

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-I & II (NEW) EXAMINATION – WINTER 2020****Subject Code:3110006****Date:18/03/2021****Subject Name:Basic Mechanical Engineering****Time:10:30 AM TO 12:30 PM****Total Marks:56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of steam tables is permitted in exam

		Marks
Q.1	(a) List advantages of Solar energy and its application.	03
	(b) Explain phenomena of global warming and causes of ozone depletion.	04
	(c) Define the following terms: Prime movers, Internal energy, heat capacity, first law of thermodynamics, state, Path, Zeroth law of thermodynamics.	07
Q.2	(a) Classify pumps on basis of principle, construction, and fluid flow direction in pump.	03
	(b) Explain the following terms: volumetric efficiency, compression ratio.	04
	(c) With usual notations derive expression to determine efficiency of Otto Cycle.	07
Q.3	(a) Define the following terms: Boyles law, Avogadro's law, Charles Law.	03
	(b) A Vessel of 2.5 m ³ capacity contains one kg –mole of nitrogen at 100°C. Calculate the specific volume and pressure if the gas is cooled to 30°C, calculate final pressure, change in specific internal energy and specific enthalpy.	04
	(c) Explain adiabatic process. Derive an expression for work done during the adiabatic expansion of an ideal gas.	07
Q.4	(a) What is superheated steam, list its advantages and application.	03
	(b) With neat sketch explain construction and working of separating calorimeter.	04
	(c) Calculate the internal energy of 1 kg of superheated steam at a pressure of 10 bar and 280°C. If this steam is to be expanded to a pressure of 1.6 bar and 0.8 kg dry, determine the change in internal energy. Assume specific heat of superheated steam as 2.1 k J /kg K.	07
Q.5	(a) In an Otto cycle the temperature at the beginning and end of the isentropic compression are 316 K and 596 K resp. Determine the air standard efficiency and compression ratio. Assume $\gamma=1.4$	03
	(b) With neat sketch explain construction and working of water level indicator.	04
	(c) Draw neat sketch of an internal combustion engine, list its parts and state functions of each.	07
Q.6	(a) Compare reciprocating compressor and rotary compressor.	03
	(b) List essential qualities of a good boiler.	04

- (c) During a trial on single cylinder oil engine, working on the four stroke cycle and fitted with rope brake the following readings were taken, Effective diameter of brake wheel= 630mm, dead load on the brake=200N, spring balance reading=30N, Speed =450rpm, Area of indicator diagram=420mm², length of indicator diagram=60mm, spring scale=1.1 bar per mm, diameter of cylinder=100mm, stroke=150mm, quantity of oil used =0.815kg/hr, calorific fuel of oil =42,000k J /kg, Calculate brake power, indicated power, mechanical efficiency, brake thermal efficiency, and brake specific fuel consumption. **07**
- Q.7** (a) Draw neat sketch of domestic refrigerator and list its different parts. **03**
(b) Compare belt drive, chain drive and gear drive. **04**
(c) List and explain physical, thermal, mechanical and electrical properties of metals. **07**
- Q.8** (a) Explain working of split air conditioner. **03**
(b) List properties of copper and its applications. **04**
(c) Draw sketch and label the following: shoe brake, cone clutch, flange coupling **07**
