

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-I &II (NEW) EXAMINATION – SUMMER-2019****Subject Code: 2110006****Date: 04/06/2019****Subject Name: Elements of Mechanical Engineering****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. **Question No. 1 is compulsory. Attempt any four out of remaining Six questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

<b>Q.1</b>	<b>Objective Question (MCQ)</b>	<b>Mark</b>
	(a)	<b>07</b>
	1. The first law of thermodynamic is the law of (a) energy conservation (b) heat transfer (c) work transfer (d) all of these	
	2. Which of the following is a path function? (a) heat (b) temperature (c) pressure (d) volume	
	3. Main disadvantage of nuclear energy is (a) high operating cost (b) waste disposal (c) low efficiency (d) all of above	
	4. Air standard Otto cycle is also called (a) Constant volume cycle (b) constant pressure cycle (c) dual pressure cycle (d) isothermal cycle	
	5. Steam coming out of the whistle of pressure cooker is (a) Dry and saturated vapour (b) Wet vapour (c) Superheated vapour (d) Ideal gas	
	6. Which one of the following is vertical boiler? (a) Lancashire (b) Cochran (c) Cornish (d) Locomotive	
	7. The processes of Carnot cycle are (a)Two adiabatic and two constant volume (b)Two constant pressure and two constant volume (c)Two isothermal and two adiabatic (d)Two isothermal and two isentropic	
	(b)	<b>07</b>
	1. The impeller of a centrifugal pump may have (A) volute casing (B) volute casing with guide blades (C) vortex casing (D) any one of these	
	2. One ton of refrigeration is equal to (a) 221 kJ/min (b) 420 kJ/min (c) 600 kJ/min (d) 210 kJ/min	
	3. Which of the following elements is used to connect two shafts_____ (a) clutch (b) brakes (c) Couplings (d) none of above	
	4. COMPRESSOR is a machine which is used to do (A) lift liquid from low height to higher elevation ( B) To store liquid (C) To compress liquid OR gas. (D) none of the above	
	5. A hydraulic coupling belongs to the category of (A). power absorbing machines (B) power developing machines (C) energy transfer machines (D) energy generating machines	
	6. Which of the following is a positive belt drive. (a) V-belt (b) flat belt (c) Cross belt (d) timing belt	
	7. The efficiency of Diesel cycle increases with (A) decrease in cut-off (B) increase in cut-off (C) constant cut-off (D) none of these	
<b>Q.2</b>	(a) State Zeroth law, First law and Second law of thermodynamics.	<b>03</b>
	(b) Write a short note on solar energy?	<b>04</b>
	(c) One Kg of gas at 100 kN/ m <sup>2</sup> and 17° C is compressed isothermally to a pressure of 2500 kN/ m <sup>2</sup> in a cylinder. The characteristic equation of the gas is given by the equation $PV = 260 T / \text{Kg}$ where T is in degree Kelvin. Find out (i) The final temperature (ii) Final Volume (iii) compression ratio (iv) change in enthalpy (v) work done on the gas.	<b>07</b>

- Q.3** (a) Show the function and location of the following in the boiler plant: (i) Economizer (ii) Steam stop valve (iii) Fusible plug. **03**  
 (b) Prove that  $C_p - C_v = R$  **04**  
 (c) Derive an equation for air standard efficiency of Otto cycle. **07**
- Q.4** (a) Explain working of a centrifugal pump. **03**  
 (b) What is compressor ? Give use of compressed air. **04**  
 (c) Explain Vapor Compression Refrigeration system with neat sketch. Also draw p-h and T-s diagram for the same. **07**
- Q.5** (a) Give comparison between Petrol and Diesel Engine **03**  
 (b) What is Boiler Mounting and Accessories Explain one each of them **04**  
 (c) With neat sketch describe the working of two stroke petrol engine. **07**
- Q.6** (a) What are bearings? How are they classified? **03**  
 (b) What is belt drive? Describe briefly types of belt drives **04**  
 (c) What is coupling? Explain internal expanding shoe brake with a neat sketch? **07**
- Q.7** (a) Classify properties of engineering material **03**  
 (b) Make comparison between vapour compressions and vapour absorption system. **04**  
 (c) Give comparison between belt drive, gear drive and chain drive. **07**

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