Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV (New) EXAMINATION – WINTER 2019

Subject Code: 2140907 Date: 07/12/2019

Subject Name: Applied Thermal and Hydraulic Engineering

Time: 10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Define steam rate, thermal conductivity and ton of refrigeration.	**03**
	(b)	Define density, viscosity, surface tension and capillary.	**04**
	(c)	Explain with a neat sketch the components of centrifugal pump.	**07**
Q.2	**(a)**	Write the classification of heat exchangers.	**03**
	(b)	Explain open cycle gas turbine with schematic diagram.	**04**
	(c)	Explain the working of a simple air refrigeration system without evaporative cooling with neat sketch.	**07**
		OR	
	(c)	Plot schematic diagram, T-s and h-s diagram of Rankine cycle. Derive the expression for thermal efficiency of Rankine cycle.	**07**
Q.3	**(a)**	Define dry air, relative humidity and dry bulb temperature.	**03**
	(b)	Enlist the different methods of improving efficiency of Rankine cycle and explain any one in detail.	**04**
	(c)	Derive the expression for thermal efficiency of ideal Brayton cycle in terms of pressure ratio (r_p). Plot the same cycle on T-s and p-v diagram also.	**07**
		OR	
Q.3	**(a)**	Write the types of fins and their application.	**03**
	(b)	Define black body, opaque body, white body and gray body	**04**
	(c)	Derive expression for LMTD for parallel flow heat Exchanger.	**07**
Q.4	**(a)**	Describe the absolute pressure, atmospheric pressure and gauge pressure.	**03**
	(b)	What is specific speed of centrifugal pump? Derive an expression of specific speed of centrifugal pump.	**04**
	(c)	Write a short note on construction and working of Pelton wheel turbine with neat sketch.	**07**
		OR	
Q.4	**(a)**	Write classification of turbines.	**03**
	(b)	Define cavitation and explain in brief about cavitation in pumps.	**04**
	(c)	Derive an expression for the discharge through a venturimeter for measurement of flow through pipe with neat sketch.	**07**
Q.5	**(a)**	Define notches and weirs. List the types of notches.	**03**
	(b)	Explain U-tube manometer.	**04**
	(c)	State Bernoulli's equation and write assumptions and applications of Bernoulli's equation.	**07**
		OR	
Q.5	**(a)**	Differentiate between Francis and Kaplan turbines.	**03**
	(b)	What is draft tube? List the functions of draft tube.	**04**
	(c)	Obtain an expression for the work done by the impeller of a centrifugal pump on water per second per unit weight of water.	**07**

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