

Branch: MECHANICAL	Year: IV	Semester: Odd
Subject Code: NOE-073	Subject Name: Operations Research	
Course Outcomes:	1. Formulate suitable mathematical models of the day-to-day business problems and employ Simplex method to solve Linear Programming Problems.	
	2. Develop minimum cost solutions for conventional Transportation and Assignment problems..	
	3. Use Network flow models to find solution to problems like - shortest path, Minimal spanning Tree, Max-Flow & Minimum cut problems.	
	4. Monitor the progress of projects using techniques like PERT & CPM and take necessary steps to avoid any time and cost overruns in projects.	
	5. Suggest optimum strategies for the decision makers via Games theory fundamentals.	
	6. Apply OR tools & techniques to make optimum decisions regarding issues like - Queuing system design, Inventory Control, Replacement of old equipments .	
Syllabus: As per AKTU		
Unit 1	Definition and scope of operations research (OR), OR model, solving the OR model, art of modelling, phases of OR study. Linear Programming: Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.	
Unit 2	Transportation Problems: Types of transportation problems, mathematical models , transportation algorithms, Assignment: Allocation and assignment problems and models, processing of job through machines.	
Unit 3	Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem. Project Management: Phases of project management, guidelines for network construction, CPM and PERT.	
Unit 4	Theory of Games : Rectanagular games, Minimax theorem, graphical solution of $2 \times n$ or $m \times 2$ games, game with mixed strategies, reduction to linear programming model. Quality Systems: Elements of Queuing model, generalized poisson queuing model, single server	

	models.
Unit 5	<p>Inventory Control: Models of inventory, operation of inventory system, quantity discount.</p> <p>Replacement: Replacement models: Equipments that deteriorate with time, equipments that fail with time.</p>

Branch: MECHANICAL	Year: IV	Semester: Odd
Subject Code: NME-032	Subject Name: Project Management	
Course Outcomes:	1. Understand the basic terminology and concepts used in project management	
	2. Understand the types of organization and the process of awarding project contracts.	
	3. Analyze and appraise various project proposals.	
	4. Develop the plan and schedule through various project management tools and techniques	
	5. Understand the complexity and challenges associated with project milieu.	
	6. Evaluate and select suitable computer aided project management software packages/modules for various project environments.	
Syllabus: As per AKTU		
Unit 1	<p>Project Management Concepts Introduction, project characteristics, taxonomy of projects, project identification and formulation. Establishing the project and goals. Nature & context of project management; phases of PM, A framework for PM issues, PM as a conversion process, project environment & complexity. Organizing human resources, organizing systems & procedures for implementation. Project direction.</p>	
Unit 2	<p>Project Organization & Project Contracts Introduction, functional organization, project organization, matrix organization, modified matrix organization, pure project organization, selection of project organization structure, project breakdown structures, project contracts, types of contracts, types of payments to contractors.</p>	
Unit 3	<p>Project Appraisal & Cost Estimation Introduction, technical appraisal, commercial appraisal, economic appraisal, financial appraisal, management appraisal, social cost/benefit analysis, project risk analysis. Cost analysis of the project, components of capital cost of a project, modern approach to project performance analysis.</p>	
Unit 4	<p>Project Planning & Scheduling Introduction to PERT & CPM, planning and scheduling networks, time estimation, determination of critical path, CPM model, event slacks & floats, PERT model, expected time for activities, expected length of critical path,</p>	

	calculating the project length and variance, PERT & CPM cost accounting systems, lowest cost schedule, crashing of networks, linear programming formulation of event oriented networks, updating of networks, LOB technique.
Unit 5	Modification & Extensions of Network Models Complexity of project scheduling with limited resources, resource leveling of project schedules, resource allocation in project scheduling - heuristic solution. Precedence networking- examples with algorithm, decision networks, probabilistic networks, computer aided project management essential requirements of PM software, software packages for CPM. Enterprise- wide PM, using spread sheets for financial projections.

Branch: MECHANICAL	Year: IV	Semester: Odd
Subject Code: NME-701	Subject Name: Computer Aided Design	
Course Outcomes:	1. Understand the basic structure of CAD tools and its hardware components.	
	2. Explain the basic elements of computer graphics and transformations	
	3. Represent synthetic curves in Parametric form.	
	4. Perform solid modeling with the help of AutoCAD and Pro-E software.	
	5. Understand the basic steps in Finite Element Analysis.	
	6. Formulate and solve any 1D and 2D engineering problem using Finite element method.	
Syllabus: As per AKTU		
Unit 1	Introduction: Introduction to CAD/CAED/CAE, Elements of CAD, Essential requirements of CAD, Concepts of integrated CAD/CAM, Necessity & its importance, Engineering Applications Computer Graphics-I CAD/CAM systems. Computer Graphics-I Graphics Input devices-cursor control Devices, Digitizers, Keyboard terminals, Image scanner, Speech control devices and Touch, panels, Graphics display devices - Cathode Ray Tube, Random & Raster scan display, Color CRT monitors, Direct View Storage Tubes, Flat Panel display, Hard copy printers and plotters.	
Unit 2	Computer Graphics-II Graphics standards, Graphics Software, Software Configuration, Graphics Functions, Output primitives- Bresenham's line drawing algorithm and Bresenham's circle generating algorithm Geometric Transformations: World/device Coordinate Representation, Windowing and clipping, 2 D Geometric transformations-Translation, Scaling, Shearing, Rotation & Reflection Matrix representation, Composite transformation, 3 D transformations, multiple transformation.	
Unit 3	Curves: Curves representation, Properties of curve design and representation, Interpolation vs approximation, Parametric representation of analytic curves, Parametric continuity conditions, Parametric representation of synthetic curves-Hermite cubic splines-Blending function formulation and its	

