S.E. Electrical III CBSGS   16-12-16
EEM

Q.P. Code : 542200

(3 Hours) [Total Marks 80]

N. B.
(1) Question No. **1** is **compulsory**.
(2) **Attempt** any **three** questions out of remaining questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable data wherever **necessary**.

1. a) Draw the circuit diagram and phasor diagram of Maxwell's bridge. 05
   b) Derive the equation for voltage developed 'V' in a piezoelectric crystal in terms of applied pressure 'P'. 05
   c) Explain with formulas the concepts of 'limiting error', 'relative error' and 'percentage error'. What is the relation between accuracy and error? 05
   d) Draw the circuit diagram of dual slope integrator type DVM. Also draw all the appropriate waveforms. 05

2. a) Derive the equation for deflecting torque in PMMC type instrument. A PMMC instrument has a 0.2 Tesla magnetic flux density in its air gaps. The coil dimensions are diameter = 2.5 cm and length = 2.5 cm. Determine the minimum number of coil turns required to give a torque of 5 μNm when the coil current is 100 μA. 10
   b) Write down the advantages and disadvantages of thermistor. Find the material constant β (in Kelvin) of a NTC thermistor if its resistance at 108°C is 1.87 KΩ and it increases to 1.37 MΩ as the temperature changes to -37°C. 10

3. a) Explain construction and working of Power-factor meter. Draw the necessary diagrams. 10
   b) Explain the construction and working of dual slope type DVM with proper diagram and waveforms. 10

4. a) Compare Electro-dynamometer type instruments, MI instruments and PMMC instruments. List down the advantages and disadvantages of each. 10
   b) Explain the construction and working of digital phase meter. Draw the necessary diagrams and waveform 10

5. a) Derive the expression for deflection 'θ' in terms of current 'I' for attraction type MI instrument. 10
   b) Draw the circuit diagram and phasor diagram of Anderson's bridge. Derive the equation for unknown inductance in terms of bridge parameters. 10

6. a) Explain measurement of unknown potential using standard DC potentiometer. 10
   b) Explain with suitable diagrams measurement of very low, medium and very high impedance measurement using Q meter. Also derive the expression for unknown impedance for each case. 10