

# VALLIAMMAI ENGINEERING COLLEGE

## DEPARTMENT OF MECHANICAL ENGINEERING

### ME6703 COMPUTER INTEGRATED MANUFACTURING SYSTEMS

#### QUESTION BANK

#### UNIT I INTRODUCTION

##### PART-A

1. Define CAD. (BT1)
2. Describe CAM (BT1)
3. Identify what is CIM. (BT1)
4. Examine Manufacturing Planning (BT1)
5. Where is Manufacturing Control applied? (BT1)
6. Name the relationship between CAD and CAM? (BT1)
7. Summarize Concurrent Engineering. (BT2)
8. Discuss the concepts of CIM. (BT2)
9. Contrast the elements of CIM system. (BT2)
10. Express the types of production. (BT2)
11. Demonstrate the manufacturing models. (BT3)
12. Show the manufacturing metrics. (BT3)
13. Examine the mathematical Models. (BT3)
14. Analyze the production Performance. (BT4)
15. Classify the basic elements of automated system. (BT4)
16. Compare the levels of automation. (BT4)
17. Explain details on lean production. (BT5)
18. Criticize JIT production. (BT5)
19. Prepare the salient features of JIT. (BT6)
20. Formulate the components of Lean. (BT6)

##### PART-B

1. Describe the basic activities that must be carried out in a factory to convert raw material into finished product (BT1) (16)
2. (a) Examine what is meant by product data management? Explain why it is important in CAD/CAM integration. (BT1) (8)  
(b) Identify the main element of automated system. (BT1) (8)
3. (a) Name various level of automation. (BT1) (8)  
(b) Define MUDA and KAIZEN with example. (BT1) (8)
4. When the conditions are to be fulfilled in order to implement JIT concept effectively (BT1) (16)
5. (a) Describe the need for CIM and the issues addressed by CIM (BT2) (8)  
(b) Summarize are the various activities of a manufacturing plant which can be carried out through computer control? (BT2) (8)
6. (a) Discuss the main elements of CIM systems. (BT2) (8)  
(b) Express how does IT facilitate concurrent engineering? (BT2) (8)
7. (a) Distinguish the different types of manufacturing. (BT2) (8)

- (b) Discuss an assessment of extent of computer control in specific cases of each types of manufacturing (BT2) (8)
8. (a) Demonstrate the significance of concurrent engineering approach in limiting design changes. (BT3) (8)
- (b) Illustrate how CIM can act as an enabling technology for concurrent engineering (BT3) (8)
9. (a) Examine lean production and mass production (BT3) (8)
- (b) Show the characteristic of Just-In-Time (BT3) (8)
10. (a) Analyze various implementation issues on KANBANS and JIT systems. (BT4)
- (b) Explain with various applications on flexible work force in JIT. (BT4) (8)
11. (a) Point out the effect on Pull systems with various examples. (BT4) (8)
- (b) Compare Lean and Agile manufacturing systems. (BT4) (8)
12. Analyze a case study on manufacturing in competitive environment (BT4) (16)
13. Assess the contemporary implementation automation of manufacturing process, Numerical control & adaptive control (BT5) (16)
14. Generalize the conditions that need to be fulfilled in order to implement JIT concept effectively. (BT6) (16)

## **UNIT II PRODUCTION PLANNING AND CONTROL AND COMPUTERISED PROCESS PLANNING**

### **Part-A**

1. Define what is meant by process planning? (BT1)
2. List the activities associated with process planning. (BT1)
3. Describe the basic approaches of CAPP? (BT1)
4. Identify what is meant by CAPP? (BT1)
5. Name any two advantages of CAPP. (BT1)
6. Examine the underlying concepts of variant and generative CAPP systems. (BT1)
7. Summarize the various components of a generative CAPP system. (BT2)
8. Distinguish some commercial variant and generative CAPP software systems. (BT2)
9. Express what is master production schedule (MPS)? (BT2)
10. Give an important function of PPC? (BT2)
11. Demonstrate aggregate production planning? (BT3)
12. Illustrate MRP and capacity planning. (BT3)
13. Classify the benefits of MRP. (BT3)
14. Analyze the of inputs data to MRP and outputs of MRP. (BT4)
15. Explain SFC? (BT4)
16. Point out are the functions of shop floor control? (BT4)
17. Assess the phases of SFC? (BT5)
18. Compare the types of inventory. (BT5)
19. Generalize MRP-II? (BT6)
20. Develop enterprise resource planning (ERP)? (BT6)

