R20 Regulation *Subject code: 3P7CA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VII Semester Supplementary Examinations, May 2026

FINITE ELEMENT METHODS

(ME)

Maximum Marks: 70 Date: 05.05.2026 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 5 Units. Answer any one full question from each unit.
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)		Marks	CO	BTL
1	What is Discretization?	2M	1	L1
2	What about global coordinate system?	2M	1	L1
3	Write the stiffness matrix of a bar element.	2M	2	L1
4	Differentiate between BAR and TRUSS elements in FEM.	2M	2	L1
5	What is meant by node?	2M	3	L1
6	Write the properties of shape functions.	2M	3	L1
7	Write the ID beam element.	2M	4	L1
8	What are the CST and LST elements?	2M	4	L1
9	Write the Lagrangian interpolation function.	2M	5	L1
10	What is the required condition for the Eigen vector?	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	How to write the equilibrium equation for a finite element method?	10M	1	L2
	OR			
12	Write the advantage of finite element method over numerical analysis methods.	10M	1	L2
13	Explain the ID bar element and ID beam element in detail.	10M	2	L2
	OR			
14	Classify and explain the boundary conditions.	10M	2	L2
15	Discuss in detail about 2D heat conduction in Composite slabs using FEA.	10M	3	L2
	OR			
16	What is meant by node? List the types of nodes.	10M	3	L2
17	Determine the temperature distribution along a circular fin of length 5 cm and radius1 cm. The fin is attached to boiler whose wall temperature 1400C and the free end is open to the atmosphere. Assume T= 400C, h = 10 W/cm2/0 C, k = 70 W/cm 0C.	10M	4	L2
	OR			
18	Derive the stiffness matrix for 2D truss Element.	10M	4	L2

19	Explain the beam element in global and intrinsic co-ordinate system.	10M	5	L2
	OR			
20	Use Galerkin's approach to find the stiffness matrix of a torsional triangular element.	10M	5	L2