

# 17435

**21415**

**3 Hours / 100 Marks**

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
  - (8) Preferably, write the answers in sequential order.

**Marks**

**1. a) Attempt any SIX of the following:**

**12**

- (i) Define transducer. State two examples of it.
- (ii) Distinguish between Accuracy and Precision. (On the basis of any two factors)
- (iii) State any four applications of Digital Storage Oscilloscope.
- (iv) Define “Flow” and “Temperature”.
- (v) State the function of Delay line.
- (vi) Define signal generator.
- (vii) Define primary and secondary transducer.
- (viii) Give examples of any two materials used for Piezoelectric transducers.

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b) **Attempt any TWO of the following:****8**

- (i) Explain the working principle of capacitive transducer with suitable diagram.
- (ii) The expected value of voltage across a resistor is 80 V. However the measurement gives a value of 79 V. Calculate the absolute error and percentage error of the measurement.
- (iii) Draw construction of the PMMC instrument and explain its working principle.

**2. Attempt any FOUR of the following:****16**

- a) Draw the block diagram of basic CRO and explain its working.
- b) Explain Seebeck effect and Peltier effect.
- c) Draw neat diagram of three-wire RTD circuit.
- d) A 1 mA meter movement with an internal resistance of  $100\Omega$  is to be converted in to 0–100 mA. Calculate the value of shunt resistance required.
- e) State four applications of function generator.
- f) Draw the block diagram of digital multimeter and explain its working.

**3. Attempt any FOUR of the following:****16**

- a) List any four specifications of analog D.C. ammeter and analog D.C. voltmeter.
- b) Draw labelled block diagram of video pattern generator.
- c) State any four advantages and four disadvantages of digital instruments.
- d) Explain how phase can be measured on CRO using Lissajous figure.
- e) Explain with neat diagram the working principle of time difference type ultrasonic flow meter.
- f) Draw a neat labelled diagram of Digital Storage Oscilloscope.

**4. Attempt any FOUR of the following:****16**

- a) State the meaning of time domain and frequency domain instrument. State one example of each.
- b) Differentiate logic analyzer and spectrum analyzer. (On the basis of any four factors).
- c) Draw the block diagram of single beam dual trace CRO and explain its operation.
- d) Draw the block diagram of AF sine and square wave generator and explain its operation.
- e) Illustrate the working of LVDT as a displacement transducer with the help of diagram.
- f) Draw the block diagram of instrumentation system and state function of each block.

**5. Attempt any FOUR of the following:****16**

- a) Differentiate between RTD and thermocouple (On the basis of any four factors)
- b) Define waveform analyzer and state any four applications of wave analyzer.
- c) Draw block diagram of frequency selective wave analyzer and state the function of each block.
- d) Draw the schematic diagram of electromagnetic flow meter and describe its working.
- e) List any four types of thermocouples, its material and its temperature range.
- f) Differentiate between Active and Passive transducer. (On the basis of any two factors)

**6. Attempt any FOUR of the following:****16**

- a) Illustrate the working principle of Digital Frequency Meter with the help of neat schematic diagram.
  - b) Draw the circuit of basic Q-meter and explain its working.
  - c) Distinguish between single beam dual trace CRO and dual beam CRO. (On the basis of any four factors)
  - d) Name the four dynamic characteristics of instrument and define any two.
  - e) Draw the circuit of D.C. voltmeter and explain its working.
  - f) The current resistor is 3 A. But the measurement yields value of 2.9 A. Calculate the relative accuracy and percentage accuracy.
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