Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_

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**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec - 2017**

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| **Code :** | **09AE202/ 11AE202** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **AIRCRAFT STRUCTURES** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Marks** |
| **PART-A(10X1=10 MARKS)** | | |
| 1. | Define neutral axis and give expression to determine it. | 1 |
| 2. | Define shear center. | 1 |
| 3. | Define elastic axes. | 1 |
| 4. | Write Bredt-Batho formula. | 1 |
| 5. | Stiffness factor for a beam fixed at one end and freely supported at the other is | 1 |
| 6. | Fixing moment over a simply supported end is | 1 |
| 7. | Define Strain Energy. | 1 |
| 8. | A solid circular shaft subject to torque, Strain Energy, U= \_\_\_\_\_\_\_\_\_\_. | 1 |
| 9. | Define colomn. | 1 |
| 10. | Define crippling load of a colomn. | 1 |

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| **PART B(5 X 3= 15 MARKS)** | | |
| 11. | What is difference between tension field beam and semi tension field beam? | 3 |
| 12. | State Castigliano’s theorems. | 3 |
| 13. | Write down assumption of perfect frame. | 3 |
| 14. | Differentiate the statically determinate structures and statically indeterminate structures? | 3 |
| 15. | Explain the assumptions made in Euler’s column theory. | 3 |

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| **PART C(5 X 15= 75 MARKS)** | | |
| 16. | Obtain the shear flow and shear center location for the cannel section subjected to a vertical shear load of 750N. The height of the vertical web is 30mm and width of the flanges is 20mm. Thickness of flanges and web is 1mm. | 15 |
| (OR) | | |
| 17. | Compute the load and direct bending stress on the lumped flanges shown in figure 1. Moment Mx = 1200 kN-cm, My = 80 kN-cm, Area of the flange A1 = 6 cm2, A2 =18cm2, A3 = 6 cm2, A4 = 18 cm2.    Fig.1 | 15 |
| 18. | Calculate the distribution of stiffener loads and the shear flow distribution in the web panels shown in fig.2. Assuming that the latter are effective only in shear.    Fig.2 | 15 |
| (OR) | | |
| 19. | Calculate the shear flows in the web panels and direct load in the flanges and stiffeners of the beam shown in fig.3.if the web panels resist shear stresses only.    Fig.3 | 15 |
| 20. | A continuous beam ABC of length 10m rests on three simply supports A, B and C at the same level in which span AB=6m and span BC=4m. In span AB, There is a point load of 3 kN at a distance of 2m from the end A, whereas in the span BC, There is a uniformly distributed load of 1 kN/m run over the whole length. Determine the support moments and support reactions. Draw Bending moment and shear force diagram. | 15 |
| (OR) | | |
| 21. | Determine the force in each member of the trusses as shown in figure 4. Neglect any horizontal reactions at the supports.    Fig.4 | 15 |
| 22. | Using principle of virtual work, determine the vertical and horizontal deflection components of joints F of the truss in Fig.5. The cross section area of each member is 300 mm2 and E = 200 GPa.    Fig.5 | 15 |
| (OR) | | |
| 23. | Using the principle of virtual work, determine the vertical deflection components of joints D of the truss in Fig.6. The cross section area of each member is 300 mm2 and E = 200 GPa.    Fig.6 | 15 |
| 24. | A solid round bar 3m long and 5cm in diameter is used as a struct with both ends hinded. Determine the crippling load, when the given strut is used with the following conditions:   1. One end of the struct is fixed and the other end ifs free 2. Both the ends of struct are fixed 3. One end is fixed and other is hinged.   Take E = 2 X 105 N/mm2. | 15 |
| (OR) | | |
| 25. | Derive the Euler’s crippling load for a column when it has both ends hinged and one end fixed and other end free. | 15 |

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