

Roll No.

24086

**B. Tech. 3rd Semester (AUE)
Examination – December, 2018**

STRENGTH OF MATERIALS

Paper : AUE-201-F

Time : Three Hours] [Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions in all, selecting at least *one* question from each Unit. Question No. 1 is *compulsory*. All questions carry equal marks.

1. (a) Define Hooke's law. 2
- (b) Draw stress strain diagram for mild steel. 2
- (c) Write the name of different types of stresses. 2
- (d) Define the strain. 2
- (e) What is simply supported beam ? 2
- (f) Define Principal stress. 2
- (g) What is column ? Write the name of different types of column. 2

- (h) What is Mohr Circle ? 2
 (i) What is thick pressure vessel ? 2
 (j) Define strain energy. 2

UNIT – I

2. Determine the changes in length, breadth and thickness of a steel bar which is 4 m long, 30 mm wide and 20 mm thick and is subjected to an axial pull of 30KN in the direction of its length. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio = 0.3 and also determine the volumetric strain and final volume of the given bar. 20
3. Explain the Concept of various types of Stresses and strains also establish the relation in between Elastic Constants. 20

UNIT – II

4. A simply supported beam of length 5m carries a uniformly increasing load of 800N/m run at one end to 1600 N/m Run at the other end. Draw the SF and BM diagrams for the beam. Also calculate the position and magnitude of maximum bending moment. 20
5. A rectangular beam 6 cm × 4 cm is 2 m long and is simply supported at the ends. It carries a load 1KN at mid span. Determine the maximum bending stress induced in the beam. 20

UNIT – III

6. A round steel rod of diameter 15 mm and length 2 meter is subjected to a gradually increasing axial

compressive load. Using Euler's formula find the buckling load. Find also the maximum lateral deflection corresponding to the buckling condition. Both ends of the rod may be taken as hinged. Take $E = 2.1 \times 10^5 \text{ N/mm}^2$ and the yield stress of steel = 250N/mm². 20

7. Find the Euler crushing load for a hollow cylindrical cast iron column 20 cm external diameter and 25 mm thick, if it is 6 m long and is hinged at both ends. Take $E = 1.2 \times 10^6 \text{ N/mm}^2$. Compare the load with the crushing load as given by the Rankine's formula, taking $\sigma_c = 550 \text{ N/mm}^2$ and $a = 1/1600$; for what length of the column would these two formulas give the same crushing load ? 20

UNIT – IV

8. Find the maximum deflection and point of contraflexure for fixed beam at both ends and carrying uniformly distributed load. 20
9. A cylindrical shell 900 mm long, 150 mm internal diameter, having a thickness of metal 8 mm, is filled with a fluid at atmospheric pressure. If an additional 20000 mm² of fluid is pumped into the cylinder find (1) the pressure exerted by the fluid on the cylinder, and (2) the hoop stress induced. 20