Hall Ticket Number :										

R-14

Code: 4G561

III B.Tech. II Semester Supplementary Examinations May 2019

Instrumentation and Control Systems

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Sketch and explain with a block diagram generalized measurement system and its elements with an example. 7M

   b) How errors are classified? Explain how errors can be reduced. 7M

OR

2. a) Sketch and explain Linear Variable Differential Transformer with a neat sketch 7M

   b) Sketch and explain Photo electric transducer. 7M

UNIT–II

3. a) Explain the working principle of McLeod pressure gauge. State advantages and disadvantages of McLeod pressure gauge 10M

   b) Explain working principle of thermocouples. 4M

OR

4. a) Explain the working of liquid in glass thermometers by means of neat sketch. List their advantages and disadvantages. 7M

   b) Explain the following vacuum gauges **i**) Thermocouple type thermal conductivity gauge and **ii**) Pirani gauge 7M

UNIT–III

5. a) How does a mechanical load cell work? Explain the principle of measuring shaft torque using strain gauge torsion meter? 7M

   b) Explain the function of a dummy gauge in a strain gauge load cell. 7M

OR

6. a) Explain the construction, principle of working and advantages of Strain gauge accelerometer. 7M

   b) Explain the following i) Hydraulic load cell ii) Strain gauge load cell 7M

UNIT–IV

7. a) Explain the two-arm and four-arm conditions used for strain measurements? 7M

   b) Describe the working principles of strain gauge bridge with sketch. Indicate their arrangements for measurement of torque on a circular shaft. 7M

OR

8. a) Explain one method of temperature compensation using an adjacent arm compensating gauge. 7M

   b) Explain any two methods of compensating temperatures for electrical resistance strain gauge. 7M

UNIT–V

9. a) What is closed loop system? Explain the various elements of it with a block diagram. 10M

   b) Distinguish between open-loop and closed loop control system. 4M

OR

10. a) With the help of block diagram explain how is the water level in a boiler controlled? 8M

    b) What is a servo mechanism? Explain its operation. 6M

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R-14

Code: 4G564

III B.Tech. II Semester Supplementary Examinations May 2019

Applied Thermodynamics-III

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

Use of refrigeration table is allowed

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UNIT–I

1. In a gas turbine cycle, having pressure ratio 4.0, air enters the compressor at 1.01 bar and 30°C. The isentropic efficiencies of compressor and turbine are 80% and 85% respectively. The A:F ratio is 75:1. Air flow rate is 2.5 kg/s. Assuming the values of ratio of specific heats and specific heat at constant pressure for air 1.4 and 1.0 respectively and CV of fuel 42.0 MJ/kg, Calculate the IP and the thermal efficiency of the cycle. 14M

OR

2. Draw a schematic diagram of turbo jet engine and explain its working principle. Briefly discuss the advantages and disadvantages of a turbo jet engine. 14M

UNIT–II

3. A R-22 vapour compression refrigeration system of 3 TR capacity works within a pressure range of 0.25 MPa to 1.5 MPa. The refrigerant vapour enters the compressor at -5°C and leaves the condenser at 35°C. Calculate a) COP, b) swept volume of the compressor, assuming 80% volumetric efficiency, if the compressor runs at 600 rpm. 14M

OR

4. a) Explain why we need air conditioning in an aircraft. With a neat sketch explain the working principle of an aircraft refrigeration system. 10M

   b) Discuss how does the actual air refrigeration cycle deviate from ideal one. 4M

UNIT–III

5. Draw a neat sketch of a vapour absorption refrigeration system working on NH_3 – H_2O as the working fluid and write its working principle. 14M

OR

6. Discuss (with neat sketch) the working principle of a three-fluid refrigeration system. What is the role of the third fluid (inert gas) used. Why this system has not yet been commercialized. 14M

UNIT–IV

7. A sample of moist air at atmospheric pressure of 736 mm of Mercury has dbt 40°C and relative humidity 80%. Find the specific humidity, degree of saturation, dew point temperature, specific enthalpy and specific volume. 14M

OR

8. a) Write a brief note on classification of air conditioner. 7M

   b) Differentiate between RSHF and GSHF. Show these lines on a psychrometric chart. 7M

UNIT–V

9. a) With the aid of simple sketch, explain the working of any one type of air filter. 7M

   b) What is chemical dehumidifying process? Explain the process on a psychrometric chart. What are the dehumidifying materials used for the process. 7M

OR

10. a) Explain the working of any one of the atomizing the water type humidifier. 7M

    b) What is a heat pump? Write the working principle of a heat pump. Discuss some of its application. 7M

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