

## OBJECTIVES

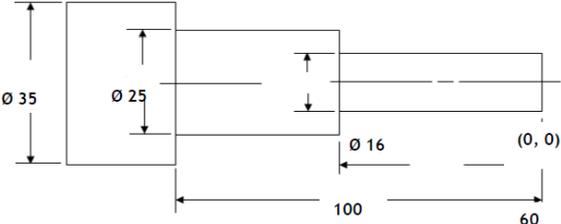
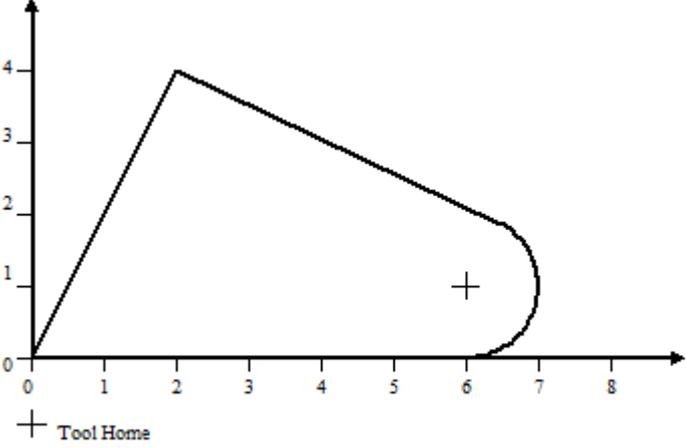
- I. To understand the concept of implementation of CAD-CAM in industries and product cycles.
- II. To know various components used in CAD-CAM systems such as hardware components memory types input & output devices.
- III. To know about different concepts of Computer graphics & geometrical modeling along with the Applying of Drafting and modeling systems during the implementation of CAD-CAM concepts used as a part of CAD-CAM system.
- IV. To know the implementation of CAM concepts along with the Applying of CNC & NC programming for different scenarios.
- V. To understand the about the group technology concepts, Computer Aided Quality Control and CIM.

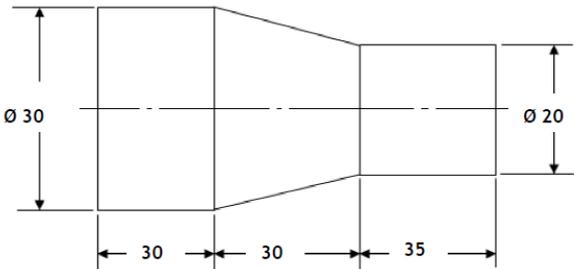
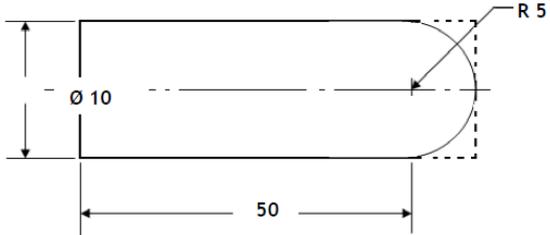
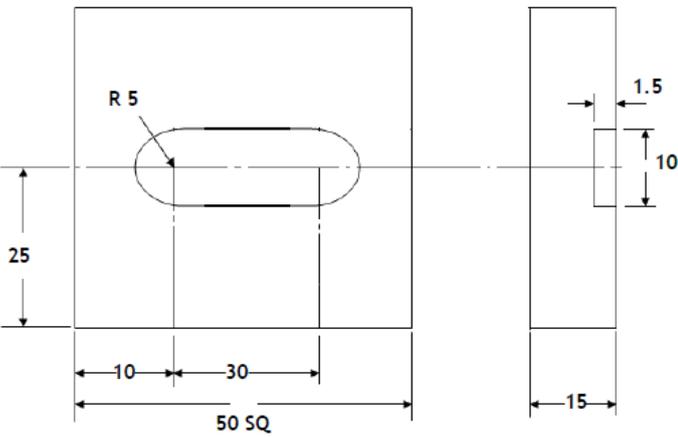
S. No.	Question	Blooms Taxonomy Level	Course Outcomes
<b>UNIT-I</b>			
1	a) Give the general configuration of a CAD computer system. b) In what ways CAD can help manufacturing activity? Discuss.	Understanding, Applying	1
2	a) CAD helps in integrating CAM- Justify this statement. b) How do you specify a plotter for graphics applying?	Understanding, Applying	1
3	a) Briefly describe the types of storage devices used in computers. b) In design, what do you understand by synthesis and engineering analysis	Understanding, Applying	1
4	a) Explain how CAD helps to synthesize a product design and do engineering analysis for getting optimal design. b) Briefly explain the conventional process of the product cycle in the conventional manufacturing environment.	Understanding, Applying	1
5	a) What is the structure of a computing system? b) What do you understand by the CPU & ALU?	Understanding, Applying	1

