Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– 1st / 2nd (OLD SYLLABUS) EXAMINATION – SUMMER 2015

Subject Code:110006 **Date: 04/06/2015**

Subject Name: Element of Mechanical Engineering.

Time: 10.30am-01.00pm **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)**	What are the various forms of energy? List the non convectional sources of energy.	**03**
	(b)	With usual notation prove Cp- Cv = R.	**04**
	(c)	A cylinder contains 0.6 m^3 of gas at a pressure of 1 bar and 90° C the gas is compressed to volume of 0.18 m^3 according to law $PV^n = C$. The final pressure is 5 bar. Assuming R = 0.287 KJ/Kg K and $\gamma = 1.4$ Calculate : (i) The mass of gas (ii) The Value of Index 'n' for compression. (iii) The change in internal energy of gas.	**07**
Q.2	**(a)**	State and explain zeroth Law of Thermodynamics.	**03**
	(b)	Define : (i) Sensible heat (ii) Latent heat (iii) Dryness Fraction (iv) Enthalpy of evaporation	**04**
	(c)	Combined separating & throttling calorimeter is used to find out dryness fraction of steam. following reading were taken: Main pressure = 12 bar ab. Mass of water collected in separating calorimeter = 2 kg. Mass of steam condensed in throttling calorimeter = 20 Kg Temperature of steam after throttling calorimeter = 110° C Pressure of steam after Throttling = 1 bar ab. Assume Cp of steam = 2.1 kJ/Kg K. Calculate dryness fraction.	**07**
Q.3	**(a)**	Derive equation for thermal efficiency of Rankine cycle.	**03**
	(b)	Differentiate between Petrol engine & diesel Engine.	**04**
	(c)	In ideal constant volume cycle the pressure & temperature at the beginning of compression are 97 KPa & 50° C respectively. The volume ratio is 8. The heat is supplied during the cycle is 930 kJ/kg of working fluid. Calculate : (i) The maximum temperature attained in the cycle. (ii) The thermal efficiency of cycle. (iii) Work done during the cycle /kg of working fluid.	**07**
Q.4	**(a)**	State the function of following (i)Fusible plug (ii) Safety valve (iii) Economizer	**03**
	(b)	Explain working of four stroke petrol engine with neat sketch.	**04**
	(c)	What is boiler ? Discuss Construction & working of Cochran boiler with neat sketch.	**07**
Q.5	**(a)**	What is priming? Why it is required in centrifugal pump?	**03**
	(b)	Explain with neat sketch working of single acting piston pump.	**04**
	(c)	Classify the Air compressor. Differentiate between reciprocating compressor & rotary compressor.	**07**
Q.6	**(a)**	Differentiate between the functions of governor & flywheel.	**03**

	(b)	Define Air conditioning .State the basic component of air conditioning systems.	**04**
	(c)	What is refrigeration ? Explain the working of vapour compression refrigeration cycle. Name basic components of VCRC.	**07**
Q.7	**(a)**	Enlist physical properties of engineering materials.	**03**
	(b)	List various liquid fuels. State their merits over solid fuels.	**04**
	(c)	What is brake ? How it differ from clutch? What are various type of clutches? Name type of clutch is used in scooter and car.	**07**

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