

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-6 SEMESTER – OLD PAPER – S22 TO W25 – QUESTION BANK

Subject Name & Code:

COMPUTER AIDED MANUFACTURING (3161917)

Unit 1: Computer Aided Manufacturing

Repeated Questions:

1. Explain the benefits of Computer Aided Manufacturing. (S25 - Q1a, 03 marks), (W22 - Q1a, 03 marks), (W23 - Q1a, 03 marks)
2. Draw and explain the CIM wheel. / Draw the CIM wheel. (S25 - Q1c, 07 marks), (S23 - Q1b, 04 marks), (W22 - Q1c, 07 marks), (S22 - Q1c, 07 marks)
3. What is CIM? What are the benefits of CIM? Draw a CIM wheel. (S25 - Q1c, 07 marks)
4. Identify the major components of a CIM system. Analyze the impact of CIM on production planning and control. (W24 - Q1c, 07 marks)
5. Draw sketch of CIM enterprise wheel and compare with CIM wheel. (S22 - Q1c, 07 marks)

Other Important Questions:

1. Define Computer-Aided Manufacturing (CAM). What are its primary objectives? (W24 - Q1a, 03 marks)
 2. What are the primary objectives of implementing CAM in manufacturing? (S24 - Q1a, 03 marks)
 3. Explain the role of management in CAM. (W25 - Q3a, 03 marks)
 4. Discuss the main elements of CIM systems. (W25 - Q3a OR, 03 marks)
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Unit 2: NC/CNC Machine Tools

Repeated Questions:

1. Explain canned cycles with suitable example. / What are canned cycles and sub-routines? (S23 - Q1c, 07 marks), (W25 - Q2a, 03 marks)
2. Explain Axis designation in CNC machine tool with sketch. / Describe the axis designation system commonly used in CNC machines. (S25 - Q2b, 04 marks), (S24 - Q2a, 03 marks)
3. Explain important G & M codes used in CNC Milling operations? (S25 - Q1b, 04 marks)
4. Define NC and CNC technology. What are the differences between them? (W24 - Q2a, 03 marks)
5. Classify NC according to tool motion control system. / Classify NC machine based on programming method, feedback control and tool motion control system. (S22 - Q1b, 04 marks), (W23 - Q1c, 07 marks)
6. Explain working of recirculating ball screw. How does a recirculating ball screw contribute to the precision and efficiency of CNC machines? (W24 - Q2c OR, 07 marks), (S24 - Q2c, 07 marks)
7. Write a simple part program to perform a drilling operation using a CNC machine. (W24 - Q2c, 07 marks)

Other Important Questions:

