

QP Code: S0125

3 Hours

[Total Marks: 75]

**N.B: 1) All questions are compulsory.****2) Draw neat diagrams wherever necessary.****3) Figures to the right indicate full marks.****4) Use of log table or non-programmable calculator is permitted.****A) Attempt any one****8M**

1. Discuss the thermal and electrical characteristics of a thermistor.
2. Write notes on
  - a. Seven Segment Display.
  - b. LED

**B) Attempt any one****7M**

1. Write note on Construction and working of a thermocouple.
2. Explain load cell with neat diagram. Where is it used?

**A) Attempt any one****8M**

1. With the help of neat circuit diagram of CRT connection explain the following CRT controls i) Focus ii) Intensity iii) Astigmatism iv) Vertical and Horizontal Position.
2. A  $3\frac{1}{2}$  digit display voltmeter is used for voltage measurements.
  - i) Find its resolution
  - ii) How 8.37 V will be displayed on the 20V range?
  - iii) How 128.86 mV will be displayed on the 200mv and 2 Volt ranges?

**B) Attempt any one****7M**

1. With a neat diagram, explain the operation of a transistorized voltmeter.
2. With neat block diagram, explain the working of a single trace CRO.

**A) Attempt any one****8M**

1. Explain working of an instrumentation amplifier with a neat circuit diagram. Derive an expression for its output voltage.
2. Draw a labeled diagram of a Wien's bridge oscillator. Explain its operation and state the expression for the frequency of oscillation.



7M

**B) Attempt any one**

1. How are higher order (more than 2) filters designed? Draw neat circuit diagram of a fourth order active high pass filter. Show comparison between second & fourth order filter using output characteristics curves.
2. With the help of neat circuit diagram explain the working of IC 555 timer as tone burst.

8M

**4. A) Attempt any One.**

1. With the help of neat diagram, explain the working of an adjustable bipolar voltage regulator using IC-LM 317 & LM 337.
2. With the help of neat diagram, explain the principle of operation of a Buck-Boost switching regulator. Give expression for its output voltage.

7M

**B) Attempt any One**

1. Draw the circuit diagram of a constant current source using OPAMP & PNP transistor. Explain its operation.
2. Write note on Monolithic switching regulators.

**5. A) Attempt any One**

15M

1. Explain construction & working of LVDT.
2. A resistance strain gauge has a gauge factor 2 & resistance of  $120\ \Omega$ . This is installed in an aluminum matrix which is subjected to stress of  $0.2\ \text{GN/m}^2$ . The young's modulus of the gauge is  $68.87\ \text{GN/m}^2$ . Determine the change in resistance.
3. Write a note on positive clipper using OPAMP.
4. A band-pass filter has a lower cutoff frequency of  $20\ \text{KHz}$ . & a higher cutoff frequency of  $22\ \text{KHz}$ . Calculate the Q factor.
5. What are the three desirable characteristics of linear voltage regulator?
6. Find the output voltage in case of LM 317 & LM 337 when  $R_2$  is short circuited. Give reason.