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**B. E. (Seventh Semester) Examination,
April-May 2020**

(Old Scheme)**(Mech. Engg. Branch)****FINITE ELEMENT METHOD***Time Allowed : Three hours**Maximum Marks : 80**Minimum Pass Marks : 28*

*Note : Part (a) is compulsory from each unit.
Attempt any two parts from (b), (c) and (d).
Assume suitable data required.*

Unit-I

1. (a) Define finite element method. 2
(b) Write the basic steps in the finite element method. 7

- (c) Explain virtual work principle. 7
(d) Discuss Rayleigh-Ritz method. 7

Unit-II

2. (a) Explain solid mechanics. 2
(b) Explain the governing equations of fluid mechanics by using FEM. 7
(c) Write the steps involve in variational approach method with suitable example. 7
(d) Discuss Weighted Galerkin Collocation Techniques. 7

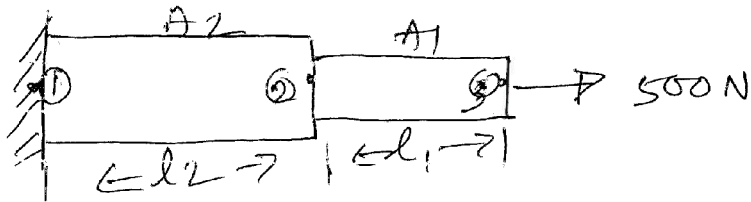
Unit-III

3. (a) Define shape function. 2
(b) Discuss in details Interpolation function. 7
(c) Derive stiffness matrix for spring element. 7
(d) Explain convergence requirement for Heat transfer problem. 7

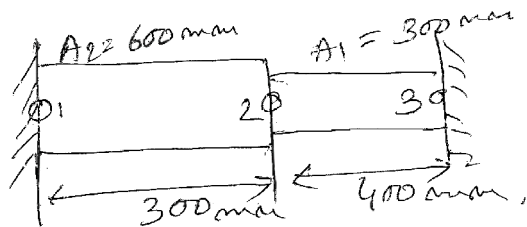
Unit-IV

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4. (a) What is Global stiffness matrix. 2
- (b) Figure shows stepped bar bearing a load of 500 N by using principal of minimum potential energy to determine the displacement at the nodes. Find the strain in each of the elements. 7



- (c) Write the procedure to assemble element matrix to global matrix. 7
- (d) Consider the bar shown in fig below. An axial load of 15 kN is applied. Determine the displacement at each node and also determine the stress in each elements and reaction at fixed ends. 7



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Stresses are 83 GPa for the length 400 mm and 70 GPa for the length 300 mm.

Unit-V

5. (a) Name finite element base software used in designing. 2
- (b) Explain the standard component of finite element method software. 7
- (c) Write the different application of finite element method in designing. 7
- (d) Discuss the advantage of finite element based software packages to solve dynamic problems. 7