark evaluate existing product.

Unit 6

Concept testing: Concept testing steps, Define the purpose of the concept test, choose a survey population, choose a survey format, communicate the concept, measure customer response, interpret the results, reflect on the result and the process.

Product Architecture: Implication of the architecture, establishing the architecture, delayed differentiation, platform differentiation.  

**SLE:** Related system – level design issues.

Text book:


References:


Course Outcomes:

Upon successful completion of the course, the students will be able to

1. Explain the characteristics and process of product development
2. Demonstrate the product planning, evaluating and allocation of resources.
3. Identify the importance of customer needs.
4. Establish the product specifications and set the final specifications based on identified customer needs.
5. Develop different concepts and select the appropriate one for further design.
6. Develop techniques for testing of generated concepts and product architecture.

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Elective - V

MANAGEMENT INFORMATION SYSTEM (3:0:0)

Course Code : IP 0324
CIE : 50% Marks
Hrs/Week : 03
SEE : 50% Marks
SEE Hrs : 03
Max. Marks: 100

Course Objective:

Students will learn different information systems and technology used in a business analysis and understand different decision support systems.

Unit 1
Foundation Concepts: Foundation of information systems in business – information systems and technologies, applications, development and management, competing with information technology.  8Hrs

SLE: Fundamentals of strategic advantage, using information Technology for strategic advantage.

Unit 2
Review of information Technologies: Computer hardware , computer systems, end user and enterprise computing, computer peripherals: input, output, and storage technologies, computer software , application software: end user applications, system software.  5Hrs

SLE: Computer system management.

Unit 3
Data resource management , technical foundations of database management.  6Hrs

SLE: Managing data resources.

Unit 4
Business Applications: The internet worked E-business enterprise, the internet, intranets and extranets in business, enterprise communication and collaboration, electronic business systems, cross functional E-business systems functional E- business systems, electronic commerce systems, electronic commerce fundamentals, commerce applications and issues, E-business decision support system, artificial intelligence, technologies in business.  8Hrs

SLE: Decision support in E-business.

Unit 5
Unit 6
Management Challenges: Security and ethical challenges of E-business, security, ethical and societal challenges of E-business, security management of E-business, enterprise and global management of E-business technology, managing E-business technologies. 7Hrs

SLE: Global E-business Technology Management.

Text Books:


References:

Course Outcomes:
Upon successful completion of the course, the students will be able to

1. Explain the foundation concepts in information system technologies and E-business application.
2. Identify the computer hardware and software including business application software.
3. Interpret the new content on data resource management, data warehouses and data mining.
4. Illustrate how internet, intranet and extranet are used in E-business enterprises to support electronic business and commerce, team and enterprise collaboration and business decision making.
5. Develop and implementing E-business strategies and systems using several strategic planning and application development approaches.
6. Explain the challenges of E-business technologies and strategies, including security and ethical challenges and global IT management.

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INDUSTRIAL DESIGN AND ERGONOMICS (2:2:0)

Course Code: IP 0320  
CIE: 50% Marks
Hrs/Week: 04  
SEE: 50% Marks
SEE Hrs: 03  
Max. Marks: 100

Course Objectives:
To introduce principles of industrial design and ergonomics facilitating the achievement of improved efficiency of man and machine.

Unit 1
Introduction: An approach to industrial design, Elements of design structure for industrial design in engineering application in modern manufacturing systems
Ergonomics and Industrial Design: Introduction to ergonomics, communication system, general approach to the man-machine relationship, human component of work system, machine component of work system, local environment-light, heat, sound.  
8Hrs

SLE: Design of layouts.

Unit 2
Ergonomics and Production: Ergonomics and product design, anthropometric data and its applications in ergonomic, working postures, body movements, work station design, chair design.  
8Hrs

SLE: Design and drawing of workstations.

Unit 3
Displays: Design principles of visual displays, classification, quantitative displays, qualitative displays, check readings, situational awareness, representative displays, design of pointers, signal and warning lights, colour coding of displays, design of multiple displays.
Controls: Design considerations, controls with little efforts – push button, switches, rotating knobs. controls with muscular effort – hand wheel, crank, heavy lever, pedals. design of controls in automobiles, machine tools.  
6Hrs

SLE: Design and Drawing of domestic and Industrial displays and controls.
Unit 4
Visual Effects of Line and Form: The mechanics of seeing, psychology of seeing, figure on ground effect, gestalt’s perceptions – simplicity, regularity, proximity, wholeness, optical illusions, influences of line and form.  

SLE: Parts of Eye, structure of cones and rods

Unit-5
Colour: Colour and light, colour and objects, colour and the eye – after image, colour blindness, colour constancy, colour terms – colour circles, munsel colour notation, reactions to colour and colour combination – colour on engineering equipments, colour coding, psychological effects, colour and machine form, colour and style.

SLE: Use of colours in Industries.

Unit-6
Aesthetic Concepts: Concept of unity, concept of order with variety, concept of purpose, style and environment, aesthetic expressions – symmetry, balance, contrast, continuity, proportion. style – the components of style, house style, style in capital good.

SLE: Golden ratio and Use of aesthetics in design.

