Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– 1st / 2nd • EXAMINATION – SUMMER 2013

Subject Code: 110006 Date: 11-06-2013

Subject Name: Elements of Mechanical Engineering

Time: 02:30 pm – 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)	Explain working of four stroke Diesel Engine with P-V diagram.	**05**
	(b)	A four cylinder four stroke petrol engine has 100mm bore and stroke is 1.3 times bore. It consumes 4 kg of fuel per hour having calorific value of 40500 kJ/kg. If engine speed is 850 rpm. Find its Indicated thermal efficiency. The mean effective pressure is 0.75 N/mm^2	**05**
	(c)	Define Pressure and explain Absolute Pressure, Guage Pressure and Atmospheric pressure.	**04**
Q.2	(a)	Explain construction and working of Locomotive boiler with neat sketch.	**07**
	(b)	State the function of the following (1) Fusible plug. (2) Economiser (3) Safety valve	**03**
	(c)	Define : (i) Sensible heat (ii) Latent heat (iii)Dryness fraction (iv)Enthalpy of evaporation.	**04**
Q.3	(a)	Derive Expression PV/T=constant with the help of Boyle's law and Charle's law.	**05**
	(b)	A steel cylinder contains O_2 at pressure of 25 bar and temperature of 27^0C, After using some quantity of the gas the pressure was found to be 5 bar and temperature of 20^0C.700 liters of O_2 was originally put in the cylinder at NTP Density of O_2 at NTP is 1.43 gm/liter. Find the mass of O_2 used.	**06**
	(c)	Define Calorific value and explain Higher and Lower Calorific values.	**03**
Q.4	(a)	Explain Separating Calorimeter with neat sketch.	**05**
	(b)	Find internal energy of 1 kg of steam at a pressure of 15 bar when (i) The steam is superheated with temperature of 400^0C. (ii) The steam is wet with dryness fraction =0.9 Take Cps=2.1 kJ/kg K	**05**
	(c)	What are different methods of IC engine governing? Explain governing method used in the Petrol engine.	**04**
Q.5	(a)	Derive expression for the efficiency of the Carnot cycle.	**05**
	(b)	In an ideal Diesel cycle the temperature at the beginning and at the end of compression are 57^0C and 603^0C. The temperature at the beginning and at the end of expansion are 1950^0C and 870^0C.Find the ideal efficiency of the cycle. If the pressure is 1 bar find the maximum pressure in the cycle.	**05**
	(c)	Explain Oldham's coupling with neat sketch.	**04**
Q. 6	(a)	Explain working of main parts of centrifugal pump with neat sketch.	**05**
	(b)	Explain difference between Reciprocating and Rotodynamic compressor.	**05**
	(c)	Draw and explain Internal expanding brake.	**04**
Q.7	(a)	Explain Vapour absorption Refrigeration system with the neat sketch.	**06**
	(b)	Define (i) Hardness (ii) Creep (iii) Resilience (iv) Toughness.	**04**
	(c)	What are Bearings and how they are classified?	**04**

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