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6	a) List the advantages of computer aided design. b) Bring out clearly the difficulties a design engineer has to face at each of the design stages if they are carried out manually.	Understanding, Applying	1
7	a) Write briefly on the secondary storage devices used in CAD System. b) Explain about the types of production.	Understanding, Applying	1
8	a) Explain with the help of a neat sketch, how an image is generated on a computer terminal. b) Elaborate on the basic requirements that a C.A.D. software has to satisfy.	Understanding, Applying	1
9	a) Describe the various database models which are generally used. b) Write short notes on the following: a. Random scan graphic terminal b. Digitizers and Image scanners c. CPU	Understanding, Applying	1
10	a) What are the reasons for implementing a computer aided design system. b) With the help of a block diagram, explain the computer aided design process.	Understanding, Applying	1
11	c) Explain how an image is generated and maintained in a direct beam refresh terminal. d) What is a digitizer? Explain how it can be used for transferring paper drawing to CAD system.	Understanding, Applying	1
12	a) Briefly describe the types of storage devices used in computers b) What is engineering analysis? Explain with the example a gear and the shaft assembly.	Understanding, Applying	1
<b>UNIT-II</b>			
1	A scaling factor of 2 is applied in the Y direction while no scaling is applied in the X direction to the line whose two end points are at coordinates (1, 3) and (3,6). The line is to be rotated subsequently through $30^{\circ}$ , in the counter clockwise direction. Determine the necessary transformation matrix for the operation and the new coordinates of the end points.	Applying Evaluating	3
2	The vertices of a triangle are situated at points (15, 30), (25, 35) and (5, 45). Find the coordinates of the vertices if the triangle is first rotated $10^{\circ}$ counter clockwise direction about the origin and then scaled to twice its size.	Applying Evaluating Creating	3
3	a) What is the need for concatenation of transformations? Explain what care should be taken in such cases. b) Explain the concept of obtaining a reflection about an arbitrary line starting from the plain reflection about an axis. How do you obtain the orthographic projections of 3D geometric data base?	Applying Evaluating Creating	3
4	a) What is meant by Interactive Computer Graphics? Explain its various elements. b) Describe the various database models which are generally used.	Creating , Applying	2
5	a) What are the different graphic display devices? Explain atleast two display devices in detail.	Understanding, Applying	2

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	b) List at different problems associated with raster graphic display device.		
6	a) What are normalized device co-ordinators? b) What is display file? Explain the stricture of display file?	Understanding, Applying	2
7	a) What is transformation? How many types of transformations are there to change the geometry? b) What is a projection? Explain different types of projections?	Understanding, Applying	3
8	a) What is clipping? Explain with the help of a diagram. b) Write down the different techniques for the hidden surface removal. Explain?	Understanding, Applying	3
9	a) Single transformation for a manipulation is unusual- Explain b) What is the need of the concatenation of transformations? Explain what care should be taken is such cases.	Understanding, Applying	3
10	Explain the concept of obtaining a reflection about arbitrary line starting from the plain reflection about an axis. How do you obtain the orthographic projection of geometric data base?	Understanding, Applying	3
<b>UNIT-III</b>			
1	a) Specify the three principal classifications of the geometric modeling systems and write in brief about each of them. b) Investigate the statement “each segment of a B-Spline curve is influenced by only K control points or each control point affects only K curve segments”. Use N=3, k =2,3,4.	Remembering Applying Evaluating Creating	3
2	a) Derive the cubic spline equations. b) Explain the engineering Applying of cubic splines.	Remembering, Understanding	3
3	a) What are the types of surfaces that CAD/CAM systems use? b) What do you understand by the form element method of geometric construction? Specify the Applyings of this method of modeling in comparison to that of the variant type.	Remembering, Understanding	3
4	a) What are the limitations in utilizing the sweep method for geometric construction? b) Distinguish between interpolation and approximation approaches used in design of curves	Remembering, Understanding	3
5	a) Explain the basic curve fitting techniques. b) Write on the importance of studying geometric modeling in CAD.	Remembering, Understanding	3
6	a) Describe with the help of neat sketches the major surface entities provided by CAD/CAM systems. b) What do you mean by blending function? Explain reparameterization of a surface.	Remembering, Understanding	3
7	a) What are entities? Explain the methods of defining lines, arcs and Circles in wire frame modeling? b) Write a note on: a. NURBS b. B-splines	Remembering, Understanding	3
8	a) Discuss the modeling guidelines to be followed by the user while constructing a surface model as a CAD/CAM system. b) Differentiate between Bezier and B- spline surface with reference to number of control points, order of continuity and surface normal.	Remembering, Understanding	3
9	a) . Explain how a Bezier curve is defined. b) What are the advantages of Bezier curves over cubic spline?	Remembering, Understanding	3
10	a) Explain how the curves are represented in	Remembering,	3

