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**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

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

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

**End Semester Examination – Nov/Dec - 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **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 truss. | (1) |
| 2. | Write the general form of theorem of three moment equation. | (1) |
| 3. | The stress due to suddenly applied load is ------------ times that of gradually applied load. | (1) |
| 4. | Proof resilience per unit volume is called as………………… | (1) |
| 5. | What you mean by crippling load? | (1) |
| 6. | Define factor of safety. | (1) |
| 7. | Shear flow can be defined for both thin and thick walled section (true/false). | (1) |
| 8. | What you mean by shear centre? | (1) |
| 9. | In a Wagner beam, the normal stresses are carried by\_\_\_\_\_\_\_\_\_\_\_. | (1) |
| 10. | Define longeron | (1) |

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| **PART B(5 X 3= 15 MARKS)** | | |
| 11 | Define continuous beam and state its advantages. | (3) |
| 12 | Prove Maxwell’s reciprocal theorem. | (3) |
| 13 | Calculate the buckling load of a mild steel column of equivalent length is 2m for which Euler’s  formula is valid. Assume EI=7MN-m2. | (3) |
| 14 | Write short notes on Bredt-Batho theory. | (3) |
| 15 | How the loads are distributed in fuselage members? | (3) |

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| **PART C(5 X 15= 75 MARKS)** | | | |
| 16. |  | A continuous beam ABCD of length 15m rests on four supports covering 3 equal spans and carries a uniformly distributed load of 1.5 kN/m length. Calculate the moments reaction at the supports. Draw bending moment and shear force diagrams also. | (15) |
| (OR) | | | |
| 17. |  | A truss of 12 m span is loaded as shown in the figure. Determine the forces in the  members of the truss by method of joints. | (15) |
| 18. |  | Show that the strain energy U due to bending of a cantilever of length *l* with a concentrated load *W* at the free end is given by where EI is the flexural rigidity of the beam. Hence show that the deflection of the free end of the beam is . Show further that for a rectangular beam cross-section the strain energy can be expressed asxvolume of the beam where σ is the maximum bending stress in the beam. | (15) |
| (OR) | | | |
| 19. |  | A cantilever of rectangular section breadth *b*, depth *d* and of length *l* carries uniformly distributed load spread from free end to the mid section of the cantilever. Using *castigliano’s theorem* find:  *(i)*Deflection due to shear at the free end. *(ii)* Deflection due to bending at the free end. | (15) |
| 20. |  | In a material the principal stresses are 60Mpa, 48Mpa and -35Mpa. Calculate:   1. Total strain energy; 2. Volumetric strain energy; 3. Shear strain energy; 4. Factor of safety on the total strain energy criterion if the material yields at 120Mpa. (3)   *Take E=200Gpa and 1/m =0.3* |  |
| (4) |
| (4) |
| (4) |
| (3) |
| (OR) | | | |
| 21. |  | Compare the crippling loads given by Rankine’s and Euler’s formulae for tubular strut 2.25m long having outer and inner diameters of 37.5 mm and 32.5mm loaded through pin-joint at both ends. Take yield stress as 315MN/m2; Rankine constant a=1/7500 and E=200GN/m2. If elastic limit for the material is taken as 200MN/m2; then for what length of the strut does the Euler formula cease to apply? | (15) |
| 22. |  | Calculate the shear flow distribution in the channel section shown in Figure produced by  a vertical shear load of 4.8kN acting through its shear center. Assume A1= A2 = A3 =  A4= 300mm2. | (15) |
| (OR) | | | |
| 23. |  | Find the shear flow distribution as shown in figure. Assume A1= A3 = A4 = A6=900mm2  and A2 = A5=1200mm2. | (15) |
| 24. |  | The fuselage of a light passenger-carrying aircraft has the circular cross section shown in Fig. (a). The cross-sectional area of each stringer is 100mm2, and the vertical distances given in Fig. (a) are to the midline of the section wall at the corresponding stringer position. If the fuselage is subjected to a bending moment of 200 kNm applied in the vertical plane of symmetry, at this section, calculate the direct stress distribution. | (15) |
| (OR) | | | |
| 25. |  | Explain in detail about Tension field web beam. | (15) |

ALL THE BEST