

E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai |
Accredited by NAAC with 'A' Grade | Accredited by NBA (CIVIL, CSE, ECE, EEE, IT, MECH)
NAGAPATTINAM – 611 002



B.E Mechanical Engineering Full Time Curriculum And Syllabus Fourth Year – Eighth Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
	Elective VII	3	0	0	3	40	60	100
	Elective VIII	3	0	0	3	40	60	100
	Elective IX	3	0	0	3	40	60	100
1704ME851	Project Viva Voce	-	-	18	9	50	50	100
		9	0	18	18	170	230	400

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1703ME012	RENEWABLE ENERGY SOURCES	L	T	P	C
		3	0	0	3

UNIT I SOLAR RADIATION AND SOLAR THERMAL SYSTEMS 9 Hours

Solar radiation at the Earth's surface, solar radiation measurements, solar radiation data, estimation of average solar radiation. Introduction to conversion of solar radiation into heat, flat plate collectors, concentrating collectors – Types.

UNIT II SOLAR PHOTOVOLTAIC SYSTEMS 9 Hours

Introduction to photovoltaic system, principle of a photovoltaic cell, Voltage current characteristics of a solar cell, interconnection of solar cells, efficiency of a solar cell, configuration of solar photovoltaic panel, photovoltaic cell technology, merits and limitations and its applications.

UNIT III UNIT III OCEAN ENERGY AND GEOTHERMAL ENERGY 9 Hours

Wave energy - Energy from waves, energy potential. Conversion devices. Tidal energy - energy potential, conversion systems. Ocean thermal energy conversion -Methodology, Applications. Geothermal energy - classification of geothermal resources, schematic of geothermal power plants, operational and environmental problems

UNIT IV WIND ENERGY 9 Hours

Basic principles of wind energy conversion - classification of wind turbines, Types of rotors. Design of windmills - wind turbine rotor, regulating system for rotor, wind power generation curves, wind data and energy estimation. Site selection considerations - Merits and demerits of wind energy systems

UNIT V BIO-ENERGY 9 Hours

Biomass resources - Conversion technologies - Biochemical conversion, Biomass gasification, Pyrolysis. Biogas - Production, factors affecting biogas production, biogas plants. Energy recovery from urban waste, power generation from liquid waste, biomass cogeneration, bio-fuels.

FOR FURTHER READING – SEMINAR – CPS Total: 45 Hours

Hydrogen energy, Solar production of hydrogen, selection of optimum wind energy generators, power generation from landfill gas, power from satellite stations

Reference(s)

1. D. P. Kothari, K. C. Singal and Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies, Prentice Hall of India, New Delhi, 2011.
2. Godfrey Boyle, Renewable energy power for sustainable future, Oxford University Press in association with the Open University, New Delhi, 2012.
3. S. A. Abbasi and Naseema Abbasi, Renewable energy sources and their environmental impact Prentice Hall of India, New Delhi, 2010.
4. John W. Twidell and Anthony D. Weir, Renewable energy resources, English Language Book Society (ELBS), 2015.
5. G. D. Rai, Renewable Energy Sources, Khanna Publishers, New Delhi 2004.
6. <http://nptel.ac.in/courses/121106014>.

COURSE OUTCOMES:

	Competency	Cognitive level
CO1	Understand the solar radiation and the various methods of solar thermal energy conversion system	K2
CO2	Explain the concept of Photovoltaic system and its application	K2
CO3	Understand the Ocean thermal energy conversion, Tidal energy & Geothermal, its mechanism of production and its applications	K2
CO4	Identify Winds energy as alternate form of energy and to know how it can be tapped	K3
CO5	Explain bio gas sources, generation and its impact on environment	K3
CO6	Illustrate the concepts of Renewable Energy Conversion systems & their applications	K2

1703ME014	DESIGN OF JIGS, FIXTURES AND PRESS TOOLS	L	T	P	C
		3	0	0	3

UNIT I TOOL DESIGN 7 Hours

Objectives, Challenges and Requirements, Production and Inspection Devices. Jigs and Fixtures - Differences, Design principles, Advantages, Essential Features, Materials used. Introduction to Limits, Fits and Tolerances, International Tolerance Grades, Geometric Dimensioning and Tolerancing.

UNIT II LOCATION AND CLAMPING 8 Hours

Location - Principles, Basic rules, Degrees of Freedom, 3-2-1 Principle, Locating Methods, Types of Locators, Standard Parts. Clamping - Principles, Types of Mechanical Actuation Clamps, Pneumatic, Hydraulic, Magnetic, Vacuum, Electrostatic clamping, Epoxy Resin Clamping. Factors considered for Design of Jigs and Fixtures.

UNIT III JIGS 10 Hours

Jigs - Elements, Construction, Types and Materials for Jig Elements. Drill bushes - Types, Special Bushes, Bush Clearance. Automatic drill jig, Rack and pinion operated, Indexing, Air operated Jig components - Design of Jigs for given components.

UNIT IV FIXTURES 10 Hours

General Design Principles of Fixture. Types of Boring, Lathe, Milling and Broaching fixtures - Setting Block. Grinding, Planing and Shaping fixtures. Inspection - Gauging, Measuring and Supplement fixtures. Welding, Assembly and Modular fixtures. Design of fixtures for given component.