1. Explain tool radius compensation with example. (S25 - Q2a, 03 marks)
2. Write Canned cycle programme for Diameter Grooving for FIG.1. [Figure given - refer Question paper of S25] (S25 - Q2c, 07 marks) OR Write Canned cycle programme for Axial turning for FIG.2. [Figure given - refer Question paper of S25] (S25 - Q2c OR, 07 marks)
3. Write the programme for circular pocketing CNC milling as shown in FIG.3. [Figure given - refer Question paper of S25] (S25 - Q3c, 07 marks)
4. Explain the open loop and close loop control system. (S23 - Q3a, 03 marks)
5. Explain the role of sensors and actuators in a CNC system. (W24 - Q2b, 04 marks)
6. Write a manual part program for profile milling of the job as shown in fig. (Enable the cutter radius compensation) [Figure given - refer Question paper of S23] (S23 - Q2c OR, 07 marks)
7. Give classification of CNC machine. (S23 - Q3b OR, 04 marks)
8. Explain incremental and absolute dimensioning with neat sketch. (S23 - Q5b, 04 marks)
9. Explain the classification of CNC machines based on their functions and applications. (S24 - Q2b, 04 marks)
10. Describe the concept of canned cycles in CNC programming and when they are typically used. (S24 - Q2c OR, 07 marks)
11. Illustrate the use of canned cycle and subprograms with example in case of manual part programming. (W22 - Q2c, 07 marks) OR Write a manual part program for drilling and milling of a component with 10mm thickness as shown in Fig. 1. [Figure given - refer Question paper of W22] (W22 - Q2c OR, 07 marks)
12. Prepare CNC milling part program to cut the outside of the profile for the figure 1. (Use machining parameter as spindle speed 2000 RPM and Feed 150 mm per min, The thickness of plate is 12 mm) [Figure given - refer Question paper of W23] (W23 - Q2c, 07 marks) OR Prepare CNC turning part program for the figure 2. (Use stock removal cycle G71 first with depth of cut 0.5mm and 0.1mm finishing allowance then use G70 for finishing operation with Spindle speed 700RPM and Feed 0.5mm per revolution) [Figure given - refer Question paper of W23] (W23 - Q2c OR, 07 marks)
13. Explain with neat sketch the operation of the canned cycle G81 as per ISO. (S22 - Q2a, 03 marks)
14. Prepare CNC milling part program for figure 1. (Thickness of plate is 15 mm) [Figure given - refer Question paper of S22] (S22 - Q2c, 07 marks) OR Prepare CNC turning part program for figure 2. [Figure given - refer Question paper of S22] (S22 - Q2c OR, 07 marks)
15. Explain accuracy and repeatability. (W25 - Q1a, 03 marks)
16. Name three techniques of interpolation. (W25 - Q1b, 04 marks)
17. Give specifications of a machining centre. (W25 - Q1c, 07 marks)

18. Differentiate (i) AC servomotors & DC servomotors. (ii) CNC Lathe & CNC Turning centre (W25 - Q2c OR, 07 marks)
 19. Write a NC part program using G and M code, to cut a slot for the component, shown in fig. by using an end mill of 10mm diameter. Assume suitable data for machining parameters. [Figure given - refer Question paper of W25] (W25 - Q2c OR, 07 marks)
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Unit 3: Programmable Logic Controllers

Repeated Questions:

1. Explain the PLC architecture using a diagram / using neat sketch. (S23 - Q5a OR, 03 marks), (W22 - Q1b, 04 marks)
2. Draw block diagram of PLC system and list the components of it. (S22 - Q2b, 04 marks)
3. Define PLC. Brief about the relay device components used in it. (W23 - Q1b, 04 marks)

Other Important Questions:

1. Evaluate the advantages of using PLCs over traditional hardwired control systems in terms of programming flexibility. (W24 - Q1b, 04 marks)
 2. Describe the basic architecture of a programmable controller (PLC). (S24 - Q1b, 04 marks)
 3. List the input and output devices for the PLC. (S23 - Q4b, 04 marks)
 4. What are the essential elements of a PLC system? (W25 - Q2b, 04 marks)
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Unit 4: Group Technology and CAPP

Repeated Questions:

1. Explain OPITZ classification system in Group Technology? / Explain OPITZ system for part classification and coding. (S25 - Q4c, 07 marks), (S24 - Q4c, 07 marks), (W23 - Q3c OR, 07 marks)
2. Define Part Families. Explain different attributes used for family formation. (W22 - Q3a, 03 marks), (W23 - Q3a, 03 marks), (W25 - Q4b, 04 marks)
3. Define JIT. Write the disadvantage of JIT. / Explain in brief about the JIT philosophy. (S25 - Q4b, 04 marks), (W22 - Q5b, 04 marks), (W23 - Q5b OR, 04 marks)
4. What is CAPP? Explain Generative CAPP in detail. / What is computer aided process planning? Explain benefits over traditional process planning. (S23 - Q5c, 07 marks), (W23 - Q3c, 07 marks), (S22 - Q3c, 07 marks)
5. Explain the Generative type CAPP. (S25 - Q3b OR, 04 marks)
6. List the advantages of Group Technology. (S23 - Q1a, 03 marks)
7. Identify the key benefits of implementing Group Technology in manufacturing. / Enumerate the benefits of implementing Group Technology in manufacturing. (W24 - Q4b, 04 marks), (S24 - Q4b, 04 marks)
8. Compare variant and generative process planning methodologies. (W25 - Q4c OR, 07 marks)

