

**B.E. POWER ENGINEERING SECOND YEAR SECOND SEMESTER EXAMINATION – 2022****Subject: APPLIED SOLID MECHANICS AND MECHANISMS****Time: 3 Hours****Full Marks: 100****Answer the following questions.**

1. (a) Draw the stress-strain diagram for mild steel material and explain the salient points of the curve.

(b) A mild steel wire of radius 0.5 mm and length 3 m is stretched by a force of 49 N. Calculate i) longitudinal stress, ii) longitudinal strain, iii) elongation produced in the body if  $E$  for steel is  $2.1 \times 10^{11} \text{ N/mm}^2$ . *10+10=20 Marks*

2. (a) Derive the Mohr's circle equation.

(b) If at a point in a body  $\sigma_x = 70 \text{ MPa}$  and  $\sigma_y = 60 \text{ MPa}$  and  $\tau_{xy} = -5 \text{ MPa}$  then what will be the radius of the Mohr's circle. *14+6=20 Marks*

3. Derive the following equation for a thin-walled pressure vessel.

$$\sigma_1 / r_1 + \sigma_2 / r_2 = p/t \text{ (Usual notations)} \quad \text{20 Marks}$$

- Or. (a) Derive the expression for a relationship between shear force and bending moment.

(b) Draw SFD & BMD for a simply supported beam subjected to concentrated load at the midpoint of the beam. *8+12=20 Marks*

4. (a) Explain with diagram of a quick return mechanism for shaping machine.

(b) Write down the Kutzbach criterion for plane mechanism. *12+8=20 Marks*

5. Derive the expression for velocity and acceleration of a single slider-crank mechanism.

*20 Marks*