### **PART-B**

1. List the two approaches commonly used in CAPP systems bringing out their advantages and limitations. (BT1) (16)
2. (a) Define process planning? What are the activities associated with it? (BT1) (8)  
(b) Describe the information required for process planning. What are the factors that influence process planning? (BT1) (8)
3. (a) Examine details logical steps in computer aided process planning (BT1) (8)  
(b) Identify the features of variant and generative CAPP systems. (BT1) (8)
4. (a) Name the criteria for selection of CAPP systems. (BT1) (8)  
(b) Define what is meant by CAPP? List various advantages of CAPP systems. (BT1)
5. (a) Summarize briefly on CMPP. In what ways, CMPP is considered vary significant. (BT2) (8)  
(b) Describe the factors should be consider while selecting the best CAPP system. (BT2) (8)
6. Discuss in details in phase of shop floor control system. (BT2) (16)
7. Express about production planning process in discrete part manufacturing (BT2) (16)
8. Demonstrate production planning and control. Describe the various activities of PPC systems. (BT3) (16)

9. Illustrate notes on the following. (BT3) (16)
- a. Aggregate production planning (4)
  - b. Master production planning (4)
  - c. Material requirements planning (4)
  - d. Capacity planning (4)
10. (a) Analyze shop floor control? What are the functions of SFC? (BT4) (8)
- (b) Explain the various priority sequencing rules used for job sequencing. (BT4) (8)
11. Point out what is computer process monitoring? Also explain the use of data acquisition systems, and multilevel scanning. (BT4) (16)
12. (a) Explain the four classes of users and four steps of evolution in MRP. (BT4) (8)
- (b) Compare briefly cost planning and control and capacity planning and control (BT4)
13. Assess an engineering brief about (i) MRP-II and (ii) ERP (BT5) (8+8)
14. Develop an engineering brief about the various types of automatic identification technologies. (BT6) (16)

## UNIT III CELLULAR MANUFACTURING

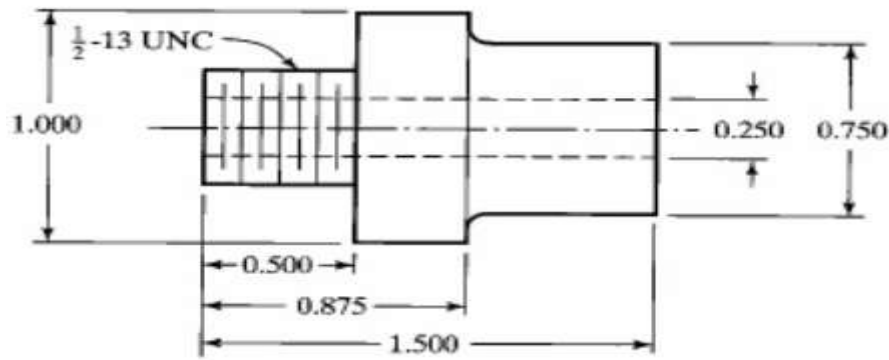
### PART-A

1. Describe group technology? (BT1)
2. List the roles of group technology in CAD/CAM integration? (BT1)
3. Identify GT an important element of CAD/CAM integration? (BT1)
4. Define what do you understand concept of part family? (BT1)
5. List components of GT. (BT1)
6. Examine the general methods used for grouping parts into part families. (BT1)
7. Summarize PFA. (BT2)
8. Distinguish the steps involved in production flow analysis. (BT2)
9. Discuss the three basic code structure used in GT application. (BT2)
10. Express the factors to be considered in selection of coding systems. (BT2)
11. Demonstrate what is a MICLASS system (BT3)
12. Illustrate what do you understand concept of DCLASS? (BT3)
13. Show what do you understand concept of Opitz classification system? (BT3)
14. Analyze what is the main difference between hierarchical codes and attribute code structure? (BT4)
15. Explain any six coding systems that are widely recognized in industries.(BT4)
16. Point out what is meant by cellular manufacturing? (BT4)
17. Assess any four benefits implementation of cellular manufacturing. (BT5)
18. Summarize any four design considerations guiding the cell formation. (BT5)
19. Generalize what are the limitations for implementation cellular manufacturing? (BT6)
20. Develop the steps in ROC algorithm. (BT6)

