VII Sem

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(1503701) CAD/CAM

COURSE OBJECTIVE:

The course examines the area that is commonly referred to as CAD/CAM. The general objectives of the course are to enable the students to:

Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings,

Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program,

Understand the possible applications of the CAD/CAM systems in motion analysis, structure analysis, optimization, rapid prototyping, reverse engineering and virtual engineering,

Useful-scale CAD/CAM software systems designed for geometric modeling of machine components and automatic generation of manufacturing information.

Course outcomes:

CO1.Students are able to understand Automation, components of CAD/CAM, input and output components of CAD and Steps involved in computer aided design.

CO2.Students are able to understand the geometric model of the component in CAD technology of computer graphics. The techniques of raster technology, scan conversion, clipping, removal of hidden lines and hidden surfaces, color, shading and texture.

CO3.Geometric Modeling constitutes the most important and complex part in most of CDA software packages. Hence the students should focus on various requirements of information that are generated during geometric modeling stage, various types and its applications.

CO4. Understand the need of computers in process planning and QC. Understand the definition and concept of FMS, and its elements etc.

UNIT-I

Fundamentals of CAD - design process - Applications of computers for design benefits of CAD - Computers configuration of CAD applications - Computer peripherals for CAD - Design work station - Graphics terminal.

UNIT-II

Geometry and line generation, Computer graphics: Transformations- Points and lines transformation - Translation, rotation, Scaling, Mirror Reflection; 2D and 3D transformations - - Windowing and Clipping.

UNIT-III

Curve generation - Plane curves - Space curves - Surface description and generation; modeling concepts: 2D and 3D modeling - Wire frame, Surface and Solid modeling. B-rep solid modeling and constructive solid geometry, Bezier curve and surface representations

UNIT-IV

CAM - Definition, Divisions of CIM: Group technology - Introduction, concepts of GT, Analysis of GT, Classification and coding system, Advances of GT, Flexible manufacturing systems (FMS) - Definition, Different flexibilities Need of FMS, Components of FMS, Difference between conventional manufacturing system and FMS, Advantages of FMS.
Applications of robots in manufacturing and material handling

UNIT V

Computer Aided Process Planning- Variant and Generative CAPP Systems.
MRP- Inputs and outputs of MRP, Capacity Planning
Basic concepts of Shop floor data- Types of factory data and collection systems- concepts of automatic identification methods- Bar code technology-Concepts and uses.

Text Books:
1. CAD/CAM, A Zimmers&P.Groover, PE, PHI
2. CAD/CAM-Principles and applications, P.N. Rao, TMH, 3rd edition, 2010
3.CAD/CAM By Ibrahim Zeid ,R.sivasubramanyam , Mcgraw Higher Ed

References:

1. Computer Graphics : PlastockSchaum Series
2. Interactive Computer Graphics: Newman &Sproul
3. Computer Graphics: Steven Hamington
4. CAD/CAM: Groover
5. Automation, Production System & CIM: M.P. Groover
6. Mathematical Elements of Computer Graphics: Rogers and Adams
7. Procedural Elements of Computer Graphics: Rogers

B.Tech –VII Sem

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(1503703)FINITE ELEMENT METHODS

COURSE OBJECTIVE:

The students will learn the Fundamental of Finite Element analysis including, discrete system analysis , steady state and transient heat transfer analysis, static and dynamic analysis of structures. The main objective of the course is to teach the fundamentals of finite element method with emphasize on the underlying theory, assumption , and modeling issues as well as providing hands on experience using finite element software to model, analyze and design systems of Mechanical Engineers

COURSE OUTCOMES:

CO1.Students are able to know introductory basic principles and approaches for solving FEM problems in different fields.
CO2.Students are able to formulate FEM model for simple problems.
CO3.Students are able to write interpolation functions to higher order isoparametric elements.
CO4.Students are able to derive element matrices for applying the principles to find stresses in beams and trusses and temperature distribution in composite walls and fins.
CO5.Students are able to solve bars, trusses, beams and heat transfer problems using FEM and also to apply boundary conditions in realistic problems.

UNIT-I:

Introduction To Fem, Basic Steps, Advantages And Limitations Of Fem. , Equilibrium Equations in elasticity subjected to body force, traction force and point loads, stress strain relations in 3D elasticity, variational methods- potential energy method, Rayleigh Ritz method, Galerkin and weighted residual methods.

