

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-I & II(OLD) EXAMINATION – WINTER 2022**

**Subject Code:110006****Date:03-03-2023****Subject Name:Elements of Mechanical Engineering****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) An ideal gas is heated from 25°C to 145°C. The mass of gas is 2 kg. Determine (i) Specific heats (ii) change in internal energy, (iii) change in enthalpy. Assume  $R = 267 \text{ J/Kg K}$  and  $\gamma = 1.4$  for the gas. **07**
- (b) Describe in brief the various non-ferrous metals along with their applications. **07**
- Q.2** (a) Derive the Carnot efficiency of vapour. Draw P-V diagram for the Carnot vapour cycle **07**
- (b) With neat sketch explain the working of window Air Conditioner. **07**
- Q.3** (a) In an air standard Otto cycle the maximum and minimum temperatures are 1400°C and 15°C. The heat supplied per kg of air is 800 kJ. Calculate the compression ratio and cycle efficiency. Also calculate the ratio of maximum to minimum pressures in the cycle **07**
- (b) Explain with neat figure, the construction of Cochran Boiler **07**
- Q.4** (a) Classify heat engines and pumps. **07**
- (b) A cylinder 2 stroke engine develops 30 kW at 2500 rpm. The mean effective pressure of each cylinder is 800 kPa and mechanical efficiency = 80%. Calculate brake power and mass flow rate of fuel if  $L/D = 1.5$ , Brake thermal efficiency = 28% and calorific value of fuel = 44000 kJ/kg. **07**
- Q.5** (a) Compare (i) Two stroke and Four stroke engine (ii) brake and clutch. **07**
- (b) Derive the expression of work done by a single stage single acting reciprocating air compressor neglecting clearance volume. Consider adiabatic process for expansion of air. **07**
- Q.6** (a) Specify the types of centrifugal pumps and explain any one in detail. **07**
- (b) Classify the types of couplings and with neat figure, discuss the working of any coupling of your choice. **07**
- Q.7** (a) Derive the expression for ratio of driving tensions in a flat belt drive. **07**
- (b) A steel drum weighing 20 kg contains 25 kg of water at 20°C. 0.7 m<sup>3</sup> of steam at a pressure of 8 bar is passed into the drum. The temperature of water after mixing with the steam is 82°C. find the quality of steam passed into the steel drum. Assume  $C_p$  for material of drum as 0.84 kJ/kg K. **07**

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-I & II(OLD) EXAMINATION – WINTER 2022****Subject Code:110004****Date:09-03-2023****Subject Name:Elements of Civil Engineering****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt any five questions.
1. Make suitable assumptions wherever necessary.
2. Figures to the right indicate full marks.
3. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Explain role of civil engineer. **07**  
(b) Write fundamental principle of surveying. **07**
- Q.2** (a) Enlist various instruments used in chaining and describe with sketch any two of them. **07**  
(b) Enlist scheduling techniques and explain bar chart. **07**
- Q.3** (a) The length of a chain line when measured with a 20m chain was found to be 1432 meters. But when a 30m chain which was 0.65 meter too short was used for the purpose, the line was found to be 1445 meter long. Find the error in 20m chain? **07**  
(b) State and explain the components of GIS. **07**
- Q.4** (a) State various characteristics of contours in details. **07**  
(b) The details of observed bearings are mentioned below. Find out the included angles and also correct the angles if needed to be corrected. **07**
- | Line | FB       | BB       |
|------|----------|----------|
| AB   | 20° 30'  | 200° 00' |
| BC   | 110° 00' | 290° 30' |
| CD   | 195° 00' | 15° 00'  |
| DE   | 286° 30' | 106° 00' |
- Q.5** (a) Differentiate between load bearing structure and framed bearing structure. **07**  
(b) Enumerate various principles of planning and explain privacy and Roominess in detail. **07**
- Q.6** (a) Discuss use and properties of Wrought iron. **07**  
(b) Draw the neat sketch for the following **07**  
(i) R.C.C lintel with chajja (ii) sectional plan of a ledged and battened door.
- Q.7** (a) Write a short note on different ways of transportation. **07**  
(b) Write a short note on watershed development. **07**

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