GANPAT UNIVERSITY
M.Tech. Sem. Ist Mechanical (AMT)
Jan. 2012 External Examination
3ME 104 Computer Aided Design

Time: 3 Hrs   Marks: 70

Instructions:
   (i)   All questions are compulsory.
   (ii) Answers to two sections must be written in separate answer books.
   (iii) Assume suitable data if required but state them clearly in your answer-books.
   (iv) Figure to the right indicates full marks.

SECTION – I

Q1	Answer the following Questions.	**12**
(a)	How over striking effect is minimize in scan conversions? Prepare program for scan converted DDA line.	
(b)	Which solid modeling techniques used in ANSYS software. Discuss it in brief.	
(c)	Prove that uniform scaling and rotation form a commutative pair of operations but in general scaling and rotation are not commutative.	

OR

Q1(a)	Explain latest applications of CAD in Advanced Manufacturing domains.	**12**
(b)	Where the pixel density is higher in ellipse? Write algorithm for trigonometric ellipse generation.	
(c)	Prove that multiplication of transformations matrix for each of the following are different: A) Rotation succeeding by Scaling B) Scaling succeeding by Rotation.	
Q2(a)	Write program for scan converted spherical surface.	**12**
(b)	Obtain the vertices of triangle after triangle is reflected about arbitrary line y=0.5(x+4). The initial position of the vertices of triangle is (2, 4, 1), (4, 6, 1) and (2, 6, 1).	
(c)	Why configuration of CAD workstation required very high? Explain with suitable example.	

OR

Q2(a)	Write steps for object rotation about any arbitrary line in space.	**12**
(b)	Differentiate between parametric and non parametric generation of curves. How parameter optimizes in line & circle algorithm.	
(c)	For a circle radius r=8, plot the pixels by bresenham's algorithm in first quadrant from x=0 to x= r/√2. For center (5, 4).	
Q3	Write answers on following **(Any three)**	**11**
(a)	What are the different types of surface generation methods? Explain rotational surface generation.	
(b)	What factors are to be considered for developing algorithm for graphics elements become efficient and user friendly?	
(c)	Explain properties of spline curve. Explain how complex its computation of constants in equation of spline.	
(d)	Write co-ordinate equations of following surfaces by rotation methods. Eillipsoid, paraboloid, hyperboloid	

SECTION – II

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Q4	Answer the following Questions.	**12**
(a)	Differentiate global control and local control of curves. Derive equation of Bazier curves.	
(b)	Explain second order continuity of curves. And condition of blending of cubic segments.	

(c)   Explain PDE standard.

OR

Q4(a)   Compare properties of synthetic curves and gives its applications.   12

(b)   Calculate the nodal displacement and element stresses of compound bar shown in fig. 1. Properties of material given below:

	Steel	Aluminium	Brass
Area in mm^2	200	350	350
Young modulus of elasticity (GPa)	200	70	85
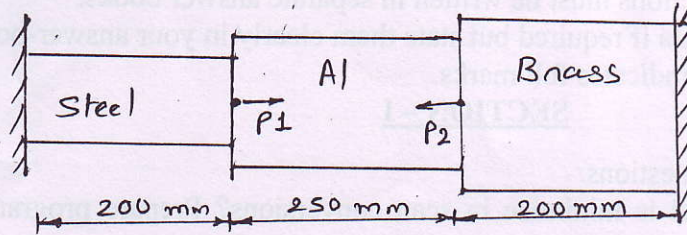
Fig.1 Que 4(b)

Q5(a)
1. Which different ways FEA modeling is different than solid modeling?   12
2. What is shape function? Write its properties.
3. Write limitation of FDA method for analysis.
4. Explain types of element and its selection.

(b)   The coordinates of four control pints relative to a current WCS are given A(3 3 0), B(3 4 0), C(4 4 0), D(4 3 0), find the five point cubic curve for tangent at first point and last points are 120^0 & 320^0 respectively.

(c)   Write short notes on "IGES".

OR

Q5(a)   Derive the equation for elemental stiffness matrix for the 2-D truss element in terms of l and m. where l = cos θ and m = sin θ. Where θ is angle between global co-ordinate system and local co-ordinate system of element.   12

(b)   Analyse the following spring system shown in fig 2. with finite element analysis considering the spring as an element.
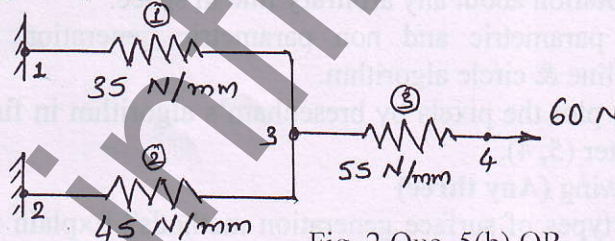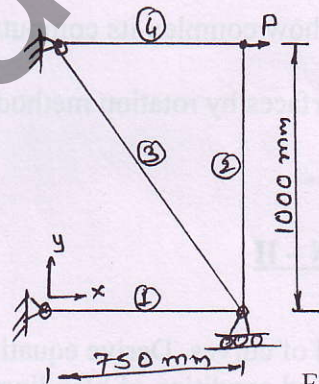

Fig. 2 Que. 5(b) OR

Q6   Write answers on following :   11

(a)   The arrangement of truss element is shown in fig.3 using the finite element method.

$E = 30 \times 10^4 \, MPa$

$A = 30 \, mm^2$ for each member

$P = 20 \, kN$

Fig. 3 Que. 6(a)

2/3

Determine :
1. Nodal displacement at each node.
2. Stress in each element.
3. Reaction force at support.

(b) Write a short note on minimum energy principal in FEA.

OR

(b) "In penalty approach, choice of C (stiffness value) of support is selected is selected with high value". Justify this statement.