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	i. Generic form ii. Parametric form. b) What are the types of surfaces that CAD/CAM systems use?	Understanding	
11	a) What do you understand element by the form element method of geometric constructions? Specify the Applying of this method of modelling in comparison to that of the variant type b) Discuss about the composite surface and Bezier surface.	Remembering, Understanding	3
12	a) What are the parametric curve continuity conditions? b) Distinguish between 2D and 3D wireframe models? With a suitable figure explain the difficulty in displaying holes and curved ends in wire frame modeling?	Remembering, Understanding	3
13	a. Describe various commonly used primitives for solid modeling and explain the Boolean operations b. The coordinates of the four control points relative to a current WCS are given by $P_0=[2\ 2\ 0]^T$ , $P_1=[2\ 3\ 0]^T$ , $P_2=[3\ 2\ 0]^T$ . Find the equations of the resulting Bezier curve. Also find points on the curve for $u=0,0.25,0.5,1$ respectively	Remembering, Understanding Applying	3
<b>UNIT-IV</b>			
1	Find all the layer-related commands on your system, specifically how to select/deselect layers, assign entities to layers, assign layers to entities, assign colours to layers, modify layer colours and modify layers of existing entities	Remembering Applying, Understanding	3
2	a) What is a Hybrid Solid Modeller b) What is meant by sweep operation in solid modelling	Remembering, Understanding	3
3	a) What are the basic Geometric commands, Editing commands in CAD? b) Discuss about display control commands used in CAD/CAM.	Remembering, Understanding	3
4	Give an example of how the centralized integrated database concept can help with the what-if situations that arise during the design process.	Remembering, Understanding	3
5	a) How to you classify different solid modelling based Applying b) What is the advantages and disadvantages of C-rep & B-rep approaches in solid modelling	Remembering, Understanding	3
6	a) What do you mean by geometric modelling? Enumerate various solid-modelling techniques and compare them b) Compare the different techniques used in solid modelling	Remembering, Understanding	3
7	a) Give some practical Applying of Solid modelling b) What are the different solid manipulation techniques	Remembering, Understanding	3
8	a) What are the Different Editing commands used in CAD/CAM b) Explain method of CSG modelling.	Remembering, Understanding	3
9	a) Give difference between line, surface, and solid modelling b) Describe the coded decimal system used in the NC machines for the part programming	Remembering, Understanding	3
10	a) Why is parity check provided in the NC punched tapes b) What are the limitations is utilizing the sweep method of geometric construction?	Remembering, Understanding	3

