Scheme and Syllabus for the academic year 2019-20

LEAN MANUFACTURING SYSTEM (4:0:0)

Sub Code : IP0421
Hrs/Week : 04
SEE Hrs : 03

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

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

1. Recognize the underlying philosophy of the Toyota Production System.
2. Analyze the different concepts of 5S, 3M, etc. to keep clean and standardizing the operation.
3. Recall the concepts and implementation of Jidoka and poka-yoke systems.
4. Explain how to look at one's own shop floor in terms of lead-time reduction, waste elimination and material flow.
5. Understand the continuous improvement concept and Taylor's principles.
6. Explain how to manage people in a Lean environment in order to sustain improvements in production method.
Scheme and Syllabus for the academic year 2019-20

reduction, overall efficiency - standardized work and kaizen, common layouts.

**Lean tools:** 5S system, why-why analysis, Ishikawa diagram. **8 Hrs.**

**SLE:** Case study on lean tool implementation.

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**Unit 3**

**Standardization of operations:** Job rotation, Improvement activities to reduce work force and increase worker morale foundation for improvements.

**Just In Time:** Principles of JIT, JIT system, Kanban, Kanban rules, expanded role of conveyance, production leveling, pull systems, value stream mapping. **10 Hrs.**

**SLE:** Multi-function workers.

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**Unit 4**

**Shortening of production lead times:** Reduction of setup times: practical procedures for reducing setup time, Jidoka concept, poka-yoke (mistake proofing) systems, inspection systems and zone control, types and use of poka-yoke systems. **10 Hrs.**

**SLE:** Implementation of Jidoka.

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**Unit 5**

**Worker Involvement and Systematic Planning Methodology:** Involvement, activities to support involvement, quality circle activity, Kaizen training, suggestion programmes, Hoshin planning system (systematic planning methodology), phases of Hoshin planning. **8 Hrs.**

**SLE:** Lean culture.

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**Unit 6**

**Managing lean enterprise:** Global enterprises and their benefits.
FINANCIAL MANAGEMENT (4:0:0)

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

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

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.

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

6 Hrs.

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

10 Hrs.
Unit 3

Capital Budgeting: Techniques and problems, cost volume profit analysis, break even analysis, problems 8 Hrs.

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. 10 Hrs

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. 6 Hrs.

SLE: SEBI guidelines 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. 12 Hrs.

SLE: Dividend policies in practice.

Text Books:

Scheme and Syllabus for the academic year 2019-20

SUPPLY CHAIN AND LOGISTICS MANAGEMENT (3:0:0)

Course Code : IP0330
Hrs/Week : 04
SEE Hrs : 03

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

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

1. Understand supply chain concepts, systemic and strategic role of SCM in global competitive environment.
2. Evaluate alternative supply and distribution network structures using optimization models.
3. Explain the planning and managing inventory to increase supply chain profit.
4. Understand the importance of cross functional drivers like sourcing, information technology and coordination for managing supply chain processes.
5. Evaluate alternative transportation network structures and explain the practices used in revenue management in supply chain.
Unit 2
Designing the Supply Chain Network: distribution networking – role, design, supply chain network (SCN) – role, factors, framework for design decisions.


SLE: Analytical problem on evaluating network design decisions using Cash flow analysis and decision trees.

Unit 3
Planning and Managing Inventories in a Supply Chain: Role of cycle inventory, estimating cycle inventory related cost, economics of scale, Managing multi-echelon cycle inventory, safety inventory determination, impact of supply uncertainty aggregation and replenishment policies on safety inventory, optimum level of product availability, important factors, managerial levers to improve supply chain profitability.

SLE: Trade Promotions

Unit 4
Managing Cross-Functional Drivers In A Supply Chain: The role of sourcing in a supply chain, in-house or outsource, Third-and Fourth-party logistics providers, Supplier scoring and assessment, Supplier selection-Auctions and Negotiations, Contracts and supply chain performance, Design Collaboration, The procurement process, sourcing planning and analysis.

IT in a supply chain: Role of IT in a supply chain, The supply chain in IT framework, The supply chain macro processes, Lack of Supply Chain coordination and the Bullwhip effect, managerial levers to achieve coordination, continuous replenishment and vendor-
SEMESTER ON CONTEMPORARY TECHNICAL TOPICS
(0:0:2)

Course Code: IP0111

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.

