Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH. (CIVIL ENGINEERING)
END SEMESTER EXAMINATIONS, NOV/DEC 2018
SUBJECT: FINITE ELEMENT METHOD OF ANALYSIS [CIE 4015]
REVISED CREDIT SYSTEM
(29 /11 /2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed
- Compulsorily write DOF numbers and node numbers wherever required.

1A.	Explain the procedure to obtain element equilibrium equation using principle of minimum potential energy.	**(05)**	**CO1**
1B.	Derive the element stiffness matrix for 2 noded bar element	**(05)**	**CO2**
2A.	Analyze the truss shown in Fig.Q2A and determine member forces in each member. Take A= 1400mm^2 and E= 2x 105 N/mm^2.	**(07)**	**CO3**
2B.	Derive the transformation matrix for a plane truss element.	**(03)**	**CO3**
3A.	A space truss element defined by nodes (1, 1.2) and (2, 5.3) meters is subjected to 100 N/mm^2 of tensile stress. If first node is observed to have a local displacement of -3 mm, determine the displacement in the second node. Also, determine the nodal displacements in global direction. Take E=2.1 x 10^5 N/mm^2.	**(05)**	**CO3**
3B.	Write the nudal load vector for a beam element of length 5m and cis 0.23 *0.4 m^2 if it is loaded with a midspan point load of 10 kN downward and a point load of 5kN acting downward on the right hand side node. Consider self-weight. Take density of material as 25kN/m^3.	**(05)**	**CO4**
4.	Analyze the continuous beam shown in the Fig.Q4. Take EI= 10,000 kNm^2. Determine reactions and draw FBD	**(10)**	**CO4**
5A.	Examine the validity of mapping for the 4-noded element defined by Cartesian coordinates {(0,0) ,(4,0), (3,8), (0,2)}	**(07)**	**CO5**
5B.	Explain Gaussian-quadrature numerical integration rule and evaluate integral $\int_{-1}^{1} x^3 dx$ using 2-Gauss point	**(03)**	**CO5**

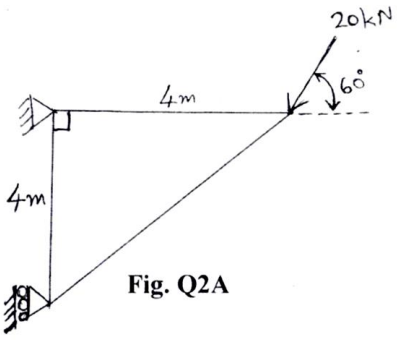

Fig. Q2A

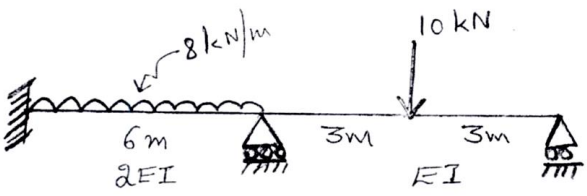

Fig. Q4