Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(NEW) EXAMINATION – WINTER 2022

Subject Code:3161910 Date:13-12-2022

Subject Name:Applied Thermodynamics

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**
5. **Students can use Steam tables and P-H chart(R-717).**

			MARKS
Q.1	**(a)**	Define 1)Dry bulb temperature 2)Wet bulb temperature 3)Dew point temperature	**03**
	(b)	Explain Compressibility Chart and Compressibility Factor with neat Sketch.	**04**
	(c)	What is Psychometric chart? Explain the measurement of different lines on it.	**07**
Q.2	**(a)**	State the Dalton's law of partial pressure.	**03**
	(b)	Differentiate Between Vapour Compression System and Vapour Absorption System.	**04**
	(c)	What are desirable characteristics of refrigerant? Explain how refrigerants are designated.	**07**
		OR	
	(c)	Explain Vander Waal's Equation of State. Derive an expression for Evaluation of Constant 'a' and 'b'	**07**
Q.3	**(a)**	Justify the need for multistaging.	**03**
	(b)	Explain Li-Br Vapour Absorption System.	**04**
	(c)	Explain Thermodynamic , Physical and Chemical Properties of Refrigerants	**07**
		OR	
Q.3	**(a)**	Differentiate Centrifugal and Axial Flow Compressor.	**03**
	(b)	Explain the phenomenon of surging and choking in centrifugal Compressor.	**04**
	(c)	An ammonia compound compression of refrigeration system consists of two evaporators of capacities 20TR at -10^0C, and10TR at 10^0C.Thevapours leaving the evaporators are dry and saturated. The condenser temperature is 40^0C.the system is provided with multiple expansion valves and flash intercooler. Calculate 1) mass of refrigerant passing through each compressor, and 2) COP of the system.	**07**
Q.4	**(a)**	Explain with neat sketch Catalytic Converter used in SI Engines	**03**
	(b)	Write short note on "Heat balance sheet".	**04**

(c) A single cylinder, four stroke gas engine has bore and stroke are 225mm and 325mm respectively. the clearance volume is 1.8ltrs. The gas consumption is 12.1 m^3 /hr when the engine runs at 500rpm with imep 700KN/m^2 .The calorific value of fuel is 40,000kJ/m^3 .Find : indicated power, thermal efficiency, air standard efficiency, relative efficiency, take
ϒ=1.4. **07**

OR

Q.4 **(a)** Explain Exhaust Gas Recirculation System with neat Sketch. **03**

(b) What are the different Losses in Actual Cycle? Explain any two with neat sketch. **04**

(c) Define Following terms related with engine. **07**

1. Indicated power
2. Brake power
3. Friction power
4. Mechanical efficiency
5. Thermal efficiency
6. Volumetric efficiency
7. Brake specific fuel consumption.

Q.5 **(a)** Define compressible and incompressible flow. **03**

(b) What is the effect of clearance on the performance of air compressor? **04**

(c) Derive an expression for velocity of sound in usual notations as **07**
C= $\sqrt{\frac{dP}{d\rho}}$ **.**

OR

Q.5 **(a)** Give a Comparison between Air- Standard Cycle, Fuel- Air Cycle and Actual Cycle. **03**

(b) Explain Ozone Depletion Potential (ODP) and Global Warning Potential (GWP). **04**

(c) What are the stagnation Properties? Derive an equation for Stagnation Pressure and Stagnation Density. **07**

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