

Code No: R1932033

R19

SET - 1

III B. Tech II Semester Regular Examinations, June-2022

CAD/CAM

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) What is the basic hardware structure of digital computer? [8M]
b) Explain the various graphic transformations required for manipulating the geometric information. [7M]

(OR)

2. a) Describe briefly about the techniques used in current computer graphics terminals for generating the image on the CRT screen. [8M]
b) Explain the concept of obtaining a rotation about an arbitrary point in xy-plane. [7M]

UNIT-II

3. a) Show by example that a planar coons bicubic surface results when the position, tangent and twist vectors lie in the same plane. [8M]
b) Describe the importance of surface modeling in computer aided graphics and design. [7M]

(OR)

4. a) Why the sweep representations are useful in creating solid models of 2D objects and explain what are the desirable properties of any solid modeling scheme. [8M]
b) Explain the various surface entities that are needed to construct a surface model. [7M]

UNIT-III

5. a) What do you understand by NC part programming? List out the advantages of manual part programming. [8M]
b) Write briefly about fixed sequential format and word address format. [7M]

(OR)



6. a) Describe any five Preparatory (G) codes. [5M]
 b) Write a CNC program for the profile shown, in Fig.1, assuming the required parameters. All dimensions are in mm. [10M]

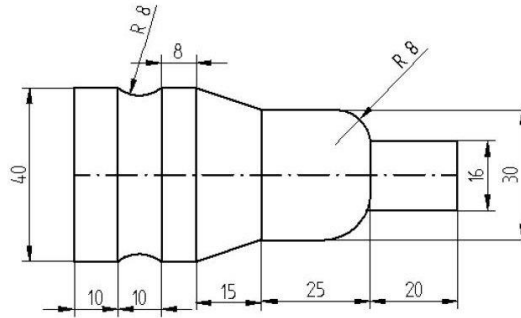


Fig.1

UNIT-IV

7. a) What are the production conditions under which group technology and cellular manufacturing are most applicable? [8M]
 b) Explain about OPITZ parts classification and coding system. [7M]
- (OR)**
8. a) Apply 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. [8M]

Machines	Parts					
	A	B	C	D	E	F
1	1				1	
2				1		1
3	1	1				
4			1	1		
5		1			1	
6			1	1		1

- b) What is the importance of computer aided process planning in manufacturing? Describe in your own words. [7M]

UNIT-V

9. a) Write any eight benefits of CIM. [8M]
 b) What is the significance of quality control in CIM? [7M]
- (OR)**
10. a) What is inspection and what are the different types of inspection? [8M]
 b) Write briefly about the methods of operating and controlling CMM? [7M]



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UNIT-I

1. a) Describe about product cycle using computers. [8M]
- b) Describe the importance of 2D and 3D transformations in any CAD system. [7M]

(OR)

2. a) What is meant by raster scanning? Why is it preferred to the storage tube in the display of graphics information? [8M]
- b) Prove that any two successive 3D rotations about a given rotation axis is commutative. [7M]

UNIT-II

3. a) What is solid modeling? Compare Bezier representation with CSG representation scheme. [8M]
- b) Describe the parametric equation of a composite surface. [7M]

(OR)

4. a) Differentiate between solid modeling and surface modeling methods. [8M]
- b) Describe the modeling guidelines to be followed by the user while constructing a surface model on a CAD/CAM system. [7M]

UNIT-III

5. a) What is the purpose of a part program? Explain the function of punched tape in an NC machine tool? [8M]
- b) Enumerate the differences between incremental and absolute programming. [7M]

(OR)

6. a) Write a CNC program for the profile shown, in Fig.1, assuming the required parameters. All dimensions are in mm. [10M]

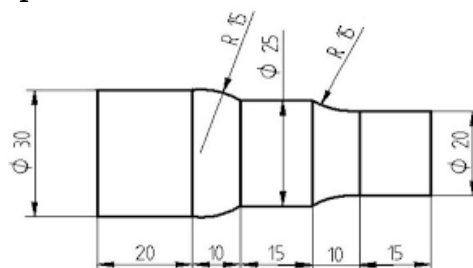


Fig.1

[5M]

- b) Describe any five Miscellaneous codes.



UNIT-IV

7. a) What are three capabilities that a manufacturing system must possess in order to be flexible? Explain. [8M]
 b) Explain about MICLASS coding system. [7M]

(OR)

8. a) Apply 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. [8M]

Machines	Parts								
	A	B	C	D	E	F	G	H	I
1	1								1
2		1					1		
3			1		1			1	
4		1				1	1		
5			1					1	
6						1	1		
7	1			1					
8			1		1				

- b) Explain about retrieval CAPP system. [7M]

UNIT-V

9. a) Explain the aspects that one should consider in implementing CIM. [8M]
 b) Explain the steps used in implementing lean manufacturing. [7M]

(OR)

10. a) Describe any four types of CMM? [8M]
 b) Describe the steps that are followed in a typical inspection of an item. [7M]



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UNIT-I

1. a) Describe important functions of a design work station. [8M]
- b) Explain shear transformations. [7M]

(OR)

