Sardar Patel University, Balaghat (M.P.)

Curriculum

For

M.Tech.

Industrial Management & Engineering

From Session: 2024-25

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology
Syllabus
Subject Name: Advanced Mathematics Subject Code: MIM011
Course: M.Tech. Branch: Industrial Management & Engineering, Semester: I
Academic Session:2024-25

Course Contents

Course Objectives

1. Understand and apply key concepts of linear transformations, vector spaces, and modular mathematics.
2. Solve partial differential equations (PDEs) using the separation of variables method.
3. Grasp the principles of probability, including compound probability and discrete random variables.

UNIT 1
Linear Algebra: Linear transformation, vector spaces, hash function, Hermite polynomial, Heavisite's unit function and error function. Elementary concepts of Modular mathematics.

UNIT 2
Solution of Partial Differential Equation (PDE) by separation of variable method, numerical solution of PDE (Laplace, Poisson's, Parabolic) using finite difference methods, Elementary properties of FT, DFT, WFT, Wavelet transform, Haar transform.

UNIT 3
Probability, compound probability and discrete random variable, Binomial, Normal and Poisson's distributions, Sampling distribution, elementary concept of estimation and theory of hypothesis, recurred relations.

UNIT 4
Stochastic process, Markov process transition probability transition probability matrix, just and higher order Markov process, Application of Eigen value problems in Markov Process, Markov chain. Queuing system, transient and steady state, traffic intensity, distribution queuing system, concepts of queuing models (M/M/1: Infinity/ Infinity/ FC FS), (M/M/1: N/ Infinity/ FC FS), (M/M/S: Infinity/ Infinity/ FC FS)

UNIT 5
FEM: Variational functionals, Euler Lagrange's equation, Variational forms, Ritz method, Galerkin's method, descretization, finite elements method for one dimensional problem.

Reference Books:

- ❖ Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
- ❖ Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
- ❖ Applied Numerical Methods with MATLAB by Steven C Chapra, TMH.
- ❖ Introductory Methods of Numerical Analysis by S.S. Shastry,
- ❖ Introduction of Numerical Analysis by Forberg
- ❖ Numerical Solution of Differential Equation by M. K. Jain
- ❖ Numerical Mathematical Analysis By James B. Scarborogh
- ❖ Fourier Transforms by J. N. Sheddon

Course Outcomes

1. Develop a strong mathematical foundation across various fields including linear algebra, probability, and stochastic processes.
2. Enhance problem-solving skills using analytical and numerical methods in differential equations and FEM.
3. Foster the ability to apply mathematical concepts to real-world engineering and scientific problems.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)
School of Engineering and Technology
Syllabus

Subject Name: Work Study & Management Subject Code : MIM012

Course: M.Tech. Branch: Industrial Management & Engineering, Semester: I

Academic Session:2024-25

Course Contents

Course Objectives

1. Gain a comprehensive understanding of the concepts and principles of work study, including methods analysis, work measurement, and productivity improvement techniques.
2. Develop skills to conduct time and motion studies effectively, analyzing workflows to identify inefficiencies and recommend improvements.
3. Explore the importance of human factors and ergonomics in work design, ensuring that systems are user-friendly and promote employee health and safety.

Unit 1

Productivity Management: Concept of Productivity, Factors affecting Productivity, Total productivity model. Short term and Long term Productivity Planning Models. Productivity improvement Techniques: Technology based, Material based, Employee based, Product and Time based P.I. Techniques, Work Study: Definition, objectives and areas of application of work study in industries, Historical review,; Human aspects of work-study, Role of work-study in productivity improvement

Unit 2

Interrelation between method study and work measurement, Method Study: Definition and objectives; Engineering approach to methods analysis and improvement, Data collection and recording techniques; critical examination and development, creative thinking, tools of creativity, Installation and maintenance of the new improved methods. Motion Economy and Analysis: Principles of motion economy, motion analysis; Micro motion and memo motion study; Therbligs and Simo charts

Unit 3

Work Measurement: Definition and objectives; work measurement techniques, Stop watch time study, Principles and procedures, Systems of performance rating; calculation of basic time, allowances and standard time, predetermined motion time and other standard systems, introduction to MOST, Work Sampling : principles and techniques, application of work sampling studies.

Unit 4

Introduction to Ergonomics: Ergonomics as a multi-disciplinary field, components, Importance of ergonomics in equipment and work design, Concept of man-machine system; Types and characteristics of Man-machine systems, Rest Pause design based on physiological consideration, Anthropometry and Work place design.

