Exam.Code:0941
Sub. Code: 6724

2063
B.E. (Mechanical Engineering)
Fifth Semester
MEC-504: Mechanical Measurement

Time allowed: 3 Hours Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.

x-x-x

Q1. (a) Briefly describe hydrogen bubble technique used for flow visualisation.

(b) A Wheatstone bridge requires a change of 7Ω in the unknown arm of the bridge to produce a change in deflection of 3 mm of the galvanometer. Determine its sensitivity.

(c) Distinguish between steady state response and transient response.

(d) How Does a Scanning Probe Microscope work?

(e) A liquid in glass thermometer is seen to dip by few degrees before rising when thrust into a hot fluid. Explain the cause of this effect.

(2×5 = 10 Marks)

PART-A

Q2. (a) Define measurement. What are primary, secondary and tertiary measurements? Explain with examples. (4 Marks)

(b) Define linearity? Briefly describe various forms of linearity. (2 Marks)

(c) Give some possible reasons for preferring electrical/electronic techniques of measurement. What are advantages of such measurement systems over mechanical systems? (4 Marks)

Q3. (a) What is propagation in uncertainty? Write the precautions to be observed for minimizing error in designing experiments. (5 Marks)

(b) A laboratory experiment is to be conducted to measure viscosity of given oil. A series of tests gives the values as 5.30×10^{-3}, 5.73×10^{-3}, 6.77×10^{-3}, 5.26×10^{-3}, 4.33×10^{-3}, 5.45×10^{-3}, 6.09×10^{-3}, 5.64×10^{-3}, 5.81×10^{-3} and 5.75×10^{-3} m^2/s. Point out any reading that can be rejected by applying Chauvenet's Criterion. The ratio for maximum deviation to standard deviation should not exceed **1.96.** (5 Marks)

Q4. (a) On which principle photoelectric transducers work? Describe photo emissive cell and photo conductive cell with the help of neat sketches. (5 Marks)

(b) Differentiate between bonded and unbonded strain gauges. Write the applications of strain gauges for direct, bending and torsional loads. (5 Marks)

PART-B

Q5. (a) Explain the principle of operation of Ultrasonic flow meter & hot wire anemometer. (6 marks)

(b) Discuss the working of a McLeod gauge with a neat sketch. (4 Marks)

Q6. (a) Sketch a typical optical pyrometer and describe its working with the help of neat sketch. List its field of application, advantages and disadvantages. (5 Marks)

(b) Describe the working of a pressure thermometer with the help of a schematic diagram. (5 marks)

Q7. (a) What is function of dynamometer? Explain construction and working of rope brake dynamometer with the help of neat sketch. (4 Marks)

(b) How Does a Scanning Probe Microscope work? (2 Marks)

(c) What do you mean by Clean Room Technology? Briefly describe various cleanroom standards. (4 Marks)

x-x-x