OPERATIONS RESEARCH

Course Objectives: To learn the importance of Operations Research in the design, planning, scheduling, manufacturing and business applications and to use the various techniques of Operations Research in solving such problems.


UNIT – III REPLACEMENT: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.


UNIT – V INVENTORY: Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed – stochastic models – demand may be discrete variable or continuous variable – instantaneous production. Instantaneous demand and continuous demand and no set up cost. ABC & VED Analysis.

TEXT BOOKS:
1. Operations Research / S.D.Sharma-Kedarnath

REFERENCES:
1. Introduction to O.R/Hiller & Libermann (TMH).

Course Outcomes: After completion of the course, the student will be able to: To solve the LP and DP problems. To solve the Transportation, assignment, game, inventory, replacement, sequencing, queuing problems.
INTERACTIVE COMPUTER GRAPHICS

Course objectives: This course allows the students to: 1. Understand the fundamental concepts and theory of computer graphics. 2. Understand modeling, and interactive control of 3D computer graphics applications. 3. The underlying parametric surface concepts be understood. 4. Learn multimedia authoring tools.

UNIT-I INTRODUCTION: Application areas of computer graphics, overview of graphic system, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

UNIT-II OUTPUT PRIMITIVES: Points and lines, line drawing algorithms, midpoint circle algorithm, Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood-fill algorithm. 2-D GEOMETRICAL TRANSFORMATIONS: Translation, scaling, rotation, reflection and shear transformation matrix representations and homogeneous co-ordinates, composite transformations, transformations between coordinates.

UNIT -III 2-D VIEWING : The viewing pipe-line, viewing coordinate4 reference frame, window to view-port co-ordinate transformations, viewing function, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland-Hodgeman polygon clipping algorithm.

UNIT -IV 3-D OBJECT REPRESENTATION: spline representation, Hermite curve, Bezier curve and B-spline curve, Polygon surfaces, quadric surfaces, , Solid modeling Schalars – wire frame, CSG, B-rep. Bezier and B-spline surfaces, Basic illumination models, shading algorithms.

UNIT -V 3-D GEOMETRIC TRANSFORMATIONS: Translation, rotation, scaling, reflection and shear transformation and composite transformations. Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting.

UNIT-VI COMPUTER ANIMATION: Design of animation sequence, general computer animation functions, raster animation, computer animation language, key frame system, motion specification.

TEXT BOOKS:


4. Computer Graphics, Steven Harrington, TMH.

Course outcomes: Upon successful completion of the course, students will be able to: 1. Use the principles and commonly used paradigms and techniques of computer graphics. 2. Write basic graphics application programs including animation. 3. Design programs to display graphic images to given specifications. 4. Possess in-depth knowledge of display systems, image synthesis, shape modeling, and interactive control of 3D computer graphics applications.
DESIGN OF MACHINE MEMBERS – II

Course Objectives: • This course gives the insight of slider and roller bearings and the life prediction. • Learn to design I.C engine parts. • Design the mechanical systems for power transmission elements such as gears, belts, ropes, chains, keys and levers.


UNIT – II ENGINE PARTS: Connecting Rod: Thrust in connecting rod – stress due to whipping action on connecting rod ends – cranks and crank shafts, strength and proportions of over hung and center cranks – crank pins, crank shafts.

UNIT – III Pistons, forces acting on piston – construction design and proportions of piston, cylinder, cylinder liners.

UNIT – IV Design of curved beams: introduction, stresses in curved beams, expression for radius of neutral axis for rectangular, circular, trapezoidal and t-section, design of crane hooks, c –clamps.


REFERENCES:

2. Data Books: (I) P.S.G. College of Technology (ii) Mahadevan


Course outcomes: At the end of the course 1. The student will be able to select the suitable bearing based on the application of the loads and predict the life of the bearing. 2. Design power transmission elements such as gears, belts, chains, pulleys, ropes, levers and power screws. 3. Design of IC Engines parts.
ROBOTICS

Course Objectives: 1. To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics. 2. The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning. 3. Mathematical approach to explain how the robotic arm motion can be described. 4. The students will understand the functioning of sensors and actuators.


UNIT V General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint Mechanical Engineering 122 integrated motion – straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language.

TEXT BOOKS: 1. Industrial Robotics / Groover M P / Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrah I J / TMH.

