

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2018 - 19 Examination

Semester: 1
Subject Code: 203104151
Subject Name: Mechanics of Solids

Date: 11/12/2018
Time: 02:00 pm to 04:30 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) (15)

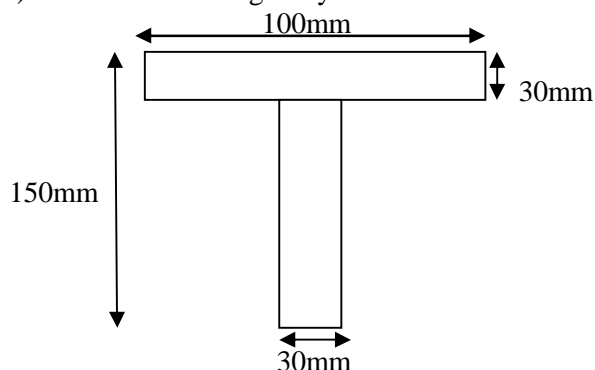
1. The process of finding components of a force is called _____ of forces.
2. Two unlike parallel forces, will form a couple. True or False
3. Write the moment of inertia for a circular section of diameter (d).
4. Explain the term rigid body.
5. The type of support provided at the abutment of a bridge is
 (a) Fixed (b) Hinged (c) Roller (d) Simple
6. Define the term centre of gravity
7. When two forces each equal to P act at 90° to each other, then their resultant will be
 (a) $\sqrt{2}P$ (b) $2P$ (c) $0.707P$ (d) zero
8. Give mathematical expression of Lami's theorem
9. In S.I units, the unit of moment is
10. Write the Newton's second Law
11. State and explain Hooke's law.
12. Explain cone of friction with neat sketch.
13. State the laws of dry friction.
14. Define principle of Superposition
15. Define stress and strain on a body.

Q.2 Answer the following questions. (Attempt any three) (15)

- A) Two tensile forces of 20 kN and 30 kN are acting at a point with an angle of 60° between them. Find the magnitude and direction of the resultant force.
- B) Define: (i) coefficient of friction (ii) Angle of friction
- C) A Mild Steel bar of 20 mm diameter is acted upon by a tensile force of 60 kN. If the length of bar is 1m and modulus of elasticity is $2.0 \times 10^5 \text{ N/mm}^2$ Find stress, strain and elongation of the bar.
- D) Define Force and classify the force system.

Q.3 A) State and Prove law of Parallelogram (07)

- B) Find the centre of gravity of a 100 mm x 150 mm x 30 mm T-section (08)



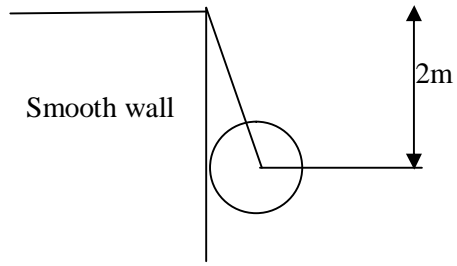
OR

- B) State and prove the theorem of perpendicular axis applied to moment of inertia. (08)

Q.4 A) Explain various types of beams and their support. (07)

OR

- A) A sphere of weight 200 N and diameter 30 cm is tied to a smooth wall by a rope as shown in below figure. Find tension in the rope and reaction from the wall on the sphere. **(07)**



- B) A simply supported beam of 3 m span carries two loads of 5kN each at 1m and 2m from the left hand support. Draw the shear force and bending moment diagrams for the beam. **(08)**