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Question Paper Code: 34721

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Fourth Semester

Electronics and Instrumentation Engineering

(Common to Instrumentation and Control Engineering)

01UME421 – THERMODYNAMICS AND FLUID MECHANICS

(Use of steam tables is permitted)

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Define system and surrounding.
2. State second law of thermodynamics.
3. What are the assumptions made in analysis of air standard cycles?
4. Why Carnot cycle cannot be realized in practice for vapour power cycles?
5. Give two merits of rotary compressor over reciprocating compressor.
6. State the substances used in the lithium bromide system and their functions.
7. What is meant by capillarity?
8. What are mechanical Gauges? Give two examples.
9. What is the application of Moody's diagram?
10. What factors are accounts for the energy loss in Laminar flow?

11. (a) Derive the expression for steady flow energy equation and explain the application of steady flow energy equation to various engineering systems. (16)

Or

- (b) A turbine operates under steady flow conditions, receiving steam at the following state: Pressure 1.2 MPa, temperature 188°C, enthalpy 2785 kJ/kg, velocity 33.3 m/s and elevation 3 m. The steam leaves the turbine at the following state: Pressure 20 kPa, enthalpy 2512 kJ/kg, velocity 100 m/s, and elevation 0 m. Heat is lost to the surroundings at the rate of 0.29 kJ/s. If the rate of steam flow through the turbine is 0.42 kg/s, what is the power output of the turbine in kW. (16)

12. (a) (i) Write any four major differences between Otto and Diesel cycle. (6)
(ii) Derive the expression for efficiency of regeneration Brayton cycle. (10)

Or

- (b) A steam turbine plant working on a single stage of regenerative feed heating receive steam at 30 bar and 300°C, the turbine exhausts to a condenser at 0.15 bar, while the bled steam is at 3 bar. Assuming that the cycle uses actual regenerative cycle. Calculate the thermal efficiency of cycle. Compare this value with a Rankine cycle operating between same boiler and condenser pressures. (16)

13. (a) Describe the working of summer air conditioning system suitable for hot and wet weather and for hot and dry weather with simple component diagrams. (16)

Or

- (b) (i) With a sketch, explain the working of a vapour compression refrigeration system. (8)
(ii) Discuss the requirement of a summer air conditioning system. Draw a schematic of the same. (8)

14. (a) Explain the working principle of Diaphragm pressure gauge. (16)

Or

- (b) (i) Explain the working principle of Diaphragm pressure gauge. (8)
(ii) Explain different types of U- tube manometers to measure the pressure at a point with neat sketch. (8)

15. (a) Derive the Hagen-Poiseuille equation for laminar flow through a round pipe and state the assumptions made. (16)

Or

- (b) (i) Explain in detail about Turbulent Boundary layer. (10)
(ii) Write short notes on Moody's diagram. (6)

