NARSIMHA REDDY ENGINEERING COLLEGE
UGC AUTONOMOUS INSTITUTION

UGC - Autonomous Institute
Accredited by **NBA & NAAC** with **'A'** Grade
Approved by **AICTE**
Permanently affiliated to **JNTUH**

Maisammaguda (V), Kompally - 500100, Secunderabad, Telangana State, India

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

III B.Tech, I Semester, Academic Year: 2024-25

Course Name	:	Electrical and Electronics Instrumentation (EE3206PE)
L – T – P	:	3– 0– 0
Course Instructor	:	Dr.K.Eswaramoorthy

PREVIOUS YEAR QUESTION PAPERS

R13

Code No: 126AH

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, April - 2018
ELECTRICAL AND ELECTRONICS INSTRUMENTATION
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) State two sources of error in moving iron instrument. [2]
  b) What are the various effects with which deflecting torque is produced? [3]
  c) What is true zero in potentiometer? [2]
  d) What are the sources of error in a current transformer? [3]
  e) Which errors are possible to occur in wattmeter? [2]
  f) How creeping adjustment is provided in induction type single phase energy meter? [3]
  g) What are the difficulties in measurement of high resistance? [2]
  h) What is hay's bridge? Why it is preferred over maxwell's bridge? [3]
  i) Distinguish between active and passive electrical transducers. [2]
  j) Why is a CRO considered one of the most important tools in the field of modern electronics? [3]

PART - B

(50 Marks)

2.a) A moving-coil instrument gives the full-scale deflection of 10 mA when the potential difference across its terminals is 100 mV. Calculate (i) the shunt resistance for a full-scale deflection corresponding to 100 A, and (ii) the series resistance for full scale reading with 1000 V. Calculate the power dissipation in each case.
  b) With usual notation derive an expression for the deflecting torque in a PMMC instrument. [5+5]

OR

3.a) Explain how a potential divider arrangement is used for multipliers used multi range voltmeters.
  b) How temperature effect is corrected in the shunts? Discuss with a neat circuit diagram. [5+5]

4.a) Describe the methods employed for reducing ratio error and phase angle error in PTs?
 b) Why the secondary winding of a CT should never be open circuited with its primary still energized? Explain briefly. [5+5]

OR

5.a) Explain with the help of suitable diagrams, how ac potentiometers can be used for (i) calibration of voltmeter (ii) calibration of ammeter.
 b) A Crompton's potentiometer consists of a resistance dial having 15 steps of 10 ohm each and a series connected slide wire of 10 ohm divided into 100 divisions. If the working current of the potentiometer is 10 mA and each division of slide wire can be read accurately upto $1/5^{th}$ of its span, calculate the resolution of the potentiometer in volts. [5+5]

6.a) An electrodynamometer-type wattmeter has a current coil with a resistance of 0.1 Ω and a pressure coil with resistance of 6.5 kΩ. Calculate the percentage errors while the meter is connected as (i) current coil to the load side, and (ii) pressure coil to the load side. The load is specified as (I) 12 A at 250 V with unity power factor, and (II) 12 A at 25 V with 0.4 lagging power factor.
 b) How the phantom loading test is carried out with rotating substandard meter using phase shifting device? Explain. [5+5]

OR

7.a) Describe the method of measurement of reactive power in three phase circuits using single dynamometer type wattmeter.
 b) Explain the errors caused due to pressure coil inductance and pressure coil capacitance in electrodynamometer wattmeter. [5+5]

8. Explain the principle of working of a Kelvin's double bridge for measurement of unknown low resistances. Explain how the effects of contact resistance and resistance of leads are eliminated. [10]

OR

9.a) Explain why the maxwell's inductance capacitance bridge is useful for the measurement of inductance of coils having quality factors between 1 and 10.
 b) Define quality factor of a coil. Why is Hay's bridge suitable for the measurement of inductance of high Q coils? [5+5]

10.a) What is an LVDT? Explain its working principle with necessary diagrams and characteristics. What are its advantages and uses?
 b) Describe with suitable diagrams the working principle of strain gauges. [5+5]

OR

11. Write short notes on the following.
 a) Vertical amplifier
 b) Free running sweep
 c) Oscilloscope limitations
 d) Electromagnetic focusing. [10]

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, December - 2019
ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
(Electrical and Electronics Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A
(25 Marks)

1.a) Why is it preferable to have slightly under damped instrument? [2]
 b) A permanent magnet moving coil instrument has a coil of dimension 18mm × 15mm, the flux density in the air gap is $1.6 × 10^{-3}$ Wb/m² and the spring constant is $0.1 × 10^{-6}$ Nm/rad. Determine the number of turns required to produce an angular deflection of 90^0 when a current of 3 mA is through the coil. [3]
 c) Highlight the special features of the Diesselhorst potentiometer. [2]
 d) A simple slide-wire is used for measurement of current in a circuit. The voltage drop across a standard resistance of 0.1Ω is balanced at 80 cm. Find the magnitude of the current if the standard cell emf of 1.25V is balanced at 40 cm. [3]
 e) What is a Trivector meter? [2]
 f) Briefly discuss the operating principle of Clock meters. [3]
 g) Discuss the condition during which the Bridge sensitivity is maximum for a detector. [2]
 h) What is Wagner earthing device? Why is it used in measurable by a.c bridges? [3]
 i) Define the Gauge Factor of a Strain Gauge. [2]
 j) A Piezoelectric crystal has a dimension of 5mm × 5mm × 1.25mm and has a voltage sensitivity of 0.05 V-m/N. It is used for the measurement of force. Calculate the magnitude of force if the voltage developed is 80V. [3]

PART – B
(50 Marks)