Other Important Questions:

1. Explain the conditions in which GT can be applied. (S25 - Q4a, 03 marks)
2. Explain AND, OR, XOR, NOT, NAND, NOR logic gate (S25 - Q4a OR, 03 marks)
3. Explain ladder programming in PLC with example. (S25 - Q4b OR, 04 marks)
4. Define Computer-Aided Process Planning (CAPP). Explain the difference between variant and generative CAPP systems. (W24 - Q4c, 07 marks)
5. List the method to make part families. Explain any one in brief. (S23 - Q3a OR, 03 marks)
6. Apply the rank order clustering technique to the part machine incidence matrix in the following table to identify logical part families and machine groups. [Table given - refer Question paper of S23] (S23 - Q4b OR, 04 marks)
7. Explain the concept of cellular manufacturing and how it differs from traditional batch production. (W24 - Q3b, 04 marks)
8. List the steps involved in the rank order clustering method for cell design. (W24 - Q4b OR, 04 marks)
9. Compare the OPITZ and PFA coding systems in terms of complexity and application with suitable example. (W24 - Q4c OR, 07 marks)
10. Define rank order clustering and its significance in GT. How does rank order clustering assist in grouping similar parts together? (S24 - Q4c OR, 07 marks)
11. Discuss the three basic code structures used in classification and coding for group technology. (W22 - Q3c, 07 marks) OR Discuss various codes used for GT. Explain the digits used in Opitz code. (W22 - Q3c OR, 07 marks)
12. Why is part classification and coding required in GT. Explain OPTIZ system of coding. (W23 - Q3c OR, 07 marks)
13. Explain objectives of parts classification and coding. (S22 - Q3b, 03 marks)
14. Explain how hybrid codes are generated? (S22 - Q3b OR, 03 marks)
15. Explain variant and generative approaches of CAPP. (S22 - Q3c OR, 07 marks)
16. What is the need for computer aided process planning? What are its advantages? (W25 - Q4a, 03 marks)
17. Classify a component using either OPTIZ or MICLASS system. (W25 - Q4c, 07 marks)
18. Describe the structure of a process plan. (W25 - Q4a OR, 03 marks)
19. What are the major modules of a process planning software and the databases required? (W25 - Q4b OR, 04 marks)

Unit 5: Flexible Manufacturing System

Repeated Questions:

1. What is a Flexible Manufacturing System (FMS)? List the key components of an FMS. / What is a Flexible Manufacturing System (FMS), and how does it differ from traditional manufacturing systems? (W24 - Q3a, 03 marks), (S24 - Q3a, 03 marks)
2. Explain the different types of flexibilities in FMS. / Name and define the various types of flexibility associated with Flexible Manufacturing Systems. (S25 - Q5c, 07 marks), (S23 - Q3c OR, 07 marks), (S24 - Q3b, 04 marks)
3. Explain the FMS layout configurations / Explain different types of FMS layout with neat sketch. (S25 - Q5b, 04 marks), (S23 - Q3c, 07 marks), (W22 - Q4c OR, 07 marks), (W25 - Q5c, 07 marks)
4. List the benefits of FMS. (S23 - Q2a, 03 marks)
5. Explain Automated Guided Vehicles (AGVs). Compare the advantages and disadvantages of AGVs versus traditional material handling methods. / What are Automated Guided Vehicles (AGVs), and where are they commonly used in industrial settings? Explain types of Automated Guided Vehicles (AGVs) (W24 - Q3c OR, 07 marks), (S24 - Q3c, 07 marks)
6. Explain the working principle of AS/RS and how it benefits warehouse operations. / Explain the concept of an Automated Storage and Retrieval System (AS/RS) and its advantages in modern warehousing. (W24 - Q3c, 07 marks), (S24 - Q3c OR, 07 marks)
7. Describe with neat sketch AS/RS system used in FMS. (W22 - Q4a OR, 03 marks), (W23 - Q3b OR, 04 marks), (W25 - Q5b, 04 marks)

