

17435

16172

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.

Marks

1. (A) Attempt any SIX :

12

- (a) Define the terms active and passive transducer.
- (b) Explain zero and span drift.
- (c) State function of delay line in CRO.
- (d) List four units of temperature measurement.
- (e) State any four applications of CRO.
- (f) Define wave analyzer. State any two wave analyzers.
- (g) Define resistive transducer. State any two examples.
- (h) Explain the principle of piezoelectric transducer.

(B) Attempt any TWO :

8

- (a) Explain analog and digital transducer with the help of suitable examples.
- (b) If a moving coil voltmeter gives 30° displacement for 3 V input voltage. Calculate the sensitivity of voltmeter. If minimum measurable displacement is 1° calculate its resolution.
- (c) Draw a neat labelled diagram of half wave AC voltmeter. Explain its working.

2. Attempt any FOUR :**16**

- (a) Draw a block diagram of DSO.
- (b) Explain principle of time difference type ultrasonic flowmeter with neat labelled diagram.
- (c) Distinguish between RTD and thermocouple on the basis of following factors :
 - (i) Principle of operation
 - (ii) Operating range
 - (iii) Linearity
 - (iv) Materials used
- (d) A permanent magnet moving coil instrument has a coil of dimensions $15 \text{ mm} \times 12 \text{ mm}$. The flux density in the air gap is $1.8 \times 10^{-3} \text{ Wb/m}^2$ and the spring constant is $0.14 \times 10^{-6} \text{ Nm/rad}$. Determine the number of turns required to produce an angular deflection of 90° when a current of 5 mA is flowing through the coil.
- (e) List four signal generators. Also state one function of each.
- (f) Draw a block diagram of LCR-Q meter. State its principle.

3. Attempt any FOUR :**16**

- (a) List any four specifications of analog voltmeter and ammeter each.
- (b) Draw a block diagram of spectrum analyzer. Explain its working.
- (c) State advantages of digital instruments over analog.
- (d) Describe the waveform generation technique in CRO.
- (e) State advantages and disadvantages of electromagnetic flowmeter (two each).
- (f) Explain time and frequency measurement with the help of CRO.

4. Attempt any FOUR :**16**

- (a) Draw a block diagram of function generator.
- (b) Differentiate between logic analyzer and wave analyzer. (any four points).
- (c) Draw a block diagram of single beam dual trace CRO. Explain alternate and chop mode.
- (d) Draw test patterns generated by pattern generator. State importance of test pattern.
- (e) Suggest a transducer to measure tank level. Explain with neat labelled diagram.
- (f) State any four applications of LVDT.

5. Attempt any FOUR :**16**

- (a) Thermocouple is best suitable temperature transducer for higher temperature range upto 2000 °C. Illustrate.
- (b) State applications of spectrum analyzer.
- (c) Draw a block diagram of pulse generator. Explain function of upper and lower current source.
- (d) Differentiate J, K, R and S thermocouples on the basis of material used and temperature range.
- (e) State classification of temperature transducer.
- (f) With neat labelled diagram explain piezoelectric transducer for vibration measurement.

P.T.O.

6. Attempt any FOUR :**16**

- (a) Illustrate the concept of autoranging in DMM.
- (b) Explain SAR type DVM with neat diagram.
- (c) Describe phase measurement using Lissajous patterns on CRO.
- (d) State SI units of following quantities :
 - (i) Thermodynamic temperature
 - (ii) Luminous intensity
 - (iii) Amount of substance
 - (iv) Plane angle
- (e) Draw universal shunt type multirange Ammeter. Derive equation for all three positions.
- (f) The following table gives a set of 7 measurements. Calculate the precision of third measurement.

Sr. No.	Measurements X_n
1.	12
2.	18
3.	15
4.	14
5.	13
6.	15
7.	17
