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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