

Code No: R05310202

R05**Set No. 2****III B.Tech I Semester Examinations, November 2010****ELECTRICAL MEASUREMENTS****Electrical And Electronics Engineering****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. Explain the loss of charge method for measuring high resistance. Mention the possible errors and suggest methods to minimize these. [16]
2. (a) Explain the advantages of instrument transformers as regards to extension of range of current and voltage on high voltage A.C. systems.
(b) A 1000/5A, 50Hz current transformer has a secondary burden comprising a non-inductive impedance of 1.6Ω . 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 1.5W at full load. [8+8]
3. (a) What are the errors in energy meter and how are they compensated in multi-element induction type energy meter? How these energy meter errors will compare with that of watt-meter?
(b) The disc of an energy meter makes 600 revolutions per unit energy. When a 1,000 watt load is connected, the disc rotates at 10.2 rpm, if the load is on for 12 hours, how many units are recorded as error? [10+6]
4. (a) Give the constructional details of electrodynamicometer type wattmeter with a neat sketch.
(b) Prove that the true power = $\frac{\cos\phi}{\cos\phi \cdot \cos(\phi-\beta)} \times \text{Actual wattmeter reading}$ for electrodynamicometer type of wattmeters, where $\cos\phi = \text{p.f. of the circuit}$, $\beta = \tan^{-1}\left(\frac{\omega L}{R}\right)$ where L and R are the inductance and resistance of the pressure coil of the circuit. [8+8]
5. (a) Explain the method of measuring the dielectric loss of the capacitor at high voltage and high frequency. Derive the condition of balance for the bridge. Also, explain the precautions to be taken to ensure accuracy. Draw the phasor diagram under balance conditions.
(b) In an Anderson bridge for measurement of inductance L_x and Resistance R_x in the arm AB, the arm CD and DA have resistances of 600Ω each and the arm CE has a capacitor of $1\mu\text{F}$ capacitor with A.C. supply at 100 Hz supplied across A and C, balance is obtained with a resistance of 400Ω in arm DE and 800Ω in the arm BC. Calculate the value of L_x and R_x . [10+6]
6. The cores of two identical transformers A and B carry alternating fluxes whose instantaneous values are $(0.01 \sin 314t)\text{W}$ and $0.012 (1.1 \sin 628t + 0.1 \sin 1884t)\text{W}$ respectively. Find the ratio of eddy current loss of B to A. Find also the ratio of hysteresis loss of B to A. [16]

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7. (a) State the errors present in electrostatic instruments.
(b) State the advantages and disadvantages of electrostatic instruments.
(c) The capacitance of a 0-2,000 V electrostatic voltmeter increases uniformly from 42 to 54 pf from zero to full scale deflection. It is required to increase the range of the instrument to 20,000 V by means of an external capacitor. Calculate the value of capacitance required? [6+6+4]
8. Explain the construction and working principle of a co-ordinate type A.C. potentiometer with the help of a neat diagram. [16]

