Regulation R20 **Subject code: 3P7CA**

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VII Semester Supplementary Examinations, April 2024

FINITE ELEMENT METHODS
(Mechanical Engineering)

Maximum Marks: 70 Date:29.04.2024 **Duration: 3 Hours**

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 10 questions. Answer any 5 questions which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)

1 Define Finite Element Method.
2 What are local coordinates?
3 Write the stiffness matrix of a bar element.
4 What are local coordinates?
5 What is meant by node?
6 What is the shape function for a four node element?
7 Explain ID beam element.
8 Write the governing equation for convection process.
9 What is the equation of Langrangean in dynamic analysis?
10 What is the required condition for the Eigen vector?

Part-B

Answer All the following questions. (10MX 5=50Marks)

11 How to write the equilibrium equation for a finite element method? [10]

OR

12 List the various methods of solving boundary value problems. [10]

13 Distinguish between ID bar element and ID beam element. [10]

OR

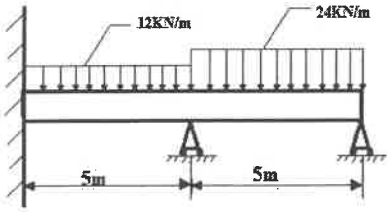
14 Write down the stress strain relationship for a three-dimensional stress field? [10]

15 How to write the equilibrium equation for a finite element? [10]

OR

16 The spring system show in the figure, find the displacement the nodes and the reactions given K1=100N/mm2, K2=200N/mm2, K3 =100N/mm2 and P=500N Stiffness matrix. [10]

17 Analyse the beam shown in figure by finite element method and determine displacements and slopes at the nodes. E=2 x 10^5 N/mm^2 & I= 5 x 10^6 mm^4. [10]



OR

18 Derive the stiffness matrix for 2D truss Element. [10]

19 Draw beam element in global and intrinsic co-ordinate system. [10]

OR

20 Use Galerkin's approach to find the stiffness matrix of a torsional triangular element. [10]