UNIT -II:

Interpolation models : Introduction, Types of interpolation models, Polynomial form of interpolation models, Simplex, Complex and Multiplex elements, Order of polynomial interpolation model, Geometrical in variance, Pascal Triangle, Convergence, Compatibility condition,

One Dimensional Finite methods bar elements , Solution for Displacement ,Reaction, Stresses, Temperature effects, Element matrices, Assembling of Global stiffness matrix, Elimination and Penalty Approaches

UNIT -III :

Trusses and beams : Element Stiffness matrix, Assembling of Global stiffness matrix, solution for displacements, reaction, stresses, Deflections

UNIT- IV:

Two Dimensional problems- Introduction, Plane stress and Plane strain condition, CST elements, Shape function of CST element, Strain displacement matrix [B] for CST element, Stress strain relationship matrix [D], Stiffness matrix equation for CST element,Temperature effects

Isoparametric Formulation concepts ,sub parametric ,super parametric Elements-Derivations and probelms

UNIT-V

Numerical Integration, Heat transfer problems one dimensional , conduction and convection, Temperature distribution Through composite walls , One Dimensional fin – problems

TEXT BOOKS:

1.Finite Element Analysis in Engineering, S.Md. Jalaludeen, Anuradha Publishers
2.Introduction to Finite Elements in Engineering, Chandraputla,a and Belegundu, PHI.
3.Applied finite elements by G. Ramamurthy,Osmania university, I K International Publishing House Pvt. Ltd

REFERENCES:

1.An Introduction to Finite Element Method, JN Reddy, TMH
2. Finite Element Method, its basics and fundamentals, O.C.Zienkiewicz, Elsevier
3. Fundamentals of Finite element analysis ,David V Hutton ,TMH
4. Finite Element Analysis, G. Laksminarasaiah, B.S.Publ.
5. Textbook of Finite Element Analysis by P. Seshu PHI Publishers
6. Finite Element Methods in Engineering, SS Rao, Pergamon,

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(1503704) INSTRUMENTATION AND CONTROL SYSTEMS

COURSE OBJECTIVE:

1. To enable the students to understand the fundamentals of instrumentation and control available for monitoring/measuring in domestic / industrial applications.
2. To learn fundamentals of various types of Transducers.
3. To acquire basic understanding of principle & working of Transducers
4. To understand the methods to analyze the stability of systems from transfer function forms

COURSE OUTCOMES:

CO1. Student can select appropriate device for the measurement of parameters like temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and performance.
CO2. Students are able to understand fundamentals of various types of Transducers.
CO3. Students are able to understand principle & working of Transducers
CO4. Students are able to understand the methods to analyze the stability of systems from transfer function forms.

UNIT-I

Definition - Basic principles of measurement - Measurement systems, generalized configuration and functional descriptions of measuring instruments - examples. Dynamic performance characteristics sources of error, Classification and elimination of error.

UNIT-II

Theory and construction of various transducers to measure displacement - Piezo electric, Inductive, capacitance, resistance, calibration procedures
MEASUREMENT OF TEMPERATURE: Classification - Ranges - Various Principles of measurement - Expansion, Electrical Resistance - Thermistor - Thermocouple - Pyrometers - Temperature Indicators.
MEASUREMENT OF PRESSURE: Units - classification - different principles used- Manometers, Piston, Bourdon pressure gauges, Bellows - Diaphragm gauges. Low pressure measurement - Mcleod pressure gauge

UNIT -III

MEASUREMENT OF LEVEL: Direct method - Indirect methods - capacitative, ultrasonic, magnetic, cryogenic fuel level indicators - Bubler level indicators.

FLOW MEASUREMENT: Rotameter, magnetic, Ultrasonic, Turbine flow meter, Hot - wire anemometer Laser Doppler Anemometer (LDA).

MEASUREMENT OF SPEED: Mechanical Tachometers - Electrical tachometers - Stroboscope, Noncontact type of tachometer. Measurement of Acceleration and Vibration: Different simple instruments - Principles of Seismic instruments - Vibrometer and accelerometer.

UNIT -IV

STRESS & STRAIN MEASUREMENTS: Various types - electrical strain gauge – gauge factor - method of usage of resistance strain gauge for bending, compressive and tensile strains - usage for measuring torque.