Each student will be given a product for which the sequence of operations and various manufacturing processes and activities involved has to be identified and a detailed presentation followed by report writing has to be done.

PROJECT WORK (0:0:12)

Course Code: IP0601

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.
ELECTIVES-I
ADVANCED MANUFACTURING PROCESSES (3:0:0)

Sub Code : IP 0304
Hrs/Week : 03
SEE Hrs : 03

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

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

1. Understand the need for advanced manufacturing process and explain the principle of operation of ultrasonic machining process.
2. Explain the characteristic features of Abrasive Jet Machining (AJM)
3. Define the process parameters influence the material removal rate with the help of characteristics curves.
4. Explain the principle of chemical machining and chemical milling process.
5. Summarize the various aspects of Electric discharge machining (EDM).

Unit 1
Introduction: History, need for non-traditional machining processes, classification, process selection.
Mechanical Process: Ultrasonic Machining (USM): Introduction, equipment, tool material and tool size, abrasive slurry, magnetostriction assembly, tool cone (concentrator), exponential concentrator of circular cross section and rectangular cross sections, effect of parameters, amplitude, frequency, grain diameter, applied static load and slurry, tool and work material. USM process
characteristics: material removal rate, tool wear, accuracy, surface finish, applications, advantages and disadvantages of USM.  10Hrs

SLE: Comparison between conventional and non-conventional machining.

Unit 2

Abrasive Jet Machining (AJM): Introduction, equipment, variables in AJM: carrier gas, size of abrasive grain, velocity of the abrasive jet, mean no. abrasive particles per unit volume of the carrier gas, work material, stand-off distance (SOD), process characteristics-material removal rate. nozzle wear, Accuracy and surface finish, Applications, advantages and disadvantages of AJM.  6Hrs

SLE: Type of abrasives.

Unit 3

Electrochemical Machining Process (ECM): Introduction, elements of ECM process: Cathode tool, anode work piece, source of DC power, electrolyte, chemistry of the process, ECM process characteristics - material removal rate, accuracy, surface finish, tool and insulation materials, tool size, electrolyte flow arrangement, applications, simple problems.  6Hrs

SLE: Electrochemical Grinding, Electrochemical Honing, Electrochemical deburring

Unit 4

Chemical Machining (CHM): Introduction, elements of the process, chemical blanking process: preparation of work piece, preparation of masters, masking with photo resists, etching for blanking, accuracy of chemical blanking.

Chemical Milling (Contour machining):- Process steps-masking, etching, etc. process characteristics of CHM: - material removal rate, accuracy, surface finish, application of CHM.  6Hrs

SLE: Applications of chemical blanking.
scheme and syllabus - iv year

electives- iii

database management system (3:0:0)

Course Code : IP0314  
CIE : 50% Marks
Hrs/Week : 03  
SEE : 50% Marks
SEE Hrs : 03  
Max. Marks: 100

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.
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 guide lines 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. **7Hrs**

*SLE: Concurrency control techniques*
PRODUCT DESIGN AND DEVELOPMENT (4:0:0)

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

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

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.

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. Value engineering and concurrent Engineering 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.

**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.

**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.

**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
MARKETING MANAGEMENT (3:0:0)

Course Code: IP0328
Hrs/Week: 03
SEE Hrs: 03

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

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.

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. 10Hrs

SLE: Market segmentation.
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. 4Hrs

SLE: Market research.

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. 6Hrs

SLE: Buying patterns of industrial users.

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.
FACILITY PLANNING AND DESIGN (3:0:0)

Course Code : IP0312
Hrs/Week : 03
SEE Hrs : 03

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

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.

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.

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's grid, load distance analysis, Median analysis, Apple James and Reed's approaches, systematic layout planning, the activity relationship chart, Constructing the activity relationship chart, Activity relationship diagram.

*SLE:* Space relationship diagram to plant layout.

6Hrs

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.

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

5Hrs

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.

*SLE:* Standardized office planning, Workplace Design.

9Hrs

Unit 5

**Quantitative approaches to facilities planning:** Deterministic
MANAGEMENT INFORMATION SYSTEMS (3:0:0)

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

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.
development and management, competing with information technology.  

**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.  

**SLE:** Computer system management.

**Unit 3**

Data resource management, technical foundations of database management.  

