Sanjay Ghodawat University, Kolhapur

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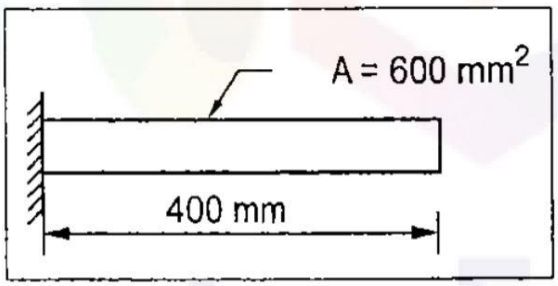
2020-21

EXM/P/09/00

Year and Program: B.Tech Final Year	**School of Technology**	**Department: Aeronautical Engineering**
Course Code: AET308A	**Course Title: Finite Element Method**	**Semester : VIII**
Day and Date:	**End Semester Examination**	**Time : 2 Hrs.** **Max Marks : 50**

Instructions: 1) All Questions are compulsory.

Q.1		**Answer/Solve the following (any Two)**	**Marks**	**Bloom's Level**	**CO**
	a)	Evaluate I = $_{-1}\int^{1}$ $(3e^{x}+x^{2}+1/x+2)dx$ using 1pt and 2pt gaussian quadrature.	8	3	CO1
	b)	Using Rayleigh Ritz method, determine the expression for displacement and stress in a fixed bar subjected to axial force P at the center. Draw the displacement and stress variation diagram. Take three terms in displacement function.	8	3	CO2
	c)	Explain the terms (i) Degrees of freedom (ii) Discretization (iii) Static and dynamic analysis (iv) Three phases of FEM	8	2	CO1
Q.2		**Answer/Solve the following (any two)**			
	a)	Assemble the stiffness equations or global equations by considering a bar with 4 elements and 5 nodal points.	8	3	CO3
	b)	Consider a two noded truss element with nodal displacements u_1=5mm and u_2=8mm. Calculate the displacement at x=l/4, l/3,l/2.	8	3	CO4
	c)	Explain the following. (i) CST, LST and QST element. (ii) Plane stress analysis. (iii) Assumptions in the theory of pure torsion.	8	2	CO4
Q.3		**Answer/Solve the following (any two)**			
	a)	Derive the shape function for six noded triangular element.	9	2	CO6
	b)	Consider the eight node quadrilateral element defined by the following nodal co-ordinates: X_1=5, y_1=7, x_2=1, y_2=4, X_3=2, y_3=1, x_4=8, y_4=4, X_5=3, y_5=3, x_6=6,	9	3	CO5

		y_6=5, X_7=2.5, y_7=3, x_8=1.5, y_8=2. Determine global co-ordinates that corresponds ξ=0.75 and η=1			
	c)	For the one dimensional bar element shown in figure, determine the natural frequencies of longitudinal vibration using two elements of equal length. Take E=2X10^5 N/mm^2, ρ=0.8X10^{-4} N/mm^3 and L=400mm. 	9	3	CO6

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