Hall Ticket No | | | | | | | | | | |  Question Paper Code: ACEB07

# INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

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

## STRENGTH OF MATERIALS

**Time: 2 Hours** **(CE)** **Max Marks: 70**

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

### PART – A

1. Write short notes on i) Modulus of elasticity ii) Poisson's ratio . **[5M]**
2. Describe the following terms i) Shear force and bending moment ii) Types of beams **[5M]**
3. Explain the concept of complimentary shear in longitudinal section of a beam which is transversely loaded. **[5M]**
4. What are the methods to determine slope and deflections in beams? **[5M]**
5. Write the expression for circumferential stress (Hoop Stress) of thin cylinder. **[5M]**
6. Explain the concept of fatigue failure and write about the endurance limit and fatigue limit. **[5M]**
7. How many points of contraflexure you will have for simply supported beam overhanging at one end. Explain with a neat sketch. **[5M]**
8. Of the following sections: rectangular, circular, triangular, I, T sections, which is most efficient for withstanding shearing stresses in beams? Why? **[5M]**

### PART – B

9. Illustrate the stress-strain diagrams and explain the phenomenon of strain hardening. **[10M]**
10. The tensile stresses at a point across two mutually perpendicular planes are 120N/$mm^2$. Determine the normal, tangential and resultant and resultant stresses on a plane inclined at 30$^o$ to the axis of the minor stress. **[10M]**
11. Determine the expression to find out the deflection of beam using moment area method? **[10M]**
12. A beam 6m long, simply supported at its ends, is carrying a point load of 50kN at its centre. The moment of inertia of the beam(I) is given as equal to 78x10$^6$$mm^4$. If E for the material of the beam is 2.1x10$^5$ N/$mm^2$, Calculate i) Deflection at the centre of the beam ii) Slope at the supports. **[10M]**
13. Determine the equation for bending with neat sketch. **[10M]**
14. A steel plate of width 120mm and of thickness 20mm is bent into a circular arc of radius 10m. Determine the maximum stress induced and the bending moment which will produce the maximum stress.
    Take E = 2x10$^5$ N/ $mm^2$. **[10M]**
15. Determine the torsion equation and write its assumptions. **[10M]**
16. Find the maximum shear stress induced in a solid circular shaft of diameter 15cm when the shaft transmits 150kW power at 180rpm. **[10M]**
17. Determine the expression for internal pressure on the dimensions of a thin cylindrical shell. **[10M]**
18. A cylindrical pipe of diameter 1.5m and thickness 1.5cm is subjected to an internal fluid pressure of 1.2N/$mm^2$ . Determine i) Longitudinal stress developed in the pipe ii) Circumferential stress developed in the pipe **[10M]**