**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.  

**SLE:** Decision support in E-business.

**Unit 5**

**Development Process:** Developing E-business strategies, E-business planning fundamentals, implementing E-business
PROJECT MANAGEMENT (3:0:0)

Course Code : IP0315
Hrs/Week : 03
SEE Hrs : 03

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

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

1. Recall the elementary concepts of projects and their management.
2. Plan and estimate a given project for its feasibility.
3. Organize human resources of a project and know the terms of contracting.
4. Select an appropriate tool/technique for project implementation.
5. Understand the knack behind directing, coordinating and controlling a project.
6. Evaluate a project for its performance and know the project management scenario in our nation.

Unit 1
Concepts of Project Management: Concepts, characteristics of project, phases of project life cycle.

SLE: Tools and techniques for project management.

6Hrs

Unit 2

SLE: Fixing the zero date.

7Hrs
Unit 3
Organizing human resources and contracting: Delegation, project organization, Accountability in project execution, contracts, 3 'R's of contracting,

*SLE: Tendering and selection of contractors.*

7Hrs

Unit 4
Project implementation: Project work system design, work breakdown structure (WBS).

Tools and Techniques of Project Management: Project scheduling techniques, bar (Gantt) chart, project evaluation and review technique (PERT) planning,

*SLE: Computerized project management*

8Hrs

Unit 5
Project direction, coordination and Control: Project direction, project co-ordination, project control.

*SLE: Communications in a project.*

7Hrs

Unit 6
Project Management performance: Performance indicators, The CM and DM companies for better project management,

*SLE: Project management and environment.*

7Hrs

Text Books:


Dept. of Industrial and Production Engg, NIE, Mysuru 41
COMPOSITE MATERIALS (3:0:0)

Course Code: IP 0305
Hrs/week: 6hrs
SEE Hrs: 4hrs

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

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

1. Identify and classify the different types of fiber and matrix materials used in commercial composites.
2. Understand the various manufacturing processes of composites.
3. Summarize various methods of composite fabrication techniques and also understand the importance of ceramic matrix composites.
4. Outline various applications of composites and its characterization.
5. Explain the importance of metal matrix composites and its fabrication processes.
6. Understand the importance of recent advances in composites, includes polymer nano composites.

Unit 1
Introduction to Composite Materials: Definition, classification and characteristics of composite materials, fibrous composites, laminated composites, particulate composites, properties and types of reinforcement and matrix materials.

SLE: Thermosets and Thermoplastics.

Unit 2

SLE: Processing of Thermoplastics.
Unit 3
**Fabrication of Composites**: cutting, drilling, mechanical fasteners, adhesive bonding, and joining.
**Ceramic Matrix Composites**: Introduction, properties and fabrication technologies.  
6Hrs

**SLE: Machining of composites.**

Unit 4
**Application of Composites**: Uses and characteristics of composites in automobile, electrical and electronic, marine, aircraft, spacecraft, sports and recreational industries, characterization of composites and testing of composites.  
6Hrs

**SLE: Tribological Characterization.**

Unit 5
**Properties of MMC's**: physical mechanical, wear, machinability, effect of size, shape and distribution of particulate on properties production process.  
7Hrs

**SLE: Manufacturing methods of MMC.**

Unit 6
**Advanced Composites**: Polymer nanocomposites – introduction, nanoclay, carbon nanofiber, carbon nanotubes.  
6Hrs

**SLE: Introduction to shape memory alloys.**

Text Books:
MECHANICAL VIBRATIONS (3-0-0)

Course Code: IP 0307
Hrs/week : 3hrs
SEE Hrs : 3hrs

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

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.

Unit 1

Undamped Free Vibrations: Types of vibrations, S.H.M, principle of super position applied to simple harmonic motions, beats, Fourier theorem and simple problems. single degree of freedom systems, introduction, undamped free vibration-natural frequency of free vibration, stiffness of spring elements. 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.  

**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.  

**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.  

**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.  

**SLE: Euler's equation for beams.**

**Unit 6**

**Numerical methods for Vibration Analysis:** Introduction, influence coefficients, Method of matrix iteration, Dunkerley's
MANAGEMENT AND ENTREPRENEURSHIP (3:0:0)

Course Code: IP0458
CIE: 50% Marks
Hrs/Week: 04
SEE: 50% Marks
SEE Hrs: 03
Max. Marks: 100

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 guide lines to write project report.