Unit 5

Wage Incentives and Job Evaluation: Various types of wage Incentive schemes and their impact on productivity, Comparison of different incentive plans, design of incentive plans, Group system of Wage payment, Supervisory incentive plans. Job Evaluation: Purpose, Various types of jobs evaluation system and their application of classification. Wage Cure, Designing salary structure and Grade, Merit Rating, Performance Appraisal. Case Studies.

Reference Books:

1. Sumanth D.J., Productivity Management, TMH.
2. I.L.O., Introduction of Work Study, ILO
3. Maynard H.B., Industrial Engineering Hand Book.

Course Outcomes

1. Demonstrate the ability to apply work study techniques, including time and motion studies, to analyze and improve operational processes.
2. Evaluate and implement effective work measurement methods to establish performance benchmarks and standards within an organization.
3. Create and enforce work standards that align with organizational objectives and promote high-quality output.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology
Syllabus
Subject Name: Principles and Practices Of Management Subject Code : MIM013
Course: M.Tech. Branch: Industrial Management & Engineering, Semester: I

Academic Session:2024-25

Course Contents

Course Objectives

1. Analyze and compare classical and contemporary management theories and their application in organizational settings
2. Cultivate effective leadership and communication skills necessary for managing teams and influencing organizational culture.
3. Explore decision-making processes and tools, emphasizing critical thinking and problem-solving skills.

Unit 1
Introduction: Definition, Roles and Functions of a Manager, Schools of Management Thought, Comparison of American, Japanese and Indian Philosophies of Management, Importance and relation between planning and control, why planning is difficult, types of plans, Objectives of business, Decision-Making, Policy Formulation and Strategies, Management by Objectives.

Unit 2
Organization: Nature and Purpose of Organizing, size, complexity, centralization and formalization, Departmentation, Organization Structures, line, staff and matrix organizations, formal and informal organizations, Span of Control, Delegation of Authority.

Unit 3
Staffing: Functions of Personnel Management, Manpower Planning, Selection and Recruitment, Methods & Types of Training, Motivation, Maslow's need hierarchy, role of money, reduction in hierarchy levels, Herzberg hygienic and motivating factors, Leadership Theories, characteristic and styles of leaderships, Performance Appraisal.

Unit 4
Control: Meaning, Process and Evaluations, effectiveness and efficiency controls, feed forward (push) and feedback (pull) controls, Developing and compensating employees, Control Methods, Effective Communication.

Unit 5
Understanding Organization Behavior, O B model, Hawthorne studies, Foundations of Individual & Group behavior, Introduction to HRD: Importance & Need of HRD, HRD processes & mechanisms, Planning & organizing HRD, OCTAPAC, KAIZEN, HRIS. TQM. Case Studies.

Reference Books:

- ❖ Koontz -O'Donnell, Essentials of Management; TMH
- ❖ Bhat Anil and Arya; Management principles processes and practices; Oxford university.
- ❖ Daft; The new era of management; Cengage pub.
- ❖ Robbins and Coulter; Management; PHI
- ❖ Stoner, Freeman, Gilbert; Management; PHI
- ❖ Chhabra T.N., Principles and Practice of Management.
- ❖ Murton- Gulab, Management Today.
- ❖ Prasad L.M., Principles and Practice of Management

Course Outcomes

1. Demonstrate knowledge of key management theories and concepts, including classical, behavioral, contingency, and systems approaches.
2. Develop the ability to create and implement strategic plans that align with organizational goals and respond to external market conditions.
3. Apply various decision-making models and techniques to solve real-world managerial problems.
4. Evaluate the ethical implications of managerial decisions and promote socially responsible practices within organizations.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)
School of Engineering and Technology
Syllabus
Subject Name: Quantitative Techniques In Management Subject Code : MIM014
Course: M.Tech. Branch: Industrial Management & Engineering, Semester: I
Academic Session:2024-25

Course Contents

Course Objectives

1. Develop a foundational understanding of quantitative techniques and their relevance in decision-making processes within management.
2. Equip students with the skills to apply statistical methods to analyze and interpret data relevant to business scenarios.
3. Teach students how to employ forecasting methods to predict future trends and outcomes, enhancing strategic planning capabilities.

Unit 1

Introduction: History and Development of O.R. & Linear Programming, Present Trend, Assignment models, Transportation: Optimality Test, Degeneracy unbalanced Problems, Transshipment.

Unit 2

Linear Programming: Formulation, Graphical Method, Simplex Method, and Big - M Method, Two-phase Method, Degeneracy, and Unrestricted variables, Revised Simplex, Duality, and Sensitivity analysis, Introduction to Integer programming. Branch and Bound Method.

