Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–I-EXAMINATION – SUMMER 2016

Subject Code:X11102 Date:04/06/2016

Subject Name:ELEMENTS OF MECHANICAL AND STRUCTURAL

Time:02:30 PM to 05:00 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: (i) Force (ii) Pressure (iii) Work (iv) Power	**07**
	(b)	Explain working of four stroke petrol engine with neat sketch.	**07**
Q.2	**(a)**	Explain Carnot cycle on p-v diagram.	**07**
	(b)	Explain the working of four stroke petrol engine with neat sketch.	**07**
Q.3	**(a)**	Give difference between governor and flywheel.	**07**
	(b)	Explain construction and working of window air conditioner with neat sketch.	**07**
Q.4	**(a)**	Enlist various types of air compressor. Explain any one in detail with neat sketch.	**07**
	(b)	Explain construction and working of centrifugal pump with neat sketch.	**07**
Q.5	**(a)**	Define: (i) Toughness (ii) Hardness (iii) Proof stress (iv) Volumetric strain	**07**
	(b)	Determine stress, stain and elongation of a mild steel bar of 20 mm diameter. The length of the bar is 1000 mm. The bar is subjected to an axial pull of 30kN. Take E = 2 x 10^5 N/mm^2.	**07**
Q.6	**(a)**	Draw Shear force and Bending moment diagram for a beam shown in fig. 1.	**07**
	(b)	A steel bar having 30 mm diameter and 2 m length hangs vertically. If a weight of 30 kN falls on the collar at lower end from a height of 20 mm, determine stresses developed in the bar. Also calculate strain energy stored in the bar. Take E = 2 x 10^5 N/mm^2.	**07**
Q.7	**(a)**	A Solid circular shaft has a radius of 10 mm, is 4 meters long subjected to a torque of 0.10 kNm. Determine (i) the angle of twist of one end of shaft relative to the other and (ii) the maximum shearing stress within the section. Take G = 75 kN / mm^2.	**07**
	(b)	At a point in a strained material the stresses on two perpendicular planes are shown in fig. 2. Determine normal stress and tangential stress when θ = 30°.	**07**

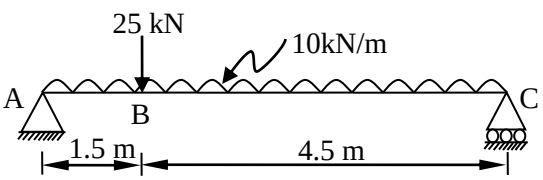

Fig. 1: Q.6 (a)

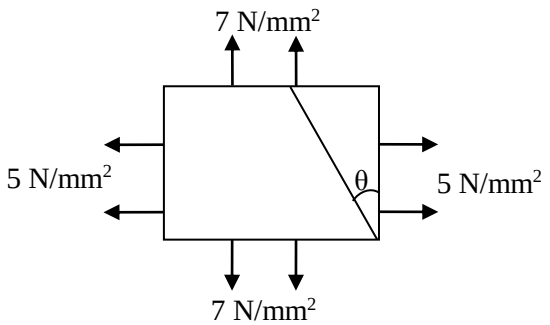

Fig. 2: Q.7 (b)

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