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. 5Hrs.

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,
LEAN MANUFACTURING SYSTEM (4:0:0)

Sub Code : IP 0421
Hrs/Week : 04
SEE Hrs : 03

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

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

1. Recognize the underlying philosophy of the Toyota Production System.
2. Analyze the different concepts of 5S, 3M, etc. to keep clean and standardizing the operation.
3. Recall the concepts and implementation of Jidoka and poka-yoke systems.
4. Explain how to look at one's own shop floor in terms of lead-time reduction, waste elimination and material flow.
5. Understand the continuous improvement concept and Taylor's principles.
6. Explain how to manage people in a Lean environment in order to sustain improvements in production method.

Unit 1
Introduction: Mass production system, origin of lean production system, necessity, lean revolution in Toyota, systems and systems thinking, basic image of lean production, customer focus. 8Hrs.

SLE: Muda (waste).

Unit 2
Stability of lean system: Standards in the lean system, total productive maintenance, standardized work, elements of standardized work, charts to define standardized work, man power
reduction, overall efficiency - standardized work and kaizen, common layouts.

**Lean tools:** 5S system, why-why analysis, Ishikawa diagram. **8Hrs.**

**SLE:** Case study on lean tool implementation.

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**Unit 3**

**Standardization of operations:** job rotation, Improvement activities to reduce work force and increase worker morale foundation for improvements.

**Just In Time:** Principles of JIT, JIT system, Kanban, Kanban rules, expanded role of conveyance, production leveling, pull systems, value stream mapping. **10Hrs.**

**SLE:** Multi-function workers.

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**Unit 4**

**Shortening of production lead times:** Reduction of setup times: practical procedures for reducing setup time, Jidoka concept, poka-yoke (mistake proofing) systems, inspection systems and zone control, types and use of poka-yoke systems. **10Hrs.**

**SLE:** Implementation of Jidoka.

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**Unit 5**

**Worker Involvement and Systematic Planning Methodology:** Involvement, activities to support involvement, quality circle activity, Kaizen training, suggestion programmes, Hoshin planning system (systematic planning methodology), phases of Hoshin planning. **8Hrs.**

**SLE:** Lean culture.

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**Unit 6**

**Managing lean enterprise:** Global enterprises and their benefits.
FINANCIAL MANAGEMENT (4:0:0)

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

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

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.

Unit 1

Introduction: Evolution of financial management, goals, scope, objectives, key activities, financial decisions in a firm, principles of finance, risk return trade-off. 6 Hrs.

SLE: Forms of Business

Unit 2

Financial statements: Balance sheet, profit and loss account, relationship, financial analysis, nature of ratio analysis, types of ratios. 10 Hrs.

SLE: users of Financial Analysis
Unit 3
Capital Budgeting: Techniques and problems, cost volume profit analysis, break even analysis, problems 8 Hrs.
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. 10 Hrs
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. 6 Hrs.
SLE: SEBI guidelines 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. 12 Hrs.
SLE: Dividend policies in practice.

Text Books:

SUPPLY CHAIN AND LOGISTICS MANAGEMENT (3:0:0)

Course Code : IP0330
Hrs/Week   : 04
SEE Hrs    : 03

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

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

1. Understand supply chain concepts, systemic and strategic role of SCM in global competitive environment.

2. Evaluate alternative supply and distribution network structures using optimization models.

3. Explain the planning and managing inventory to increase supply chain profit.

4. Understand the importance of cross functional drivers like sourcing, information technology and coordination for managing supply chain processes.

5. Evaluate alternative transportation network structures and explain the practices used in revenue management in supply chain.

Unit 1
Building a Strategic Frame Work to Analyze Supply Chains:
Supply chain stages and decision phases process view of a supply chain, supply chain flows, competitive and supply chain strategies, achieving strategic fit, expanding strategic scope, drivers of supply chain performance, framework for structuring drivers – inventory, transportation, facilities, information, obstacles to achieving fit.

08 Hrs

SLE: Analysing the successful supply chain.
Unit 2
Designing the Supply Chain Network: distribution networking – role, design. supply chain network (SCN) – role, factors, framework for design decisions.
SLE: Analytical problem on evaluating network design decisions using Cash flow analysis and decision trees.