2.   Explain the construction details of Repulsion – attraction type moving iron instrument. Derive the Torque equation for moving iron instrument. [10]

OR

3.a) What do you think are the permissible Errors in Ammeters and Voltmeters?
 b) An electrostatic voltmeter consists of two attracted plates (movable and fixed provided with guard rings). When a potential difference of 10 KV is applied between the plates, there is a pull of $5×10^{-3}$ N on the movable plate. Find the change in capacitance produced due to the change in the position of the movable plate by 1mm. Diameter of the movable plate is 100mm. [4+6]

4.   With the help of a neat circuit diagram explain Crompton's potentiometer and it's working. How a true zero is obtained in a Crompton's pot?   [10]

OR

5.   Describe the working principle of Larsen Potentiometer with the help of neat circuit.   [10]

6.   What are the various types of errors in induction type energy meter? Explain the methods incorporated for their compensation.   [10]

OR

7.   A dynamometer- type watt meter has a field system which may be considered long compared with its moving coils. The flux density is 0.012T. The mean diameter of the moving coil is 5cm and the moving coil turns are 600. The current through the coil is 0.06A and the power factor of the circuit of which the power is measured, is 0.866. Estimate the torque when the axis of the field and moving coil is 60^0.   [10]

8.   In Hay's bridge the four arms are arranged as under:
AB is a resistance of 600Ω in series with an inductor of 0.18 H, BC and DA are non-inductive resistances of 1200 Ω each and CD consists of a resistance R in series with a capacitor C. A potential difference of 3V at a frequency of 50Hz is applied between A and C. Determine the values of R and C. Derive the condition for bridge balance.   [10]

OR

9.   Show how the Wien's bridge can be used for the measurement of frequency in audio range. Derive the equation for frequency f.   [10]

10.a)   With the help of characteristics discuss the principle of operation of LVDT and its advantages.
   b)   Enumerate the differences between a PN diode and a Photo diode and briefly explain the working of Photo diode.   [6+4]

OR

11.   Illustrate various methods for the measurement of acceleration and explain any one of them in detail.   [10]

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, December - 2019
ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
(Electrical and Electronics Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B
consists of 5 Units. Answer any one full question from each unit. Each question carries
10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a) Why is it preferable to have slightly under damped instrument?   [2]
  b) A permanent magnet moving coil instrument has a coil of dimension 18mm × 15mm,
     the flux density in the air gap is 1.6×10^{-5} Wb/m^2 and the spring constant is 0.1×10^{-6}
     Nm/rad. Determine the number of turns required to produce an angular deflection of
     90^0 when a current of 3 mA is through the coil.   [3]
  c) Highlight the special features of the Diesselhorst potentiometer.   [2]
  d) A simple slide-wire is used for measurement of current in a circuit. The voltage drop
     across a standard resistance of 0.1Ω is balanced at 80 cm. Find the magnitude of the
     current if the standard cell emf of 1.25V is balanced at 40 cm.   [3]
  e) What is a Trivector meter?   [2]
  f) Briefly discuss the operating principle of Clock meters.   [3]
  g) Discuss the condition during which the Bridge sensitivity is maximum for a detector.
                                                                                                     [2]
  h) What is Wagner earthing device? Why is it used in measurable by a.c bridges?   [3]
  i) Define the Gauge Factor of a Strain Gauge.   [2]
  j) A Piezoelectric crystal has a dimension of 5mm × 5mm × 1.25mm and has a voltage
     sensitivity of 0.05 V-m/N. It is used for the measurement of force. Calculate the
     magnitude of force if the voltage developed is 80V.   [3]

PART – B

(50 Marks)

2.   Explain the construction details of Repulsion – attraction type moving iron instrument.
      Derive the Torque equation for moving iron instrument.   [10]
                                                OR
3.a) What do you think are the permissible Errors in Ammeters and Voltmeters?
  b) An electrostatic voltmeter consists of two attracted plates (movable and fixed provided
      with guard rings). When a potential difference of 10 KV is applied between the plates,
      there is a pull of 5×10^{-3} N on the movable plate. Find the change in capacitance
      produced due to the change in the position of the movable plate by 1mm. Diameter of
      the movable plate is 100mm.   [4+6]

4. With the help of a neat circuit diagram explain Crompton's potentiometer and it's working. How a true zero is obtained in a Crompton's pot? [10]

OR

5. Describe the working principle of Larsen Potentiometer with the help of neat circuit. [10]

6. What are the various types of errors in induction type energy meter? Explain the methods incorporated for their compensation. [10]

OR

7. A dynamometer- type watt meter has a field system which may be considered long compared with its moving coils. The flux density is 0.012T. The mean diameter of the moving coil is 5cm and the moving coil turns are 600. The current through the coil is 0.06A and the power factor of the circuit of which the power is measured, is 0.866. Estimate the torque when the axis of the field and moving coil is 60^0. [10]

8. In Hay's bridge the four arms are arranged as under:
AB is a resistance of 600Ω in series with an inductor of 0.18 H, BC and DA are non-inductive resistances of $1200\ \Omega$ each and CD consists of a resistance R in series with a capacitor C. A potential difference of 3V at a frequency of 50Hz is applied between A and C. Determine the values of R and C. Derive the condition for bridge balance. [10]

OR

9. Show how the Wien's bridge can be used for the measurement of frequency in audio range. Derive the equation for frequency f. [10]

10.a) With the help of characteristics discuss the principle of operation of LVDT and its advantages.
   b) Enumerate the differences between a PN diode and a Photo diode and briefly explain the working of Photo diode. [6+4]

OR

11. Illustrate various methods for the measurement of acceleration and explain any one of them in detail. [10]