Hall Ticket No: | | | | | | | | | | | Course Code: 16SE106

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

M.Tech I Year II Semester (R16) Supplementary End Semester Examinations – Jan 2019

FINITE ELEMENT METHODS

Time: 3 Hrs **Max Marks: 50**

Attempt all the questions. All parts of the question must be answered in one place only.
In Q.no 1 to 5 answer either Part A or Part B only.

Q.1(A)	i) List out the different types of finite elements? Give sketches.	6 M
	ii) Discuss the merits and demerits of FEM?	4 M
	OR	
Q.1(B)	i) Illustrate with sketches "Obvious locations of nodes and subdivisions lines"?	5 M
	ii) Briefly discuss primary unknowns and secondary unknowns?	5 M
Q.2(A)	Derive the element stiffness matrix for a truss element using elementary approach?	10 M
	OR	
Q.2(B)	In **Figure 1**, a load $P = 50 \times 10^3$ N is applied as shown. Determine the displacement field, stress and support reactions in the body. Take $E = 30 \times 10^3$ N/mm^2.	10 M

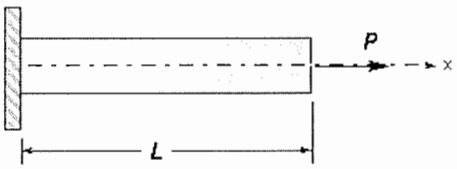

Figure 1

Q.3(A)	Find the force in each member of the truss where the axial rigidity of each member is given by AE = 1000. All the values shown in **Figure 2** are in compatible units.	10 M

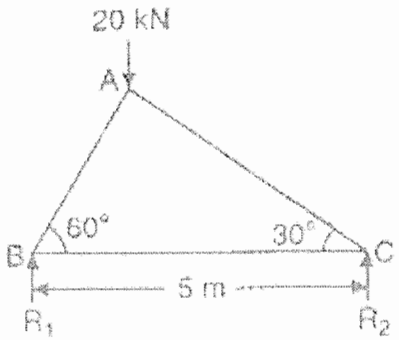

Figure 2

OR

Q.3(B)	A four bar truss is shown in **Figure 3**. It is given that E= 2×10^5 N/mm^2 and A=400 mm^2 for all members. Using finite element method, obtain the stresses in each element and the reaction forces.	10 M

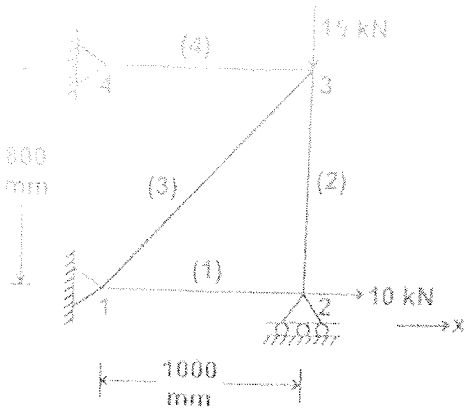

Figure 3

Q.4(A)	Explain the terms Iso-parametric, Super-parametric and Sub-parametric elements. Discuss the advantages of Iso-parametric elements.	10 M
	OR	
Q.4(B)	Explain the formulation and method of analysis of axisymmetric problems using finite element method.	10 M
Q.5(A)	i) List out the three dimensional elements, with sketches, that are used for finite element analysis of analysis of structures. ii) Write a brief note on " Hexahedral Isoparametric elements".	6 M 4 M
	OR	
Q.5(B)	Discuss the step by step procedure of deriving the stiffness matrix for a three dimensional eight noded Iso-parametric solid element. Give important value of the derivation.	10M