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R05**Set No. 4****III B.Tech I Semester Examinations, November 2010****ELECTRICAL MEASUREMENTS****Electrical And Electronics Engineering****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. Explain the loss of charge method for measuring high resistance. Mention the possible errors and suggest methods to minimize these. [16]
2. (a) What are the errors in energy meter and how are the compensated in multi-element induction type energy meter? How these energy meter errors will compare with that of watt-meter?
(b) The disc of an energy meter makes 600 revolutions per unit energy. When a 1,000 watt load is connected, the disc rotates at 10.2 rpm, if the load is on for 12 hours, how many units are recorded as error? [10+6]
3. (a) Explain the advantages of instrument transformers as regards to extension of range of current and voltage on high voltage A.C. systems.
(b) A 1000/5A, 50Hz current transformer has a secondary burden comprising a non-inductive impedance of 1.6Ω . 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 1.5W at full load. [8+8]
4. (a) Explain the method of measuring the dielectric loss of the capacitor at high voltage and high frequency. Derive the condition of balance for the bridge. Also, explain the precautions to be taken to ensure accuracy. Draw the phasor diagram under balance conditions.
(b) In an Anderson bridge for measurement of inductance L_x and Resistance R_x in the arm AB, the arm CD and DA have resistances of 600Ω each and the arm CE has a capacitor of $1\mu F$ capacitor with A.C. supply at 100 Hz supplied across A and C, balance is obtained with a resistance of 400Ω in arm DE and 800Ω in the arm BC. Calculate the value of L_x and R_x . [10+6]
5. (a) State the errors present in electrostatic instruments.
(b) State the advantages and disadvantages of electrostatic instruments.
(c) The capacitance of a 0-2,000 V electrostatic voltmeter increases uniformly from 42 to 54 pF from zero to full scale deflection. It is required to increase the range of the instrument to 20,000 V by means of an external capacitor. Calculate the value of capacitance required? [6+6+4]
6. The cores of two identical transformers A and B carry alternating fluxes whose instantaneous values are $(0.01 \sin 314t)W$ and $0.012 (1.1 \sin 628t + 0.1 \sin 1884t)W$ respectively. Find the ratio of eddy current loss of B to A. Find also the ratio of hysteresis loss of B to A. [16]

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7. (a) Give the constructional details of electro-dynamometer type wattmeter with a neat sketch.
- (b) Prove that the true power = $\frac{\cos\phi}{\cos\phi \cdot \cos(\phi-\beta)} \times \text{Actual wattmeter reading}$ for electro-dynamometer type of wattmeters, where $\cos\phi$ = p.f of the circuit, $\beta = \tan^{-1} \left(\frac{\omega L}{R} \right)$ where L and R are the inductance and resistance of the pressure coil of the circuit. [8+8]
8. Explain the construction and working principle of a co-ordinate type A.C. potentiometer with the help of a neat diagram. [16]

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R05**Set No. 1****III B.Tech I Semester Examinations, November 2010****ELECTRICAL MEASUREMENTS****Electrical And Electronics Engineering****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. (a) State the errors present in electrostatic instruments.
 (b) State the advantages and disadvantages of electrostatic instruments.
 (c) The capacitance of a 0-2,000 V electrostatic voltmeter increases uniformly from 42 to 54 pf from zero to full scale deflection. It is required to increase the range of the instrument to 20,000 V by means of an external capacitor. Calculate the value of capacitance required? [6+6+4]
2. Explain the construction and working principle of a co-ordinate type A.C. potentiometer with the help of a neat diagram. [16]
3. The cores of two identical transformers A and B carry alternating fluxes whose instantaneous values are $(0.01 \sin 314t) \text{ W}$ and $0.012 (1.1 \sin 628t + 0.1 \sin 1884t) \text{ W}$ respectively. Find the ratio of eddy current loss of B to A. Find also the ratio of hysteresis loss of B to A. [16]
4. (a) Give the constructional details of electro-dynamometer type wattmeter with a neat sketch.
 (b) Prove that the true power = $\frac{\cos \phi}{\cos \phi \cdot \cos(\phi - \beta)} \times \text{Actual wattmeter reading}$ for electro-dynamometer type of wattmeters, where $\cos \phi = \text{p.f. of the circuit}$, $\beta = \tan^{-1}(\frac{wL}{R})$ where L and R are the inductance and resistance of the pressure coil of the circuit. [8+8]
5. (a) Explain the method of measuring the dielectric loss of the capacitor at high voltage and high frequency. Derive the condition of balance for the bridge. Also, explain the precautions to be taken to ensure accuracy. Draw the phasor diagram under balance conditions.
 (b) In an Anderson bridge for measurement of inductance L_x and Resistance R_x in the arm AB, the arm CD and DA have resistances of 600Ω each and the arm CE has a capacitor of $1 \mu \text{ F}$ capacitor with A.C. supply at 100 Hz supplied across A and C, balance is obtained with a resistance of 400Ω in arm DE and 800Ω in the arm BC. Calculate the value of L_x and R_x . [10+6]
6. Explain the loss of charge method for measuring high resistance. Mention the possible errors and suggest methods to minimize these. [16]
7. (a) Explain the advantages of instrument transformers as regards to extension of range of current and voltage on high voltage A.C. systems.