Other Important Questions:

1. Explain tool management system in FMS. (W23 - Q2a, 03 marks)
 2. Write a short note on: Automated guided vehicle associated with FMS. (W22 - Q3b, 04 marks)
 3. Write a short note on: Tool monitoring system used in FMS. (W22 - Q3b OR, 04 marks)
 4. Explain the basic components of FMS. (W22 - Q4a, 03 marks)
 5. What are the steps needed to develop the flexible manufacturing cells from scratch? (W23 - Q3b OR, 04 marks), (S22 - Q4b OR, 04 marks)
 6. Explain different types of AGVs with their advantages and limitations. (W23 - Q3c OR, 07 marks)
 7. Explain the concept of a "cell" in FMS layout and its significance. (S24 - Q3a OR, 03 marks)
 8. Define Cellular Manufacturing and its role in improving production efficiency. (S24 - Q3b OR, 04 marks)
 9. Explain how the JIT philosophy can be applied to Flexible Manufacturing Systems (FMS) to reduce lead times and inventory. (S24 - Q4b OR, 04 marks)
 10. What type of data needed in order to develop a flexible manufacturing cell? (S22 - Q3b OR, 03 marks)
 11. What are the various guidance methods available for automated guided vehicle? (S22 - Q5c OR, 07 marks)
 12. Explain different types of AGVs with their advantages. (W25 - Q5a, 03 marks)
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Unit 6: Robot Technology

Repeated Questions:

1. Define robot and explain different joints used in robots. / Draw the types of joints used in robots. (S23 - Q2b, 04 marks), (S25 - Q5a OR, 03 marks)
2. List the robot configurations and explain any one with neat sketch. (S25 - Q5c OR, 07 marks), (W22 - Q4b, 04 marks), (W23 - Q3b, 04 marks)
3. Explain various physical configuration of robot with example. (W24 - Q5c, 07 marks)
4. What are SCARA configuration robot? Explain its work envelope. (W22 - Q4b OR, 04 marks), (W25 - Q3c OR, 07 marks)
5. Describe various sensors used in robot technology. (W22 - Q5a, 03 marks), (W23 - Q3b OR, 04 marks)
6. Write a brief note on types of sensors used in robots. (S25 - Q5b OR, 04 marks)
7. Describe the terms with reference to Robot: 1. Payload, 2. Work envelop 3. Manipulator. (S23 - Q4a, 03 marks), (W23 - Q3a OR, 03 marks)

Other Important Questions:

1. Explain the types of AS/RS and its applications. (S25 - Q4c OR, 07 marks)
 2. Explain the benefits of using robots in manufacturing compared to manual labor. (W24 - Q5a, 03 marks)
 3. Explain the structure of robot in detail. (S23 - Q2c, 07 marks)
 4. Discuss on automated guided vehicle. (S23 - Q3b, 04 marks)
 5. Discuss the advantage and disadvantage of magnetic gripper. (S23 - Q4a OR, 04 marks)
 6. What are the different elements of an industrial robot? (W22 - Q2b, 04 marks)
 7. What are the components of machine vision system in robotics? (W23 - Q2b, 04 marks)
 8. What are the various types of motion control possible in robots? (W23 - Q3a OR, 03 marks), (S22 - Q3a OR, 03 marks)
 9. Explain different end effectors used in ROBOTS and state their applications. (W25 - Q3c, 07 marks)
 10. Enlist robot programming method. Explain any one in detail. (W25 - Q3b, 04 marks)
 11. Give technical specification of a ROBOT. (W25 - Q3b OR, 04 marks)
 12. Explain the different methods of programming a robot, including teach pendant and offline programming. (S24 - Q4c, 07 marks)
 13. Discuss the various power sources commonly used in robotic systems. (S24 - Q4a OR, 03 marks)
 14. Describe the basic anatomy of a typical industrial robot, including its major components. (S24 - Q4c OR, 07 marks)
 15. Explain how do you justify the acquisition of a robot for a given application based on economics? (S22 - Q3c OR, 07 marks)
 16. What are the various factors which influence the selection of end effector of a robot. (W22 - Q5a OR, 03 marks)
 17. Explain different sensors used in robot with neat sketch. (S22 - Q4c OR, 07 marks)
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Unit 7: Integrated Production Management System

