

Name: \_\_\_\_\_ Hall Ticket No. 

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**Answer All Questions. All Questions Carry Equal Marks. Time: 20 Min. Marks: 10.****I Choose the correct alternative:**

1. In a three noded triangular element  $N_1, N_2,$  and  $N_3$  are the shape functions which can be expressed in natural coordinates  $\xi$  and  $\eta$  therefore  $N_1$  is equal to [ ]  
A)  $\eta$                                       B)  $\xi + \eta$                                       C)  $\xi$                                       D)  $\xi - \eta$
2. In three dimensional axisymmetric solids strain vector is defined as ' $\varepsilon$ ' which is equal to [ ]  
A)  $[\varepsilon_r, \varepsilon_z, \gamma_{rz}, \varepsilon_\theta]$       B)  $[\sigma_r, \sigma_x, \tau_{xy}, \sigma_z]$       C)  $[\varepsilon_r, \varepsilon_x, \gamma_{yz}, \varepsilon_\theta]$       D) none
3. To analyse problems involving curved boundaries or surfaces, the following type of elements are [ ] most suitable elements  
A) Linear elements      B) Isoparametric elements      C) 1-D elements      D) cubic elements
4. Stress in triangular element is given by  $\{\sigma\} = [D] [B] \{Q\}$  where  $\{\sigma\}$  is equal to [ ]  
A)  $[\sigma_x \ \sigma_y]$       B)  $[\sigma_x \ \sigma_y \ \tau_{xy}]$       C)  $[\sigma_x]$       D)  $[\sigma_y]$
5. The values of  $W_i$  and  $\xi_i$  for Gauss quadrature two-point formula are given as [ ]  
A)  $W_1 = W_2 = 1; \xi_1 = -\xi_2 = \pm 1/\sqrt{3}$       B)  $W_1 = 1; \xi_1 = 1$       C)  $W_1 = 2; \xi_1 = 0$       D)  $W_1 = 0; \xi_1 = 0$
6. In the finite element analysis of isoparametric elements the shape functions for general four noded rectangular element (in terms of  $\xi, \eta$ )  $N_2$  is equal to [ ]  
A)  $(1 + \xi)(1 - \eta)/4$       B)  $(1 + \xi)(1 + \eta)/4$       C)  $(1 - \xi)(1 - \eta)/4$       D)  $(1 - \eta)/4$
7. The governing equation for structural dynamics is given by  $[M]\{q''\} + [C]\{q'\} + [K]\{q\} = P(t) + P_b(t) + P_T(t)$ , the term  $[C]$  is known as [ ]  
A) mass matrix      B) stiffness matrix      C) displacement matrix      D) damping matrix
8. Conductance matrix is the equivalent of stiffness matrix in the following analysis [ ]  
A) Dynamic      B) thermal      C) fluid flow      D) static structural
9. The governing equation for convection process is [ ]  
A)  $q = h A T_s$       B)  $q = h A [T_h - T_s]$       C)  $q = h A T_h$       D)  $q = h A [T_s - T_h]$
10. Number of shape functions the quadrilateral plane stress elements will have [ ]  
A) 8      B) 4      C) 3      D) 2

**II Fill in the blanks**

11. A triangular element in which strain is constant throughout the element is known as \_\_\_\_\_
12. The three dimensional tetrahedron element will have nodes equal to \_\_\_\_\_
13. The consistent matrix for one dimensional bar element is given by \_\_\_\_\_
14. The mode of heat transfer in which the transfer of heat take place from one part of a substance to another part of the same substance is known as \_\_\_\_\_
15. Jacobian [J] for four node Isoparametric element is given by \_\_\_\_\_
16. The elements in which **less** number of nodes is used to define geometry than are used to define the shape function are known as \_\_\_\_\_
17. A fin is an external surface which is added on to a surface to increase the \_\_\_\_\_
18. Element conductivity matrix for 1-D heat conduction element is given by \_\_\_\_\_
19. Units for convection heat transfer coefficient is \_\_\_\_\_
20. An axisymmetric solid sometimes called as \_\_\_\_\_

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1. Stress in triangular element is given by  $\{\sigma\} = [D] [B] \{Q\}$  where  $\{\sigma\}$  is equal to [      ]  
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2. The values of  $W_i$  and  $\xi_i$  for Gauss quadrature two-point formula are given as [      ]  
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3. In the finite element analysis of isoparametric elements the shape functions for general four noded rectangular element (in terms of  $\xi, \eta$ )  $N_2$  is equal to [      ]  
 A)  $(1+\xi)(1-\eta)/4$       B)  $(1-\xi)(1+\eta)/4$       C)  $(1-\xi)(1-\eta)/4$       D)  $(1-\eta)/4$
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11. The mode of heat transfer in which the transfer of heat take place from one part of a substance to another part of the same substance is known as \_\_\_\_\_
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