BT-4/J07   8671

Electronics Instrumentation Measurements
Paper : ECE–202 E

Time : Three Hours]   [Maximum Marks : 100

Note : – Attempt any **FIVE** questions, selecting at least **ONE** question from each unit.

UNIT–I

1. (a) Three resistors have the following ratings :–

$R_1 = 50 \pm 5\%$, $R_2 = 200 \pm 5\%$ and $R_3 = 100 \pm 5\%$

Determine the magnitude of resultant resistance and limiting errors in percentage and OHMS, if the above resistances are connected in (i) Series (ii) Parallel.   8

   (b) The measurements of resistance of a resistor give the following results :–

101.3, 101.1, 101.4, 101.2, 101.3, 101.5, 101.0, 101.3, 101.7, 101.2

Assuming that the random errors are present, calculate :–

(i)   Arithmetic Mean

(ii) The standard deviation of the readings

(iii) The probable error of average of 10 readings.   7

   (c) What is meant by reading correction and how is it related to absolute error ? Explain in detail.   5

2. (a) Explain with the help of a connection diagram. How you would determine the value of low resistance shunt by Kelvin's Double Arm bridge method ? What are the important precautions that are to be taken in such an experiment ?   10

   (b) Explain how will you measure insulation resistance of

(i)   2-wire DC live main and

(ii) 3-wire DC live main.   10

EML-2007-1

UNIT–II

3. (a) What are the advantages and disadvantages of a Maxwell's inductance bridge ? Write the balance equations for the bridge and draw its phasor diagrams. 12

   (b) Describe why Schering bridge is particularly suitable for measurement at high voltage. 8

4. (a) What are the different forms of AC potentiometers and bring out the difference between them. 10

   (b) Explain how the applied voltage wave is displayed on the screen of cathode ray tube ? Sketch the same. 10

UNIT–III

5. (a) Describe the working of a wave analyzer. Give its applications. 10

   (b) Discuss some important OP-AMP parameters. 10

6. Discuss the following :–

   (a) Advantages and limitations of digital techniques over analog.

   (b) Digital voltmeter. 10×2=20

UNIT–IV

7. (a) Explain with sketches the transducer based on the following principles :–

   (i) Piezoelectric

   (ii) Thermocouple

   (iii) LVDT. 15

   (b) A thermistor has a resistance of 4000 Ω at 0°C and 800 Ω at 40°C. The resistance temperature relationship is given by the expression :– $R_t = R_0 \alpha e^{\beta/T}$

   Determine constants α (Alpha) and β (Beta). Determine the range of resistance to be measured in case the temperature rises from 50°C to 100°C. 5

8. (a) Describe the operation of a dual slope A/D converter. 10

   (b) Discuss the operation of spatial encoders. 10

8671 EMI-2007-2