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Code.No: RR310202 | RR | SET-1

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL MEASUREMENTS
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Describe how a D' Arsonval basic meter can be converted into a voltmeter. Discuss about the requirements for the construction of multipliers and how the temperature effects can be eliminated in voltmeters.

b) The inductance of a moving iron instrument is given by $L = (16 + 6\theta - \theta^2)\,\mu H$, where θ is the deflection in radians from zero position. The spring constant is $15\times10^{-6}\,Nm/rad$. Estimate the deflection for a current of 10A. [8+8]

2.a) Derive the equations for force and torque of an electrostatic instruments.

b) A 500/5A, 50Hz current transformer has a secondary burden comprising a non inductive impedance of 2.5Ω. The primary winding has one turn. Calculate the flux in the core and ratio error at full load. Neglect leakage reactance and assume the iron loss in the core to be 2.0w at full load. The magnetizing mmf is 105AT. [8+8]

3.a) Explain how power can be measured in a three phase circuit with the help of two watt meters. Illustrate your answer with the help of a phasor diagram for a balanced star connected load.

b) The inductive reactance of the pressure coil circuit of dynamometer wattmeter is 8% of its resistance at normal frequency and the capacitance is negligible, calculate the percentage error and correction factor due to reactance for loads at

i) 0.6 p.f leading
ii) 0.8 p.f leading [8+8]

4.a) Explain the sources of errors in single phase induction type energy meters.

b) Explain how KVAH and KVA measurements can be done with the help of a trivector meter. [8+8]

5.a) Explain how wattmeter is calibrated using D.C potentiometer.

b) What is volt-ratio box? Explain. Design a volt ratio box with a resistance of $50\Omega/volt$ and ranges 25V, 50V, 75V, 150V and 300V. The volt-ratio box is to be used with a potentiometer having a measuring range of 1.6V. [8+8]

6.a) Describe with a neat diagram the loss of charge method for determining the insulation resistance of a length of cable.

b) In a Carey Fosters Bridge, a resistance of 0.959Ω is compared with a standard resistance of 1Ω, the slide wire has a resistance of 0.235Ω in 100 divisions. The ratio arms normally 10Ω each are actually 10.03Ω and 9.94Ω respectively. How far (in scale divisions) are the balance positions from those which would obtain if arms ratio were true to their nominal value? The slide wire is 100 cm long. [8+8]

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7.a) Draw the circuit diagram of Anderson's bridge. Also derive equations under balance.

b) In an AC bridge arm ab consists pure capacitance of $1.5\mu F$, arm bc consists pure resistance of 800Ω, arm cd consists an unknown impedance and arm da has a 400Ω resistance in parallel with $0.5\mu F$ capacitor. Find the R and C (or) L constants of arm cd considering it as a series circuit. The frequency of the bridge is 1000Hz. [8+8]

8.a) Explain the procedure of measuring leakage factor using flux meter.

b) The area of hysteresis loop for a certain magnetic material is $400mm^2$ and scales of the graph on which it is drawn are H axis 1mm = 20A/m; B axis 1mm = $10\,mwb/m^2$. Calculate the hysteresis loss per kg. The frequency is 50Hz and the density of the material is 7500 kg/m^3. [8+8]

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SET-2

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL MEASUREMENTS
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Explain how power can be measured in a three phase circuit with the help of two watt meters. Illustrate your answer with the help of a phasor diagram for a balanced star connected load.

b) The inductive reactance of the pressure coil circuit of dynamometer wattmeter is 8% of its resistance at normal frequency and the capacitance is negligible, calculate the percentage error and correction factor due to reactance for loads at
i) 0.6 p.f leading
ii) 0.8 p.f leading [8+8]

2.a) Explain the sources of errors in single phase induction type energy meters.

b) Explain how KVAH and KVA measurements can be done with the help of a trivector meter. [8+8]

3.a) Explain how wattmeter is calibrated using D.C potentiometer.

b) What is volt-ratio box? Explain. Design a volt ratio box with a resistance of $50\Omega/volt$ and ranges 25V, 50V, 75V, 150V and 300V. The volt-ratio box is to be used with a potentiometer having a measuring range of 1.6V. [8+8]

4.a) Describe with a neat diagram the loss of charge method for determining the insulation resistance of a length of cable.

b) In a Carey Fosters Bridge, a resistance of 0.959Ω is compared with a standard resistance of 1Ω, the slide wire has a resistance of 0.235Ω in 100 divisions. The ratio arms normally 10Ω each are actually 10.03Ω and 9.94Ω respectively. How far (in scale divisions) are the balance positions from those which would obtain if arms ratio were true to their nominal value? The slide wire is 100 cm long. [8+8]

5.a) Draw the circuit diagram of Anderson's bridge. Also derive equations under balance.