Unit 3
Planning and Managing Inventories in a Supply Chain: Role of cycle inventory, estimating cycle inventory related cost, economics of scale, Managing multi-echelon cycle inventory, safety inventory determination, impact of supply uncertainty aggregation and replenishment policies on safety inventory, optimum level of product availability, important factors, managerial levers to improve supply chain profitability.
SLE: Trade Promotions

Unit 4
Managing Cross-Functional Drivers In A Supply Chain: The role of sourcing in a supply chain, in-house or outsource, Third-and Fourth-party logistics providers, Supplier scoring and assessment, Supplier selection-Auctions and Negotiations, Contracts and supply chain performance, Design Collaboration, The procurement process, sourcing planning and analysis.
IT in a supply chain: Role of IT in a supply chain, The supply chain in IT framework, The supply chain macro processes, Lack of Supply Chain coordination and the Bullwhip effect, managerial levers to achieve coordination, continuous replenishment and vendor-
Course Code: IP0601  Hrs/Week: 12

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

1. Identify the problem and carryout 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.
PRODUCT DESIGN AND DEVELOPMENT (4:0:0)

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

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

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.

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.
Value engineering and concurrent Engineering

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.

**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.

**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.

**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
MARKETING MANAGEMENT (3:0:0)

Course Code : IP0328
Hrs/Week : 03
SEE Hrs : 03

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

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.

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.
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.

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.

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.

SLE: Kinds of Packaging and Advantages and Disadvantages of Labeling.
FACILITY PLANNING AND DESIGN (3:0:0)

Course Code: IP0312
Hrs/Week: 03
SEE Hrs: 03
CIE: 50% Marks
SEE: 50% Marks
Max. Marks: 100

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.

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.

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's grid, load distance analysis, Median analysis, Apple James and Reed's approaches, systematic layout planning, the activity relationship chart, Constructing the activity relationship chart, Activity relationship diagram.

*SLE:* Space relationship diagram to plant layout.

6Hrs

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.

*SLE:* Standardized office planning, Workplace Design.

9Hrs

Unit 5

**Quantitative approaches to facilities planning:** Deterministic
PROJECT MANAGEMENT (3:0:0)

Course Code : IP0315
Hrs/Week : 03
SEE Hrs : 03

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

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

1. Recall the elementary concepts of projects and their management.
2. Plan and estimate a given project for its feasibility.
3. Organize human resources of a project and know the terms of contracting.
4. Select an appropriate tool/technique for project implementation.
5. Understand the knack behind directing, coordinating and controlling a project.
6. Evaluate a project for its performance and know the project management scenario in our nation.

Unit 1

Concepts of Project Management: Concepts, characteristics of project, phases of project life cycle. 6Hrs

SLE: Tools and techniques for project management.

Unit 2

Project Planning and Estimating: Feasibility report, preparation of cost estimates, valuation of the project profitability. 7Hrs

SLE: Fixing the zero date.
Unit 3

Organizing human resources and contracting: Delegation, project organization, Accountability in project execution, contracts, 3 'R's of contracting, 7Hrs

SLE: Tendering and selection of contractors.

Unit 4

Project implementation: Project work system design, work breakdown structure (WBS).

Tools and Techniques of Project Management: Project scheduling techniques, bar (Gantt) chart, project evaluation and review technique (PERT) planning, 8Hrs

SLE: Computerized project management

Unit 5

Project direction, coordination and Control: Project direction, project co-ordination, project control, 7Hrs

SLE: Communications in a project.

Unit 6

Project Management performance: Performance indicators, The CM and DM companies for better project management, 7Hrs

SLE: Project management and environment.

Text Books:


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

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

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 bench mark.
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 behavior
6. Extend the behavioral theories to leadership styles with group behavior as reference.

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

SLE: Organizational behavior models, challenges and opportunities for OB

6Hrs

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.

*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.

*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.

*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 effect group behavior.

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

*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
LEAN MANUFACTURING SYSTEM (4:0:0)

Sub Code : IP0421  
Hrs/Week : 04  
SEE Hrs : 03  

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

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

1. Recognize the underlying philosophy of the Toyota Production System.
2. Analyze the different concepts of 5S, 3M, etc. to keep clean and standardizing the operation.
3. Recall the concepts and implementation of Jidoka and poka-yoke systems.
4. Explain how to look at one's own shop floor in terms of lead-time reduction, waste elimination and material flow.
5. Understand the continuous improvement concept and Taylor's principles.
6. Explain how to manage people in a Lean environment in order to sustain improvements in production method.

