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Third Semester B.E. Degree Examination, July/August 2022 Transducers and Instrumentation

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define measurement and instrument. Discuss the unique features and advantages of electronic instruments. (10 Marks)
- b. Discuss the applications of measurement systems with necessary examples and diagrams. (10 Marks)

OR

- 2 a. With a block diagram, explain the elements of a generalized measurement system. (10 Marks)
- b. Discuss the method of high gain feedback for the correction of modifying inputs with diagrams and equations. (10 Marks)

Module-2

- 3 a. Define static calibration and mention its importance. Explain the importance of error calibration curve with a diagram. (06 Marks)
- b. Define and explain the importance of following static characteristics with necessary graphs and equations : i) Sensitivity ii) Linearity iii) Hysteresis. (10 Marks)
- c. An ammeter is calibrated in the range of 5amps to 10 amps. For an input ammeter reads 6.7amps and the true value of current is 6.54 amps. Determine: i) Instrument span ii) Static error iii) Static correction iv) Relative error in %. (04 Marks)

OR

- 4 a. Define all the dynamic characteristics of measurement system. (04 Marks)
- b. Explain the following standard test signals with definition, equation, graph and Laplace transform. i) Step input ii) Ramp input. (08 Marks)
- c. Discuss the response of a first order system to unit step input. (08 Marks)

Module-3

- 5 a. With a schematic diagram, circuit diagram, and equations explain the construction, working, advantages and disadvantages of variable resistance potentiometric displacement transducer. (10 Marks)
- b. Define Hall effect. Derive an equation for Hall potential. With a schematic diagram explain the working of Hall effect angular displacement transducer. (10 Marks)

OR

- 6 a. Describe the principle, construction and working of single point conductivity switch for the measurement of liquid level. (10 Marks)
- b. With a schematic diagram, explain the working of on-off transmitter type ultrasonic level switches. (10 Marks)

Module-4

- 7 a. Discuss the theory of operation of resistance strain gauges and derive an equation for gauge factor in terms of Poisson's ratio. (10 Marks)
- b. Explain the working of Four-arm active Wheatstone bridge and derive the output voltage equations for all bridge, half bridge and quarter bridge. (10 Marks)

OR

- 8 a. With a schematic diagram and necessary equations explain the construction and working of proving ring type load cell. (10 Marks)
- b. Define torque, with schematic diagrams; explain deflection type torque measurement systems. (10 Marks)

Module-5

- 9 a. Draw the neat diagrams of various elastic elements for pressure measurement and explain their principle of working. (10 Marks)
- b. Explain the need and working of pressure multiplexer with a schematic diagram. (10 Marks)

OR

- 10 a. With diagrams, explain the principles of operation of different types of microphones for the measurement of noise. (12 Marks)
- b. Discuss the principles and working of non-contacting gauges for thickness measurement. (08 Marks)

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