Reg. No. : ☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 34721

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

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. What do you understand by pure substance?

2. Explain Chemical equilibrium.

3. Define Quality of steam.

4. What is the use of superheater in a boiler?

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. What are eddies and vena contracta in pipe minor losses?

10. State the effect of boundary layer separation.

PART - B (5 x 16 = 80 Marks)

11. (a) An engine of 250 *mm* bore and 375 *mm* stroke works on Otto cycle. The clearance volume is 0.00263 *m³*. The initial pressure and temperature are 1 *bar* and 50°*C*. If the

    (i) The air standard efficiency of the cycle.

    (ii) The mean effective pressure for the cycle. Assume the ideal conditions. (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) 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) 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)

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

Or

(b) If a differential U-tube manometer, the glass tubing of various diameters is used to measure pressure. The diameters of glass tubes are *3 mm* and *4 mm*. The manometer is used to measure readings in the range of *30 mm* to *120 mm*. Calculate the percentage of error that can creep in the highest and lowest readings. Take $\sigma = 0.072$ *N/m and β= 0.* (16)

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

<div align="center">Or</div>

    (b) (i) Explain in detail about Turbulent Boundary layer.   (10)

       (ii) Write short notes on Moody's diagram.   (6)

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