UNIT - V

MEASUREMENT OF HUMIDITY - Moisture content in the gases, sling psychrometer, Absorption psychrometer, Dew point meter

MEASUREMENT OF FORCE, TORQUE AND POWER- Elastic force meters, load cells, Torsion meters, Dynamometers.

ELEMENTS OF CONTROL SYSTEMS: Introduction, Importance - Classification – Open and closed systems

TEXT BOOKS:

1. Measurement Systems: Applications & design, D.S Kumar.
2. Instrumentation and Control Systems, S.Bhaskar, Anuradha Agencies.

REFERENCES:

1. Measurement systems: Application and design, Doeblin O. Earnest..Adaptation by Manik and Dhanesh, TMH
2. Mechanical Measurements, Beckwith, Marangoni, Linehard, PHI, PE
3. Instrumentation, Measurement & Analysis, B.C.Nakra&K.KChoudhary, TMH
4. Mechanical and Industrial Measurements, R.K. Jain, Khanna Publishers.
5. Instrumentation & Mechanical Measurements, AK. Tayal ,Galgotia Publ.
6. Principals of Industrial Instrumentation and Control Systems, Chennakesava, R.A., Cengage Learning, 2008

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(1503702) METROLOGY

Course objectives:
The students will learn
1. Inspection of engineering parts with various precision instruments.
2. Design of part, tolerances and fits.
3. Principles of measuring instruments and gauges and their uses.
4. Evaluation and inspection of surface roughness.
5. Inspection of spur gear and thread elements. 6. Machine tool testing to evaluate machine tool quality.

Course Outcomes

CO1.Students are able to understand the Limits, Fits and Tolerances, Indian standard system – International Standard organization system
CO2.Students will know the principles of working of the most commonly used instruments for measuring linear and angular distances.
CO3.Students are able to study the different types of Comparators, optical measuring instruments, flatness measurement methods and measuring methods of surface roughness.
CO4.Students are able to understand, Screw thread elements and measuring methods, Gear tooth profile measurement, CMM, Alignment tests on lathe, milling and drilling machine tools.

UNIT – I

SYSTEMS OF LIMITS AND FITS: Introduction, Definitions, fits and their types –unilateral and bilateral tolerance system, hole and shaft basis systems – interchangeability and selective assembly. Indian standard Institution system – International Standard system for plain and screwed work

UNIT – II

LINEAR MEASUREMENT: Length standard, line, ends & wavelength standards slip gauges – calibration of the slip gauges, Dial indicator, micrometers.
MEASUREMENT OF ANGLES AND TAPERS: Different methods – Bevel protractor – angle gauges – spirit levels – sine bar – Sine plate, rollers and spheres used to determine the tapers.
LIMIT GAUGES: Plug, Ring, Snap, Gap, Taper, Profile and Position gauges. Taylor's principle Design of Go and No Go gauges.

UNIT – III

OPTICAL MEASURING INSTRUMENTS: Tool maker's microscope – collimators, optical projector – optical flats and their uses, interferometer.

FLATNESS MEASUREMENT: Measurement of flatness of surfaces – straight edges–surface plates – optical flat and auto collimator.

SURFACE ROUGHNESS MEASUREMENT: Differences between surface roughness and surface waviness- Numerical assessment of surface finish – CLA, R.M.S Values – Ra ,Rz

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UNIT-IV

SCREW THREAD MEASUREMENT: Elements of measurement – errors in screw threads – measurement of effective diameter, angle of thread and thread pitch- profile thread gauges.

MACHINE TOOL ALIGNMENT TESTS: Requirements of Machine Tool Alignment Tests, Alignment tests on lathe, milling, drilling machine tools. Preparation of acceptance charts.

UNIT- V

GEAR MEASUREMENT: Gear measuring instruments, Gear tooth profile measurement: Measurement of diameter, pitch, pressure angle and tooth thickness. Coordinate Measuring Machines: Types of CMM and Applications of CMM.