Unit 1
Introduction: Mass production system, origin of lean production system, necessity, lean revolution in Toyota, systems and systems thinking, basic image of lean production, customer focus. 8Hrs.  
SLE: Muda (waste).

Unit 2
Stability of lean system: Standards in the lean system, total productive maintenance, standardized work, elements of standardized work, charts to define standardized work, man power
reduction, overall efficiency - standardized work and kaizen, common layouts.

**Lean tools:** 5S system, why-why analysis, Ishikawa diagram. **8 Hrs.**

**SLE:** Case study on lean tool implementation.

**Unit 3**

**Standardization of operations:** job rotation, Improvement activities to reduce work force and increase worker morale foundation for improvements.

**Just In Time:** Principles of JIT, JIT system, Kanban, Kanban rules, expanded role of conveyance, production leveling, pull systems, value stream mapping. **10 Hrs.**

**SLE:** Multi-function workers.

**Unit 4**

**Shortening of production lead times:** Reduction of setup times: practical procedures for reducing setup time, Jidoka concept, poka-yoke (mistake proofing) systems, inspection systems and zone control, types and use of poka-yoke systems. **10 Hrs.**

**SLE:** Implementation of Jidoka.

**Unit 5**

**Worker Involvement and Systematic Planning Methodology:** Involvement, activities to support involvement, quality circle activity, Kaizen training, suggestion programmes, Hoshin planning system (systematic planning methodology), phases of Hoshin planning. **8 Hrs.**

**SLE:** Lean culture.

**Unit 6**

**Managing lean enterprise:** Global enterprises and their benefits.
SEMINARY ON CONTEMPORARY TECHNICAL TOPICS
(0:0:2)

Course Code : IP0111                      Hrs/Week : 02

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.

Each student will be given a product for which the sequence of operations and various manufacturing processes and activities involved has to be identified and a detailed presentation followed by report writing has to be done.

PROJECT WORK (0:0:12)

Course Code : IP 0601                      Hrs/Week: 12

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.
ELECTIVES-I
ADVANCED MANUFACTURING PROCESSES (3:0:0)

Sub Code : IP 0304
Hrs/Week : 03
SEE Hrs : 03
CIE : 50% Marks
SEE : 50% Marks
Max. Marks: 100

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

1. Understand the need for advanced manufacturing process and explain the principle of operation of ultrasonic machining process.
2. Explain the characteristic features of Abrasive Jet Machining (AJM)
3. Define the process parameters influence the material removal rate with the help of characteristics curves.
4. Explain the principle of chemical machining and chemical milling process.
5. Summarize the various aspects of Electric discharge machining (EDM).

Unit 1
Introduction: History, need for non-traditional machining processes, classification, process selection.

Mechanical Process: Ultrasonic Machining (USM): Introduction, equipment, tool material and tool size, abrasive slurry, magnetostriction assembly, tool cone (concentrator), exponential concentrator of circular cross section and rectangular cross sections, effect of parameters, amplitude, frequency, grain diameter, applied static load and slurry, tool and work material. USM process
characteristics: material removal rate, tool wear, accuracy, surface finish, applications, advantages and disadvantages of USM. 10Hrs

SLE: Comparison between conventional and non-conventional machining.

Unit 2

Abrasive Jet Machining (AJM): Introduction, equipment, variables in AJM: carrier gas, size of abrasive grain, velocity of the abrasive jet, mean no. abrasive particles per unit volume of the carrier gas, work material, stand-off distance (SOD), process characteristics-material removal rate, nozzle wear, Accuracy and surface finish, Applications, advantages and disadvantages of AJM. 6Hrs

SLE: Type of abrasives.

Unit 3

Electrochemical Machining Process (ECM): Introduction, elements of ECM process: Cathode tool, anode work piece, source of DC power, electrolyte, chemistry of the process, ECM process characteristics - material removal rate, accuracy, surface finish, tool and insulation materials, tool size, electrolyte flow arrangement, applications, simple problems. 6Hrs

SLE: Electrochemical Grinding, Electrochemical Honing, Electrochemical deburring

Unit 4

Chemical Machining (CHM): Introduction, elements of the process, chemical blanking process: preparation of work piece, preparation of masters, masking with photo resists, etching for blanking, accuracy of chemical blanking.

