Hall Ticket No | | | | | | | | | | | Question Paper Code: AAEB07

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech IV Semester End Examinations (Regular), November – 2020
Regulation: IARE–R18

AEROSPACE STRUCTURES
Time: 2 Hours **(AE)** **Max Marks: 70**

Answer any Four Questions from Part A
Answer any Five Questions from Part B

PART – A

1. Explain with neat figures semi monocoque and moncoque structures of the aircraft. **[5M]**
2. Write the experimental determination of critical load for flat plate. **[5M]**
3. Explain the condition for zero warping at a section and obtain the warping of cross section. **[5M]**
4. State the principle of structural idealization and what the design considerations of wing and fuselage are. **[5M]**
5. Explain the functions of fuselage frames and wing ribs. **[5M]**
6. With neat figures explan different loads acting on aircraft structural components. **[5M]**
7. Write the conditions for a plate which simply supported all edges. Write the assumed deflected form of the plate which satisfies the boundary conditions for this plate. **[5M]**
8. Write short notes on symmetrical bending and unsymmetrical bending. **[5M]**

PART – B

9. What is the effect of gust load. If we considered aircraft loads resulting from prescribed manoeuvres in the longitudinal plane of symmetry, during the longitudinal motion. **[10M]**
10. With the help of neat diagrams give note on aircraft structural components. Specify their functions and loads. **[10M]**
11. What is the factor of safety and explain the load factor and explain the flight envelope. **[10M]**
12. What are principle aerodynamic loads on an aircraft during flight? Describe the pressure distribution around an aero foil structure. **[10M]**
13. A three-flange wing section is stiffened by the wing rib shown in Figure 1. If the rib flanges and stiffeners carry all the direct loads while the rib panels are effective only in shear, calculate the shear flows in the panels and the direct loads in the rib flanges and stiffeners. **[10M]**

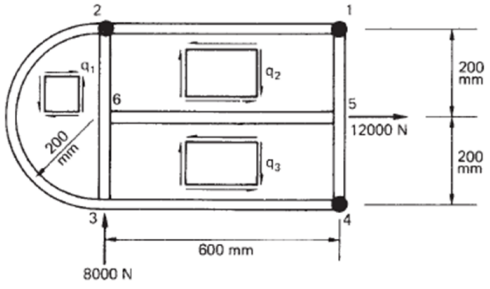

Figure 1

14. What are the different testing methods of engineering materials and aircraft structures? **[10M]**

15. An aircraft having a total weight of 45 kN lands on the deck of an aircraft carrier and is brought to rest by means of a cable engaged by an arrester hook. If the deceleration induced by the cable is 3 g determine the tension, T, in the cable, the load on an undercarriage strut and the shear and axial loads in the fuselage at the section AA; the weight of the aircraft aft of AA is 4.5 kN. Calculate also the length of deck covered by the aircraft before it is brought to rest if the touch-down speed is 25 m/s. **[10M]**

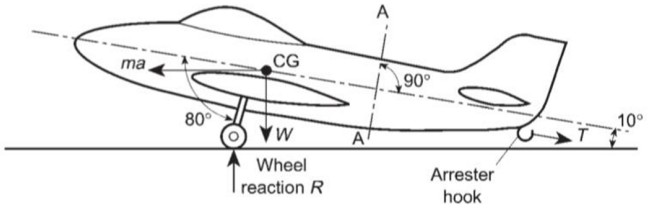

Figure 2

16. Write the equation to find out the bending stress of idealized panel, if M_x equal to zero. **[10M]**

17. Write short notes on the following i)Airframe ii)Yield Point iii)Rib, Stringer iv)Downwash v)Monocoque vi)Landing gear vii) Hooke's law **[10M]**

18. A wing box has the cross-section shown diagrammatically in Figure and supports a shear load of 100 kN in its vertical plane of symmetry. Calculate the shear stress at the mid-point of the web 3-6 if the thickness of all walls is 2 mm. **[10M]**

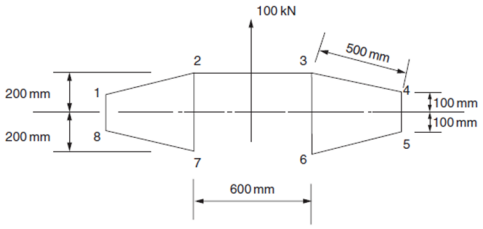

Figure 3

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