MEASUREMENT THROUGH COMPARATORS: Comparators – Mechanical, Optical, Electrical, Electronic, Pneumatic comparators and their uses

TEXT BOOKS:

1. Engineering Metrology ,Mahajan, DhanpatRai
2. Engineering Metrology, R.K. Jain, Khanna Publ.

REFERENCES:

1. BIS standards on Limits & Fits, Surface Finish, Machine Tool Alignment etc.
2. Fundamentals of Dimensional Metrology , Connie Dotson ,4e, Thomson
3. Handbook of Tribology: Materials, Coatings, and Surface Treatments, Bharat Bhushan and B.K.Gupta.
4. Surface Engineering with Lasers, Dehosson J.T.
5. Surface Engineering for corrosion and wear resistance, JR Davis, Woodhead Publ.

VII Sem

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(1503705) PRODUCTION AND OPERATIONS MANAGEMENT

(Elective-III)

COURSE OBJECTIVE:

To get acquainted with the basic aspects of production management
To learn techniques of PERT and CPM and its application to management of project
To learn various scheduling and sequencing techniques
To study different types of production systems
To learn various quality and productivity improvement techniques

COURSE OUTCOMES:

CO1.Students can get the concepts on Production planning & controls operations and its functions, productivity and productivity measurements, design of goods and services and aggregate planning.
CO2.Students can understand the importance of forecasting, uses of long term and short term forecasting and application of qualitative and quantitative methods for finding the future demands.
CO3.Students will be able to understand where the plant is to be located based on facilities available and what are the important factors affecting the facilities location of a plant, and plant layout and also able to understand plant layout design to facilitate material flow and processing of a product in the most efficient manner through the shortest possible time. Can compare the rural & urban sites, methods of selection
CO4.Students can understand the how philosophy of lean management applied to develop lean enterprise and basic concepts JIT, Six sigma control etc.,
CO5. Students will be able to understand the scheduling policies, flow shop and job shop scheduling techniques and concepts of Inventory, Classification, Functions, its associated costs etc., and also able to recognize the importance of Inventory control to ensure their availability with minimum capital lock up.

UNIT – I

Introduction to production and operations management, Production management v/s operations management, Objectives of production and operations management, Benefits of production and operations management

Production systems: Definition, components of production system, Types of production system, Mass production system, Flow production system, Batch production system, Job shop production system, Project type production system, Flexible production system, Lean production, Agile production, Just in time production system and Kanban system

UNIT – II

Forecasting: Importance of forecasting, Types of forecasting, their uses, Forecasting techniques, Qualitative methods, Quantitative methods: Regression analysis, Moving average ,Weighted moving average, Exponential smoothing method, Forecast for seasonal variations, Fore cast error : Mean absolute deviation, BIAS, Mean square error , Standard deviation, Tracking signal

Aggregate production planning: Master production schedule, Strategies for aggregates planning, Aggregate planning methods.

UNIT – III

Factors affecting facilities location, Methods of evaluating location alternatives: Cost analysis, Profit analysis, Return on investment and Factor rating system.

Types of facilities layout: Product layout, process layout and group technology layout, Travel chart, Relationship chart. Computerized layouts: ALDEP, CRAFT and CORELAP.

Assembly line balancing: Introduction, Objectives, Terms used in line balancing, Line balancing algorithms: Ranked positional weight technique and largest candidate rule

UNIT – IV

Inventory management: Functions of inventories, relevant inventory costs, ABC Analysis and VED analysis, Simple EOQ model, Inventory control systems: P–Systems and Q-Systems(S, s) Policy

PERT and CPM: Terms used in PERT and CPM, Rules for drawing network diagram, CPM, PERT, Crashing of network, Resource management, Resource allocation, Resource aggregation, Resource leveling and applications of PERT and CPM

UNIT – V

Loading and scheduling: Terms used in scheduling, Factors affecting scheduling, Objectives of scheduling, Methods used in scheduling: Forward scheduling backward scheduling and Gantt chart

Sequencing: Priority sequencing rules, Johnson algorithm: n jobs through two machines, n jobs through three machines, n jobs through m machines

Material requirement planning, Capacity planning and production control

TEXT BOOKS:

1. Analysis of production systems and Operations and production Management, Rajagopal Kurnool, CBS publishers
2. Modern Production, Operations Management, Baffa&RakeshSarin.
3. Operation Management, B. Mahadevan, Pearson Edu.
3. Production & Operations Management: Concepts, Models and Behavior, Adam & Ebert 5/e, PHI

REFERENCES:

1. Operations Management, S.N. Chary.
2. Inventory Control Theory and Practice, Martin K. Starr and David W. Miller.
3. Production Control A Quantitative Approach , John E. Biegel.
4. Production & Operations Management, KanishkaBedi, Oxford Univ Press.