	properties, Bezier curves-Blending function formulation and its properties, Composite Bezier curves, B-spline curves and its properties, Periodic and non-periodic B-spline curves.
Unit 4	3D Graphics: Polygon surfaces-Polygon mesh representations, Quadric and Superquadric surfaces and blobby objects; Solid modeling-Solid entities, Fundamentals of Solid modeling-Set theory, regularized set operations; Half spaces, Boundary representation, Constructive solid geometry, Sweep representation, Color models. Basic application commands for 2d drafting software like AutoCAD/Draftsight (any one)&3d solid modeling software Solidworks/Autodesk Inventor/PTC Creo /Catia (Any one) etc.
Unit 5	Finite Element Analysis: Basic concept of the finite element method, comparison of FEM with direct analytical solutions; Steps in finite element analysis of physical systems, Finite Element analysis of 1-D problems like spring, bar, truss and beam elements formulation by direct approach; development of elemental stiffness equations and their assembly, solution and its post processing.

Branch: MECHANICAL	Year: IV	Semester: Odd
Subject Code: NME-702	Subject Name: Automobile Engineering	
Course Outcomes:	1. Understand the design principles for main components of an automotive vehicle.	
	2. Understand the basics of transmission systems of an automotive vehicle.	
	3. Understand the function & types of braking, chassis and suspension systems of an automobile.	
	4. Understand the electrical & fuel supply systems of an automotive vehicle.	
	5. Understand the automobile air-conditioning, cooling & lubrication systems.	
	6. Understand the key features of an automobile maintenance system.	
Syllabus: As per AKTU		
Unit 1	Introduction: Basic concepts of Automobile Engineering and general configuration of an automobile, Power and Torque characteristics. Rolling, air and gradient resistance. Tractive effort. Gear Box. Gear ratio determination.	
Unit 2	Transmission System: Requirements. Clutches. Toque converters. Over Drive and free wheel, Universal joint. Differential Gear Mechanism of Rear Axle. Automatic transmission, Steering and Front Axle. Castor Angle, wheel camber & Toe-in, Toe-out etc.. Steering geometry. Ackerman mechanism, Understeer and Oversteer.	
Unit 3	Braking System:	

	<p>General requirements, Road, tyre adhesion, weight transfer, Braking ratio. Mechanical brakes, Hydraulic brakes. Vacuum and air brakes. Thermal aspects.</p> <p>Chasis and Suspension System: Loads on the frame, Strength and stiffness, Independent front & rear suspension, Perpendicular arm type, Parallel arm type, Dead axle suspension system, Live axis suspension system, Air suspension & shock absorbers.</p>
Unit 4	<p>Electrical System : Types of starting motors, generator & regulators, lighting system, Ignition system, Horn, Battery etc.</p> <p>Fuel Supply System: Diesel & Petrol vehicle system such as Fuel Injection Pump, Injector & Fuel Pump, Carburetor etc. MPFI.</p>
Unit 5	<p>Emission standards and pollution control : Indian standards for automotive vehicles-Bharat I and II, Euro-I and Euro-II norms, fuel quality standards, environmental management systems for automotive vehicles, catalytic converters, fuel additives and modern trends in automotive engine efficiency and emission control.</p> <p>Maintenance system: Preventive maintenance, break down maintenance and over hauling.</p>

Branch: MECHANICAL	Year: IV	Semester: Odd
Subject Code: NME-041	Subject Name: Total Quality Management	
Course Outcomes:	1. Understand the traditional and modern quality concepts.	
	2. Appreciate the issues related to quality of bought out and manufactured products.	
	3. Select the suitable organization structure for different products and companies	
	4. Exercise process and product control through Statistical Quality Control.	
	5. Diagnose and control various defects using reliability studies.	
	6. Understand and implement advanced quality management systems like Taguchi, JIT and ISO-9000 in the organization.	
Syllabus: As per AKTU		
Unit 1	<p>Quality Concepts Evolution of Quality control, concept change, TQM Modern concept, Quality concept in design, Review off design, Evolution of proto type.</p> <p>Control on Purchased Product Procurement of various products, evaluation of supplies, capacity verification, Development of sources, procurement procedure.</p> <p>Manufacturing Quality Methods and Techniques for manufacture, Inspection and control of product, Quality in sales and services, Guarantee, analysis of claims.</p>	

Unit 2	<p>Quality Management Organization structure and design, Quality function, decentralization, Designing and fitting organization for different types products and company, Economics of quality value and contribution, Quality cost, optimizing quality cost, seduction programme.</p> <p>Human Factor in Quality Attitude of top management, co-operation, of groups, operators attitude, responsibility, causes of operators error and corrective methods.</p>
Unit 3	<p>Tools and Techniques Seven QC tools (Histogram, Check sheet, Ishikawa diagram, Pareto, Scatter diagram, Control chart, flow chart).</p> <p>Control Charts Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts.</p> <p>Attributes of Control Charts Defects, construction and analysis off-chart, improvement by control chart, variable sample size, construction and analysis of C-chart.</p>
Unit 4	<p>Defects Diagnosis and Prevention Defect study, identification and analysis of defects, corrective measure, factors affecting reliability, MTTF, calculation of reliability, Building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle.</p>
Unit 5	<p>ISO-9000 and its concept of Quality Management ISO 9000 & ISO 14000 series, Quality information system and documentation, Auditing, Taguchi method, JIT in some details.</p>