

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE/PDDC- SEMESTER– 1st / 2nd • EXAMINATION – SUMMER 2016

Subject Code: 110010

Date: 10/06/2016

Subject Name: Mechanics of Solids

Time: 2: 30 PM to 5:00 PM

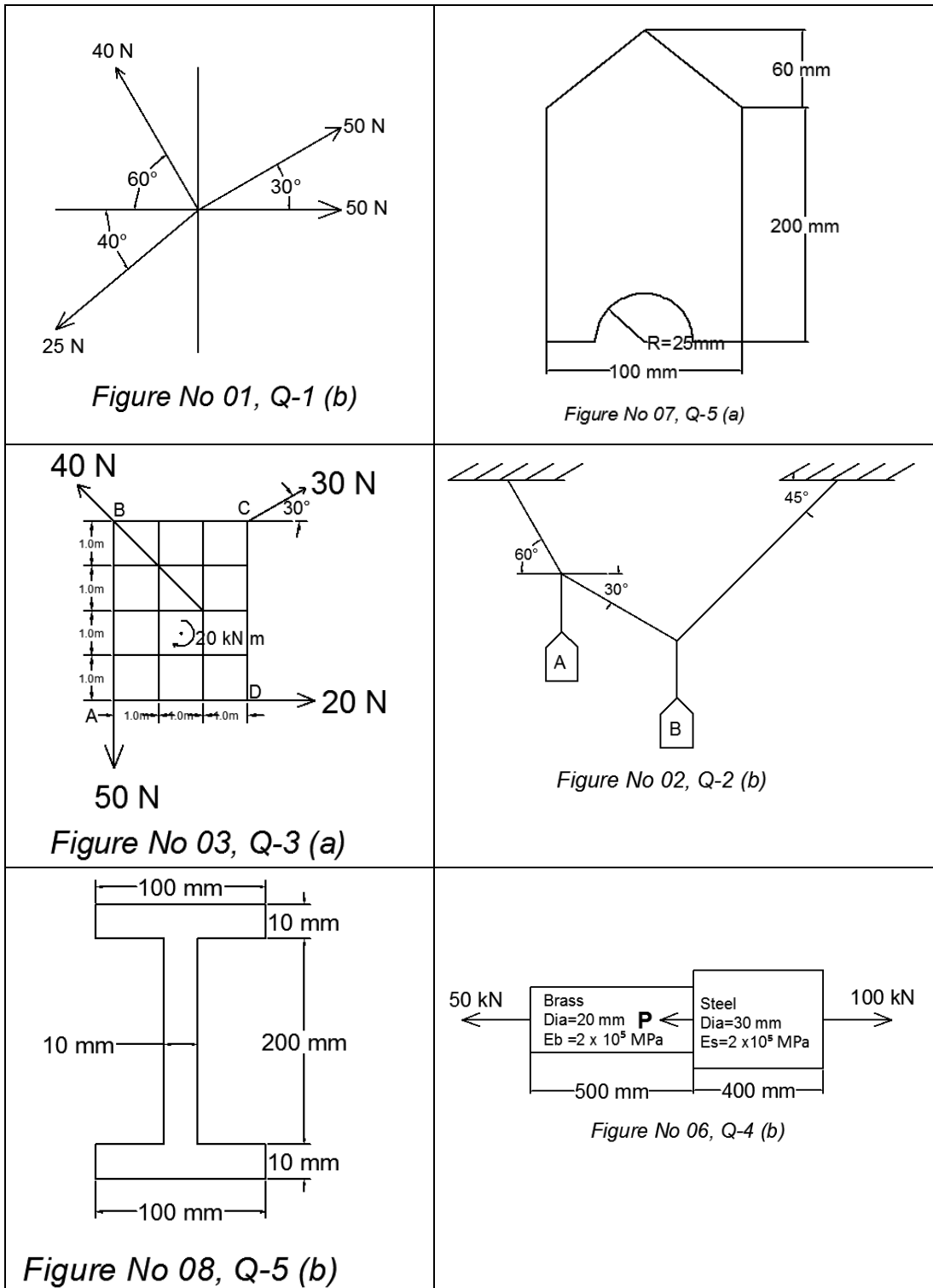
Total Marks: 70

Instructions:

