Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2140907 **Date: 30/05/2017**

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 **Short Questions** **14**

1 The force per unit length is the unit of
(a) Surface tension (b) compressibility (c) capillary (d) viscosity

2 The flow ratio in terms of Francis turbine varies from
(a) 0.15 to 0.3 (b) 0.4 to 0.5 (c) 0.6 to 0.9 (d) 1 to 1.5

3 In case of liquid and gases heat transfer take place according to
(a) Conduction (b) convection (c) Radiation (d) None of the above

4 Air refrigerator works on
(a) Reversed Carnot cycle (b) bell Coleman cycle (c) both a and b
(d) none of the above

5 Barometer is used to measure
(a) Velocity of the liquid (b) atmospheric pressure (c)pressure in a pipes and channel (d)
(d) difference of pressure between two points in a pipe

6 Water is ---------- fluid.
(a)Real (b) ideal (c) Newtonian fluid (d) non Newtonian Fluid.

7 The compression ratio of gas turbine is
(a)4 (b) 7 (c) 9 (d) 12

8 The capillary tube, as an expansion device , used in
(a)Domestic refrigerator (b) water coolers (c) room air conditioners (d) all of the above

9 The overall coefficient of heat transfer is used in problem of
(a)Conduction (b) convection (c) Radiation (d) conduction and convection

10 Pitot-tube is used for measurement of
(a) pressure (b) Flow (c) velocity at a point (d) Discharge

11 Hydraulic gradient line (H.G.L.) represents the sum of
(a) pressure head and kinetic head (b) kinetic head and datum head (c) pressure head, kinetic head and datum head (d) pressure head and datum head

12 The term $V^2/2g$ is known as
(a) Kinetic energy (b) Pressure energy (c) kinetic energy per unit weight (d) none of the above

13 Orifice-meter is used to measure
(a)Discharge (b) average velocity (c) velocity at a point (d) pressure at a point

14 Breaking jet in an impulse turbine is used
(a) to bring the runner to rest in a short time (b) to break the jet of water (c) to change the direction of runner (d) none of these

Q.2 (a) Differentiate between conduction, convection and radiation. **03**

(b) Explain Fourier's law of heat conduction. **04**

(c) Write a note on surface heat transfer co-efficient. **07**

OR

	(c)	Derive expression for LMTD for parallel flow heat Exchanger.	**07**
Q.3	**(a)**	Briefly explain Net Positive Suction Head (NPSH).	**03**
	(b)	Explain construction and working of double acting reciprocating pump.	**04**
	(c)	Write a short note on construction and working of Pelton wheel turbine with neat sketch	**07**
		OR	
Q.3	**(a)**	Write classification of turbines.	**03**
	(b)	Define unit speed, unit power and unit discharge in case of turbine.	**04**
	(c)	Explain with a neat sketch the components of centrifugal pump.	**07**
Q.4	**(a)**	Explain simple vapour compression refrigeration system with neat sketch.	**03**
	(b)	Define dry air, Relative humidity, dry bulb temperature and dew point depression.	**04**
	(c)	Derive the expression for thermal efficiency of Rankine cycle.	**07**
		OR	
Q.4	**(a)**	What are the main components of simple gas turbine plants?	**03**
	(b)	What is refrigerant? What are the desirable properties of refrigerant?	**04**
	(c)	Explain the working of a simple air cooling system used for air craft.	**07**
Q.5	**(a)**	Explain newton's law of viscosity.	**03**
	(b)	Explain U-tube manometer.	**04**
	(c)	A clean glass tube of 2.5 mm internal Diameter is immersed in mercury (specific gravity=13.6). Determine the level of mercury in the tube in relation to the free surface of mercury outside the tube. Presume that for mercury –clean glass angle of contact $\theta = 130^0$ and for air-mercury interface surface tension $\sigma = 0.48$ N/m.	**07**
		OR	
Q.5	**(a)**	Define density, dynamic viscosity and surface tension.	**03**
	(b)	State and derive Bernoulli's equation. Also write assumption made in it.	**04**
	(c)	Derive the equation to measure the quantity of water flowing through a venturimeter.	**07**

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