Unit 3

Waiting line models: Introduction, Classification, States in queue, Probability distribution of arrival and service times Birth and Death Process, Single Server Model (M/M/1), Multiple Server Model (M/M/S), Single Server Model with finite capacity.

Unit 4

Game Theory: Rectangular, Two persons, Zero Sum Games, Maximum and Minimax Principles, Saddle Point, Dominance, Graphical and Algebraic Methods of solution, transforming into Linear Programming Problem, Bidding Problems, Introduction to nonlinear and Dynamic Programming

Unit 5

Simulation: Building a Simulation Model, Monte-Carlo Simulation and Applications, Random No., characteristics and generation, pseudorandom nos., mapping to probability distributions,

Simulation Software, applications, Decision under uncertainty, Tree diagram, probability trees, Decision tree, Computer Application in O.R. and Case Study.

Reference Books:

- ❖ Taha H. Operation Research, PHI
- ❖ Hillier F and Liberman G; Introduction to Operations research; TMH
- ❖ Bronson Richard; Schaum's Outline of OR; TMH.
- ❖ Philip, Ravindran, Operation Research, John Wiley.
- ❖ Heera and Gupta, Operation Research, s. Chand.
- ❖ Sharma S.D. Operation Research
- ❖ Vohra N.D., Operation Research, TMH

Course Outcomes

1. Students will be able to effectively apply various quantitative techniques and statistical methods to solve real-world business problems.
2. Students will demonstrate proficiency in collecting, analyzing, and interpreting data to inform management decisions.
3. Students will create and utilize mathematical and statistical models to optimize business processes and enhance decision-making.
4. Students will be able to employ forecasting methods to predict trends, evaluate risks, and develop strategic plans.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Subject Name: Operations Management Subject Code : MIM015

Course: M.Tech. Branch: Industrial Management & Engineering, Semester: I

Academic Session:2024-25

Course Contents

Course Objectives

1. Equip students with the skills to analyze and design operational processes to improve efficiency, effectiveness, and quality in production and service delivery.
2. Teach students how to assess and determine capacity requirements, balancing demand and supply to optimize resource utilization.
3. Introduce key concepts in supply chain management, including logistics, inventory management, and the integration of suppliers and distributors.

Unit 1

Operations Management: Introduction, Systems concept, Decisions, Organization, Objectives and Evolution of Operations Management, comparing production of tangible goods and services, Operations Strategy, Type of Production Systems, Role of Production Manager.

Unit 2

Facilities Planning & Production Planning Control: Plant location, Plant layout and Material Handling, Layout analysis, Procedures such as CORELAP, CRAFT etc. Organization & Functions of PPC CAPP, Make or Buy Decision, Forecasting Methods & its relationship with Product Life Cycle, Case Studies.

Unit 3

Aggregate Planning and Master Scheduling: Strategies of Aggregate Planning, Graphic & and Charting methods, Application of LP, Master Scheduling, Job Shop Scheduling and Sequencing Algorithms Gantt Chart, Line Balancing, LOB, Case Studies.

Unit 4

Maintenance Management: Types of maintenance strategies, Breakdown, Preventive and Predictive maintenance, Individual and Group Replacement Policies, Case Studies.

Unit 5

Materials Management as part of supply chain, Purchasing, stores and vendor selection, Inventory Models, Selective Inventory Control, MRP, MRP-II, Lot size Techniques, Just - In – Time system of manufacturing, Kaizen, Total Productive Maintenance (TPM), BPR, SCM, ERP etc.& Case Studies.

Reference Books:

- ❖ Hop W, Spearman M; Factory Physics; TMH
- ❖ Charry S.N.; Production & Operations Management; TMH.
- ❖ Chase, Acquilino, Production & Operations Managment, TMH.
- ❖ Eilon S. Production Planning and Control, McMillon Pub.
- ❖ Vollmann; Mfg planning and control for SCM; TMH
- ❖ Nahmias Steven; Production and Operations analysis; TMH
- ❖ Bedi Kaniska; Production and Operations Management; Oxford Pub
- ❖ Dobler & Lee, Purchasing & Materials Management, PHI.
- ❖ Chitle A.K., Gupta R.C. Materials Management, PHI.

Course Outcomes

1. Students will be able to apply fundamental principles of operations management to analyze and improve business processes.
2. Students will demonstrate the ability to assess and redesign operational processes for enhanced efficiency, quality, and customer satisfaction.
3. Students will analyze and optimize supply chain operations, including inventory management and logistics, to improve overall performance.