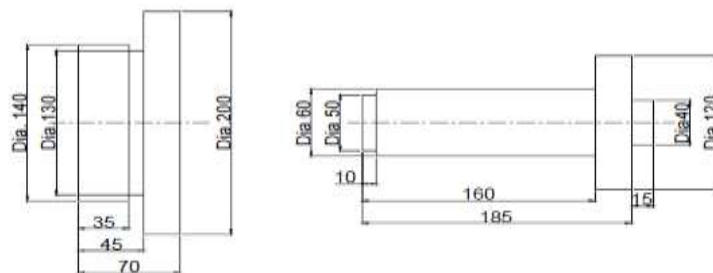
### PART-B

1. (a) List the various benefits of implementing a GT in a firm. Also bring out the advantages and limitation of using GT. (BT1) (8)  
(b) Define the Production Flow Analysis in detail. (BT1) (8)
2. Describe what is Group Technology? Also explain why GT is important in achieving CAD and CAM integration. (BT1) (16)
3. (a) Identify what do you understand by cell design? What are the criteria used for cell design? (BT1) (8)  
(b) Examine what is MICLASS system? Compare it with DCLASS system. (BT1) (8)
4. Name and briefly explain the various machine cells and layouts in used industries. (BT1) (16)
5. Summarize how group technology is used in designing manufacturing cells. (BT2) (16)
6. Describe an engineering brief about (i) DCLASS, and (ii) Opitz Classification system (BT2) (16)
7. Discuss about (i) Composite part concept (ii) Key machine concept (BT2) (8+8)
8. Demonstrate in brief of following (BT3)
  - a. Opitz coding system (4)
  - b. MICLASS (4)
  - c. DCLASS (4)
  - d. PFA (4)

9. Illustrate the form code (first five digits) in the Opitz system for a given part. (BT3)(16)



10. Two components are shown in Fig. do they belong to the same part family? Compare. (BT4) (16)



*Rotational Components*

11. Analyze the rank order clustering technique to the part-machine incidence matrix in the following table to identify logical part families and machine groups. Parts are identified by letters, and machines are identified numerically. (BT4) (16)

Machine	Parts				
	A	B	C	D	E
1	1				
2		1			1
3	1			1	
4		1	1		
5				1	

12. Explain that four machines 1, 2, 3, and 4 have been identified as belonging in a GT machine cell. An analysis of 50 parts processed on these machine has been summarized in the From-To chart of table below. Additional information is that 50 parts enter the machine grouping at machine 3, 20 parts leave after processing at machine 1, and 30 parts leave after machine 4. Determine the a logical machine arrangement using Hollier method-1 (BT4) (16)

To	1	2	3	4
From: 1	0	5	0	25
2	30	0	0	15
3	10	40	0	0
4	10	0	0	0

13. Assess Four machines used to produce a family of parts are to be arranged into a GT cell. The From-To data for the parts processed by the machines are shown in the table below. Determine the most logical sequence of machines for this data using. Hollier methods (b) construct the flow diagram for the data, showing where and how many parts enter and exit the system. (BT5) (16)

To		1	2	3	4
From:	1	0	10	0	40
	2	0	0	0	0
	3	50	0	0	20
	4	0	50	0	0

14. Develop a case study of an industrial environment of cellular manufacturing.(BT5) (16)

## **UNIT IV FLEXIBLE MANUFACTURING SYSTEM (FMS) AND AUTOMATED GUIDED VEHICLE SYSTEM (AGVS)**

### **PART-A**

1. Describe flexible manufacturing system. (BT1)
2. List the components of FMS. (BT1)
3. Identify any four functions of the material handling systems in a FMS (BT1)
4. Name the different types of layout configuration prevalent in FMSs (BT1)
5. Differentiate between primary and secondary material handling systems. (BT1)
6. Examine types of material handling equipment that is commonly employed in FMS. (BT1)
7. Summarize some of the functions of a FMS computer system. (BT2)
8. Describe How FMS classified does based on number of machines? (BT2)
9. Distinguish the FMS layout configurations. (BT2)
10. Discuss different types of data files required for a FMS. (BT2)
11. Demonstrate between FMS and FMC. (BT3)
12. Illustrate the application of FMS. (BT3)
13. Show How FMS classified does based on level of flexibility? (BT3)
14. Differentiate between dedicated FMS and random-order FMS. (BT4)
15. Analyze some important advantages of implementing FMS. (BT4)
16. Explain what are AGVs? How do they operate? (BT4)
17. Assess How an AGV will differ with Robot? (BT5)
18. Explain the components of automated guided vehicle. (BT5)
19. Prepare various applications of AGVs. (BT6)
20. Formulate what are the factors should be considered in selection of AGV? (BT6)