B.Tech VII Sem

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(1503710) RAPID PROTOTYPING

(ELECTIVE IV)

Course Objectives

1. To study the basics of RPT
2. To study the various process in RP
3. To study the principles of Rapid tooling and reverse engineering
4. To study the Rapid tooling-Direct ,Indirect soft & Hard tooling

Course Out Comes

1).At end of semester students gains knowledge on various types rapid prototyping techniques

2).Student gains knowledge in various operation principles and applications

3). Student gains knowledge Various Part building errors in rapid prototyping Process

4). Student Gains knowledge in Rapid tooling

Unit-I

Introduction: Need for the compression in product development, History of RP system, Survey of applications, Growth of RP industry and classification of RP system.

Unit_II

Stereo Lithography System: Principle, Process parameter, Process details, Data preparation, Data files and machine details, Applications.

Unit III Fusion Decomposition Modeling: Principle, process parameter, Path generation, Applications.

Solid ground curing: Principle of operation, Machine details, Applications,

Unit IV

Laminated Object Manufacturing: Principle of Operation, LOM materials, Process details, Applications

Concepts Modelers: Principle, Thermal jet printer, Sanders model market, 3-D printer, GenisysXs printer HP system, Object Quadra system.

Unit –V

Rapid Tooling: Direct soft tooling- selective laser sintering of sand casting molds, Direct ACES injection molding, SL composite tooling, Indirect soft tooling-Arc spray metal tooling, silicone rubber molds, spin casting with vulcanized rubber molds, Castable resin molds, Castable ceramic molds, Plaster molds ,casting, Direct Hard tooling-Rapid tool, laminated metal tooling, Direct metal laser sintering tooling, Pro metal rapid tooling, Indirect Hard tooling- 3D keltool, EDM Eletrodes ,Eco tool, copy milling

Software for RP: STL files, Overview of Solid view, magics, imics, magic communication, etc.Internet based software, Collaboration tools. **Rapid Manufacturing Process Optimization:** Factors influencing accuracy, Data preparation error, Part building error, Error in finishing, Influence of build orientation.

TEXT BOOKS:

1. " Stereo lithography and other RP & M Technologies**"**, Paul F.Jacobs, SME, NY 1996

2. " Rapid Manufacturing **",** Flham D.T &Dinjoy S.S, Verlog London 2001

3. "Rapid automated**"**, Lament wood, Indus Press New York.

4."Rapid Prototyping- Principles & Applications"-Third Edition ,world scientific publishing co pte Ltd

VIII Sem

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(1503801) AUTOMATION & ROBOTICS

COURSE OBJECTIVES:

1. To provide knowledge of sensors used in Robotics
2. To make the student to understand
3. To make the student to understand the basics and the latest technology of sensors used in robotics.
4. To make the student to understand the different sensing variables
5. To make the student to understand Robot vision system
6. To make the student to understand Robot programming

COURSE OUTCOMES:

CO1.Students are able to understand to know what is automation, types of automation, components of automation, strategies and levels of automation.

CO2.Students are able to understand the types of flow lines, quantitative analysis of flow lines, how the assembly is carried out on automated flow line without interruption and how to balance the line and flexible assembly lines.

CO3.Student should come to know the various components in the anatomy of robot. By knowing this the student may apply in the design of new robotic structure.

CO4.Students is able to understand the applications of various types of end effectors, and sensor devices. Student should also learn about the homogeneous transformations and its applications in the analysis of a robotic structure and method of developing different types of mechanisms and kinematics of the robot.

CO5.Students are able to understand robot programming languages which may adopt in different applications of robot. Student also knows the control motion mechanism in all devices of robot and application of robots in manufacturing sector.

UNIT – I

Introduction to Automation: Need, Types, Basic elements of an automated system, levels of automation, hardware components for automation and process control, Mechanical feeders, hoppers, orienters, high speed automatic insertion devices.

UNIT – II

Automated flow lines: Part transfer methods and mechanisms, types of Flow lines, flow line with/without buffer storage, qualitative analysis.

UNIT – III

Introduction to Industrial Robots: Definition**,** Classification, basic components of a robot, Robot configurations, degrees of Freedom., types of joints, body and arm motions ,specification characteristics, performance parameters, end effectors and grippers.

