Code No: R2032022 **R20** SET -1

III B. Tech II Semester Regular Examinations, July -2023
ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Derive the equation for deflection in spring controlled permanent magnet Moving coil instrument with a neat sketch. [7M]
   b) List the different types of errors in PMMC Instruments and how they can be overcome? [7M]

(OR)

2. a) List the difference between Current transformer and Potential transformer. [7M]
   b) Explain the use of instrument transformers and list the advantages and disadvantages. [7M]

UNIT-II

3. a) Describe the working principle of a Single phase electro dynamometer type power factor meter with the help of a suitable diagram. [7M]
   b) 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. [7M]

(OR)

4. a) Explain the working principle DC potentiometer. [7M]
   b) What are the advantages of AC potentiometer over DC Potentiometer? [7M]

UNIT-III

5. a) Explain how the inductance can be measured by using Maxwell bridge with a neat diagram. [7M]
   b) Explain in detail the loss of charge method for measurement of high resistance. [7M]

(OR)

6. a) Derive the balancing equation of Anderson Bridge with neat phasor diagram. [7M]
   b) 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. [7M]

UNIT-IV

7. a) Explain the construction and working principle of a thermocouple. [7M]
   b) Describe the advantages, disadvantages and applications of thermocouple. [7M]

(OR)

8. a) Describe the method of measurement of different pressure using an inductive transducer. [7M]
   b) A transducer that measures force has a normal resistance of 300Ω, forms a four arm strain gauge bridge and is excited by 7.5V DC. When the force of 0.1N is applied, all the four strain gauge resistances are changed by 5.2Ω. Find the output voltage and determine its sensitivity. [7M]

UNIT-V

9. a) Explain with a neat block diagram of a successive approximation digital voltmeter. [7M]
   b) With the help of a functional block diagram, describe the principle Of operation of a Digital Multimeter. [7M]

(OR)

10. a) Discuss about the electrostatic focusing deflection system of a CRO with necessary diagrams. [7M]
    b) With the help of a functional block diagram, describe the principle of operation of a Digital Energy Meter. [7M]

Code No: R2032022 **R20** SET -2

III B. Tech II Semester Regular Examinations, July -2023
ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. a) What is essential difference between a moving coil and a moving iron instrument? [7M]
   b) Explain the construction and working of Repulsion type Moving iron Instruments. [7M]

(OR)

2. a) Explain about extension of instrument ranges. [7M]
   b) Find the deflection of a moving iron ammeter having the following. data control spring constant $=8\times10^{-6}$, current is 6 A and $L= 6+3\Theta-0.5\Theta^2\mu H$. [7M]

UNIT-II

3. a) Illustrate the constructional features of single phase Dynamometer wattmeter. [7M]
   b) Derive the torque equation of a Single phase electro dynamometer type power factor meter. [7M]

(OR)

4. a) What are the applications of DC potentiometer? [7M]
   b) Explain the working principle of co-ordinate type AC Potentiometer. [7M]

UNIT-III

5. a) What are the applications of wheat stone bridge? Explain any one application. [7M]
   b) Derive the balancing equation of Kelvin double bridge. [7M]

(OR)

6. a) Explain about Schering Bridge, with neat diagram. [7M]
   b) The impedances of an AC bridge are $Z1=400\Omega\angle 50^0$; $Z2=200\Omega\angle 40^0$; $Z3=800\Omega\angle -50^0$; $Z4=400\Omega\angle 20^0$. Find out whether bridge is balanced under these conditions or not. [7M]

UNIT-IV

7. a) With the help of characteristics discuss the principle of operation of LVDT and its advantages. [7M]
   b) An LVDT with a secondary voltage of 5V has a range of ±25mm. i) Find the output voltage when the core is –18.75mm from centre, ii) Plot the output voltage versus core position for a core movement going from +18.75mm to -10mm. [7M]

(OR)

8. a) What are Thermistors? Explain the working, construction and applications of Thermistors. [7M]
   b) Describe the construction and working of the following types of transducers (i) Photo Diode (ii) Piezoelectric. [7M]

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UNIT-V

9. a) Compare ramp type and integrating type DVM. [7M]
   b) Explain with the help of a functional block diagram, the principle of operation of a digital frequency meter. [7M]

(OR)

10. a) Discuss the advantages of a digital voltmeter over an analog voltmeter. [7M]
    b) Explain the principle of operation of Q-meter. [7M]

