Code No:P18MET18

R18

HALL TICKET NUMBER

PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)
IV B.TECH I SEMESTER END REGULAR EXAMINATIONS, NOV-2022
FINITE ELEMENT METHODS
(Common to AME & ME Branch)

Time: 3 hours Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answer **all** the questions in Part-A (**5X2=10M**)

1	a)	List different weighted residual methods	[2M]
	b)	Write strain displacement relations for 2 D problems	[2M]
	c)	Write the shape functions for two noded beam element	[2M]
	d)	Draw four noded quadrilateral element	[2M]
	e)	Write the mass matrix for two noded bar vibration element	[2M]

PART-B

Answer One Question from each UNIT (5X10=50M)

UNIT-I

2		Explain Rayleigh Ritz method with an example	[10M]

(OR)

3		Derive the stress strain relations for plane stress problem	[10M]

UNIT-II

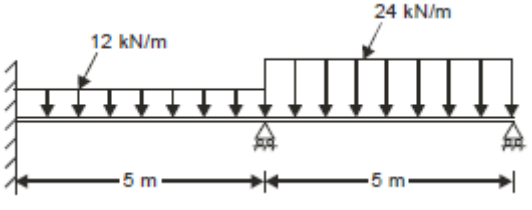
4	a.	What are the advantages and disadvantages of finite element method	[5M]
	b.	What is meant by geometric invariance? How do you achieve geometric invariance	[5M]

(OR)

5	a.	How do you fund best node numbering scheme	[5M]
	b.	Explain about convergence requirements	[5M]

UNIT-III

6		Analyse the beam shown in Fig. by finite element method and determine the slope of deflection curve at the supports. given $E = 2 \times 10^5$ N/mm^2 and $I = 5 \times 10^6$ mm^4	[10M]



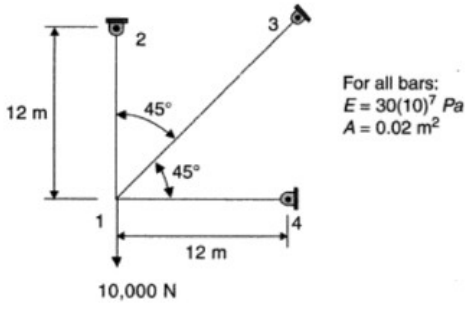
(OR)

7 For the plane truss shown in Figure , [10M]

(i) determine the displacement components at nodes.

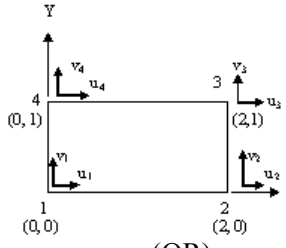
(ii) determine the stresses in each bar, and

(iii) verify the nodal equilibrium at node I.



UNIT-IV

8 A rectangular element is shown in figure. Evaluate Jacobian matrix at $\xi = 0, \eta = 0$ and determine the strain displacement matrix [10M]

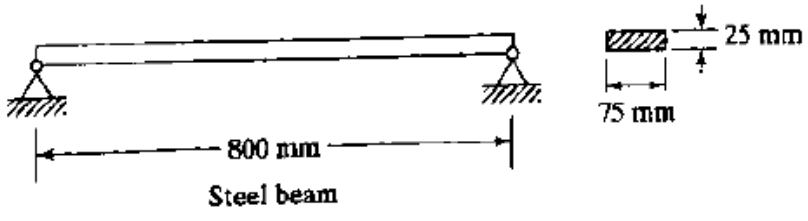


(OR)

9 Derive the Gaussian points and corresponding weights for two point Gaussian quadrature approach [10M]

UNIT-V

10 Determine the natural frequencies of the stepped simply supported beam as shown in figure [10M]



(OR)

11 A fin of length 12cm has its base (left end) temperature at 120$_o$C. Its cross section is a rectangleof width 3cm and thickness 1cm. The conductivity of the fin material is 50 W/m-$_o$K. Theconvective heat transfer coefficient is 120 W/m$_2$-$_o$K and surrounding temperature is 20$_o$C.Determine the temperature distribution along the length of the fin. Considering two cases ofwithout including convection and including [10M]

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