GANPAT UNIVERSITY
M. TECH AM5 SEM- I CBCS (NEW)
REGULAR EXAMINATION NOV-DEC 2017
3ME 104 COMPUTER AIDED ENGINEERING

Max. Time: 3 hours **Max. Marks: 60 Marks**

Instructions:

1. Candidate can not keep with him any paper or book related to subject during the examination.
2.
3. Use of any electronic devices or programmable calculators is not allowed.

SECTION I

Que 1 Attempt all

(A) Why configuration of CAD workstation required very high? Explain with suitable example. [3]

(B) Explain how an ellipse can be represented efficiently by use of parametric representation. [3]

(C) Write a C++ program for preparation of Bresenham's line in graphics. [4]

OR

Que 1 Attempt all

(A) What is scan conversion? Draw a flow chart to scan converted DDA line. [5]

(B) Derive equation of decision variable for Bresenham's Circle algorithm. [5]

Que 2 Attempt all

(A) Prove that in case of 2D transformation of a triangle ABC, result obtained after it being reflected about the X axis first and then about line y = -x will be same as when the triangle is rotated about the origin by an angle $\theta = 270^{o}$. [5]

(B) Write a Matlab program for 30^{o} anticlockwise rotation of any geometry. [5]

OR

Que 2 Attempt all

(A) Write down steps required for object rotated about any arbitrary line in space. [5]

(B) Plan object has vector points A to H as given below. Obtain coordinates of each vector after the object is rotated about y axis through 45^{o}. [5]
A(-1 1), B(1 1), C(-1 -1),D(1 -1).

Que 3 Attempt all

(A) Explain IGES computer graphics standard. [4]

(B) Write down the areas of CAE subject and its significance in present industrial design scenario. [3]

(C) Calculate the pixel location approximating the first octant of a circle having center at (4,5) and radius 4 units using midpoint algorithm. [3]

SECTION II

Que 4 Attempt all.

(A) Solve the following by making use of weak formulation [5]

$$EI\frac{d^4v}{dx^4} - q_0 = 0,$$
$$v(0) = 0$$
$$\frac{d^2v}{dx^2}(0) = 0$$
$$v(L) = 0$$
$$\frac{d^2v}{dx^2}(L) = 0$$

(B) For a problem given below, find a two-parameter Galerkin approximate solution that contains trigonometric trial functions. [5]

$$\frac{d^2y}{dx^2} - \cos\frac{\pi x}{l} - 10 = 0$$
$$\frac{dy}{dx} = 0 \; at \; x = 0 \; and \; L$$

OR

Que 4 Attempt all

(A) For the heat conduction through the annulus region as shown in figure 1. Derive the weak form and find the solution. [5]

$$\frac{\partial^2 T}{\partial r^2} + \frac{1}{r}\frac{\partial T}{\partial r} + \frac{q_0}{k} = 0$$
$$T(r_i) = T_i$$
$$T(r_0) = T_0$$

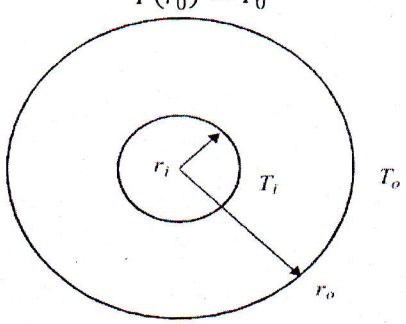

Fig. 1 Que. 4(B) OR

(B) State and explain Galerkin method. Using this method obtain stiffness matrix for one dimensional bar element. [5]

Que 5 Attempt all

(A) A tapered circular rod is subjected to concentrated forces as shown in figure 2. Considering the self-weight of the rod, determine the stresses and strains in the rod by discretizing in two elements. The diameter of the rod at top is 200mm and bottom is 100mm respectively. E=200GPa and density $\rho = 2710 * 10^{-9} kg/mm^3$ [5]

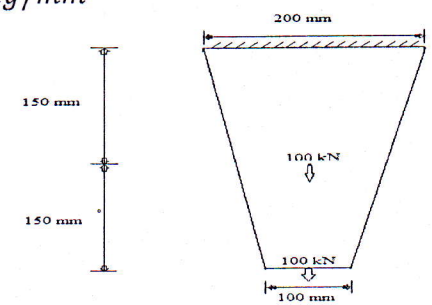

Fig. 2 Que. 5(A)

B Consider a 1mm diameter, 50mm long aluminum pin fin as shown in figure 3, used to enhance the heat transfer from a surface wall maintained at 300°C. Let k=200W/m/°C for aluminum, h=20W/m^2/ °C, T_∞=30 °C. Obtain the solution using Rayleigh Ritz method assuming quadratic trial function. [5]