UNIT-V			
1	<p>The top surface of a large cast iron plate is to be face milled. The area to be machined is 400mm wide and 700mm long. The insert face milling cutter has eight teeth and is 100mm diameter. Define the origin of the axis system at the lower left of the part with the long parallel to the x axis. Write the APT geometry and motion statements of this job.</p>	Remembering Applying Evaluating Creating	4
2	<p>a) Briefly discuss the following NC motion control systems.</p> <ol style="list-style-type: none"> <li>i. Point -to-point</li> <li>ii. Straight cut</li> <li>iii. Contouring</li> </ol> <p>Write a CNC Turning Programing for the figure 1 01 (All dimensions are in mm).</p>  <p>The drawing shows a shaft with three distinct diameters. The first section on the left has a diameter of 35 mm and a length of 100 mm. The second section has a diameter of 25 mm. The third section has a diameter of 16 mm and a length of 60 mm. The origin (0,0) is marked at the right end of the 16 mm diameter section.</p>	Remembering Applying Evaluating Creating	4
3	<p>a) An APT program for the profiling of the part in Figure 2 is to be generated. The processing parameters are: (a) feed rate is 5.39 inches per minute; (b) spindle speed is 573 revolutions per minute; (c) a coolant is to be used to flush the chips; (d) the cutter diameter is to be 0.5 inches, and (e) the tool home position is (0, -1, 0).</p>  <p>The graph shows a profile in the first quadrant of a Cartesian coordinate system. The x-axis ranges from 0 to 8, and the y-axis ranges from 0 to 4. The profile starts at the origin (0,0), rises linearly to a peak at approximately (2, 3.8), then descends linearly to a point at approximately (6.5, 1.5). From this point, the profile curves smoothly to the x-axis at approximately x=7. A crosshair symbol labeled 'Tool Home' is located at approximately (6.5, 1.5).</p> <p style="text-align: center;">+ Tool Home</p> <p><b>Figure 2. APT Program Workpiece</b></p> <p>b) Discuss the difficulties encountered in using conventional numerical control.</p>	Remembering Applying Evaluating Creating	4
4	<p>a) Draw the Manual Part Programming sheet and explain how the entries are made in the sheet with the help of an example.</p> <p>b) Write CNC Turning Programing for the Figure 3</p>	Remembering Applying Evaluating Creating	4

	 <p>Figure 3</p>		
5	<p>a) Discuss the special features of NC machine tool when compared to the conventional machine tools.</p> <p>b) Write CNC Turning Programing for the Figure 4 (All dimensions are in mm).</p> <div style="text-align: center;">  </div> <p>Figure 4</p>	Remembering Applying Evaluating Creating	4
6	<p>a) Explain the APT statements: (i) GOTO and GO/TO (ii) GODLTA and GOBACK and (iii) INTOL and OUTTOL</p> <p>b) Write CNC milling Programing for the Figure 5</p> <div style="text-align: center;">  </div> <p>Figure 5</p>	Remembering Applying Evaluating Creating	4
7	<p>a) What are the steps in APT?</p> <p>b) Write CNC milling Programing for the Figure 6</p>	Remembering Applying Evaluating Creating	4

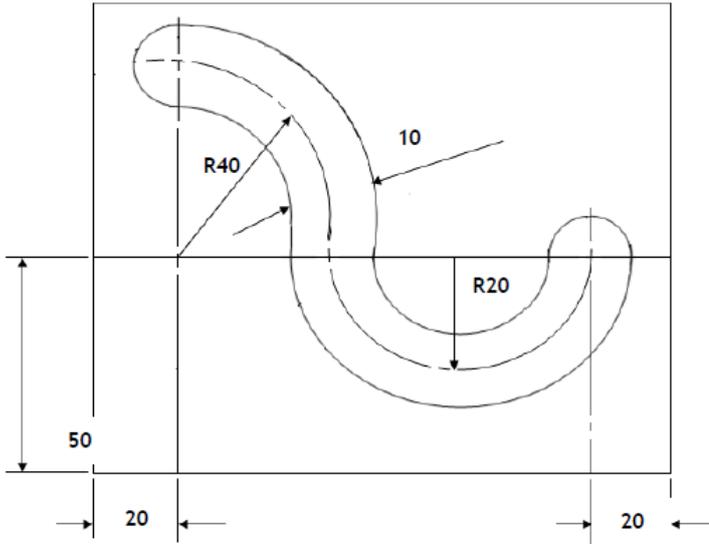


Figure 6

- 8
- a) Describe the parts classification and coding system. Enumerate advantages of GT
  - b) Write CNC drilling Programing for the Figure 7

