MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

MANIPAL

ISEMESTER MTECH (STRUCTURAL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2017

SUBJECT: FINITE ELEMENT METHOD OF ANALYSIS - I [CIE 5152]

REVISED CREDIT SYSTEM

Time: 3 Hours

(/ /2017)

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ALL the questions.

Missing data may be suitable assumed.

1.(a)	What are the advantages and disadvantages of finite element method compared to other methods	3
1(b)	Obtain the shape functions for three noded triangular element in cartesian and natural coordinate system	4
1 (c)	Using principle of minimum potential energy obtain the equivalent nodal load vector for three noded bar element of length L, width b and depth h due to a surface traction of intensity $P \text{ kN/m}^2$ acting on the surface of length L and width b	3
2(a)	Analyse a continuous beam shown in figure Fig Q 2 (a). Consider constant E for all the elements and moment of inertia I and 2I as shown in figure $ \begin{array}{c} 10 \text{ kN/m} \\ \hline 10 \text{ kN/m} \\ \hline 21 \\ \hline 4 \text{ m} \\ \hline 2 \text{ m} \\ \hline 1 $	8
2(b)	Obtain the matrix relating stress to strain for plane stress condition	2
3(a)	Using the stiffness matrices of bar and beam elements, obtain the stiffness matrix for two noded plane frame element and explain the procedure to transform the stiffness matrix from local direction to global direction	3

