

Con. 5008-07.

CD-7098

(REVISED COURSE)

(3 Hours)

[Total Marks : 100

N.B. (1) Question No. 1 is compulsory.

(2) Attempt any four questions out of remaining questions.

(3) Draw Neat Technical Figures and Block Diagrams and Circuit Diagrams.

1. (a) Explain the sample and hold Amplifier with Block and Circuit diagram, and Timing diagram for sample state, sample to Hold State, Hold-state and Hold to sample state. 5
- (b) Explain the 4-Op-Amp type Instrumentation Amplifier and compare it with 3-Op-Amp I.A. version. Derive the equation of Gain for 4-Op-Amp type Instrumentation Amplifier. 5
- (c) Explain the operating principles of photo-conductive cell, photo-voltaic cell, and photo-emissive cells. Also state their Applications in industrial applications. 5
- (d) Explain the 3-wire and 4-wire, 2-wire type PT-100-temperature measurement probes/transducers. Also explain this comparisons. 5
2. Explain the weather monitoring type Data Aquisition System on the following guidelines 20
 - * Types of weather parameters to be monitored
 - * Suitable sensors/Transducers for that weather parameters
 - * Analog/Digital Signal/Information Processing module.
 - * Out-put module in the form of Recording, Storing and Communicating Methodology.
3. (a) Explain the need of Isolators in Analog Digital Circuits. Give the different methods of Isolator used in signal processing/Amplifications. Also state the comparison of 2-port, and 3-port Isolation Technology with functional diagrams. 20
- (b) (1) Explain the seebede and peltier effects in the thermocouples type temperature measurements.
- (2) Explain the 5-laws of Thermo-couples types temperature Transducers.
4. (a) Explain the following types of displacement transducers : 20
 - * Incremental type for Angular and Linear Displacements.
 - * Encoded type for Angular and Linear Displacements.Also explain how the DIRECTION and MAGNITUDE of DISPLACEMENT Quantifier are generated for the user.
- (b) Explain both types of ultrasonic type flow-measurement methods with constructional and mathematical and also the circuit/block diagram type technical support.
5. (a) Explain the Binary-Weigted and R-2R Weighted type D/A – convertors. Give their mathematical relationships between Digital I/P and output Analog value. Also compare their qualities for D/A conversions. 20
- (b) Explain the Quad-slope-Integrating convertor type A/D. Convertor with following things :
 - * Timing Diagram—for all 4-phases
 - * Comparison with Dual slop type A/D-convertor
 - * Block/Circuit diagram for Quad-slope A/D-convertor.

6. (a) Define the following terms : 20
- * Gauge pressure
 - * Absolute pressure
 - * Differential pressure
 - * Static pressure
 - * Velocity pressure.
- (b) Explain the following types of strain Gauges :
- * Wire type
 - * Foil type
 - * Semi-conductor type
7. (a) Explain the different methods of Torque measurements. Give their constructional diagrams with working principles. 20
- (b) What is LVDT and RVDT ? Explain what are the parameters those can be measured with this. Give their out-put characteristics with constructional details. Explain how Direction and Magnitude of displacement are monitored/measured.
8. (a) Explain the following types of proximity s/w (any **two**) :— 20
- * Ultrasonic-Echo-type proximity s/w
 - * Inductive-proximity s/w.
 - * Retro-Reflective optical proximity s/w.
- Give the constructional diagram, electrical block /circuit diagram also give the connector pin, Specifications and on prx-switch adjustment controls.
- (b) Explain the mechanical pressure transducers of following types. (any **two**) :—
- * Bourdon-tubes
 - * Inductive Differential Pressure Transducers
 - * Solid-state crystal type pressure Transducers.

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Students' are requested to solve any question of Instrumentation System subject in the following format :—

- (i) *Circuit-Diagram and/or Block—Diagram of the asked system/problem.*
- (ii) *Working principle and/or Explanation, of the asked system/problem.*
- (iii) *Timing—Diagram and/or Flow—Diagram and/or Mathematical Treatment (Formula Derivation) for the system/problem.*
- (iv) *Applications and/or users and/or specifications of the above explained systgem.*