

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) EXAMINATION – SUMMER 2024****Subject Code:3132504****Date:29-06-2024****Subject Name: Basic and Applied Thermodynamics****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.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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|------------|---|-----------|
| Q.1 | (a) Define thermodynamics. What is Applied Thermodynamics? | 03 |
| | (b) Give any four comparison between microscopic approach and macroscopic approach of thermodynamics. | 04 |
| | (c) Identify the difference between (i) Open system and closed system (ii) System and surrounding | 07 |
| Q.2 | (a) State the first law of thermodynamics. | 03 |
| | (b) What do you mean by PMM1? | 04 |
| | (c) Gas enters a nozzle at 15 bar and 1500k with a velocity of 30 m/s. The pressure at the exit of nozzle is 5 bar. If the nozzle efficiency is 90%, calculate the actual exit velocity. Neglect changes in P.E.and heat exchange between nozzle and surrounding. Take $C_p = 1.005 \text{ KJ/Kg K}$ | 07 |
| | OR | |
| | (c) Give kelvin-plank statement and clausius statement for the 2 nd law of thermodynamics. Also explain PMM2. | 07 |
| Q.3 | (a) Differentiate between open cycle and closed cycle of gas turbine. | 03 |
| | (b) In an otto cycle the temperature at the beginning and end of the isentropic compression are 316 K and 595 K respectively. Determine the air standard efficiency and compression ratio. | 04 |
| | (c) Show rankine cycle on p-v and T-s diagram and explain the processes involved. Also show the mechanical system to show different processes of rankine cycle. | 07 |
| | OR | |
| Q.3 | (a) What are the limitations of carnot cycle? | 03 |
| | (b) Draw and explain simple brayton cycle. | 04 |
| | (c) Write comparison of otto, diesel and dual cycle. | 07 |
| Q.4 | (a) Briefly explain about bell coleman cycle. | 03 |
| | (b) Define (i) C.O.P and (ii) Tonne of refrigeration | 04 |
| | (c) Draw and explain simple vapour compression cycle of refrigeration. | 07 |
| | OR | |
| Q.4 | (a) What is compounding of steam turbine. | 03 |
| | (b) Give a difference between impulse and reaction type of steam turbine. | 04 |
| | (c) What is governing of steam turbine? Explain various methods of governing a steam turbine. | 07 |
| Q.5 | (a) State zeroth law of thermodynamics. | 03 |
| | (b) What are the limitations of first law of thermodynamics? | 04 |
| | (c) Explain throttling process. Apply steady flow energy equation and prove that enthalpy of fluid remains constant during throttling process. | 07 |

OR

- Q.5** (a) Define optimum pressure ratio in actual Bryton cycle **03**
(b) The engine working on ideal otto cycle. The temperature at the beginning and the end of compression is 60°C and 450°C. Determine the standard efficiency and compression ratio. **04**
(c) Write a short note on entropy. **07**