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- (b) A 1000/5A, 50Hz current transformer has a secondary burden comprising a non-inductive impedance of 1.6Ω . 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 1.5W at full load. [8+8]
8. (a) What are the errors in energy meter and how are they compensated in multi-element induction type energy meter? How these energy meter errors will compare with that of watt-meter?
- (b) The disc of an energy meter makes 600 revolutions per unit energy. When a 1,000 watt load is connected, the disc rotates at 10.2 rpm, if the load is on for 12 hours, how many units are recorded as error? [10+6]

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R05**Set No. 3****III B.Tech I Semester Examinations, November 2010****ELECTRICAL MEASUREMENTS****Electrical And Electronics Engineering****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. (a) Explain the method of measuring the dielectric loss of the capacitor at high voltage and high frequency. Derive the condition of balance for the bridge. Also, explain the precautions to be taken to ensure accuracy. Draw the phasor diagram under balance conditions.
- (b) In an Anderson bridge for measurement of inductance L_x and Resistance R_x in the arm AB, the arm CD and DA have resistances of $600\ \Omega$ each and the arm CE has a capacitor of $1\ \mu\text{F}$ capacitor with A.C. supply at 100 Hz supplied across A and C, balance is obtained with a resistance of $400\ \Omega$ in arm DE and $800\ \Omega$ in the arm BC. Calculate the value of L_x and R_x . [10+6]
2. Explain the construction and working principle of a co-ordinate type A.C. potentiometer with the help of a neat diagram. [16]
3. (a) Give the constructional details of electro-dynamometer type wattmeter with a neat sketch.
- (b) Prove that the true power = $\frac{\cos\phi}{\cos\phi \cdot \cos(\phi-\beta)} \times \text{Actual wattmeter reading}$ for electro-dynamometer type of wattmeters, where $\cos\phi = \text{p.f. of the circuit}$, $\beta = \tan^{-1}\left(\frac{\omega L}{R}\right)$ where L and R are the inductance and resistance of the pressure coil of the circuit. [8+8]
4. (a) Explain the advantages of instrument transformers as regards to extension of range of current and voltage on high voltage A.C. systems.
- (b) A 1000/5A, 50Hz current transformer has a secondary burden comprising a non-inductive impedance of $1.6\ \Omega$. 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 1.5W at full load. [8+8]
5. (a) State the errors present in electrostatic instruments.
- (b) State the advantages and disadvantages of electrostatic instruments.
- (c) The capacitance of a 0-2,000 V electrostatic voltmeter increases uniformly from 42 to 54 pF from zero to full scale deflection. It is required to increase the range of the instrument to 20,000 V by means of an external capacitor. Calculate the value of capacitance required? [6+6+4]
6. (a) What are the errors in energy meter and how are they compensated in multi-element induction type energy meter? How these energy meter errors will compare with that of watt-meter?

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- (b) The disc of an energy meter makes 600 revolutions per unit energy. When a 1,000 watt load is connected, the disc rotates at 10.2 rpm, if the load is on for 12 hours, how many units are recorded as error? [10+6]
7. Explain the loss of charge method for measuring high resistance. Mention the possible errors and suggest methods to minimize these. [16]
8. The cores of two identical transformers A and B carry alternating fluxes whose instantaneous values are $(0.01 \sin 314t)W$ and $0.012 (1.1 \sin 628t + 0.1 \sin 1884t)W$ respectively. Find the ratio of eddy current loss of B to A. Find also the ratio of hysteresis loss of B to A. [16]

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