UNIT – IV

Manipulator Kinematics: Homogeneous transformations as applicable to rotation and translation - D-H notation for forward kinematics,

Trajectory Planning: Trajectory planning, Cubic polynomial

UNIT V

Robot actuators: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors,

Robot sensors: Position sensors – potentiometers, resolvers, encoders – Velocity sensors, tactile sensors, Proximity and range sensors.

Robot Applications: industrial and non industrial applications.

TEXT BOOKS:

1. Automation , Production systems and CIM, M.P.Groover, Pearson Edu.

2. Industrial Robotics, M.P. Groover, TMH.

3. A text book of Robotics by Saeed B. Niku, Pearson Publishers.

REFERENCES:

1. Robotics, Fu KS, McGraw Hill.

2. An Introduction to Robot Technology, P. Coiffet and M.Chaironze, Kogam Page Ltd. 1983 London.

3. Robotics Engineering, Richard D.Klafter, Prentice Hall

4. Robotics, fundamental Concepts and analysis, AshitaveGhosal, Oxford Press, 2006

5. Robotics and Control, Mittal RK &Nagrath IJ, TMH.

6. Introduction to Robotics, John J. Craig, Pearson Education

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(1503804) GEOMETRIC MODELLING

(ELECTIVE – V)

COURSE OBJECTIVE:

The students will learn principles and practices used in the creation of 3D models; mathematical principles of geometric modeling; theory and application of modeling techniques, Study representation schemes for curves, surfaces, solids, and other spatial data and the impact of representation on graphics algorithms. Topics include spline curves and surfaces, quadric surfaces, and how to design, program and analyze algorithms and systems for interactive 3D shape modeling, including, Boolean operations, parametric modeling; lighting setup and control.

COURSE OUTCOMES:

CO1.Student can able to understand to produce engineering drawings.

CO2.Student can able to understand applications of geometric modeling techniques

CO3.Student can able to understand modeling complex curves and surfaces

CO4: Student can analyze algorithms and systems for interactive 3D shape modeling, including,

Boolean operations, parametric modeling; lighting setup and control.

UNIT- I

Introduction, Application area of Computer graphics, overview of graphic system, video display devices, raster- scan systems, random scan systems, graphics monitors and work stations and input devices.

Filled area primitives: scan-line polygon fill algorithm, boundary-fill and flood–fill algorithm.

UNIT- II

Line clipping: simple visibility algorithm, Cohen-Sutherland algorithm ,mid-point subdivision algorithm and Cyrus –beck line clipping algorithm.

Polygon clipping: polygon clipping, reentrant polygon clipping S-utherland-Hodgeman algorithm, character clipping,3D clipping.

UNIT- III

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B- spline curve, Bezier and B- spline surfaces.

UNIT- IV

2-D geometrical transformations: Translation, scaling, rotation, reflection and sheartransformation matrix representations and homogeneous co-ordinates, composite transformations.

3-D geometric transformations: Translation, rotation, scaling, reflection and sheartransformation and composite transformations.

UNIT- V

Shading algorithms: constant intensity algorithm, phong's shading algorithm ,gouraud shading algorithm, comparison of shading algorithms.

Visible surface detection methods: Classification, back-face detection, depth- buffer, scan-line, depth sorting.

TEXT BOOKS:

1. Mathematical Elements for computer graphics, David 1 Rodgers, TMH
2. Computer Graphics C version , Donald Hearn and M.PaulineBaker,Pearson/PHI
3. Computer Graphics Principles & Practice, C.Foley, Vndom, Fener, Hughes,2/e, Peason Publ.

REFERENCES:

1. CAD/CAM Theory, Ibrahim Zeid, TMH
2. Computer Graphics second edition, Zhigandxiang, Roy Plastock, Schaum'soutlines, TMH.
3. Computer Graphics, Steven Harrington, TMH
4. Principles of computer Graphics, ShaliniGovil, PHI, 2005, Springer.
5. Computer Graphics and Automation, M.C. Trivedi, Jaico Pub./ PearsonEducation

B.Tech- VIII Sem

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(1503803)GAS TURBINES AND JET PROPULSION

COURSE OBJECTIVE:

To Familiarize with basic components of gas turbine

To analyze the power cycles and performance predictions

To understand Aircraft propulsion

To understand different types of Rocket propulsion systems and performance predictions

COURSE OUTCOMES:

CO1.Student can analyze the simple gas turbine cycle in determining the specific work and thermal efficiency. Also, student can able to know the methods in improving them is using combinations of reheating as well as regeneration.