3. Robot Analysis and Intelligence / Asada and Slow time / Wiley InterScience.

Course outcomes: Upon successful completion of this course you should be able to: 1. Identify various robot configuration and components. 2. Select appropriate actuators and sensors for a robot based on specific application. 3. Carry out kinematic and dynamic analysis for simple serial kinematic chains. 4. Perform trajectory planning for a manipulator by avoiding obstacles.
HEAT TRANSFER

(Heat transfer data book allowed) Course Objectives: This course is intended to impart knowledge of principles of heat transfer and analyze the heat exchange process in various modes for the evaluation of rate of heat transfer and the temperature distribution in different configurations.


TEXT BOOKS: 1. Heat Transfer - HOLMAN/TMH


Course outcomes: The student after undergoing this course is expected to know the principles of heat transfer and be able to apply to practical situations where in heat exchange takes place through various modes of heat transfer including phase change.
Course Objectives: 1. To impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering. 2. To produce graduates with the ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy. 3. To enable students to understand the interactions between engineering, business, technological and environmental spheres in the modern society. 4. To enable students to understand their role as engineers and their impact to society at the national and global context.

Unit – I INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of IE and productivity measurement. concepts of management, importance, functions of management, scientific management, Taylor’s principles, theory X and theory Y, Fayol’s principles of management.

Unit – II PLANT LAYOUT: Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, plant maintenance, preventive and breakdown maintenance.

Unit – III OPERATIONS MANAGEMENT: Importance, types of production, applications, workstudy, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs.

Unit – IV STATISTICAL QUALITY CONTROL: Quality control, its importance, SQC, attribute sampling inspection with single and double sampling, Control charts – X and R – charts X AND S charts and their applications, numerical examples. TOTAL QUALITY MANAGEMENT: zero defect concept, quality circles, implementation, applications, ISO quality systems. six sigma – definition, basic concepts .

Unit – V RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types.

Unit - VI VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management. PROJECT MANAGEMENT: PERT, CPM – differences & applications, critical path, determination of floats, importance, project crashing, smoothing and numerical examples.

2. Industrial Engineering and Production Management, Martand Telsang, S.Chand & Company Ltd. New Delhi.


3. Industrial Engineering by Banga & Sharma.


5. Statistical Quality Control by Gupta.


Course outcome: Upon successful completion of this course you should be able to: 1. Design and conduct experiments, analyse, interpret data and synthesise valid conclusions. 2. Design a system, component, or process, and synthesise solutions to achieve desired needs. 3. Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints. 4. Function effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management.
III Year – II SEMESTER

DEPARTMENTAL ELECTIVE – I

REFRIGERATION & AIR CONDITIONING

(Refrigeration and Psychrometric tables and charts allowed) Course objectives: The course is to understand the basic cycles of various refrigerating systems, their performance evaluation along with details of system components and refrigerant properties. The course is also aimed at imparting knowledge of psychrometric properties, processes which are used in air conditioning systems for comfort and industrial applications.

UNIT – I INTRODUCTION TO REFRIGERATION: Necessity and applications – unit of refrigeration and C.O.P. – Mechanical refrigeration – types of ideal cycles of refrigeration. air refrigeration: bell coleman cycle - open and dense air systems – refrigeration systems used in air crafts and problems.


UNIT IV VAPOR ABSORPTION SYSTEM: Calculation of maximum COP – description and working of NH3 – water system and Li Br –water ( Two shell & Four shell) System, principle of operation three fluid absorption system, salient features.

STEAM JET REFRIGERATION SYSTEM: Working Principle and basic components. principle and operation of (i) thermoelectric refrigerator (ii) vortex tube.


UNIT – VI AIR CONDITIONING SYSTEMS: Classification of equipment, cooling, heating humidification and dehumidification, filters, grills and registers, fans and blowers. heat pump – heat sources – different heat pump circuits.


Course outcomes: At the end of the course the students should be able to: After undergoing the course the student should be in a position to analyze various refrigerating cycles and evaluate their performance. The student also should be able to perform cooling load calculations and select the appropriate process and equipment for the required comfort and industrial airconditioning.
HEAT TRANSFER LAB

Objectives:

The laboratory course is aimed to provide the practical exposure to the students with regard to the determination of amount of heat exchange in various modes of heat transfer including condensation & boiling for several geometries.

1. Determination of overall heat transfer co-efficient of a composite slab.
2. Determination of heat transfer rate through a lagged pipe.
3. Determination of heat transfer rate through a concentric sphere.
4. Determination of thermal conductivity of a metal rod.
5. Determination of efficiency of a pin-fin.
6. Determination of heat transfer coefficient in forced convection.
10. Determination of Stefan Boltzman constant.

Outcomes: The student should be able to evaluate the amount of heat exchange for plane, cylindrical & spherical geometries and should be able to compare the performance of extended surfaces and heat exchangers.