Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER 1st / 2nd EXAMINATION (NEW SYLLABUS) – SUMMER - 2017

Subject Code: 2110006 Date:31/05/2017

Subject Name: Elements of Mechanical Engineering

Time: 2:30 PM to 05:00 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) **MARKS**

Attribute

(a) **07**

1. In an isolated system, what transfer?
(a) mass (b) energy (c) both mass and energy (d) neither mass nor energy

2. Which of the following is a path function?
(a) heat (b) temperature (c) pressure (d) volume

3. Which has the highest calorific value?
(a) Petrol (b) Diesel oil (c) Alcohol (d) Benzene

4. Choose the incorrect relationship.
(a) $C_P + C_V = R$ (b) $C_P - C_V = R$ (c) $\gamma = C_P / C_V$ (d) $C_V = R/(\gamma - 1)$

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. Superheating of steam is done at constant
(a) pressure (b) volume (c) temperature (d) enthalpy

7. The Otto cycle is also known as
(a) constant pressure cycle (b) constant volume cycle
(c) constant temperature cycle (d) constant enthalpy cycle

(b) **07**

1. When heat is added to the water and if its temperature does not change, the heat added is called
(a) latent heat (b) isothermal heat
(c) sensible heat (d) constant pressure heat

2. Which one of the following is vertical boiler?
(a) Lancashire (b) Cochran (c) Cornish (d) Locomotive

3. Petrol engine work on _____system.
(a) either spark or compression ignition (b) spark ignition
(c) compression ignition (d) all of the above

4. Scroll compressor is a _____compressor.
(a) reciprocating (b) rotary
(c) dynamic (d) radial

5. Pump cannot be driven by
(a) electric motor (b) I.C. Engine
(c) steam turbine (d) compressor

6. Performance parameter for refrigeration system is known as
(a) efficiency (b) COP
(c) effectiveness (d) energy ratio

7. In VCR cycle, refrigeration effect is produced by
(a) compressor (b) condenser
(c) expander (d) evaporator

Q.2	**(a)**	Give the definition of (1) close system (2) open system (3) isolated system	**03**
	(b)	Define the heat and give the comparison of heat and work.	**04**
	(c)	Explain steam formation with figure also draw T-H diagram.	**07**
Q.3	**(a)**	Define the terms 1.Melting point 2.Boiling point 3.Critical point	**03**
	(b)	Give the classification of boilers.	**04**
	(c)	Draw the figure of Cochran boiler and explain its construction and working.	**07**
Q.4	**(a)**	State Zeroth law of thermodynamics.	**03**
	(b)	Prove that $C_P - C_V = R$.	**04**
	(c)	In air compressor, air enters at 1.013 bar and 27^0C having volume of 5 m^3/ kg and it is compressed to 12 bar isothermally. Determine (i) work done (ii) heat transfer, and (iii) change in internal energy.	**07**
Q.5	**(a)**	Give comparison between Petrol and Diesel Engine.	**03**
	(b)	What is boiler mountings and accessories? Also give the list of it.	**04**
	(c)	A six cylinder 4 stroke I.C. engine is to produce 95 kW brake power at 800 rpm. The stroke to bore ratio is 1.25, mean effective pressure is 7 bar. Determine the bore and stroke of the engine. Assume mechanical efficiency as 80%.	**07**
Q.6	**(a)**	What is priming? Why it is required in centrifugal pump but not in reciprocating pump.	**03**
	(b)	What is compressor? Give the classification of Rotary Compressors.	**04**
	(c)	Explain Vapor Compression Refrigeration system with neat sketch. Also draw p-h and T-s diagram for the same.	**07**
Q.7	**(a)**	Classify properties of engineering material.	**03**
	(b)	Explain flange coupling with neat sketch	**04**
	(c)	What is brake? Describe an internal expanding shoe brake with a neat sketch and state its applications.	**07**

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