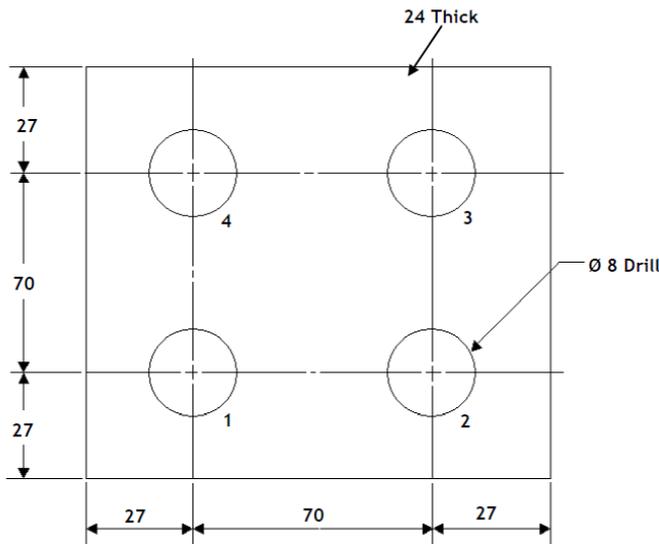


Figure 7

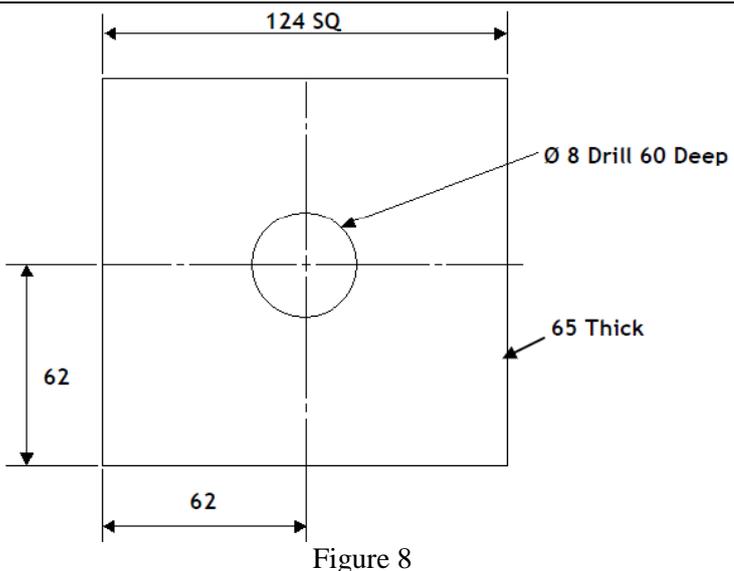
- 9
- a) Differentiate between: i) NC, CNC and DNC system ii) ACC and ACO adaptive control system
  - b) Write CNC drilling Programing for the Figure 8

Remembering  
Applying  
Evaluating  
Creating

4

Remembering  
Applying  
Evaluating  
Creating

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	 <p style="text-align: center;">Figure 8</p>		
10	<p>a) Enumerate the advantages of Computer Assisted Part Programming when compared to Manual Part Programming</p> <p>b) What is adaptive control system? Discuss its advantages to the manufacturing technology.</p> <p>c) Discuss the merits and demerits of NC system</p>	Remembering, Understanding	4
<b>UNIT-VI</b>			
1	<p>a) What is a part family? explain various methods of part formation</p> <p>b) Explain the part design and manufacturing attributes giving examples</p>	Remembering, Understanding	5
2	<p>a) What is Group Technology? Mention some of the benefits associated with Applying of GT</p> <p>b) Discuss in brief the different stages of a group technology plan. What types of work are to be conducted at each stage of plan?</p>	Understanding, Remembering	5
3	<p>a) Discuss the benefits of Group technology.</p> <p>b) What is group technology? Classify a component using any one type of coding system</p>	Remembering, Understanding	5
4	<p>a) What do you understand by Computer Aided Process Planning?</p> <p>b) Write about Retrieval CAPP</p>	Remembering, Understanding	5
5	<p>a) Write about Hybrid CAPP</p> <p>b) Discuss about the difference between the process type layout and GT layout</p>	Understanding, Remembering	5
6	<p>a. The job has 6 turning machines, 5 milling machines 5 grinding machines and 4 boring machines. Arrange these machines in a convenient job shop layout. Discuss about to arrange the same machines in the form of a group technology layout.</p> <p>b. What are the benefits of Using Hybrid CAPP over Variant CAPP?</p>	Remembering Applying Evaluating Creating	5
7	<p>a) Explain about generative type process planning systems.</p> <p>b) By using GT what types of benefits are associated in Manufacturing, Production and Quality control functional areas</p>	Analysis, Understanding	5
8	<p>a) Explain the Retrieval type Process Planning System with the</p>	Remembering,	5

