

Code No: R31022

R10

Set No: 1

III B.Tech. I Semester Supplementary Examinations, May - 2013

ELECTRICAL MEASUREMENTS

(Electrical and Electronics Engineering)

Time: 3 Hours**Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks

1. Draw the sketch and explain the principle of PMMC instrument. Discuss how it can be used as voltmeter and ammeter? Derive the expression for deflecting torque.
2. (a) Derive the expression for ratio and phase angle error of a potential transformer.
(b) A potential transformer, ratio of 1000/100V, has the following constants:
primary resistance = 94.5Ω
secondary resistance = 0.86Ω
primary reactance = 66.2Ω
total equivalent reactance referred to primary = 110Ω
magnetizing current = 0.02A at 0.4 power factor. Calculate:
(i) Phase angle error at no load
(ii) Load in VA at unity power factor at which the phase angle will be zero
3. (a) Describe the constructional details of induction type single-phase energy meter.
(b) Explain how the following adjustments are made in induction type single-phase energy meter?
(i) lag adjustment (ii) overload compensation (iii) creep (iv) voltage compensation
4. (a) What is potentiometer? Explain the operation of Crompton's potentiometer.
(b) Describe the working of a co-ordinate type a.c. potentiometer.
5. (a) Explain the construction and working principle of Wheatstone bridge.
(b) Derive the expression for sensitivity of Wheatstone bridge.
6. (a) Describe how unknown self-inductance of a resistance can be measured in terms of capacitance, by using Owen's bridge.
(b) Draw the phasor diagram of Owen's bridge. Also mention the advantages and disadvantages of Owen's bridge.
7. (a) Explain the Double bar method of measuring the flux density of iron specimen.
(b) Describe the method for determination of B-H curve of magnetic material by method of reversals.
8. (a) Explain the functioning of ramp type digital voltmeter.
(b) Explain the working principle of digital tachometer.



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ELECTRICAL MEASUREMENTS
(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Explain the constructional details and operating principle of PMMC instrument.
(b) Discuss various errors that occur in measurements and how can they be compensated?
2. (a) Explain the design and constructional features of current transformers.
(b) Derive the expressions for ratio and phase angle error of a current transformer.
3. (a) What are the special features incorporated in electro-dynamometer wattmeter to make it as LPF type of wattmeter?
(b) Describe the operating principle of induction type single-phase energy meter.
(c) What is creeping in an energy meter?
4. (a) With a neat sketch, explain the operation of a potentiometer. What is standardization? How is it achieved?
(b) A simple slide wire is used for measurement of current in a circuit. The voltage drop across a standard resistor of 0.1 ohm is balanced at 75 cm. Find the magnitude of current if the standard cell emf of 1.45V is balanced at 50 cm.
5. (a) Why is Kelvin's double bridge superior to the wheatstone bridge for the purpose of low resistance measurement.
(b) Explain Kelvin's double bridge method of measurement of low resistances.
(c) Discuss the arrangements necessary in order that the greatest precision may be obtained.
6. (a) Explain why Maxwell's inductance-capacitance bridge is useful for measurement of coils having storage factor between 1 and 10.
(b) An ac bridge circuit is working at 1000Hz. Arm **AB** is 0.2 μ F pure capacitance, arm **BC** is 500 Ω pure resistance, arm **CD** contains unknown impedance and arm **DA** has a 300 Ω resistance in parallel with 0.1 μ F capacitor. Find the R and C or L constants of arm **CD** considering it as a series circuit.
7. Describe a method of experimental determination of flux density in a specimen of magnetic material using a ballistic galvanometer. Explain how the correction for flux in the air space between the specimen and coil is applied.
8. (a) Explain the functioning of a digital frequency meter.
(b) Explain how a digital multimeter operates.



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R10

Set No: 3

III B.Tech. I Semester Supplementary Examinations, May - 2013

ELECTRICAL MEASUREMENTS
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Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. Classify the instruments that are used for electrical measurements? What are the various torques present in deflecting type instruments? What are the various errors that occur in measurements and how can they be compensated?
2. (a) Discuss the working principle of power factor meter. Mention its merits and demerits.
(b) A 100/5A, 50 Hz current transformer has a secondary burden comprising a non-inductive burden of 1.6 ohm. 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.
3. (a) Explain the operating principle of induction type single-phase energy meter.
(b) Write about errors and compensations of energy meters.
4. (a) Explain with a neat sketch, working principle and operation of D.C. Crompton's potentiometer.
(b) Explain the term "standardization" of a potentiometer. Describe the procedure of standardization of a D.C. potentiometer.
5. (a) Discuss the principle and operation of Carey Foster's slide wire bridge.
(b) Explain low resistance measurement by using Kelvin's double bridge method.
6. (a) Discuss the advantages and disadvantages of D'Sauty's bridge.
(b) Describe the working of low voltage Schering bridge. Derive the equation for unknown capacitance.
(c) Draw the phasor diagram of the Schering bridge under balanced conditions.
7. (a) Derive an expression for equation of motion of a ballistic galvanometer.
(b) A solenoid is 60cm long and 2.5cm in diameter; it is uniformly wound with 600 turns of wire. Find the magnetic field strength at the centre of the solenoid when carrying a current of 2amp. If the secondary coil is wound round the central part of solenoid, calculate the flux passing through it
8. (a) Explain the basic principle and working of digital frequency meter.
(b) Explain the principle of working of digital tachometer.



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ELECTRICAL MEASUREMENTS
(Electrical and Electronics Engineering)

Time: 3 Hours

Max Marks: 75

Answer any FIVE Questions
All Questions carry equal marks

1. Classify moving iron instruments. Draw the sketch and explain the principle one moving iron instruments. Discuss how it can be used as voltmeter and ammeter. Derive the expression for deflecting torque.
2. (a) Explain how the range of ammeter and voltmeter can be extended? Explain with an example.
(b) At its rated load of 50A, a 100/5A current transformer has an iron-loss of 0.2W and the magnetizing current of 1.8A. Calculate approximately its ratio error and phase angle error when supplying rated output to a meter having a ratio of resistance to reactance of 5.
3. (a) Explain the principle and working of dynamometer type wattmeter.
(b) Explain how the range of wattmeter can be extended? Differentiate between LPF and UPF meter.
4. Describe the construction and working of polar type potentiometer. How is it standardized? What are the functions of the transfer instrument and the phase shifting transformer?
5. (a) Explain Kelvin's double bridge method of measurement of low resistances.
(b) In a specific Kelvin bridge the ratio of the arms 1:100. The standard resistance is 20 ohms. Find out the unknown resistance.
(c) Why is Kelvin's double bridge superior to the Wheatstone bridge for the purpose of low resistance measurement?
6. (a) Describe the working of Hay's bridge for measurement of inductance of high Q coils.
(b) A Maxwell's inductance capacitance bridge is used to measure unknown inductance in comparison with capacitance. The various values at balance are R_2 of arm **AD** = 400 Ω ; R_3 of arm **BC** = 600 Ω ; R_4 and C_4 of arm **CD** = 1000 Ω , 0.5 μ F; Calculate the values of R_1 and L_1 of arm **AB**. Also calculate the value of storage factor of coil if the frequency is 1000Hz.
7. (a) Describe the Lloyd-Fisher square for measurement of iron losses in a specimen of laminations.
(b) Explain how iron loss and a.c permeability of ferro-magnetic material can be determined by using A.C. potentiometer?
8. (a) Explain about each block of digital voltmeter and mention advantages.
(b) Explain the functioning of a digital tachometer.

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