GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code:3724713
Semester – II
Subject Name: Automation and Computer Integrated Manufacturing (Prog. Elective – III)

Type of course: Engineering

Prerequisite: N.A.

Rationale: This course offers a broad understanding of automation in any manufacturing industry and projects the need of cost and time reduction for quality improvement. Also the concept of low cost production is also covered in this syllabus.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction: Automation; Manufacturing operations and production facilities; production performance, Realizing CIM and future trends in manufacturing	**7**
2	Concurrent Engineering: Serial versus concurrent engineering; benefits of concurrent engineering; characterization, difficulties and techniques of concurrent engineering	**5**
3	Manufacturing Planning and Control System: Demand management; Material requirement planning; MRP lot sizing problem; capacity planning; shop floor control	**5**
4	Just-in-Time Manufacturing System: Pull versus push system; types of Kanban; Alternative JIT systems; Just –in-Time purchasing; barrier and benefits of JIT	**4**
5	Group Technology and Computer Aided Process Planning: Importance of Group Technology (GT), various classification and coding system used in GT, machine sequencing, machine grouping, Steps in developing process planning; process planning approaches; variant and generative process planning system	**7**
6	Flexible Manufacturing Systems and Automated Material Handling System: Types of flexibilities; components of FMS; Layout consideration; FMS benefits, Analysis of automated storage and retrieval (AS/RS) system; automated guided vehicles (AGVs)	**8**
7	Assembly Lines: Manual and Automated assembly lines; work station consideration; alternative assembly lines	**4**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
35	**30**	**20**	**5**	**5**	**5**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Systems Approach to Computer Integrated Design and Manufacturing
   Nanua Singh, John Wiley & Sons, Inc publication
2. Automation, Production System and Computer Integrated Manufacturing
   M.P. Groover, PHI publication

Course Outcomes:

After learning the course the students will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the fundamentals of production technology and shop floor planning used in industries.	35
CO-2	Analyze the managerial decision taken to control production rate or cost of production for optimizing the problem on hand.	25
CO-3	Judge the importance of Mechatronics Engineering, a multidisciplinary branch of engineering.	20
CO-4	Finalize alternate method of manufacturing using the concept of automation.	20

List of Experiments:

Similar to the following experiments may be planned.

1. Evaluate manufacturing performance by finding number of operations and number of workers required for the task on hand.
2. Evaluate manufacturing performance by finding manufacturing lead time, production rate, plant capacity, plant utilization, etc. for the given situation.

3. Solve numericals on manufacturing planning and control system as well as on aggregate production planning.
4. Study the process of finding out total number of Kanbans required for Just-in-Time manufacturing system.
5. Write a programme to find out the total cost, number of scrap units and number of input units along with average lead time for a production system as per the given task of concurrent engineering (02 turns).
6. Generate an expert system, which is a rule based system, for developing a knowledgeable system. Assign individual task to students for programming (02 turns).
7. Study various line balancing algorithms for assembly line problem.
8. Study of Flexible Manufacturing system for calculating the bottle neck station and other performance evaluations.

Major Equipment:

Computer facility may be utilized for above mentioned experiments.

List of Open Source Software/learning website:

NPTEL