

[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 2362

F-4

Your Roll No.....

Unique Paper Code : 2511403

Name of the Course : **B. Tech. Electronics**

Name of the Paper : Electronic Instrumentation

Semester : IV

Duration : 3 Hours

Maximum Marks : 75

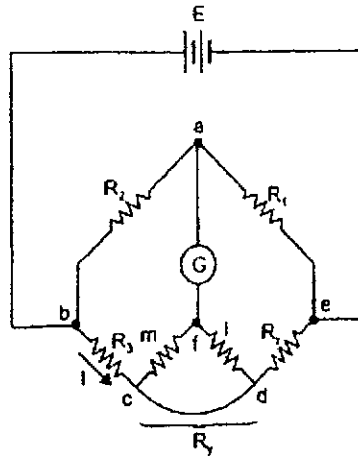
Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question No. 1 is compulsory.
3. Attempt Five questions in all.
4. All questions carry equal marks.
5. Nonprogrammable scientific calculator are allowed.

1. (a) Maxwell bridge can only be used for the Quality factor in the range of 1-10. Justify.
- (b) What are the disadvantages of using prescaler for extending the range of frequency counter ? How it can be minimized ?
- (c) Mention the different types of graticules used in a CRT, and what are their merits and demerits ?
- (d) A resistance strain gauge with a $K = 2$, mounted on a steel plate under a strain of $1.0E-6$. Calculate the change in resistance with the original resistance of the gauge is 130Ω .
- (e) Draw the block diagram of a function generator which generates pulse, triangular and sinusoidal waveforms. (5×3=15)

P.T.O.

2. (a) How the limitations of a Kelvin single bridge are resolved in Kelvin double bridge. In a Kelvin double bridge, there is error due to mismatch between the ratios of outer and inner arm resistances. The following data relate to this bridge: standard resistance $R_3 = 100.03 \mu\Omega$; inner ratio arms l and $m = 100.31\Omega$ and 200Ω ; outer ratio arms R_1 and $R_2 = 100.24\Omega$ and 200Ω ; the resistance of connecting leads from standard to unknown resistor R_x is $680 \mu\Omega$. Calculate the unknown resistance. (7)



- (b) Differentiate between repeatability and reproducibility? How they determine characteristics of a measuring instrument? (3)
- (c) Draw the circuit diagram and obtain the balancing condition for the Maxwell's bridge. State the limitations of Maxwell bridge. (5)
3. (a) Determine the binary equivalent of $0.9375V$ of a SAR type DVM having 8 bit output and reference voltage of $+5V$. (4)
- (b) Design a multi range ammeter with range $0-1A$, $5A$ and $10A$ employing individual shunt in each D'Arsonval movement with an internal resistance of 500Ω and a full scale deflection of $10 mA$ is available. (5)
- (c) Draw the block diagram of a digital frequency meter. Why do we need reciprocal counting or time measurement for low frequency signals? Calculate the errors involved in the measurement of

- (i) 100 Hz and (ii) 1.0 MHz
signals when the gate frequency is 10 MHz. (6)
4. (a) Explain the functioning of a series type ohmmeter. How can one compensate the zero error involved in this type of ohmmeter? (6)
- (b) Explain, using the block diagram, the working principle of an integrating type of DVM. Also derive the mathematical relation for the voltage and time conversion. (6)
- (c) A $3\frac{1}{2}$ digit voltmeter is used for voltage measurement. Find its resolution. How would 0.52V be displayed in 1V and 10 range. (3)
5. (a) Explain how a cathode ray tube can be used as a linear voltage indicating device. Obtain the expression for the sensitivity of the CRO and justify the placement of Vertical and Horizontal deflection plates in CRT. (7)
- (b) What is sweep synchronization? Compare sweep synchronization using negative sync pulses and sinusoidal sync signal. (5)
- (c) Draw the Lissajous figure pattern obtained for two signals having the same amplitude, frequency, and a phase difference of
- (i) 0 degree (ii) 180 degree
(iii) 270 degree (3)
6. (a) Define a pulse with respect to the duty cycle. How is duty cycle varied and controlled in a pulse generator? (4)
- (b) An LVDT has an output of 5.2V for a corresponding input of 6.3V, for a range of $\pm 0.5''$. Determine
- (i) The output voltage vs core position for a variation of core movement from $+0.45''$ to $-0.30''$.

- (ii) The corresponding output voltage when the core is $-0.25''$ w.r.t. the reference. (5)
- (c) What do you understand by NTC and PTC with respect to transducers? Give an example for both. Explain any one in detail. (6)
7. (a) Explain the construction and working of a photovoltaic cell and a photodiode. Differentiate between the two. (5)
- (b) A shopkeeper desires to count the number of customers visit his shop on daily basis. Suggest a mechanism using a transducer for the same? Define its working principle. (5)
- (c) Which sensor will you prefer to measure temperature in the range of 1000 Deg C to 1500 Deg C and why? (5)