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**Question Paper Code: 57702**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2020

Seventh Semester

Mechanical Engineering

15UME702 - FINITE ELEMENT ANALYSIS

(Regulation 2015)

Duration: One hour

Maximum: 30Marks

PART A - (6 x 1 = 6 Marks)

**(Answer any six of the following questions)**

- \_\_\_\_\_ -temperature or fluid pressure at each nodal point is obtained. CO1- R  
(a) Non – Structural Problems (b) Structural Problems  
(c) Both (a) and (b) (d) None of the above
- The number of element to be selected for discretization depends upon the CO1- U  
following factor is/are  
(a) Accuracy desired (b) Size of the elements.  
(c) Number of degrees of freedom involved (d) All of the above
- Assemblage of beams is called\_\_\_\_\_ CO2-R  
(a) Truss (b) Bar (c) Spring (d) None of the above
- Assemblage of bars is called\_\_\_\_\_ CO2-R  
(a) Truss (b) Bar (c) Spring (d) None of the above
- The sum of all the shape functions in a CST element is equal to CO3- U  
(a) 0 (b) -1 (c) 1 (d) 2
- Linear Strain Triangular Element has \_\_\_\_\_ number of nodes. CO3- R  
(a) 3 (b) 6 (c) 12 (d) 24
- Actual damping coefficient to critical damping coefficient is CO4- U  
(a) Frequency (b) Time Period (c) Damping Ratio (d) Density
- A motion which repeats itself after equal interval of time is called CO4- R  
(a) Cycle (b) Frequency (c) Periodic Motion (d) Damping

9. The unit of Thermal Conductivity is \_\_\_\_ CO5- U  
 (a) W/m<sup>4</sup>K (b) W/m<sup>3</sup>K (c) W/m<sup>2</sup>K (d) W/mK
10. Actual damping coefficient to critical damping coefficient is CO5- U  
 (a) Frequency (b) Time Period (c) Damping Ratio (d) Density

PART – B (3 x 8= 24 Marks)

**(Answer any three of the following questions)**

11. A simply supported beam subjected to Uniformly Distributed Load over entire span. Determine the bending moment at mid-span by using Rayleigh Ritz method. CO1- App (8)
12. Derivate the stiffness matrix for one dimensional Linear bar element and write the properties of stiffness matrix. CO2- App (8)
13. Evaluate the integral CO3- App (8)  
 $\int_{-1}^1 (2 + x + x^2) dx$  and compare with exact solution.
14. Determine the eigen pairs & Natural Frequencies of a system whose stiffness matrix and mass matrix are given below CO4- App (8)

$$[K] = \frac{2AE}{L} \begin{bmatrix} 3 & -1 \\ -1 & 1 \end{bmatrix} \quad m = \frac{\rho AL}{12} \begin{bmatrix} 6 & 1 \\ 1 & 2 \end{bmatrix}$$

15. A steel rod of diameter d= 2 cm, Length L=5 cm and thermal conductivity k = 50W/m°C is exposed at one end to a constant temperature of 320°C. The other end is in ambient air of temperature 20°C with a convection coefficient of h = 100 W/m<sup>2</sup>°C. Determine the temperature at the midpoint of the rod. CO5- App (8)