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 **Reg. No. :**

**Question Paper Code: 44070**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fourth Semester

Electronics and Instrumentation Engineering

14UME421 - THERMODYNAMICS AND FLUID MECHANICS

(Common to Instrumentation and Control Engineering)

 (Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. A closed system is one in which

(a) Mass does not cross the boundaries of the system, though energy may do so (b) Mass crosses the boundary but not the energy

(c) Neither mass nor energy crosses the boundaries of the system

(d) Both energy and mass cross the boundaries of the system

2. For any irreversible process the net entropy change is

(a) Zero (b) Positive (c) Negative (d) Unity

3. Otto cycle consist of following 4 processes

 (a) 2 isothermal and 2 isentropic (b) 2 isentropic and 2 constant volume cycles

 (c) 2 isentropic , 1 constant volume and 1 constant pressure (d) 2 isentropic and 2 constant pressures

4. The behaviour of super-heated vapour is similar to that of

 (a) Perfect gas (b) Air (c) Steam (d) Ordinary gas

5. Air conditioning means

(a) Cooling (b) Heating (c) Dehumidifying (d) All the above

6. 1 micron is equivalent to

 (a) 10-2 cm (b) 10-4 cm (c) 10-2mm (d) 10-3cm

7. Mercury does not wet glass. This is due to the property of liquid known as

 (a) Adhesion (b) Cohesion (c) Surface tension (d) Viscosity

8. The property that most determines whether an object will float or not in oil is the object's

 (a) Weight (b) Density (c) Mass (d) Volume

9. Bernoulli’s equation deals with the law of conservation of energy

(a) Mass (b) Momentum (c) Energy  (d) Force

10. The flow is laminar when Reynolds number is

 (a) Less than 4000 (b) More than 4000 (c) Less than 2000 (d) More than 2000

 PART - B (5 x 2 = 10 Marks)

11. Define thermodynamic system. What are the different types of systems?

12. Sketch the p-v and T-s diagram of Dual combustion cycle.

13. Define ton of refrigeration.

14. Define Capillarity

15. Explain the significance of Moody diagram.

 PART - C (5 x 16 = 80 Marks)

16. (a) (i) Differentiate between point and path functions. State whether heat and work

are point or path functions and justify your answer. (8)

 (ii) Prove that First law of thermodynamics describes energy of the system. (8)

Or

(b) State and prove Carnot theorem. (16)

17. (a) With the help of a neat layout explain the working principle of a steam power plant. (16) Or

 (b) Derive an expression for air standard efficiency of diesel cycle with p-v and T-s diagram. (16)

18. (a) (i) Explain the effect of clearance volume on the volumetric efficiency of air

compressor with proper diagrams and derivation. (8)

(ii) Evaluate the conditions for perfect inter cooling of reciprocating compressor.

 (8)

 Or

 (b) With the help of a neat sketch, explain the working principle of vapour compression refrigeration system. (16)

19. (a) (i) Define viscosity and derive an expression for dynamic viscosity describing

the law governing the concept of viscosity. (6)

 (ii) State and prove Pascal’s law. (10)

Or

(b) State and prove Pascal’s law. (16)

20. (a) Derive the Darcy – Weisbach equation. (16)

Or

(b) Formulate the theorem which provides the basics for the working of venture meter and orifice meter mentioning the assumptions made and their limitations, if any. (16)