Text book:


References books:


Course Outcomes:

Upon successful completion of the course, the students will be able to

1. Demonstrate familiarity with theoretical concepts explaining human cognitive functioning relating to the study of work.
2. Evaluate situations and recommend appropriate designing of work place.
3. Understand and apply ergonomic principles to design displays and controls for safer, efficient and effective utilization.
4. Recognize and value the diversity of human vision in product design.
5. Identify and use appropriate colours in workplace layout and engineering equipment design.
6. Apply aesthetic concepts for designing products.
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ORGANIZATIONAL BEHAVIOUR (3:0:0)

Course Code : IP 0326
Hrs/Week : 03
SEE Hrs : 03

CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

Course Objective:

Students will learn the models of organizational behavior in general and also focus on the study of individual behavior which influences the functioning of the organization.

Unit 1
The foundations of organizational behavior: Introduction to OB, historical background, defining OB, therapeutic foundations for OB, Introduction to research methodology, use of research design

6Hrs

SLE: Organizational behavior models, challenges and opportunities for OB

Unit 2
Organizational Learning: OB in global context, learning objectives, definition of TQM, TQM framework, basic approach, quality movement in India, obstacles to implement TQM, reengineering, benchmarking, empowerment.

8Hrs

SLE: Learning organizations.

Unit 3
Foundations of individual behavior: Biographical characteristics, ability, personality, types of personality, learning, types of learning, perception and individual decision, values, attitudes.

7Hrs

SLE: Job satisfaction.

Unit 4
Basic Motivation concepts: Defining motivation, importance of motivation, Work motivation approaches, content theories of work motivation, process theories of work motivation, contemporary theories of work motivation.

6Hrs

SLE: Job Design, Quality of work life and Goal Setting.

Unit 5
Foundations of Group Behavior: Defining and classifying groups, stages of group development, group structure, characteristics of effective groups, contingency variables that affect group behavior.

Communication and group decision making: Functions of communication, communication process, group versus individual, group decision making techniques

7Hrs

SLE: Group processes and group tasks
Unit 6
Leadership: Leadership styles and skills, behavioral theories and contingency theories, power and politics, conflict and inter group behavior.
Foundations of organization structure: Organization structure, Job design, work settings and job stress, human resource policies and practices, organizational culture. 8Hrs

SLE: Organizational change and development.

Text Books:

References:

Course Outcomes:
Upon successful completion of the course, the students will be able to

1. Define different concepts related to Organizational behavior
2. understand different learning objectives with total quality management as benchmark.
3. Explain different characteristic of individual behavior
4. Summarize motivation approaches and consider job design with different contemporary theories.
5. Understand group dynamics in the light of individual and group behaviour
6. Extend the behavioral theories to leadership styles with group behavior as reference.

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MARKETING MANAGEMENT (3:0:0)

Course Code : IP 0328
Hrs/Week : 03
SEE Hrs : 03
CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

Course Objective:

This course provides an introduction to the fundamentals of marketing management, basic marketing concepts and elements of marketing practice. Emphasis will be on the managerial aspects of marketing plans, including analysis of the external environment.

Unit 1
Introduction: Historical development of marketing management, definition of marketing, core marketing concept, micro and macro environment, importance of marketing in the India socio economic system.
Consumer Markets and Buying behavior: characteristics affecting consumer behavior. Types of buying decisions, buying decision process, classification of consumer products.

SLE: Market segmentation.

10Hrs

Unit 2
Marketing Information system and Research: Components of marketing information system-benefits and uses of marketing research system, market research procedure, measurement of market demand.

SLE: Market research.

4Hrs

Unit 3
Marketing of Industrial Goods: Nature and importance of industrial market, classification of industrial products, participant in the industrial buying process, major factors influencing industrial buying behavior, characteristics of industrial market demand, determinants of industrial market demand buying process of industrial users. buying motives of industrial user, the industrial buying process.

SLE: Buying patterns of industrial users.

6Hrs

Unit 4
Products planning and development: The concept of a product, features of a product, product classification, policies, product planning and development, product line, product mix, factors influencing product mix, product mix strategies, meaning of new product, major stages in new product development, product life cycle.
Branding, Labeling and packaging: Branding reasons for branding, functions of branding, feature and types of brands, kinds of brand name.
Labeling: Types, functions,
Packaging: Meaning, growth of packaging, functions of packaging.

10Hrs
SLE: Kinds of Packaging and Advantages and Disadvantages of Labeling.

Unit 5
Pricing: Importance of price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing strategies, strategies and decisions.
Distribution: Marketing channels, functions, number of channel level, physical distribution-importance, total system concept, strategy, use of physical distribution. 6Hrs

SLE: Types of channels of distribution.

Unit 6
Advertising and sales promotion: Objectives of advertisements, function of advertising classification of advertisement copy, advertisement media, kinds of media, advantages of advertising, objectives of sales promotion, advantages of sales promotion.
Personal selling: Objectives of personal selling, establishing the sales force objectives, sales force strategy, sales force structure and size, salesmanship, qualities of good salesman. 6Hrs

SLE: Types of salesman, major steps in effective selling.

Text books:

References:

Course Outcomes:
Upon successful completion of the course, the students will be able to
1. Describe micro and macro levels of marketing and the decision making processes.
2. Identify the different components of marketing information system and market research.
3. Explain the factors influencing buyer’s behavior based on industrial products.
4. Comprehend the branding decisions with reference to a product considering product life cycle and factors such as branding, labeling and packaging.
5. Demonstrate the factors affecting pricing with different strategies and use of physical distribution systems with reference to marketing channels.
6. Predict the market, different media and salesmanship with selling and distribution strategies.

Mapping of COs to POs:

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