Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV(NEW) EXAMINATION – SUMMER 2015

Subject code: 2140907 **Date: 26/05/2015**

Subject Name: Applied Thermal and Hydraulic Engineering

Time: 10:30am-1.00pm **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	Explain the Rankine cycle with line diagram? Also plot T-s and P-v diagram.	**07**
	(b)	Explain the working of a simple air cooling system used for aircraft.	**07**
Q.2	**(a)**	A closed cycle gas turbine in which air enters compressor at 1 bar, 30^0C, with pressure ratio in cycle at 5. Calculate the cycle efficiency. If it is heated in the combustion chamber to maximum temperature of 710^0C. Take γ = 1.4 and C_p= 1.005 kJ/kg.	**07**
	(b)	Describe the simple vapour compression refrigeration system with T-s and P-h diagram.	**07**
		OR	
	(b)	Derive expressions for temperature distribution, under one dimensional steady state heat conduction for the slab.	**07**
Q.3	**(a)**	Explain convective heat transfer co-efficient. Also explain natural and forced convection.	**07**
	(b)	Define the thermal conductivity and explain critical thickness of insulation.	**07**
		OR	
Q.3	**(a)**	What do you mean by overall heat transfer coefficient? Differentiate between Parallel flow heat exchanger and counter flow heat exchanger.	**07**
	(b)	What is black body? Explain kirchhoff's law in detail.	**07**
Q.4	**(a)**	Explain the following terms: (i) Viscosity (ii) Capillary tube (iii) Surface tension	**07**
	(b)	What is Euler's equation of motion? Derive Euler's momentum equation.	**07**
		OR	
Q.4	**(a)**	What is Manometer? Explain bourdon tube pressure gauge with a neat sketch.	**07**
	(b)	Explain the principle of venturimeter with neat sketch? Derive an expression for the discharge for the rate of flow of fluid through it.	**07**
Q.5	**(a)**	Obtain an expression for the work done by the impeller of a centrifugal pump on water per second per unit weight of water.	**07**
	(b)	Explain cavitation in detail.	**07**
		OR	
Q.5	**(a)**	With a neat sketch, explain the working principle of a Pelton wheel.	**07**
	(b)	A jet strikes the buckets of a pelton wheel, which is having shaft power as 7000 kW. The diameter of jet is 200 mm. If the net head on the turbine is 400 m, find the overall efficiency of the turbine. Take C_v = 1.0.	**07**

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