



GIET Main Campus (Autonomous)

Gunupur-765 022

Reg.No.:

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B.TECH. DEGREE EXAMINATION-Nov-Dec.2018
End Semester Examination
BEIPC3030-Electrical and Electronics Measurement
(Regulations 2017)(Common to AEIE and ECE Branches)

Time : 3 Hours

Maximum : 100 Marks

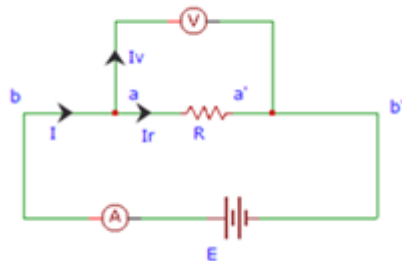
Question Code:291012

Answer ALL Questions

PART A - (10 X 2 = 20 Marks)

1. (a) Maxwell-LC bridge is used for measuring [CO1] [PO1]
- a) Capacitance
 - b) Dielectric loss
 - c) Inductance
 - d) Phase angle

- (b) In the following fig the terminals aa' are used for [CO1] [PO2]



- a) measuring the current flow through the circuit
 - b) measuring the power dissipation of the circuit
 - c) measuring the resistance of the circuit
 - d) measuring the voltage drop across the resistance
- (c) Why is damping of ballistic galvanometer kept small? [CO2 PO1]
- a) To get minimum overshoot
 - b) To make the system critically damped
 - c) To make the system oscillatory
 - d) To get first deflection large
- (d) It is required to measure the true open circuit e.m.f. of a battery. The best device is [CO2] [PO1]
- a) Dc voltmeter
 - b) Ammeter and a known resistance
 - c) D.C. potentiometer
 - d) None of the above



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- (e) The minimum number of wattmeters to measure power in a 3-phase unbalanced star-connected load is [CO3] [PO1]
a) one b) two c) three d) four.
- (f) In the measurement of 3-phase power by two-watt meters method, if the two wattmeter will be equal the power factor of the circuit is [CO3] [PO1]
a) 0.8 lagging b) 0.8 leading c) Zero d) unity
- (g) The induction type single-phase watt-hour meters uses [CO3] [PO1]
a) Control spring
b) Pointer
c) Brake magnet and spindle
d) All of these
- (h) The transformer ratio of the transformer depends upon the [CO4] [PO1]
a) Exciting current
b) Secondary current
c) Power factor of secondary circuit
d) All of these
- (i) The primary winding of a P.T. has [CO4] [PO1]
a) intermediate number of turns
b) no turns at all
c) a larger number of turns
d) a few turns
- (j) Q factor is also defined as the ratio of..... [CO4] [PO1]
a) resistance to reactance
b) reactance to resistance
c) power to voltage
d) current to power

PART B - (10 X 2 = 20 Marks)

2. (a) Mention the advantages of Wagner earthing devices. [CO1] [PO1]
- (b) A current has a true value of 2.37A. A multimeter with a scale range of 2.5A shows a current of 2.3A. What are the values of absolute error and correction error? [CO1] [PO2]
- (c) Four resistors are connected in series with the values 36.3ohm, 3.85 ohm, 34.002 ohm and 850 ohm. What is the total resistance up to the approximate number of significant figures. [CO1] [PO2]
- (d) What is the most preferred damping condition for indication type instrument? Why? [CO2] [PO1]



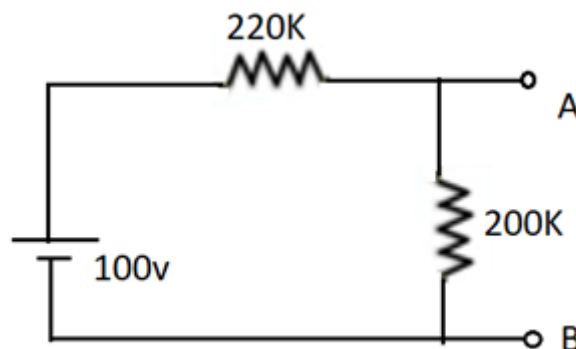
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- (e) Define the following terms used in galvanometer: CDRX and logarithmic decrement. [CO2] [PO1]
- (f) Define multiplying power and multiplying factor. [CO2] [PO1]
- (g) How can you reverse the meter in household 1- ϕ induction type wattmeter? [CO3] [PO4]
- (h) Define creeping in energy meter. How to minimize the effect of creeping? [CO3] [PO1]
- (i) What are the major drawbacks of tuned circuit harmonic analyzer? [CO4 PO1]
- (j) Define harmonic distortion. How is it measured mathematically? [CO4 PO1]

