

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

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|------------|--|-----------|
| 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 |