b) In an AC bridge arm ab consists pure capacitance of $1.5\mu F$, arm bc consists pure resistance of 800Ω, arm cd consists an unknown impedance and arm da has a 400Ω resistance in parallel with $0.5\mu F$ capacitor. Find the R and C (or) L constants of arm cd considering it as a series circuit. The frequency of the bridge is 1000Hz. [8+8]

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6.a) Explain the procedure of measuring leakage factor using flux meter.

b) The area of hysteresis loop for a certain magnetic material is $400mm^2$ and scales of the graph on which it is drawn are H axis 1mm = 20A/m; B axis 1mm = $10\,mwb/m^2$. Calculate the hysteresis loss per kg. The frequency is 50Hz and the density of the material is 7500 kg/m^3. [8+8]

7.a) Describe how a D' Arsonval basic meter can be converted into a voltmeter. Discuss about the requirements for the construction of multipliers and how the temperature effects can be eliminated in voltmeters.

b) The inductance of a moving iron instrument is given by $L = (16 + 6\theta - \theta^2)\,\mu H$, where θ is the deflection in radians from zero position. The spring constant is $15 \times 10^{-6}\,Nm/rad$. Estimate the deflection for a current of 10A. [8+8]

8.a) Derive the equations for force and torque of an electrostatic instruments.

b) A 500/5A, 50Hz current transformer has a secondary burden comprising a non inductive impedance of 2.5Ω. The primary winding has one turn. Calculate the flux in the core and ratio error at full load. Neglect leakage reactance and assume the iron loss in the core to be 2.0w at full load. The magnetizing mmf is 105AT. [8+8]

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III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL MEASUREMENTS
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Explain how wattmeter is calibrated using D.C potentiometer.
b) What is volt-ratio box? Explain. Design a volt ratio box with a resistance of $50\Omega/volt$ and ranges 25V, 50V, 75V, 150V and 300V. The volt-ratio box is to be used with a potentiometer having a measuring range of 1.6V. [8+8]

2.a) Describe with a neat diagram the loss of charge method for determining the insulation resistance of a length of cable.
b) In a Carey Fosters Bridge, a resistance of 0.959Ω is compared with a standard resistance of 1Ω, the slide wire has a resistance of 0.235Ω in 100 divisions. The ratio arms normally 10Ω each are actually 10.03Ω and 9.94Ω respectively. How far (in scale divisions) are the balance positions from those which would obtain if arms ratio were true to their nominal value? The slide wire is 100 cm long. [8+8]

3.a) Draw the circuit diagram of Anderson's bridge. Also derive equations under balance.
b) In an AC bridge arm ab consists pure capacitance of $1.5\mu F$, arm bc consists pure resistance of 800Ω, arm cd consists an unknown impedance and arm da has a 400Ω resistance in parallel with $0.5\mu F$ capacitor. Find the R and C (or) L constants of arm cd considering it as a series circuit. The frequency of the bridge is 1000Hz. [8+8]

4.a) Explain the procedure of measuring leakage factor using flux meter.
b) The area of hysteresis loop for a certain magnetic material is $400 mm^2$ and scales of the graph on which it is drawn are H axis 1mm = 20A/m; B axis 1mm = $10\, mwb/m^2$. Calculate the hysteresis loss per kg. The frequency is 50Hz and the density of the material is 7500 kg/m^3. [8+8]

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b) Explain how KVAH and KVA measurements can be done with the help of a trivector meter. [8+8]

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SET-4

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
ELECTRICAL MEASUREMENTS
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
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- - -

1.a) Draw the circuit diagram of Anderson's bridge. Also derive equations under balance.

b) In an AC bridge arm ab consists pure capacitance of $1.5\mu F$, arm bc consists pure resistance of 800Ω, arm cd consists an unknown impedance and arm da has a 400Ω resistance in parallel with $0.5\mu F$ capacitor. Find the R and C (or) L constants of arm cd considering it as a series circuit. The frequency of the bridge is 1000Hz. [8+8]

2.a) Explain the procedure of measuring leakage factor using flux meter.

b) The area of hysteresis loop for a certain magnetic material is $400mm^2$ and scales of the graph on which it is drawn are H axis 1mm = 20A/m; B axis 1mm = $10\,mwb/m^2$. Calculate the hysteresis loss per kg. The frequency is 50Hz and the density of the material is 7500 kg/m^3. [8+8]

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b) A 500/5A, 50Hz current transformer has a secondary burden comprising a non inductive impedance of 2.5Ω. The primary winding has one turn. Calculate the flux in the core and ratio error at full load. Neglect leakage reactance and assume the iron loss in the core to be 2.0w at full load. The magnetizing mmf is 105AT. [8+8]

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i) 0.6 p.f leading

ii) 0.8 p.f leading [8+8]

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