22331

3 Hours / 70 Marks   Seat No.

15 minutes extra for each hour

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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1.   **Attempt any <u>FIVE</u> of the following:**   **10**

a) Define

   i)   Accuracy

   ii)   Precision

b) State any two advantages of PMMC meter.

c) Define resolution with respect to digital meter / instruments.

d) List any four applications of CRO.

e) State any two requirements of signal generator.

f) Write two applications of function generator.

g) Define error. Write the formula for percentage error.

Marks

2.   Attempt any THREE of the following: **12**

a) What is callibration? State important of callibration of instruments.

b) Draw the construction diagram of PMMC motor and explain the torque generation process.

c) Explain the operation of digital frequency motor with neat block diagram.

d) Describe working of Hay Bridge for measurement of inductance and Q of a coil.

3.   Attempt any THREE of the following: **12**

a) Draw the circuit diagram of conversion of PMMC to multirange current meter. Derive equation for shunt resistance.

b) Draw the block diagram successive approximation type digital voltmeter and draw the output of SAR register verses time for V_X = 6 Volts (assume 4-bit SAR register or 4-bit ADC).

c) Draw the basic block diagram of single trace CRO. State materials is used for phosphor screen.

d) Compare series type and shunt type ohm-meters.

4.   Attempt any THREE of the following: **12**

a) A basic D' Arsonval movement with an internal resistance of $50\,\Omega$ and full scale deflection current of $2\,mA$ is to be as multirange voltmeter. Design the multirange voltmeter with range of $0\text{-}10\,V$, $0\text{-}50\,V$.

b) Design a multirange DC current meter using a basic movement having an internal resistance of $100\,\Omega$ and full scale deflection current of $50\,\mu A$ and the ranges are $0\text{-}10\,mA$, $0\text{-}100\,mA$.

c) Draw the block diagram of logic analyzer. List the types of modes of display in it.

d) Calculate the frequency of Channel-1 input for an oscilloscope which display the following Lissajous Fig. (Assume Channel-2 input frequency in 10 KHz.)

(i)   (ii)

Fig. No. 1

e) A DVM is having $3\frac{1}{2}$ digit display

i)   Calculate the resolution.

ii)   Calculate the value displayed on DVM display for voltage, V = 8.357 Volts and the range of DVM selected is 0-10 Volts.

5.   Attempt any TWO of the following: **12**

a) The expected value of the voltage across a resister is 80 V. However the measurement gives a value of 79 V. Calculate

i)   Absolute error

ii)   % error

iii) Relative accuracy

iv)   Percentage accuracy

b) i)   In a given bridge circuit, arms contain following constants -
arm AB – R = 1 KΩ,
arm BC – unknown coil,
arm CD – R = 1 KΩ,
arm DA – R = 470 Ω in parallel with C = 0.22 μF and input supply frequency is 1KHz.
Calculate the unknown coil value.

ii)   State the name of above bridge circuit.

iii) State two applications of it.

c) Describe function of the each block of spectrum analyzer with neat diagram.

Marks

6. **Attempt any TWO of the following:** **12**

   a) Give any six points of comparison between digital instrument and analog instrument.

   b) i)   Draw the circuit diagram of half wave and full wave rectifier type AC voltmeters.

        ii) State the sensitivity of each meter with respect to sensitivity of basic PMMC meter.

   c) State any six specifications of CRO. State the phase measurement formula using CRO with necessary diagram.

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