UNIT V PRESS TOOLS 10 Hours

Mechanical Presses - Working terminology, Elements, Types and Press Accessories. Types of Dies, Punches and Strippers. Pressure pad, Knockouts, Stops and Pilots. Bending, Forming, Drawing and Deep Drawing - Dies and its Types. Spring-back phenomenon and Draw Ratio. Progressive, Combination and Compound Dies. Design and Development of Dies - Blank Development, Strip Layout, Computation of capacities and tonnage requirements.

TOTAL: 45 HOURS

REFERENCES:

1. Edward G. Hoffman, Jig and Fixture Design, Cengage Learning, New Delhi, 2004.
2. C. Elanchezian, Design of Jigs, Fixtures and Press Tools, Eswar Press, Chennai, 2010.
3. P. H. Joshi, Jigs & Fixtures, Tata McGraw Hill Education Private Limited, New Delhi 2012.
4. Hiram E Grant, Jigs and Fixtures, Tata McGraw Hill Education Private Limited, New Delhi, 2011.
5. C. Donaldson, G. H. Lecain and V. C. Goold, Tool Design, Tata McGraw Hill Education Private Limited, New Delhi, 2011.
6. ASTM–Fundamentals of tool design”, Prentice Hall of India, 1984
7. <http://nptel.ac.in/courses/112105126/35>

Course Outcomes (COs):

CO Number	Competency
CO1	Understand about the design principles for designing the jigs and fixtures. (K2)
CO2	Identify the suitable locators and clamps. (K2)
CO3	Choose a suitable jig for producing a part. (K3)
CO4	Select a suitable fixture for producing a part. (K3)
CO5	Design suitable Press tools for Engineering applications. (K3)
CO6	Develop a drawing die for a given component. (K3)

1703ME015	COMPUTER INTEGRATED MANUFACTURING	L	T	P	C
		3	0	0	3

Course Objectives

- To introduce the basic concepts of Computer Integrated Manufacturing (CIM).
- To provide knowledge on Group Technology and Computer Aided Process Planning.
- To impart knowledge on Shop Floor Control and Flexible Manufacturing Systems.
- To learn the various CIM implementation and data communication techniques.
- To provide knowledge on the concept of Manufacturing automation protocol, Technical office protocol and database terminology.

UNIT I INTRODUCTION 8 Hours

The changing manufacturing and management scene, External communication, Islands of automation and software, dedicated and open systems, manufacturing automation protocol, introduction to CAD/CAM integration

UNIT II GROUP TECHNOLOGY AND COMPUTER AIDED PROCESS PLANNING 10 Hours

Classification and coding - DCLASS, MICLASS and OPITZ coding systems. Facility design using Benefits of G.T - cellular manufacturing. Process planning, role of process planning in - CAD/CAM integration- approaches to computer aided process planning- variant approach and generative approaches.

UNIT III SHOP FLOOR CONTROL AND FMS 9 Hours

Shop floor control phases -factory data collection system -automatic identification methods- Bar code technology - automated data collection system. FMS- components of FMS- types -FMS workstation- material handling and storage systems- FMS layout-computer control systems-application and benefits

UNIT IV CIM IMPLEMENTATION AND DATA COMMUNICATION 9 Hours

System modeling tools- ICAM definition (IDEF) models, activity cycle diagram, CIM open system architecture (CIMOSA) - manufacturing enterprise wheel- CIM architecture- Product data management, implementation- software. Communication fundamentals- local area networks (LAN) - topology -LAN implementations - network management and installations.

UNIT V OPEN SYSTEM AND DATABASE FOR CIM 9 Hours

Open systems-open system inter-connection - manufacturing automations protocol and technical office protocol-(MAP/TOP).Development of databases -database terminology- architecture of database systems- data modeling and data associations-relational data bases - database operators - advantages of data base and relational database.

FOR FURTHER READING – SEMINAR – CPS Total 45 Hours

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Paperless factory, introduction virtual reality and applications, virtual prototyping and manufacturing Instrumentation and Measurement, virtual enterprises.

Reference(s)

1. Mikell P. Groover, Automation of production systems and computer integrated manufacturing, Pearson Education, United States of America, 2008.
2. Lee Kunwoo, Principles of CAD, CAM, CAE systems, Addison Wesley, United States of America, 1999
3. Kant Vajpayee. S, Principles of Computer Integrated Manufacturing, Prentice Hall, New Delhi, 2003
4. Radhakrishnan P, Subramanyan. S and Raju. V, CAD, CAM, CIM, Second Edition New Age International Pvt. Ltd, New Delhi, 2000.
5. Lee Kunwoo, Principles of CAD, CAM, CAE systems, Addison Wesley, United States of America, 1999
6. <http://nptel.ac.in/courses/112102101/>

	Competency	Cognitive level
CO1	Understand the basic concepts of CIM.	K2
CO2	Infer the concepts of Group Technology and Computer Aided Process Planning	K3
CO3	Identify the suitable method on Shop Floor Control and Flexible Manufacturing Systems	K2
CO4	Familiarize the CIM implementation and data communication techniques..	K2
CO5	Recognize the integration of data communication at various levels of planning and manufacturing.	K2
CO6	Identify And Implement The Various Communication Methods	K3