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

- Q.1** (a) Explain in brief (i) Resultant of a force system (ii) Law of Parallelogram (iii) Lami's theorem **07**
- (b) A force system is shown in *Figure No.01*, Find the resultant of the system and check the answer by law of Polygon. **07**
- Q.2** (a) (i) State Varignon's theorem and give the application of theorem **03**
(ii) State the conditions of equilibrium for different types of force systems. **04**
- (b) Two buckets are suspended by a flexible wire as shown in *Figure No.02*. The weight of bucket is $B\ 200\ N$, if the system is in equilibrium, find the weight of bucket *A* and force in each part of the wire. Neglect self weight of wire. **07**
- Q.3** (a) Find the resultant of a non- concurrent coplanar force system shown in *Figure No.3* and locate the resultant with respect to point *A*. **07**
- (b) A beam is loaded as shown in *Figure No. 04*, Find the reactions at supports for beam. **07**
- Q.4** (a) A beam is loaded as shown in *Figure No. 05*, Find the reactions at Support and draw the shear force and bending moment diagram for the beam, Also determine the maximum bending moment. **07**
- (b) A composite stepped bar made of Brass and Steel as shown in *Figure No. 06*, is subjected to various loads is in equilibrium, Find the unknown force *P* and total change in length of the bar. **07**
- Q.5** (a) Locate the centroid of a plain lamina shown in *Figure no. 07*. **07**
- (b) Determine moment of inertia of section shown in *Figure No.8* about centroidal axes (*X* and *Y* both) **07**
- Q.6** (a) State and explain with figure Pappu's –Guildinu's theorem of surface area of Revolution **07**
- (b) Draw the shear stress distribution diagram over the section shown in *Figure No. 08* if it is subjected to maximum shear force of 100 kN. **07**
- Q.7** (a) A uniform ladder of weight 400 N and length 6 m is placed against a smooth vertical wall such that it makes an inclination of 60° with floor. A person of weight 800 N climbs the ladder. At what position of the person the ladder will start to slip. Take coefficient of friction between floor and ladder is 0.25. **07**

- (b) At a point in a strained material two mutually perpendicular tensile stress of 5 N/mm^2 and 8 N/mm^2 and shear stress 2 N/mm^2 are acting as shown in *Figure No. 09*. Find the values of principal stresses and position of principal planes. **07**



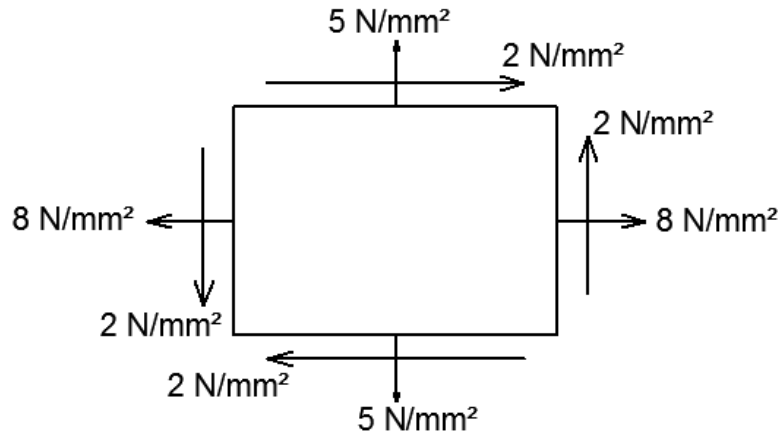


Figure No 09, Q-7 (b)

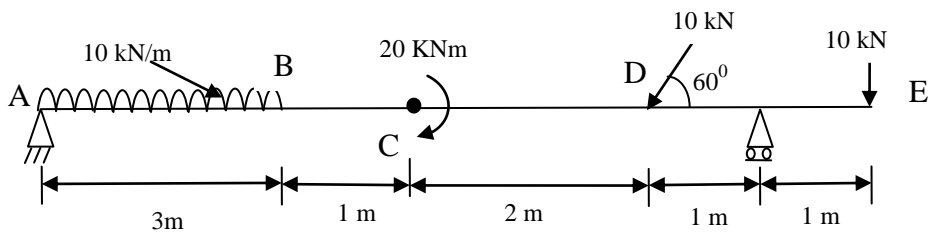


Figure No-4 Q-3 (b)

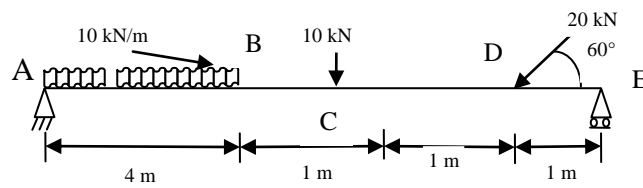


Figure No-5 Q-4 (a)