PART C - (4 X 15 = 60 Marks)

3. (a) (i) Draw the circuit diagram of Wein's Bridge, Derive the condition for balancing the Bridge and finding the unknown parameter. Draw the phasor diagram at balanced condition. [8][CO1] [PO4]
- (ii) A 75 volt range voltmeter is connected across the terminals A and B of the circuit as shown below. Find the reading of the voltmeter at open circuit and loaded condition. Find the % age accuracy and error. The voltmeter has a resistance of 100K. [7][CO1] [PO2]



(or)

- (b) (i) Draw the circuit diagram of Schering Bridge, Derive the condition for balancing the Bridge and finding the unknown parameter. Draw the phasor diagram at balanced condition. [8][CO1] [PO4]
- (ii) Draw the circuit diagram and explain the method of measurement of self inductance by three-voltmeter and ammeter method. [7][CO1] [PO2]
4. (a) (i) Describe the construction and explain the basic principle of operation of attraction and repulsion type MI instruments and Distinguish the construction between d'Arsonval, vibration and ballistic galvanometers. Write the applications of these galvanometers. [10][CO2] [PO1]



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- (ii) A ballistic galvanometer gives a first swing of 60 degree for a discharge of $1000\mu\text{C}$. Find the quantity of electricity to produce a swing of 90 degree. [5] [CO2] [PO2]

(or)

- (b) (i) What is the basic principle of potentiometer explain with neat diagram? Briefly explain the applications of potentiometer. [10][CO2] [PO1]
- (ii) The law of deflection of a MI type instrument is given by $I = 5\theta^{2n}$ A, where θ is in deflection in radian and n is a constant. For a meter current of 0A, the self inductance is 7.5 mH. The spring constant is 0.16 Nm/rad. Find out the expression for self inductance of the meter as a function of θ and n. Also compute the meter current and the deflection that corresponds to self inductance of 50 mH. [5][CO2] [PO2]
5. (a) (i) Derive the expression for power consumption by electro-dynamometer type wattmeter. [10] [CO3] [PO2]
- (ii) A wattmeter has a current coil of 0.1 ohm resistance and a pressure coil of 6500 ohm resistance. Calculate the % error due to resistance only which takes: (a) 12 A at 250 V with unity power factor and (b) 12 A at 250 V with a power factor of 0.4. [5][CO3] [PO2]
- (or)
- (b) (i) Derive the expression for power consumption in a balanced 3-phase RL, RC R load [10][CO3] [PO1]
- (ii) The declared constant of a 6A, 230V meter on full load test makes 60 revolutions in 360 seconds. If the normal disc speed is 510 revolutions per KWh, find the % error. [5][CO3] [PO2]
6. (a) (i) Explain a harmonic distortion analyzer with a neat diagram. What are its applications? [10][CO4][PO1]
- (ii) A 1 phase PT has a turn ratio of 3810/63. The nominal secondary voltage is 63V and the total equivalent resistance and leakage reactance referred to the secondary side are 2 ohm, and 1 ohm respectively. Calculate the ratio and phase angle errors when the transformer is supplying a burden of $100+j200$ ohm. [5][CO4][PO2]
- (or)
- (b) (i) Briefly explain with a neat diagram, the frequency measurement with the help of a digital frequency counter. [10][CO4][PO1]
- (ii) At a rated load of 25VA, a 100/5A CT has an iron loss of 0.2W and a magnetizing current of 1.5A. If the output has a ratio of resistance to reactance of 5, calculate the ratio error and phase angle. [5][CO4][PO2]