

**Code No: 154BC****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech II Year II Semester Examinations, July/August - 2021****INSTRUMENTATION AND CONTROL SYSTEMS****(Mechanical Engineering)****Time: 3 Hours****Max. Marks: 75****Answer any five questions****All questions carry equal marks**

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- 1.a) Explain with a neat schematic the functions of various elements of a generalized measurement system.
- b) Explain the sources of errors in measurement systems and discuss their classification and elimination. [7+8]
- 2.a) Describe the principle, construction and working of Inductive and capacitive transducers with neat sketches.
- b) Explain the theory, construction, working and applications of piezoelectric transducers. [8+7]
- 3.a) Explain the construction and working of expansion type bimetallic strip and discuss various sources of errors in it and suggest methods for their elimination.
- b) State the laws of thermoelectricity and describe with a neat sketch the construction and working of Industrial thermocouple thermometer. [7+8]
- 4.a) Explain the measurement of pressure using liquid column manometers and Bourdon tube pressure gauges with neat sketches.
- b) Explain the principle, construction and working of thermal conductivity and Ionization type vacuum gauges with help of neat diagrams. Mention their ranges of measurement. [7+8]
- 5.a) Explain the methods for measurement of liquid level in open vessels and pressurised vessels with typical sketches.
- b) Explain the construction and principle of working of Hot wire anemometer with a neat Sketch. [7+8]
- 6.a) Explain with neat sketches the working of electric tachometer type and stroboscopic type speed measurement techniques.
- b) Describe the theory of general purpose accelerometers and explain the construction and working of Piezoelectric accelerometer. [8+7]
- 7.a) Explain the principle and working of strain gauges and derive the expression for gauge factor. Describe the use of strain gauge for measuring torque with a neat sketch.
- b) Explain with neat sketch the measurement of force using hydraulic and pneumatic load cells. [8+7]
- 8.a) Explain with help of block diagrams the working of open loop and closed loop control systems and compare their performance.
- b) What is transfer function of a measurement system? Derive the transfer function of a second order mechanical system for unit step input with a typical example. [7+8]

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