### **PART-B**

1. (a) List what are the major components of an FMS? Explain them in brief. (BT1) (8)  
(b) Describe the various workstations of FMS. (BT1) (8)
2. (a) Define the various aspects of FMS layout configurations (BT1) (8)  
(b) Identify the various functions that are performed by the FMS computer control system. (BT1) (8)
3. Examine what is flexible manufacturing system? In what ways, FMS differs from other manufacturing systems. (BT1) (16)
4. (a) List and explain the functions of the material handling system in a FMS (BT1) (8)  
(b) Name the applications, advantages and disadvantages of a FMS. (BT1) (8)
5. Summarize with suitable sketches, explain the various FMS layout configurations prevalent today. (BT2) (16)
6. (a) Discuss the important of In-process monitoring of workpiece quality in FMS.(BT2)  
(b) Express how is tool life monitored in FMS (BT2) (8)
7. (a) Give principle of an automated storage and retrieval system. (BT2) (8)  
(b) Discuss how is an FMS optimized? (BT2) (8)
8. (a) Show distinguishing facts between FMS and FM (BT3) (8)  
(b) Distinguishing facts between Dedicated FMS and Random-order FMS (BT3) (8)
9. Illustrate short notes various material handling equipment that are commonly found in a FMS. (BT3) (16)



10. (a) Analyze a case study of an AGVS (BT4) (10)  
(b) Explain what is AGV? How do they operate? (BT4) (6)
11. (a) Explain various types of software in FMS (BT4) (8)  
(b) Point out various systems issues in FMS (BT4) (8)
12. Contrast extrinsic and intrinsic functions. What are factors that should be considered for implementation in FMS? (BT4) (16)
13. Assess the following types of AGVs along with their applications (BT5)
- a. AGVs towing vehicles (4)
  - b. AGVs pallet trucks (4)
  - c. AGVs fork lift trucks (4)
  - d. AGVs unit load transporters (4)
14. (a) Develop the two main types of AGV steering control (BT6) (8)  
(b) Prepare what are the advantages of AGVs over other material handling systems (BT6) (8)

## UNIT V INDUSTRIAL ROBOTICS

### PART-A

1. Describe what is a robot? (BT1)
2. List the main functions of robot. (BT1)
3. List out the objective of using industrial robot. (BT1)
4. Define what is meant by robot anatomy? (BT1)
5. Identify the types of joint notation. (BT1)
6. Examine what is meant by degrees of freedom? (BT1)
7. Summarize the commonly used robot configuration system. (BT2)
8. Describe the general areas of robotics. (BT2)
9. Express accuracy. (BT2)
10. Give what is meant by resolution? (BT2)
11. Demonstrate the different types of control techniques. (BT3)
12. Show the types of path control. (BT3)
13. Illustrate the robot major components. (BT3)
14. Explain what is end effector? Give some examples. (BT4)
15. Classify what are the types of Grippers? (BT4)
16. Point out what are the basic classifications of sensors? (BT4)
17. Assess what is teach pendant? (BT5)
18. Explain what are the methods of robot programming? (BT5)
19. Develop what is repeatability of robot? (BT6)
20. Generalize the reasons for defining points in a program. (BT6)

### PART-B

1. (a) List the different types of robotic movements. (BT1) (8)  
(b) Define the types of joints used in robots and explain its application (BT1) (8)
2. (a) List our four common robot configuration and explain its applications (BT1) (8)  
(b) Name the relative merits and demerits of different types of robot configuration (BT1) (8)
3. (a) Describe the various types of industrial robot. (BT1) (8)  
(b) Describe the basic structure of a robotic system with neat sketch. (BT1) (8)
4. Identify and Draw the neat sketch of components of teach pendant and explain briefly (BT1) (16)
5. (a) Describe the various types of robot control. (BT2) (8)  
(b) Discuss briefly explain the need for robots in industries. (BT2) (8)
6. (a) Express briefly explain selection of robots. (BT2) (8)  
(b) Differentiate the advantages, disadvantages and applications of robots (BT2) (8)
7. (a) Summarize what are robot end effectors? How do you classify them (BT2) (4+4)  
(b) Discuss various drive system used for robot gripper. (BT2) (8)
8. Demonstrate short notes on robot part programming (BT3) (16)
9. Classify the various types of gripper mechanism with neat sketch. (BT3) (16)
10. (a) Explain briefly the lead through programming method in detail (BT4) (8)  
(b) Point out the capabilities and limitations of lead-through programming methods (8)
11. Explain in detail robot language structure and motion commands used. (BT4) (16)
12. Analyze a Program for pick and place robot. (BT4) (16)

13. Explain at least four languages meant for robot programming and briefly discuss the features of any two of them. (BT5) (16)
14. (a) Formulate principle of operation of teach pendent. (BT6) (8)
- (b) Prepare What are the limitations of teach pendent control? (BT6) (8)