rtuonline.com rtuonline.com.

4E4122

Roll No. _____ [Total No. of Pages : 3

4E4122

B.Tech. IV Semester (Main/Back) Examination, June/July - 2015

Electronics Instrumentation & Control Engg.

4EI3A Electrical Measurement

Common for EE, EX & EI

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

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.*

rtuonline.com rtuonline.com rtuonline.com rtuonline.com

Unit - I

1. a) Explain why PMMC instruments are the most widely used instruments. Discuss their advantage and disadvantage. **(6)**

   b) A moving coil instrument has at normal temperature a resistance of 10Ω and a current of 45 mA gives full scale deflection. If its resistance rises to 10.2Ω due to temperature changes, calculate the reading when a current of 2kA is measured by means of a 0.225×10^{-3} A shunt of const resistance. What is the percentage error. **(10)**

OR

1. a) Explain why electrodynamometer type of instruments can be used both on a.c. and d.c? Why are these instruments used as transfer instruments. **(6)**

   b) The inductance of a certain moving iron ammeter is $\left(8+4\theta-\frac{1}{2}\theta^2\right)\mu H$, where θ is deflection in radian from the zero position. The control spring torque is $12\ \mu\ N-m/rad$. Calculate the scale positions in radian for current 1,2,3,4 and 5A and discuss the scale shape obtained. **(10)**

Unit - II

2. a) Explain comparison between CTs and PTs. **(6)**

rtuonline.com rtuonline.com

b) Explain how power can be measured in a 3-phase circuit with the help of two wattmeter. Illustrate your answer with the help of a phasor diagram for a balanced star (wye) connected load. **(10)**

OR

2. a) Explain the effect of the following on the performance of CTs.

i) Change of primary winding current.

ii) Change of secondary circuit burden and

iii) Change of frequency. **(6)**

b) There are two types of connections which can be used for an electrodynamometers type wattmeters, one where the current coil is on the load side and second where the pressure coil is on the load side. Discuss the error caused on account of the two connections. Also, explain under what condition the each of the two types of connection should be used. **(10)**

Unit - III

3. a) What is a volt-ratio box? Explain its application with example. **(4)**

b) Explain the reasons why d.c. potentiometer cannot be used for a.c. measurement straight way. Explain the modifications that are needed in a d.c. potentiometer to be used for a.c.applications. **(12)**

OR

3. a) Explain the reason's why a separate "standard cell dial circuit" is provided in modern d.c. potentiometers. **(8)**

b) Explain how "true zero" is obtained in a crampton's potentiometers. **(8)**

Unit - IV

4. a) What are the different factors which affect the precision measurement of medium resistance with Wheatstone bridge? Explain how their effects are minimized/eliminated. **(8)**

b) What is the importance of the value of earths resistance. What are the factors which influence its value. Describe the fall of potential method for measurement of earth resistance. **(8)**

rtuonline.com rtuonline.com

rtuonline.com rtuonline.com

OR

4. a) Explain Guard-wise method for high resistance measurement. **(6)**

   b) What are the different problems associated with measurement of low resistance. Explain the principle of working a kelwin's double bridge and explain how the effect of contact resistance and resistance of leads is eliminated. **(10)**

Unit - V

5. a) Derive the general equations for balance for an a.c. bridge. Prove that two conditions i.e. for magnitude and phase have to be satisfied if an a.c. bridge is to be balanced unlike a d.c. bridge where in only the magnitude condition is to be satisfied. **(10)**

   b) In maxwell's inductance - capacitance bridge, the dia of variable capacitor can be made to read the value of unknown inductance directly. How is it done. **(6)**

OR

5. a) Describe how an unknown capacitance can be measured with the help of D'sauty bridge. What are the limitations of this bridge and how are they overcome by using a modified form of D'sauty bridge? Draw phasor diagrams to illustrate your answer. **(10)**

   b) Why is it preferable in bridge circuits, that the equations of balance are independent of frequency? Explain. **(6)**

rtuonline.com rtuonline.com rtuonline.com rtuonline.com

rtuonline.com rtuonline.com