Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC- SEMESTER– 1st EXAMINATION – SUMMER 2015

Subject Code: X11102 **Date:28/05/2015**

Subject Name: Elements of Mechanical & Structural Engineering

Time: 02.30pm-05.00pm **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 the terms Refrigeration and Refrigerating effect. Explain Vapour compression refrigerating system with a neat diagram.	**07**
	(b)	Classify I.C. Engines. Write comparison between Petrol Engine and Diesel Engine.	**07**
Q.2	**(a)**	What is Pump? Give brief classification of Pumps. Explain Centrifugal pump.	**07**
	(b)	"The efficiency of Otto cycle depends upon its compression ratio" Prove it.	**07**
Q.3	**(a)**	Explain the following : (1) Prime mover (2) Second law of thermodynamics (3) Work, Energy and Power (4) Zeroth law.	**08**
	(b)	With usual notations derive an expression for work done in single stage single acting reciprocating air compressor considering clearance volume.	**06**
Q.4	**(a)**	Write note on "Governing of I.C. Engines."	**07**
	(b)	Explain shear force and bending moment in a beam.	**07**
Q.5	**(a)**	Define Simple stress and Strain. Draw and explain stress-strain curve for steel.	**06**
	(b)	Explain the following: (1) Elasticity and Plasticity (2) Stiffness and Toughness (3) Brittleness and Ductility (4) Torsion and Angle of twist	**08**
Q.6	**(a)**	A circular rod of 20 mm diameter and 300 mm long is subjected to a tensile force *50 kN*. The modulus of elasticity for steel may be taken as $200 kN/mm^2$. Calculate stress, strain and elongation of the bar due to applied load.	**07**
	(b)	Explain Principal stress and Principal Strain with usual notations. Discuss modulus of resilience and resilience in case of compound stresses.	**07**
Q.7	**(a)**	Define Factor of Safety. Derive relationship between Modulus of elasticity and Bulk modulus.	**07**
	(b)	Explain different types of beams and supports with neat symbolic sketch, showing all possible reactions for general loading condition.	**07**

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