

4E4122

Roll No.

Total No of Pages: 4

4E4122

B.Tech. IV-Sem (Main & Back) Exam; June-July 2016

Electrical & Electronics Engineering

4EX3A Electrical Measurements

Common with EE, EX, EI

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks (Main & Back): 26

Min. Passing Marks (Old Back): 24

Instructions to Candidates:-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No.205)

NIL

2. NIL

UNIT-I

- 1 (a) Discuss the different types of errors in moving iron instruments. [8]
- (b) Explain the testing and calibration of single phase energy meter by phantom loading. [8]

OR

- 1 (a) Describe the working and constructional details of an attraction type moving iron instrument. [8]
- (b) Discuss the compensation and adjustment of the errors in wattmeter. [8]

UNIT-II

Q.2 Draw the equivalent circuit and phasor diagram of a current transformer. Also derive the expressions for ratio and phase angle errors. [16]

OR

- Q.2 (a) Discuss the measurement of power by two-wattmeter method. [8+8=16]
- (b) Explain the effect of the following on the performance of current transformers.
- (i) Change of primary winding current
 - (ii) Change of secondary circuit burden
 - (iii) Change of frequency

UNIT-III

- Q.3 (a) Describe the basic principle of operation of d.c. potentiometer. Explain why a potentiometer does not load the voltage source whose voltage is being determined. [8]
- (b) Explain the term 'standardization' of a potentiometer. Describe the procedure of standardization of a d.c. potentiometer. [8]

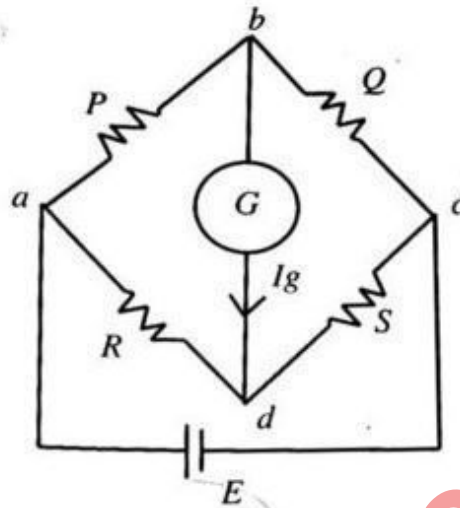
OR

- Q.3 (a) Draw the circuit diagram of a Crompton's potentiometer and explain its working. Describe the steps used when measuring an unknown resistance. [8]
- (b) What is a volt-ratio box? Explain its construction, Working and applications. [8]

UNIT-IV

Q.4 (a) A Wheatstone bridge is shown in figure

[6]



$$\begin{aligned} P &= 1k\Omega \\ R &= 1k\Omega \\ S &= 5k\Omega \\ G &= 100\Omega \end{aligned}$$

The thevenin source generator voltage $E_0 = 24\text{mV}$ and the galvanometer current is $13.6\ \mu\text{A}$. Calculate the value of Q

- (b) Describe the substitution method of measurement of medium resistances. List the factors on which the accuracy of the methods depends. [10]

OR

- Q.4 (a) What are the different difficulties encountered in the measurement of high resistances? Explain how these difficulties are overcome. [8]
- (b) What is the importance of the value of earth's resistance. What are the factors which influence its value. [8]

UNIT-V

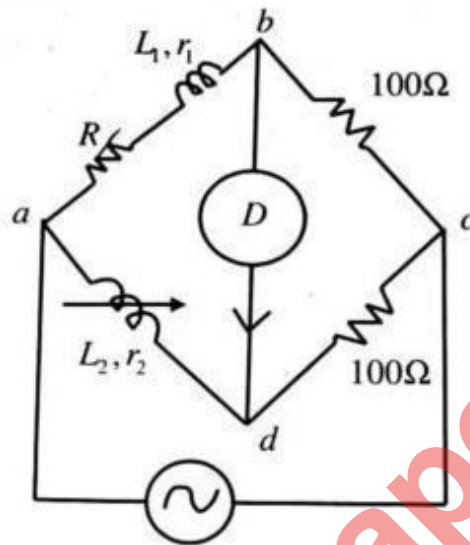
Q.5 (a) The four impedances of AC Bridge are $Z_1 = 400\angle 50^\circ\ \Omega$; $Z_2 = 200\angle 40^\circ\ \Omega$; $Z_3 = 800\angle -50^\circ\ \Omega$; $Z_4 = 400\ \Omega\angle 20^\circ\ \Omega$; here Z_1, Z_2 in one arm and Z_3, Z_4 , in another arm of bridge.

Find out whether the bridge is balanced under these conditions or not. [6]

- (b) Describe how an unknown capacitance can be measured with the help of D'sauty's bridge. What are the limitations of this bridge and how are they overcome. [10]

OR

- Q.5 (a) A Maxwell's inductance comparison bridge is shown in figure. [6]



Arm ab consists of a coil with inductance L_1 & resistance r_1 in series with a non-inductive resistance R . Arm bc and ad are each a non-inductive resistance of 100Ω . Arm ad consists of standard variable inductor L of resistance 32.7Ω . Balance is obtained when $L_2 = 47.8\text{MH}$ & $R = 1.36\Omega$. Find the resistance & inductance of the coil in arm ab.

- (b) Explain how Wien's bridge can be used for experimental determination of frequency. Derive the expression for frequency in terms of bridge parameters. [10]