CO2.Student can able to understand the basic principle of jet propulsion. Also, student can able to know the working of various Pilotless and piloted propulsion devices. Student can understand thrust equations, calculating propulsive power, and propulsion efficiency. Also, student can have knowledge on thrust augmentation methods. At the end, student can analyze the propulsive devices thermodynamically.

CO3.Student can analyze the working of ramjet engine thermodynamically. Student can aware the calculations related to efficiency. Student can distinguish the working of Ramjet from Pulsejet and Serquijet engines.

CO4.Student can able to understand the working of rocket engine. Student can have knowledge on propellants of rocket engines. Student can aware of parameters affecting the parameters of performance. Student can get difference between various domains of application.

CO5.Student can aware of thrust profile, its application and staging. Student can know advanced topics of rocket transfer, ablative cooling. Student can understand the importance of cryogenic engine and can aware advanced topics like nuclear and arc propulsion.

UNIT-I

Gas Turbines; gas turbine applications, gas turbine advantages & disadvantages, Simple open cycle gas turbine, deviation from ideal cycle, gas turbine with regeneration, thermal efficiency of gas turbine with & without regenerator, gas turbine engines with inter cooling & reheating.

UNIT-II

Jet propulsion**:** Historical sketch- reaction principle- essential features of propulsion devices- thrust; thrust power and propulsion efficiency- need for thermal jet engines and applications.

UNIT-III

Turboprop and turbojet – thermodynamic cycles, plant layout, essential components, and principles of operation – performance evaluation – thrust augmentation and Thrust reversal – contrasting with piston engine propeller plant.

UNIT-IV

Ram jet- Thermo dynamic cycle, plant lay out, essential components – principle of operation – performance evaluation – comparison among atmospheric thermal jet engines-pulse jet- elementary treatment.

UNIT-V

Rocket Engines**:** Need for, applications- basic principle of operation and parameters of performance – classification, solid and liquid propellant rocket engines, advantages, domains of application – propellants – comparison of propulsion systems ,staging of rockets.

TEXT BOOKS:

1. Gas Turbines , V. Ganesan TMH

2. Gas Dynamics & Jet Propulsion, Dr. S.L. Somasundaram.

REFERENCES:

1. Gas turbines, Cohen , Rogers &SarvanaMuttoo , Addision Wiley &longman

2. Thermodynamics of Propulsion, Hill & Paterson.

3. Rocket Propulsion , Sutton.

B.Tech. - VIII Sem

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(1503802) RENEWABLE ENERGY SOURCES

COURSE OBJECTIVE:

The purpose of this course is to provide a survey of the most important renewable energy resources, and the technologies for harnessing these within the framework of a broad range of simple to state-of the-art advanced energy systems.

After completion of the course, students will be able to:

Describe the fundamentals and main characteristics of renewable energy sources and their differences compared to fossil fuels.

Explain the technological basis for harnessing renewable energy sources

Describe the main components of different renewable energy systems

Compare different renewable energy technologies and choose the most appropriate based on local conditions

COURSE OUTCOMES:

CO 1: Students will be able to develop skills for designing and installing the energy conversion and justify storage systems
CO 2: Students will be able to explore the resources of bio energy
CO3.Students can able to identify the new methodologies /technologies for effective utilization of renewable energy sources.

CO4: Students will be able to develop different power systems using RENEWABLE ENERGY SOURCES.

UNIT – I

PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

SOLAR ENERGY COLLECTORS: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion

UNIT-III

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Biogas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking,.

UNIT-IV

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

OCEAN ENERGY: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V

DIRECT ENERGY CONVERSION: Introduction to fuel cells, Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, MHD power generation systems, electron gas dynamic conversion, economic aspects.

TEXT BOOKS:

1. Renewable energy resources, Tiwari and Ghosal, Narosa.

2. Non-Conventional Energy Sources , G.D. Rai

REFERENCES:

1. Renewable Energy Sources, Twidell& Weir

2. Non-Conventional Sources, Khan, B.H., 2/e, TMH, 2009

3. Solar Power Engineering, B.S.Magal Frank Kreith&J.F.Kreith.

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