Code No: R2032022 **R20** SET -3

III B. Tech II Semester Regular Examinations, July -2023
ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1. a) Explain the construction and operation of moving iron instruments. [7M]
   b) The range of 1mA ammeter having an internal resistance of 100 ohms is to be extended to 100 mA ammeter. Calculate the value of the resistance of required shunt. [7M]

(OR)

2. a) Explain the following terms related to PT and CT. [7M]
   i) Transformation ratio. ii) Turns ratio iii) Ratio correction factor.
   b) Derive the expressions for the ratio and phase angle errors of a CT. [7M]

UNIT-II

3. a) Explain constructional details and working principle of three phase Electro dynamometer power factor meter. [7M]
   b) Illustrate the constructional features of single phase Dynamometer wattmeter. [7M]

(OR)

4. a) Explain the principle and operation of DC Crompton's potentiometer. [7M]
   b) Explain the working principle of co-ordinate type AC Potentiometer. [7M]

UNIT-III

5. a) Describe the circuit of Kelvin double bridge used for measurement of low resistance. [7M]
   b) Derive the balancing equation of wheat stone bridge. [7M]

(OR)

6. a) Show how the Wien's bridge can be used for the measurement of frequency in audio range. [7M]
   b) The impedances of an AC bridge are $Z1=400\Omega\angle 50^0$; $Z2=200\Omega\angle 40^0$; $Z3=800\Omega\angle -50^0$; $Z4=400\Omega\angle 20^0$. Find out whether bridge is balanced under these conditions or not. [7M]

UNIT-IV

7. a) Explain the principle and working of LVDT transducer. [7M]
   b) Describe the method of measurement of different pressure using an inductive transducer. [7M]

(OR)

8. a) Describe the working of Piezo electric transducers [7M]
   b) A transducer that measures force has a normal resistance of 300Ω, forms a four armstrain gauge bridge and is excited by 7.5V DC. When the force of 0.1N is applied, all the four strain gauge resistances are changed by 5.2Ω. Find the output voltage and determine its sensitivity. [7M]

UNIT-V

9. a) Explain the basic scheme of Digital multimeter along with its advantages. [7M]
   b) Explain with neat circuit diagram the working of any one type of digital voltmeter. [7M]

(OR)

10. a) Write steps to measure phase and frequency with help of CRO. [7M]
    b) Compare Analog meter and Digital meters on the basis of [7M]
       i) Display,
       ii) Resolution,
       iii) Functions available
       iv) Power consumption.

Code No: R2032022 **R20** SET -4

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Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
*****

UNIT-I

1.	a)	Explain the construction of a PMMC meter with the help of a neat sketch.	[7M]
	b)	Find the multiplying power of shunt of 200Ω resistance used with a Galvanometer of 1000Ω resistance. Determine the value of shunt resistance to give a multiplying power of 50.	[7M]
		(OR)	
2.	a)	What are the sources of errors in current transformer? Explain them in brief.	[7M]
	b)	State the advantages of CT and explain the comparison between CT and PT.	[7M]

UNIT-II

3.	a)	With neat figures, explain the construction and working principle of three phase wattmeter.	[7M]
	b)	State the disadvantages of Dynamometer type wattmeter.	[7M]
		(OR)	
4.	a)	Explain the working principle DC potentiometer.	[7M]
	b)	Explain the operation of polar type AC potentiometer.	[7M]

UNIT-III

5.	a)	Explain about Desauty's bridge with neat diagram.	[7M]
	b)	Explain the loss of charge method for measurement of high resistance.	[7M]
		(OR)	
6.	a)	Explain about Schering Bridge, with neat diagram?	[7M]
	b)	The impedance of the basic ac bridge are $Z_1=50\Omega\angle 180^0$, $Z_2=250\Omega\angle 0^0$, $Z_3=200\Omega\angle 30^0$. Calculate the constants of unknown impedance.	[7M]

UNIT-IV

7.	a)	Describe the principle and working of capacitive transducer.	[7M]
	b)	Describe the construction and principle of thermocouples.	[7M]
		(OR)	
8.	a)	What are thermistors? Compare resistance temperature characteristics of a typical thermistor and platinum.	[7M]
	b)	Explain in detail the Hall effect sensors.	[7M]

UNIT-V

9.	a)	Explain with a neat block diagram of a successive approximation digital voltmeter.	[7M]
	b)	Explain about Ramp type DVM with neat diagram?	[7M]
		(OR)	
10.	a)	Describe the working of a frequency meter.	[7M]
	b)	State the features of digital meter.	[7M]