GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–I & II(OLD) EXAMINATION – SUMMER 2023

Subject Code:110006 **Date:28-07-2023**
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)**	Explain the following terms in brief: (1)Heat and work (2)Specific heat and calorific value of fuel (3)Differentiate between vapor and gas (4)List various source of energy	**07**
	(b)	Define Zeroth law, First law and Second law of thermodynamics. Give limitations of first law of thermodynamics	**07**
Q.2	**(a)**	Sketch the Cochran boiler and label all important mountings and accessories	**07**
	(b)	State the function of (i) Fusible Plug (ii) Economiser (iii) Safety valves (iv) water level indicator (v) Superheater (vi) Pressure gauge (vii) Air pre-heater	**07**
Q.3	**(a)**	Write short note on all types of belt drive.	**07**
	(b)	Define the following terms related to belt drive: (i) Velocity ratio (ii) Initial Tension (iii) Slip (iv) Creep (v) Power transmitted in belt drive	**07**
Q.4	**(a)**	Explain with neat sketch split air conditioner. State its advantages.	**07**
	(b)	Classify the air compressor. Differentiate between reciprocating compressor and rotary compressor.	**07**
Q.5	**(a)**	With the help of neat sketch the working of four stroke diesel engine.	**07**
	(b)	Following readings were taken during test of single cylinder four stoke oil engine. (i) Cylinder diameter = 250 mm (ii) Stroke length = 400 mm (iii) Main effective pressure = 7 bar (iv) Engine speed = 250 r. p .m. (v) Net load on brake = 1080 Newton (vi) Effective diameter of brake = 1.5 meter (vii) Fuel used per hour = 10 Kg (viii) Calorific value of fuel = 44300 KJ/Kg Calculate (1) Indicated power, (2) Brake power, (3) Mechanical efficiency and (4) Indicated thermal efficiency.	**07**
Q.6	**(a)**	What is Adiabatic process? Prove with usual notations the governing equation for adiabatic process PV^γ = Constant	**07**
	(b)	Five kg of air is heated from initial volume of 0.5 m^3 to final volume of 1.3 m^3 at constant pressure 4 bar. Determine (1) heat supplied (2) work done (3) initial and final temperature of air. Take Cp=1.005 KJ/kg-K and R=0.287 KJ/kg-K	**07**
Q.7	**(a)**	Discuss Watt Governor and Porter Governor in detail	**07**
	(b)	Define following mechanical properties (1)Elasticity (2)Malleability (3)Ductility (4)Impact strength (5)Hardness (6)Toughness (7) Resilience.	**07**

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