2. a) For a position vector $P_1[1 \ 1]$, $P_2[3 \ 1]$, $P_3[4 \ 3]$, $P_4[2 \ 3]$ that define a 2D polygon, develop a signal transformation matrix that reflects about the line $x = 0$; Translates by '-1' in both x and y directions; Rotates about the origin by 180° . Using this transformation, derive the transformed position vectors. Plot both original and transformed polygon on the same graph. [8M]
- b) Describe various hardware components of a stand-alone CAD system. [7M]

UNIT-II

3. a) Derive the equation for a cubic Bezier surface. [8M]
- b) With the help of neat sketches, describe the most commonly used solid entities. [7M]

(OR)

4. a) A cubic Bezier curve is defined by four control points as (30, 30), (50, 80), (100, 100), (150, 30). Find the equation of the curve and its midpoint. [8M]
- b) What do you mean by blending function? Explain re-parameterization of a surface. [7M]

UNIT-III

5. a) Describe various geometric statements used in APT programming. [8M]
- b) Write the advantages of computer assisted part programming. [7M]

(OR)

6. a) Write a CNC program for the profile shown, in Fig.1, assuming the required parameters. All dimensions are in mm. [10M]

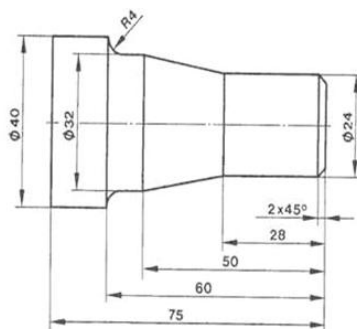


Fig.1



- b) Explain the importance of canned cycle in CNC programming. [5M]

UNIT-IV

7. a) Explain about DCLASS coding system. [8M]
 b) Apply 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. [7M]

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

(OR)

8. a) What are the three basic components of FMS? Describe them. [8M]
 b) Explain the reasons for using a coding scheme in manufacturing? Also describe briefly about the three structures used in classification and coding system. [7M]

UNIT-V

9. a) Differentiate between lean and agile manufacturing. [8M]
 b) Define total quality management and explain its relevance to CIM. [7M]

(OR)

10. a) What are the basic components of a CMM? Explain them with a neat diagram. [8M]
 b) Explain about machine vision with a neat sketch. [7M]



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R19

SET - 4

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CAD/CAM

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks

UNIT-I

1. a) What are the ground rules that should be considered in designing graphics software? [8M]
- b) Explain the method to derive the transformation matrix for rotating an object about any arbitrary axis that does not coincide with the coordinate axis x, y and z. [7M]

(OR)

2. a) A line is defined by its end points (0, 0) and (2, 3) in a 2D graphics system. Express the line in matrix notation and perform the following transformations on the line. [8M]
 - i) Scale the line by a factor of 2.0;
 - ii) Scale the original line by a factor 3.0 in x direction and 2.0 in y direction;
 - iii) Translate the original line by 2.0 units in x direction and 2.0 units in y direction;
 - iv) Rotate the original triangle by 45° about the origin.
- b) Differentiate between stroke writing and raster scan techniques. [7M]

UNIT-II

3. a) Derive the equation for a cubic B-spline surface. [8M]
- b) Distinguish between CSG and B-rep models. [7M]

(OR)

4. a) Explain how a Bezier curve is superior to a cubic spline curve from the designer point of view. [8M]
- b) Write the mathematical representation, application and limitations of the spherical surface and composite surface. [7M]

UNIT-III

5. a) Describe about various motion command statements used in APT program. [8M]
- b) Illustrate the procedure of APT programming using MACRO statement. [7M]

(OR)



6. a) Write a CNC program for the profile shown, in Fig.1, assuming [10M]
the required parameters. All dimensions are in mm.

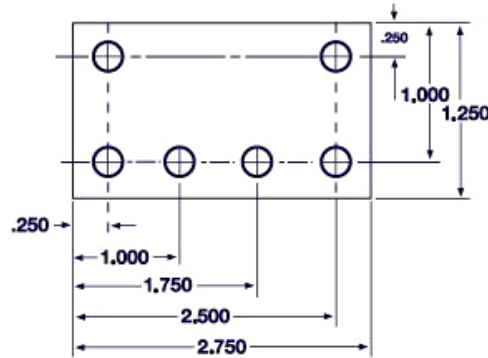


Fig.1

- b) Describe the role of a CNC part programmer. [5M]

UNIT-IV

7. a) Write the differences between hierarchical structure and a chain type structure in a classification and coding system. [8M]
b) Explain the four tests of flexibility that a manufacturing system must satisfy in order to be classified as flexible. [7M]

(OR)

8. a) Name the seven functions performed by human resources in an FMS. [8M]
b) What are the typical objectives when implementing cellular manufacturing? [7M]

UNIT-V

9. a) Explain the computerized business functions of CIM. [8M]
b) Explain the applications of computer integrated manufacturing systems. [7M]

(OR)

10. a) Briefly describe about noncontact nonoptical inspection techniques. [8M]
b) What are the advantages of using CMMs over manual inspection method? [7M]