Repeated Questions:

1. What is MRP-II? Explain in brief. / Explain MRP-I and MRP-II. (S25 - Q5a, 03 marks), (S23 - Q5c OR, 07 marks), (W23 - Q3c OR, 07 marks)
2. Discuss the role of JIT in inventory management and cost reduction. (W24 - Q5b, 04 marks)
3. List the main functions of PPC in a manufacturing system. (W24 - Q4a, 03 marks)
4. Discuss the problems with traditional production planning and control. (S23 - Q4c, 07 marks)
5. Explain the concept of expert system used in manufacturing. (W22 - Q5b OR, 04 marks), (W25 - Q5b OR, 04 marks)

Other Important Questions:

1. Explain the open loop and close loop control system. (S25 - Q3a OR, 03 marks)
2. Explain ladder programming in PLC with example. (S25 - Q4b OR, 04 marks)
3. List the primary objectives of implementing an FMS. (W24 - Q3a OR, 03 marks)
4. Explain the importance of layout design in the efficiency of an FMS. (W24 - Q3b OR, 04 marks)
5. Explain Enterprise Resource Planning (ERP). (W24 - Q4a OR, 03 marks)
6. Explain the difference between forward kinematics and inverse kinematics in robotic motion planning. (W24 - Q5a OR, 03 marks)
7. Describe key components of an expert system. (W24 - Q5b OR, 04 marks)
8. Define actuators and transducers in the context of robotics. Describe the role of transducers in robotic sensing and feedback systems. (W24 - Q5c OR, 07 marks)
9. What is Production Planning and Control (PPC), and why is it essential in manufacturing? (S24 - Q4a, 03 marks)
10. Explain Material Requirement Planning (MRP). (S24 - Q4a OR, 03 marks)
11. Discuss the applications of CAPP systems in modern manufacturing. (S24 - Q4b OR, 04 marks)
12. What is a Management Information System (MIS), and what is its role in an organization? (S24 - Q4b OR, 04 marks)
13. Elaborate on computer integrated production management system with neat flow chart. (W22 - Q5c, 07 marks), (W23 - Q3c OR, 07 marks)
14. What is an ERP System and why is it used? (W23 - Q3a OR, 03 marks), (S22 - Q4a OR, 03 marks)
15. What are the steps to successful ERP implementation? (W23 - Q3a OR, 03 marks), (S22 - Q3a OR, 03 marks)
16. In order to achieve the goal of JIT, which approaches can be followed? (S22 - Q5a, 03 marks)
17. Explain any four components of production planning and control. (S22 - Q5b, 07 marks)
18. What is the philosophy of Just In Time? (S22 - Q5a OR, 03 marks)
19. Explain planning phase of production planning and control. (S22 - Q5b OR, 07 marks)
20. Explain the major components are used in an automated storage and retrieval system. (S22 - Q5c OR, 07 marks)
21. What is the significance of bill of materials? (W25 - Q5a OR, 03 marks)
22. Discuss the Just In Time manufacturing. (W25 - Q5c OR, 07 marks)
