

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- I & II (SPFU) EXAMINATION – WINTER 2019****Subject Code: ENG004****Date: 02/01/2020****Subject Name: Mechanics Of Solids****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define Force and classify the force system with neat sketch. **07**
(b) Draw bending moment diagram and shear force diagram for a simply supported beam of length 'L', subjected to udl of 'w' kN/m throughout the length and 'W' at the center of a beam. **07**
- Q.2** (a) i) Define : Angle of Repose. **07**
ii) State and explain the Laws of Static friction.
(b) Derive the relation between shear force and bending moment. **07**
- Q.3** (a) Define: (i) Vector quantities (ii) Resolution of force (iii) Couple **07**
(b) An M. S. bar of 25 mm diameter and change in length is 0.1 m acted upon by a tensile force of 100 kN. If the length of bar is 1.2 m and modulus of elasticity is $2.0 \times 10^5 \text{ N/mm}^2$. Find stress, strain and elongation of the bar. **07**
- Q.4** (a) For a bar shown in figure.1 find the diameter of the middle portion, if the stress at that location is to be limited to 140 N/mm^2 . Also find the total change in the length of the bar. $E = 2 \times 10^5 \text{ N/mm}^2$ **07**
(b) Determine the support reactions of a cantilever beam having length 'L' subjected to point load 'W' at tip and 'W/2' at the center of a beam. **07**
- Q.5** (a) Determine the horizontal force required to cause the motion of the block weighing 550N as shown in fig.2. Take $\mu = 0.55$. **07**
a. To impend the motion downward.
b. To impend up the plane.
(b) State the condition of equilibrium for Co-planar force system. **07**
- Q.6** (a) Find out centroid of thin homogeneous wire as shown in figure 3. **07**
(b) Derive relation between bulk modulus (K), Poisson's ratio (1/m), and modulus of elasticity (E). **07**
- Q.7** (a) Draw the Shear force and Bending Moment diagram of Beam given in Fig. 4 **07**
(b) i) Define: Coefficient of Static Friction and state the Laws of Friction. **07**
ii) Define: 1] Point of Contra flexure, 2] Shear force

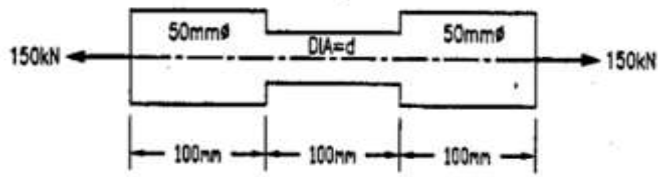


Fig. 1

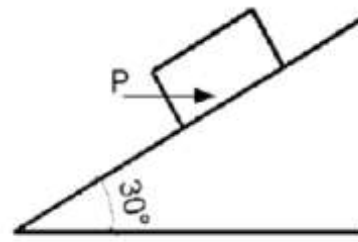


Fig. 2

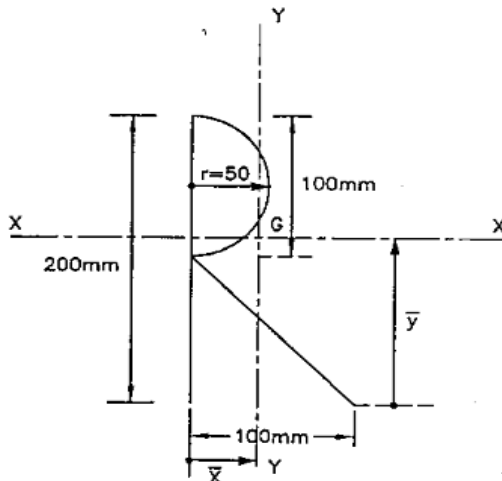


Fig. 3

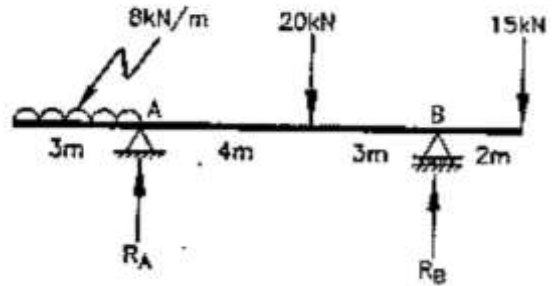


Fig. 4
