

[This question paper contains 2 printed pages.]

Sr. No. of Question Paper : 1787

Your Roll No.....

Unique Paper Code : 2512011201

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Name of the Course : B.Sc(H) Electronics (CORE)

Name of the Paper : Basic Instrumentation & Measurement Techniques

Semester : II

Duration : 3 hours

Maximum Marks : 90

Instruction for Candidates

1. There are seven questions in all, out of which you have to attempt any five questions
 2. All questions carry equal marks
 3. First Question is Compulsory.
 4. The use of a scientific non-programmable calculator is allowed.
- 1.(a) What is the loading effect in a voltmeter? How can we minimise the loading effect?
- (b) What are the difficulties associated with the measurement of low resistances? How are they overcome?
- (c) The expected value of the current through a resistor is 20mA. However, the measurement gives a current value of 18mA. Calculate (i) Absolute error, (ii) Percentage error, (iii) Relative accuracy.
- (d) What do you understand by the piezoelectric effect? How can it be used to measure pressure?
- (e) A Lissajous pattern makes five tangencies with the vertical and three with the horizontal. If the horizontal frequency is 3 kHz, find the vertical frequency.
- (f) Find the deflection sensitivity of a CRT if the distance from the screen of a CRT to the centre of the deflection plates is 10 cm. The length of the deflection plate is 2 cm. The distance between the plates is 1 cm, and the accelerating voltage is 200 V.

(3X6)

- 2.(a) Describe the working of a galvanometer briefly as a voltmeter. Convert a basic d'Arsonval movement with internal resistance 50Ω , and full-scale current of 2 mA into a multi-range DC voltmeter with voltage ranges of $0-10\text{ V}$, $0-50\text{ V}$ and $0-100\text{ V}$. (9)
- (b) Explain Load regulation, line regulation, and holdup time for power supplies. What is the advantage of an adjustable voltage regulator over a fixed voltage regulator? Mention any one positive and one negative fixed voltage regulator ICs. (9)
- 3.(a) State the advantages of a Digital Voltmeter (DVM) over analog meter. Explain, using a block diagram, how the integrating type DVM works. (9)
- (b) Explain how a Wein Bridge is used to measure the unknown frequency. A Wein Bridge circuit consists of the following values, $R_1=4.7\text{ k}\Omega$, $R_2=20\text{ k}\Omega$, $R_3=10\text{ k}\Omega$, $R_4=100\text{ k}\Omega$, $C_1=5\text{ nF}$, $C_2=10\text{ nF}$. Determine the Frequency of the circuit. (9)
- 4.(a) Explain how the thermocouple effect method is used for the measurement of moderately high temperatures. What are the advantages and disadvantages of this method? (9)
- (b) Explain the construction and working principle of a linear variable differential transducer (LVDT). An LVDT has a secondary voltage of 5.0 V for a displacement of $\pm 12.5\text{ mm}$. Determine the output voltage for a core displacement of 8.0 mm from its central position. (9)
- 5.(a) List three differences between the PMMC instrument & Electrodynamometer. Draw the circuit diagram of a series-type ohmmeter. Why is it called a "series" ohmmeter & explain why on its scale " 0Ω " is marked rightmost & " $\infty\Omega$ " is marked leftmost? (9)
- (b) Write short notes on
 (i) Capacitive transducer
 (ii) Semiconductor Photodiode
 (iii) Thermistor (9)
- 6.(a) Draw the block diagram of a general-purpose CRO, explaining the function of each block. (9)
- (b) What is the difference between a square wave generator and a pulse generator? Draw the block diagram of a pulse generator instrument and explain its operation. (9)
- 7.(a) Differentiate between passive and active voltage probes. What are 10:1 attenuator probe? What is the role of compensating capacitors in these probes? (9)
- (b) What is a Random Noise Generator? Why is it important to generate noise? How does a Random Noise Generator produce different types of noise? What is the significance of "Pink" in Pink Noise? (9)