C.U.SHAH UNIVERSITY Summer Examination-2016

Subject Name : Computer Aided Design and Engineering

Semester : 6 Date : 06/05/2016 Time :02:30 To 05:30 Marks :70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

Q-1 Attempt the following questions:

- a) Computer Aided Design is an activity to
 - (a) prepare drawing on computer
 - (b) perform analysis on computer
 - (c) perform animations of object
 - (d) All of the above
- b) The quality of an image depends ona) No. of pixel used by image
 - c) No. of resolution used by image
- c) Full form of DDA is
 - a) Direct Design Analysis
 - c) Digital Design Algorithm
- b) No. of line used by image
- d) None

b) Digital Deferential Analyser

- d) Direct Deferential Analysis
- **d**) (2,4) is a point on a circle that has center at the origin. Which of the following points are also on circle?

a) (2,-4)		b) (-2,4)				
c) (-4,-2)					d) All of above	

- e) The transformation in which an object is moved from one position to another in circular path around a specified pivot point is called
 a) Rotation
 b) Shearing
 - c) Translation d) Scaling
- **f**) If a point (x, y) is reflected about an axis which is normal to the XY plane and passing through the origin, the reflected point (x, y) is,
 - a) (x, -y) b) (-x, y)
 - c) (-x, -y) d) (y, x)
- g) The Bezier curve obtained from the four control points is called a
 - a) Quadratic Bezier curve b) Cubic Bezier curve
 - c) Hectare Bezier curve d) Rectangle Bezier curve



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h)	Surface represents the path of moving line or a curve, called a						
	a) generatrix	b) directrix					
	c) matrix	d) apex					
i)	is the FE	A software					
	a) ANSYS	b) NASTRAN					
	c) COSMAS	d) all of these					
j)	A finite element has a	a specific structural shape & is	interconnected with the adjacent				
-	elements is given by_						
	a) Nodes	b) elen	nent in truss				
	c) bar element	d) none	e of these				
k)) In Finite Element Analysis meaning of meshing is,						
	a) development	of elements	b) application of load				
	c) applying boun	ndary conditions	d) all of the above				
l)	The value of shape fu	inction at its own node is					
	a) zero	b) one					
	c) two	d) variable					
m)	The coordinate syste	m is the frame of reference for	or the entire continuum of structure				
	is						
	a) local coordinate	b) global coord	inate				
	c) natural coordinate	d) none of these	e				
n)	Finite element analys	is for lathe bed can be carried	though				
	a) structural analysis	b) thermal analy	/sis				
	c) fluid analysis	d) none of these	2				

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions

- a) What do you mean by scan conversion? Explain Bresenham's circle drawing 07 algorithm.
- b) Using Bresenham's line algorithm, find the pixel positions along the line path between 07 end points (20,10) and (30,18).

Q-3 Attempt all questions

- a) Prove with example that a uniform scaling $(S_X = S_Y)$ and a rotation form a 07 commutative pair of operations but that in general scaling and rotation are not commutative operations.
- b) A triangle ABC with co-ordinates (2, 2) (4, 4) and (3, 5) is reflected first about the X 07 axis and then about the line Y = X. Prove that the result is same as that obtained when the triangle is rotated about the origin by angle of 270°.

Q-4 Attempt all questions

- a) The end points of a cubic spline curve are P_0 (1,2) and P_1 (7,1). The tangent vector for **07** end P_0 is given by line joining P_0 and point P_2 (-2,1). The Tangent vector for end P_1 is given by line joining P_3 (9,-2) and point P_1 .
 - 1. Determine the parametric equation of hermite cubic curve.

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- 2. Determine the parametric equation for tangent Vector.
- 3. Determine five points on curve
- b) Write the demerits of Cubic spline and explain the difference between Cubic spline 07 and Bezier curve.

Q-5

Attempt all questions

- a) What is FEA? Explain steps involved in FEA.
- **b**) Figure 1 shows a truss consisting of three elements whose EA/L value is 1000 N/mm **07** using FEM determine the deflection at node 2 and reaction force at support.

07



Figure 1

Q-6 Attempt all questions

- a) A steel tapered bar of 1200 mm length has the cross sectional areas of 450 mm² and 07 150 mm² at two ends. It is fixed at large and subjected to tensile load of 35 kN at free end. The modulus of elasticity for the bar material is 2 x 10⁵ N/mm². Model the bar with three finite element each having length of 400 mm and calculate the stresses in each element.
- b) A manufacturing firm produces two machine parts using lathes, milling machine and 07 grinding machines. The different machining times required for each part. The machining times available on different machines and the profit on each machine part are given in Table

	Machining time Re	Maximum Time	
Type of Machine	part (M	Available Per week	
	Ι	II	(Minutes)
Lathes	10	5	2500
Milling machines	4	10	2000
Grinding machines	1	1.5	450
Profit per unit	Rs. 50	Rs. 100	

Determine the number of parts I and II to be manufactured per week to maximize the profit.

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Q-7 Attempt all questions

a) What is design optimization? Explain its application and advantages in engineering design 07

07

- **b**) Explain the following with reference to optimization:
 - i) Objective function
 - ii) Constraints
 - iii) Linear Programming Problem (LPP)
 - iv) Non-linear Programming Problem (NLPP)

Q-8 Attempt all questions

a) Write a note on wire frame model.
b) Write a note on Constructive Solid Geometry (CSG).
c) Write the step by step design procedure in conventional and CAD environment.
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