

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- I & II (NEW) EXAMINATION – WINTER 2019****Subject Code: 2110006****Date: 03/01/2020****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)	Select the correct answer: 1. During adiabatic process (a) Work transfer is zero (b) heat transfer is zero (c) enthalpy remains constant (d) enthalpy change is zero. 2. Work is considered positive when (a) Work is done on the system (b) work is done by the system (c) both a and b (d) none of the above 3. Following is not a component of Rankine Cycle (a) boiler (b) turbine (c) condenser (d) compressor 4. Spark plug is used in (a) petrol engine (b) diesel engine (c) steam engine (d) boiler 5. Which of the following are boiler mountings? (a) Super heater (b) Air preheater (c) Fusible Plug (d) Economiser 6. Which power transmission element is used in motor cycle? (a) rope (b) flat belt (c) chain (d) V belt 7. The ability of a material to resist fracture due to high impact loads is called (a) strength (b) stiffness (c) toughness (d) brittleness	07
(b)	Select the correct answer: 1. 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 2. Which are of the following is not a rotary pump? (a) Gear pump (b) Vane pump (c) Screw pump (d) Axial pump 3. Heat is absorbed by refrigerant during refrigeration cycle in (a) Condenser (b) Evaporator (c) Capillary (d) None of the above 4. Centrifugal compressor is suitable for producing (a) High pressure (b) medium pressure (c) low pressure (d) all of the above 5. One ton of refrigeration is equal to (a) 221 kJ/min (b) 420 kJ/min (c) 600 kJ/min (d) 210 kJ/min 6. Wind velocity is measured by (a) manometer (b) tachometer (c) anemometer (d) thermometer	07

7. When rotary motion is to be converted into linear motion following gear arrangement is used
(a) spur gear (b) spiral gear (c) rack and pinion gear (d) none of these
- Q.2** (a) State Zeroth law, First law and Second law of thermodynamics. 03
(b) Define isothermal process. Derive the expression for work done and heat transfer for this process. 04
(c) Draw the figure of Cochran boiler and explain its construction and working. 07
- Q.3** (a) Write a short note on Global Warming and Ozone depletion. 03
(b) Explain Throttling calorimeter with neat sketch and calculation of dryness fraction. 04
(c) Explain steam formation with T-H diagram. 07
- Q.4** (a) State Boyle's, Charle's and Avogadro law. 03
(b) Give comparison between Petrol and Diesel Engine. 04
(c) A 4 cylinder 4-stroke marine oil engine has cylinder diameter of 490 mm and a piston stroke of 1000 mm .The engine uses 130 kg of fuel of calorific value 42,000 kJ/kg in one hour when running at 2 rev/s. the torque transmitted at the engine coupling is 22 KN.m and indicated mean effective pressure 710 KN/m². Determine (i) indicated power (ii) brake power (iii) indicated thermal efficiency (iv) brake thermal efficiency (v) Mechanical efficiency. 07
- Q.5** (a) Differentiate between a Brake and a Clutch. 03
(b) Why multi-stage compression is required? Write advantages of the multi-staging compression. 04
(c) Discuss Rankine cycle in detail with flow diagram and P-V diagram. 07
- Q.6** (a) How the air compressors are classified based on different criteria. 03
(b) Explain the difference between boiler mountings and accessories. 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) Write short note on Gear Pump 03
(b) Explain Universal coupling with neat sketch 04
(c) Classify properties of engineering material. Explain any three of them. 07
