Reg. No. : | | | | | | | | | | |

Question Paper Code: 34070

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

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. Give the Kelvin Planck's statement of Second law of Thermodynamics.
2. State zeroth law and first law of thermodynamics.
3. Define: Mean effective pressure.
4. State the effect of reheating on Rankine cycle.
5. Mention the important application of compressed air.
6. Define: Specific humidity and Relative humidity.
7. What is meant by capillarity?
8. What are mechanical Gauges? Give two examples.
9. State the limitations of Bernoulli's theorem.
10. What factors are accounts for the energy loss in Laminar flow?

PART - B (5 x 16 = 80 Marks)

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 house hold refrigerator is maintained at a temperature of 275 *K*. Every time the door is opened, warm material is placed inside. Introducing an average of 420 *kJ*, but making only a small change in the temperature of the refrigerator. The door is opened 20 times a day and the refrigerator operates at 15 *%* of the ideal COP. The cost of the work is *Rs.* 2.50 *per kWh*. What is the electricity bill for the month of April for this refrigerator? The atmosphere is 303 *K*. (16)

12. (a) Drive an expression for the mean effective pressure of an Otto cycle. (16)

Or

(b) With neat sketch, explain the layout and working principle of a steam power plant. (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) A single stage double acting air compressor takes air at 0.98 *bar* and 32 *ºC* and delivers at 6.32 *bar*. The clearance is 5 *%* of the stroke volume. Te compression and expansion follow the law $PV^{1.32} = C$. The air handled by the compressor is 17 m^3 */min*. When measured at 1 *bar* and 15 *ºC*. Determine the temperature of air delivered, stroke volume and Indicated power of compressor in *kW*, if it runs at 500 *rpm*. Neglect the area of the piston rod and Take $R = 0.287$ *kJ / kg K*. (16)

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

Or

(b) Explain different types of U- tube manometers to measure the pressure at a point with neat sketch. (16)

15. (a) Derive an expression for head loss through pipes due to friction. (16)

Or

(b) State Bernoulli theorem for steady flow of an incompressible fluid. Derive an expression for Bernoulli equation and state the assumptions made. (16)

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