Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–1/2 EXAMINATION – WINTER 2017

Subject Code: 110010   **Date: 11/01/2018**

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.**

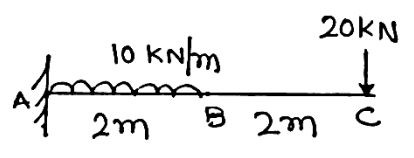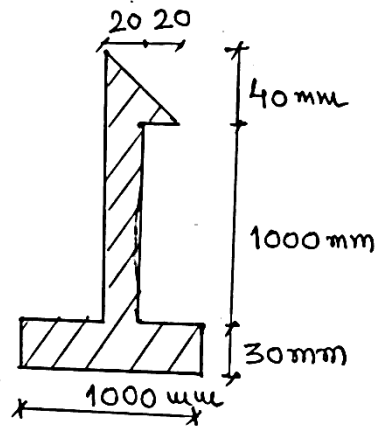|			
Q.1	**(a)**	Define force. Discuss its characteristics. Determine magnitude and direction of resultant force of the force system shown in fig. 1.	**07**
	(b)	Define : (i) Stress (ii) Stain (iii) Bulk Modulus (iv) Moment (v) Complementary shear stress (vi) Point of zero shear (vii) Angle of repose	**07**
Q.2	**(a)**	Determine stresses in each portion of bar and change in length of bar shown in fig. 2. Take E = 200 GPa	**07**
	(b)	Find support reaction for the beam shown in fig. 3.	**07**
Q.3	**(a)**	Draw shear force and bending moment diagram for the beam shown in fig. 4	**07**
	(b)	Determine centroid of the lamina as shown in fig. 5	**07**
Q.4	**(a)**	Derive equation for pure bending with usual notations.	**07**
	(b)	Draw shear stress distribution diagram for beam having rectangular cross section 200x 300 mm and carrying shear force 100 kN.	**07**
Q.5	**(a)**	A ladder is supported by a horizontal floor and a vertical wall. The weight of ladder is 200N. The coefficient of friction at the wall is 0.2 and at the floor is 0.4. A man of weight of 600N is to climb on it. Determine the minimum inclination of the ladder with horizontal floor so that the man can climb the full height of ladder without slipping.	**07**
	(b)	Define: Principal plane The stresses at a point in a bar are 200 MPa (tensile) and 100 MPa (compressive). Determine the resultant stress in magnitude and direction on a plane inclined at 60° to the axis of the major stress.	**07**
Q.6	**(a)**	(i) Draw variation of shear stress across the cross section of Hollow circle, Triangle and H section (ii) Derive relationship between rate of loading, shear force and bending moment.	**07**
	(b)	State : (i) Law of Parallelogram (ii) law of Transmissibility State and prove parallel axes theorem	**07**
Q.7	**(a)**	Determine support reaction and member forces for the truss shown in fig. 6	**07**
	(b)	Find Moment of inertia of T section having flange and web dimensions 1000 x 30 mm about centroidal axes.	**07**

****
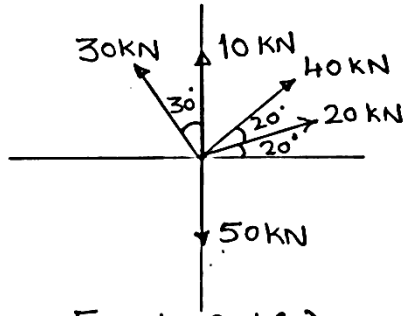
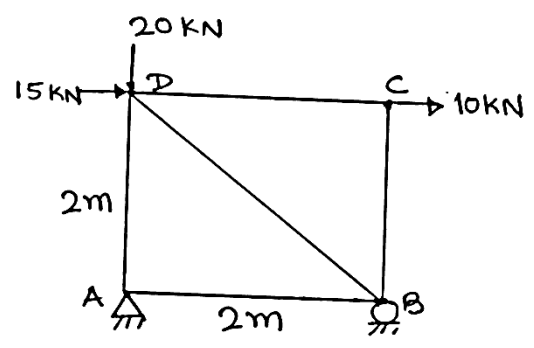Fig 1 Q:1(a)
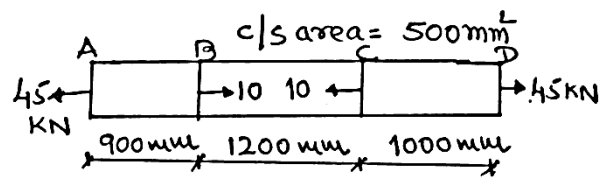
Fig 2 Q:2(a)
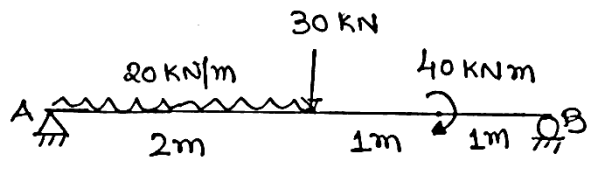
Fig 3 Q:2(b)

Fig 4 Q:3(a)

Fig 5 Q:3(b)

Fig 6 Q:7(a)