SCHEME OF COURSE WORK

Course Details:

Course Title	: AUTOMATION IN MANUFACTURING SYSTEMS		
Course Code	: 15ME2103	L T P C	: 3 0 0 3
Program:	: M.Tech.		
Specialization:	: CAD/CAM		
Semester	: FIRST		
Prerequisites	: MECHNICAL MEASUREMENTS		
Courses to which it is a prerequisite	: INDUSTRIAL ROBOTICS		

Course Outcomes (COs):

The student will be able to

1.	identify and correlate the concepts of automation in production systems.
2.	explain various models and petrinets used in automated manufacturing systems.
3.	identify various sensors and actuators used in industrial control systems.
4.	identify various components of hydraulic and pneumatic systems in industrial applications.
5.	demonstrate knowledge on various input and output models used in PLC processor.

Program Outcomes (POs):

A postgraduates of CAD/CAM will have the

1.	Ability to apply fundamental principles in the areas of computer aided design and manufacturing
2.	Ability to apply creative and innovative skills to analyze computer aided design and manufacturing problems
3.	Ability to identify, formulate and solve design and manufacturing problems
4.	Ability to carry out the research related to design and manufacturing
5.	Familiarity with existing and recent CAD/CAM software
6.	Ability to collaborate with educational institutions, industry and R&D organizations in multidisciplinary teams
7.	Ability to apply project and finance management skills to manage projects
8.	Ability to prepare technical reports and communicate effectively
9.	Awareness of the need for and ability to engage in lifelong learning
10.	Ethical attitude and accountability to the society
11.	Ability to conduct a thorough survey and analyze critically to plan, design and implement new thoughts into action

Course Outcome versus **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	S	M	S	S	M						M
CO-2	S	S	S	S		M	M	M			M
CO-3	M	S	S	M	M		S	S			M
CO-4		S	S	S	S	M					M
CO-5	S	M	S	S	S		M	M			M

S - Strongly correlated, *M - Moderately* correlated, *Blank - No correlation*

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	CO	Sample questions	Teaching – Learning Strategy	Assessment Method & Schedule
1	Fundamentals of manufacturing: Production system facilities, manufacturing support systems	1	What are the various facilities in a production system?	▫ Lecture ▫ Demonstration	
2	Different types of manufacturing systems, automation in production systems	1	Explain different types of manufacturing systems?	▫ Lecture ▫ Discussion	
3	Automation principles & strategies, manufacturing operations and production relationships	1	Write about automation principles and strategies?	▫ Lecture ▫ Discussion	Seminar 1 (Week 3)
4	Mathematical concepts & models: Production concepts, Costs of manufacturing operations, numerical problems	1	What are the various costs of manufacturing operations?	▫ Lecture ▫ Discussion ▫ Problem solving	
5	Automation and modeling automated manufacturing systems: Basic elements of automated system	2	What are the basic elements of automated system?	▫ Lecture ▫ Discussion ▫ Problem solving	
6	Advanced automation functions, levels of automation, performance modeling tools	2	What are the various levels of automation?	▫ Lecture ▫ Discussion ▫ Problem solving	
7	Markov chain models, quenching models, petrinet models types of petrinets, differences between simple petrinets and high level petrinets	2	Differentiate between simple petrinets and high level petrinets?	▫ Lecture ▫ Discussion ▫ Problem solving	Assignment 1 (Week 7 - 9)
8	Industrial control and process planning: industrial control systems, sensors, actuators & other control systems	3	Discuss about industrial control systems?	▫ Lecture ▫ Discussion ▫ Problem solving	
9	Mid-Test 1				Mid-Test 1 (Week 9)
10	Discrete control using PLC & PLC network, manufacturing support systems	3	Explain about the discrete control using PLC?	▫ Lecture ▫ Discussion	
11	CAPP, advanced manufacturing, planning, lean production & agile manufacturing	3	What do you mean by lean production & agile manufacturing?	▫ Lecture ▫ Discussion	
12	Power hydraulics & pneumatics: concepts, features & parameters governing the selection of various components necessary for building the elements, circuit design & analysis	4	Explain the features & parameters governing the selection of various Power hydraulic & pneumatic components necessary for building the elements?	▫ Lecture ▫ Discussion ▫ Problem solving	Seminar 2 (Week 12)
13	Industrial applications of fluid power & pneumatic systems, electro-hydraulic servo system and fluid logic control	4	Describe the working of electro hydraulic servo system?	▫ Lecture ▫ Discussion ▫ Problem solving	
14	PLC: Introduction, micro PLC, programming a PLC	5	What is the working principle of micro PLC?	▫ Lecture ▫ Discussion	
15	Logic functions, input & output modules, PLC processors, PLC instructors	5	Explain various types of PLC processors, PLC instructors	▫ Lecture ▫ Discussion	
16	Documenting a PLC system, timer & counter instructions, comparison & data handling instructions, sequencing instructions, mask data representation	5	What do you mean by mask data representation	▫ Lecture ▫ Discussion ▫ Problem solving	Assignment 2 (Week 16 - 18)
17	Typical PLC programming exercises for industrial applications and case studies	5	Explain any one case study of PLC programming in industrial applications?	▫ Lecture ▫ Discussion ▫ Problem solving	
18	Mid-Test 2				Mid-Test 2 (Week 9)
19/20	END EXAM				END EXAM

TEXT BOOKS:

1. M.P. Groover, "*Automation, Production Systems and Computer Integrated Manufacturing*",
   Pearson and PHI, 3rd Edition, 2009
2. N Viswanandham and Y Narahari, "*Performance Modeling of automated Manufacturing Systems***,**
   IISc. Bangalore, PHI, New Delhi

REFERENCES:

1. Goodwin, "Fluid Power System", - McGraw Hill Press Limited, 1992
2. Histand B.H., Alciatore D.G., "Introduction to Mechatronics and Measurement Systems",
   3rd edition,TMH Publishing Company Ltd, 2007
3. Bolton W., "Mechatronics – Electronics Control Systems in Mechanical and Electrical Engineering",
   4th edition, Pearson Education Press, 2010