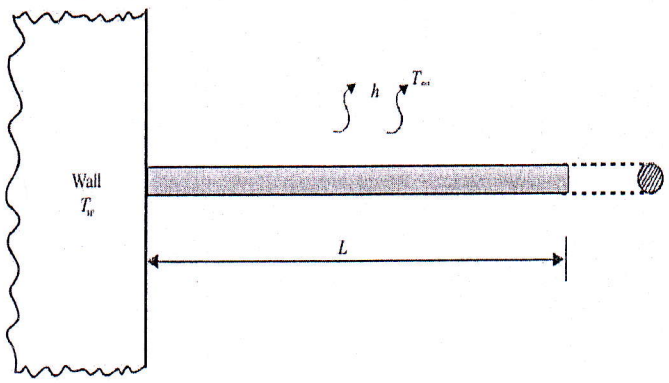

Fig. 3 Que. 5(B)

$$k\frac{d^2T}{dx^2} = \frac{Ph}{A_c}(T - T_\infty)$$

$$T(0) = T_w = 500°C$$

$$\frac{dT}{dx}(L) = 0 \ (insulated\ tip)$$

OR

Que 5 Attempt all

(A) Consider a 1m long steel rod held fixed at its left end and subjected to a concentrated force of 100N at its right end as shown in figure 4. Find the nodal displacements and the reaction force. [5]

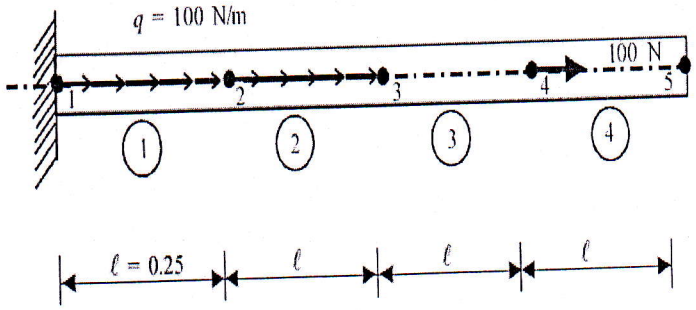

Fig. 4 Que. 5(A) OR

(B) Consider a simply supported beam under uniformly distributed load q_0 as shown in figure 5. Obtain the solution for the deflection using Rayleigh Ritz Method. [5]

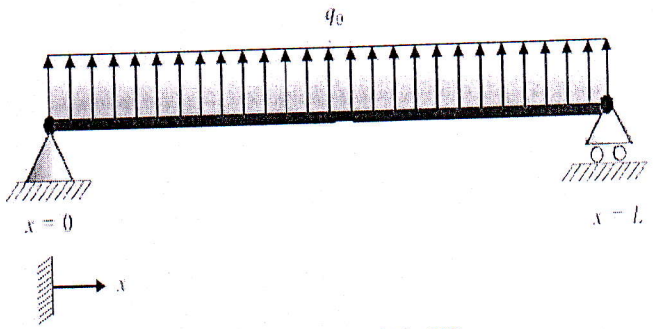

Fig. 5 Que. 5(B) OR

Que 6 Attempt all

(A) A cantilever beam of length L is subjected to uniformly distributed load q over the entire length(figure 6). Using the weighted residual method solve it. [5]

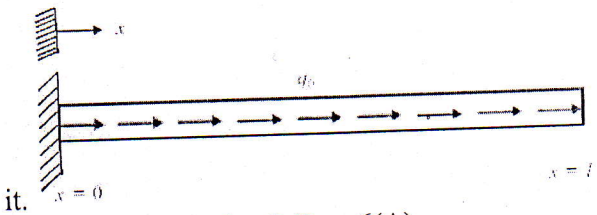

Fig. 6 Que. 6(A)

(B) A continuous beam is shown in figure 7. Determine the deflections and slope of the beam using beam elements. Assume EI=1. [5]

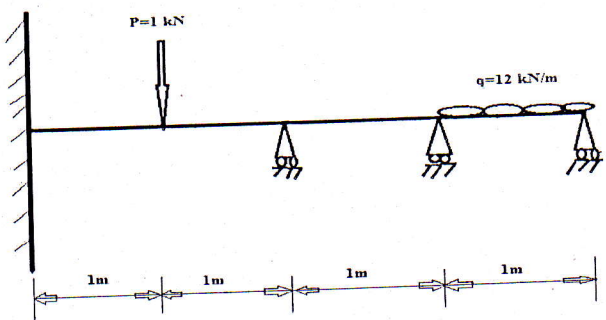

Fig. 7 Que. 6(B)

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