

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.**

- | | | |
|------------|---|-------------|
| Q.1 | Objective Question (MCQ) | Mark |
| | (a) | 07 |
| | 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) | 07 |
| | 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 | |
| Q.2 | (a) State Zeroth law, First law and Second law of thermodynamics. | 03 |
| | (b) Write a short note on solar energy? | 04 |
| | (c) One Kg of gas at 100 kN/ m ² and 17° C is compressed isothermally to a pressure of 2500 kN/ m ² 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. | 07 |

- 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**