Chemical Milling (Contour machining): Process steps-masking, etching, etc. process characteristics of CHM: - material removal rate, accuracy, surface finish, application of CHM. 6Hrs

SLE: Applications of chemical blanking.
THEORY OF METAL CUTTING (3:0:0)

Course Code : IP0310
Hrs/Week : 03
SEE Hrs : 03

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

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.

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: CVD and PVD Coating Techniques and their applications.

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.

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

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.  
\textit{SLE: Experimental determination of tool temperature.}  

\textbf{Unit 5}  
\textbf{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. \textbf{7Hrs.} \textit{SLE: Machinability of Materials.}  

\textbf{Unit 6}  
\textbf{Economics of Machining:} elements of production cost like material, labor and overhead costs, tool cost, cutting speed for maximum productivity, numerical examples. \textbf{5Hrs.} \textit{SLE: Cutting speed for minimum cost.}  

\textbf{Text Books:}  
1. \textit{Fundamentals of Metal Cutting and Machine Tools} by B L Juneja and G S Sekhon New age International. 2\textsuperscript{nd} edition 2012,  

\textbf{References:}  
2. \textit{Metal cutting principles} by Milton C Shaw Oxford University press, 2\textsuperscript{nd} edition-2014.
PRODUCT DESIGN AND DEVELOPMENT (4:0:0)

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

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

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.

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.

*SLE: A Case study on product planning.*

6Hrs

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.

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

6Hrs

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.

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

8Hrs

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
ADVANCED WELDING TECHNOLOGY (3:0:0)

Course Code: IP0321
Hrs/Week: 03
SEE Hrs: 03

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

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.

Unit 1

**Metal surfacing 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 characteristics 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.  

**SLE: Advantages and limitations of gravity welds.** 

6Hrs

**Unit 3**

**Solid state Welding:** Introduction to solid state welding, friction welding, ultrasonic welding, diffusion welding, principle of operation and applications, advantages and limitations.  

**SLE: Principles of explosive welding.** 

7Hrs

**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 (GTAW), magnetically impelled arc butt welding (MIAB).  

**SLE: Advantages, limitations and of plastic welding.** 

7Hrs

**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.  

**SLE: A, B and C scanning methods.** 

6Hrs

**Unit 6**

**Radiographic Inspection:** Principles, radiation sources, x-rays and gamma rays, X rays tubes, radiographic films, inspection of welds.  

**SLE: Electron neuron radiography applications.** 

7Hrs
Electives - V

MANAGEMENT INFORMATION SYSTEMS (3:0:0)

Course Code: IP0324  CIE: 50% Marks
Hrs/Week: 03  SEE: 50% Marks
SEE Hrs: 03  Max. Marks: 100

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.

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**  
**Development Process:** Developing E-business strategies, E-business planning fundamentals, implementing E-business
PROFESSIONAL COMMUNICATION (2:0:0)

Course Code : IP0201  
Hrs/Week : 02  
SEE Hrs : 02

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

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

1. Demonstrate the basics of technical communication, channels of communication and understand the barriers of communication which affects the process.
2. Demonstrate critical and innovative thinking, present effectively and write informatively and persuasively.
3. Prepare high-quality presentations and documents using a range of textual diagrammatic and graphic media.

Unit1
Basics of Technical communication: Introduction, process of communication, levels of communication.
Channels of Communication: Direction of communication, upward, downward, horizontal and interpersonal, organizational communication, communication networks.
Barriers of communication: Noise, classification of barriers.

SLE: Case study

12Hrs

Unit2
Listening and Speaking: Active listening, effective speaking, effective presentations.
Reading and Writing: Reading, technical writing, technology in communication, letters, memos.

SLE: Case study

08Hrs
# INDUSTRIAL DESIGN AND ERGONOMICS (3:0:0)

**Course Code**: IP0320
**Hrs/Week**: 03
**SEE Hrs**: 03

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

**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 workplace.
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.

## 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.  

**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.

*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. 6Hrs

*SLE: Golden ratio and Use of aesthetics in design.*

**Text book:**


**References books:**