

II B. Tech II Semester Supplementary Examinations, November - 2019**STRENGTH OF MATERIALS-II**

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answer **ALL** the question in **Part-A**3. Answer any **FOUR** Questions from **Part-B****PART -A**

1. a) Write a note on Mohr's circle of stresses.
- b) Define the terms:
 - (i) Torsion (ii) Torsional rigidity (iii) Polar moment of inertia.
- c) Define slenderness ratio. State the limitations of Euler's formula.
- d) What do you mean by the following terms?
 - (i) Middle third rule for rectangular sections,
 - (ii) Middle quarter rule for circular sections.
- e) Explain the parallel axes theorem for product of inertia.
- f) What is a perfect frame? How does it differ from an imperfect frame?

PART-B

2. a) A body is subjected to direct stresses in two mutually perpendicular directions accompanied by a simple shear stress. Draw the Mohr's circle of stresses and explain how you will obtain the principal stresses and principal planes.
- b) Derive an expression for the stresses on an oblique plane of a rectangular body, when the body is subjected to a simple shear stress.

3. Prove that the maximum shear stress induced in the wire of a close-coiled helical spring is given by

$$\tau = \frac{16 . W . R}{\pi d^3}$$

Where τ = Maximum shear stress induced in the wire,

w = Axial load on spring,

R = Mean radius of spring coil, and d = diameter of spring wire.

4. Derive an expression for the Euler's crippling load for a long column with following end conditions:
 - a) Both ends are hinged.
 - b) Both ends are fixed.



5. Find an expression for the maximum and minimum stresses when a rectangular column is subjected to a load which is eccentric to Y-Y axis.
6. A curved bar of rectangular section 60 mm wide by 75 mm deep in the plane of bending initially unstressed, is subjected to bending moment of 2.25kNm which tends to straighten the bar. The mean radius of curvature is 150mm. Find:
- The position of the neutral axis;
 - The greatest bending stresses.
- Draw a diagram to show approximately how the stress varies across the section.
7. Using the method of sections determine forces in BC, GC and GF of pin jointed plane truss shown in below figure