	help of a block diagram b) Explain about MICLASS coding system as used in group technology.	Understanding	
9	a) How is group technology useful for the implementation of CAPP? Explain with an example b) What are the advantages and limitations of using group technology c) What are the advantages of CAPP over Manual Process Planning? Explain in detail.	Understanding, Remembering	5
10	a) Write a brief note on Production flow analysis b) What are the benefits of Using Hybrid CAPP over Retrieval CAPP?	Remembering Understanding Applying	5
11	a) What factors must be considered while selecting a classification and coding system b) Discuss the advantages and limitations of OPITZ code system	Remembering Understanding	5
<b>UNIT-VII</b>			
1	a) Discuss about CAQC b) Explain the Applying and advantages of integration of CAQC with CAD/CAM systems.	Remembering Understanding Applying	5
2	Explain in Detail about the Various types of computer aided testing applied on computer-aided quality control systems	Remembering Understanding Applying	5
3	a) Explain in Detail about the Laser Beam Scanners used in computer-aided quality control systems b) Explain in detail about Ultrasonic Scanner used in computer-aided quality control systems	Remembering Understanding Applying	5
4	a) Explain the different types of Contact inspection techniques used in computer-aided quality control systems. b) What is the importance of computer-aided quality control systems in CAD-CAM.	Remembering Understanding Applying	5
5	a) Differentiate between Non-Contact and Computer aided testing for computer-aided quality control systems. b) What are the advantages and Limitations of the usage of Computer- aided testing in computer-aided quality control systems?	Remembering Understanding Applying	5
6	a) Differentiate between Contact and Computer aided testing for computer-aided quality control systems. b) What are the advantages and Limitations of the usage of Non-Contact testing in computer-aided quality control systems?	Remembering Understanding Applying	5
7	a) What are the advantages and Limitations of the usage of computer-aided quality control systems over traditional quality control systems? b) Discuss about the determination of microstructure of the job using METAVIS technique?	Remembering Understanding Applying	5
8	Explain the different types of Non-Contact inspection techniques used in computer-aided quality control systems.	Remembering Understanding Applying	5
9	a) Differentiate between Contact and Non-Contact testing machines for computer-aided quality control systems. b) What are the advantages and Limitations of the usage of Contact testing in computer-aided quality control systems?	Remembering Understanding Applying	5
10	With the help of schematic diagram explain the operation of scanning laser beam system. Explain its Applying in CAQC systems.	Remembering Understanding Applying	5

UNIT-VIII			
1	a) Discuss about Machine Vision. b) Describe hardware configuration of CIM with the help of a sketch. c) Explain the types of Shop floor data collection Systems?	Remembering Understanding	5
2	a) Explain about the KANBAN system b) Explain in detail about the LEAN manufacturing	Remembering Understanding	5
3	a) Describe the role of RS232C, DNC, LAN in integrating various components of FMS b) How does CIM integrate all the activities of Industry? Explain	Remembering Understanding	5
4	a) Write the steps involved in production flow analysis. Why do you carryout such analysis b) Explain JIT production system with respect to the following a. Inventory b. Quality control c. Production line	Remembering Understanding	5
5	a) Distinguish between the Lean manufacturing process and Agile manufacturing b) Explain JIT production system with respect to the following i. Batch size ii. Setup time iii. Product schedule	Remembering Understanding	5
6	a) List and explain the functions of automated material movement vehicle in a FMS. b) Discuss about MRP in detail with an example	Remembering Understanding	5
7	a) Discuss about automated guided vehicle systems b) List and explain the functions of automated guided vehicles in a FMS.	Remembering Understanding	5
8	a) Discuss about the involvement of Human Labour in various manufacturing systems. b) Discuss about the hierarchical structure of Computer control of Manufacturing Systems	Remembering Understanding	5
9	a) State the principles upon which the concept of concurrent engineering is based b) Explain with the aid of a block diagram the “concept of CIM”.	Remembering Understanding	5
10	a) What is an FMS? Explain in detail the basic components of FMS. b) Describe a materials handling system.	Remembering Understanding	5
11	a) Explain the Applying and advantages of integration of CIM with CAD/CAM systems. b) What are the classifications of Flexible Manufacturing Cells	Remembering Understanding	5
12	a) What are the different types of computer control systems used in CIM b) What are the three major elements of an ASRS? Explain	Remembering Understanding	5