Exam.Code:0941
Sub. Code: 6724

2074
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) Differentiate between the active and passive transducers.
(b) Distinguish between deflection and null-type instruments. Write Examples also.
(c) Define bias uncertainty. What are various factors leading to bias uncertainty?
(d) Briefly discuss the 'Barometric effect' phenomenon in filled systems.
(e) Distinguish between the absorption and transmission dynamometers. Write examples also.
(2×5 = 10 Marks)

PART-A

Q2. (a) What do mean by standard? Describe primary, secondary, and working standards. (5 Marks)
(b) "The measurement of the speed of a rotating shaft using an electrical tachometer is a typical example of tertiary measurement". Do you agree with this statement? If so, why? (5 Marks)

Q3. (a) Define sensitivity. Would you prefer sensitivity to be low or high for an instrument? A Wheatstone bridge requires a change of 8 ohms in the unknown arm of the bridge to produce a 2.5-ohm change in the deflection of the galvanometer. Determine the bridge sensitivity. (5 Marks)
(b) A machine shop was assigned the task to manufacture 20000 steel rods of nominal length of 15 mm, the rod length was stipulated neither to exceed 15.25 mm and not be smaller than 14.5 mm. When inspected for quality control, it was found that 2000 of the rods were too long to fit into a gauge set at 15.25 mm. Predict the number of remaining 18000 rods that will conform to the specifications. Presume that the measurement data conforms to the Gaussian normal distribution curve. Taking $z = 1.3$ for a probability of $P(z) = 0.4$. (5 Marks)

Q4. (a) Define gauge factor in strain gauges. Write the formula to determine the gauge factor. Which value of the gauge factor (lower or higher) is desirable? Give reason. (4 Marks)
(b) Explain the construction and working of the inductance and capacitive pickups. (6 Marks)

PART-B

Q5. (a) List various flow meters and explain the working of the Electromagnetic flow meter. (5 marks)
(b) Describe the construction and working of the dead weight pressure gauge. Discuss various factors affecting the accuracy of dead weight testers. (5 marks)

Q6. (a) How a resistance thermometer is used to measure temperature? Write its advantages and limitations over thermocouples. (5 Marks)
(b) Describe the construction & working of Eddy's current dynamometer with the help of a neat sketch. (5 Marks)

Q7. (a) Describe the principle of working of a stroboscope used for speed measurement with the help of a neat sketch. (5 Marks)
(b) How a proving ring is used to determine the applied force. Describe this with the help of a neat sketch. (5 Marks)

x-x-x