B.Tech. / B.E. Instrumentation Engineering (Model Curriculum) Semester-III

IN304M - Electronics Measurement

P. Pages : 3 **GUG/W/23/14012**

Time : Three Hours * 7 5 9 9 * Max. Marks : 80

Notes : 1. Same answer book must be used for each section.
2. All questions carry as indicted marks.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.

1. a) Define the following terms with respect to measurement system. **8**

a) Accuracy b) Precision
c) Resolution d) Sensitivity

b) One Hundred voltage readings were taken at a small interval of time and recorded to the nearest 0.1V. The frequency table is given below. **8**

Voltage readings	Frequency
99.7	02
99.8	08
99.9	20
100	40
100.1	21
100.2	06
100.3	03
	100

Calculate

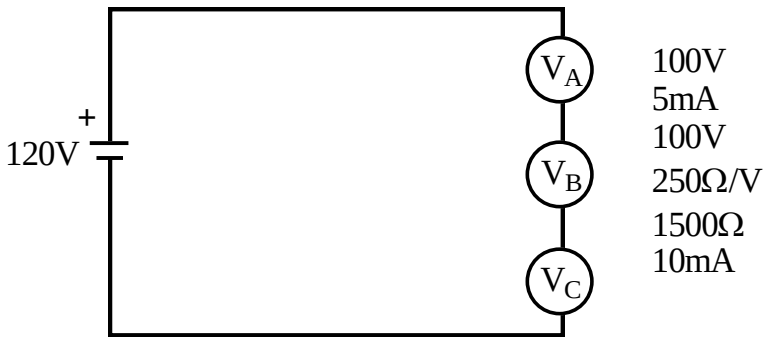
a) Arithmetic mean b) The average deviation
c) The standard deviation d) The probable error

OR

2. a) Distinguish between **8**

a) International standards b) Primary standards
c) Secondary standards d) Working standards

b) Three DC voltmeters are connected in series across 120V dc supply. The three voltmeters are specified as follows: **8**
Voltmeter A : 100V, 5mA; Voltmeter B : 100V, 250Ω / V ; Voltmeter C : 15000Ω,10mA



What voltage does each voltmeter reads?

3. a) Describe the construction and details of an Electrodynamometer type of instrument. **8**

b) A moving coil ammeter has a fixed shunt of 0.02Ω with a coil resistance of R = 1000Ω and for a potential difference of 500mV. Across, it full scale deflection is obtained. **8**

a) To what shunted current does this correspond

b) Calculate the value of R to give full scale deflection when shunted current I is
i) 10 A
ii) 75 A

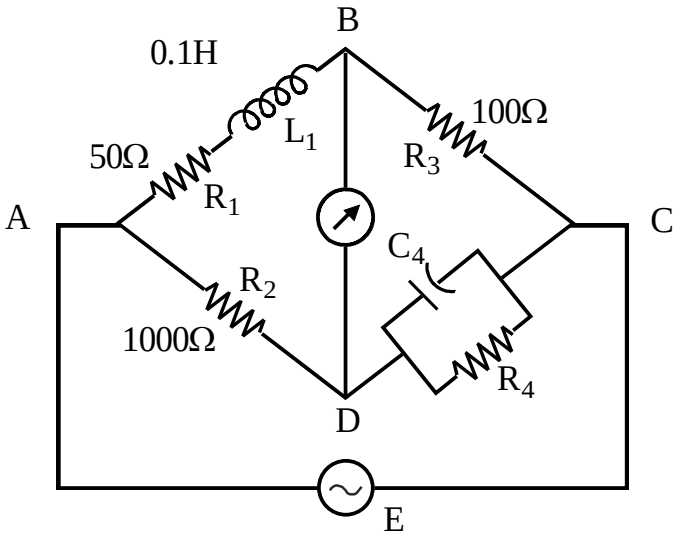
OR

4. a) Design a multi-range DC milli-ammeter using a basic movement with an internal resistance $R_m = 50\Omega$ and full scale deflection current $I_m = 1mA$. The ranges required are 0-10mA; 0-50mA; 0-100 mA; 0-500 mA. **8**

b) Describe the construction & working of series type ohm meter, why series type ohm meter preferred over shunt type ohmmeter? **8**

5. a) Discuss how Wheatstone bridge is used for the measurement of unknown resistance. **8**

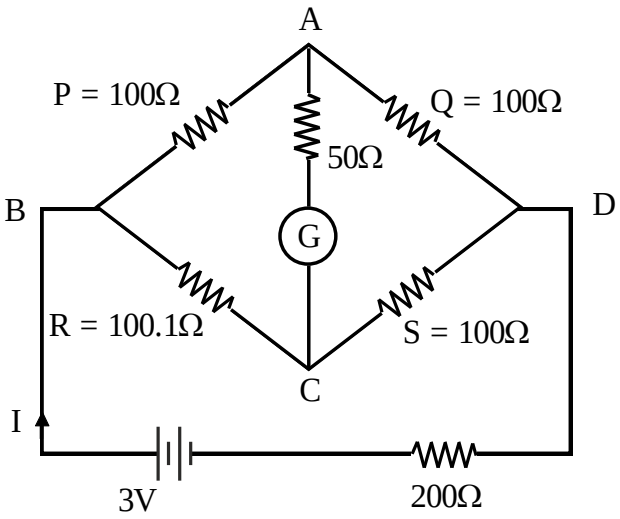
b) The four arms of balanced bridge network are made up as **8**
AB-Resistance 50Ω in series with inductance 0.1H.
BC-resistance 100Ω.
CD-unknown resistance in parallel with unknown capacitor.
DA-resistance 1000Ω.
50 cycle supply is maintained between A and C and vibration galvanometer is connected between B and D. Find the unknown resistance and capacitance and draw the phasor diagram.



OR

6. a) Derive the balancing condition AC bridges with the help of neat dig. **8**

b) Three arms of a Wheatstone bridge have resistances of 100Ω and the fourth arm 100.1Ω. A galvanometer of 50Ω resistance and $0.05\mu A/m$ sensitivity is connected across one diagonal of the bridge. A battery of 3Vmf is connected in series with resistance of 200Ω to the other diagonal. Find the deflection of galvanometer. **8**



7. a) Describe in detail the working principle of digital voltmeter. **8**

b) Write short note on **any two**. **8**
1) Amplified DC meter
2) True RMS-responding voltmeter
3) Electronic voltmeter

OR

8. a) Describe the circuit diagram and working of Q meter also state its applications. **8**

b) Compare the analog instrument and digital instrument on the basis of performance characteristics. **8**

9. a) Draw the block diagram of oscilloscope and explain the function of each block. **8**

b) Calculate the maximum velocity of the beam of electrons in a CRT having a cathode anode voltage of 800V. Assume that the electrons to leave the cathode with zero velocity. **8**

OR

10. a) An electrically deflected CRT has a final anode voltage of 2000V and parallel deflecting plates 1.5cm long and 5mm apart. If the screen is 50cm from the center of deflecting plates, find **8**
a) Beam speed
b) The deflection sensitivity of the tube and
c) The deflection factor of the tube.

b) How sweep method is used measure frequency and phase difference in dual trace CRO. **8**

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