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BAS-014

B. TECH. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

June, 2014

BAS-014 : AIRCRAFT STRUCTURES

Time : 3 hours *Maximum Marks : 70*

Note : *Question **1** is **compulsory.** Attempt any **9** questions from the remaining questions.*

1. Write short notes on **any two** of the following : **3½+3½**

(a) Slenderness ratio

(b) Brittle Lacquer

(c) Limit load factor

(d) Shafts connected in series

2. A beam of length 5 m and of uniform rectangular cross section is simply supported at its ends. It carries a UDL of 9 kN/m over the entire length. Calculate the width and depth of the beam if permissible bending stress is 7 N/mm^2 and central deflection is not to exceed 1 cm. **7**

$E = 1 \times 10^4$ N/mm^2.

3. A beam of uniform rectangular section 200 mm wide and 300 mm deep is simply supported at its ends. It carries a UDL of 9 kN/m run over the entire span of 5 m. $E = 1 \times 10^4$ N/mm^2. Find : **4+3**

(a) slope at the supports.

(b) maximum deflection.

4. Determine the slope and deflection of the free end of a cantilever beam of length 3 m which is carrying a UDL of 10 kN/m over a length of 2 m from the fixed end. $E = 2 \times 10^5$ N/mm^2, $I = 10^8$ mm^4. 7

5. Explain briefly the salient features of V-n diagram with a neat sketch. 7

6. Explain the assumptions made in determining the shear stress induced in a circular shaft when subjected to torsion. 7

7. A hollow shaft of external diameter 120 mm transmits 300 kW power at 200 rpm. Determine the maximum internal diameter if the maximum stress in the shaft is not to exceed 60 N/mm^2. 7

8. Derive the expression for circumferential and longitudinal stresses induced in a thin cylinder subjected to internal pressure. 7

9. Find the thickness of metal necessary for a steel cylindrical shell of internal diameter 150 mm to withstand an internal pressure of 50 N/mm^2. The maximum hoop stress in the section is not to exceed 150 N/mm^2. 7

10. Derive an expression for the crippling load for a long column when both the ends of the column are hinged. 7

11. Calculate the critical load for a strut which is made of a bar circular in section and 5 m long and which is pinjointed at both ends. The same bar when freely supported gives a midspan deflection of 10 mm under a load of 80 N at the centre. 7

12. Explain the working principle of any one strain gauge in detail. 7