Q. Code:854432

Reg. No. | | | | | | | | | | | | | |

B.E. / B. TECH DEGREE EXAMINATIONS, MAY 2024

Fourth Semester

EE22404 – MEASUREMENT AND INSTRUMENTATION

(Electrical and Electronics Engineering)

(Regulation2022)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Explain the Measurements in Engineering.	**5**
CO 2	Examine the structural elements of various Instruments.	**4**
CO 3	Estimate the unknown resistance, Inductance and Capacitance by using Bridges.	**5**
CO 4	Categorize the concept of Digital Instrumentation and Virtual Instrumentation.	**3**
CO 5	Apply the concepts of Sensors/Transducers.	**4**

PART- A(20x2=40Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Value of a inductor is specified as 300mHΩ ± 10% by a manufacturer. Find the limits of inductance between which the value is guaranteed.	**1**	**3**
2.	Mention the difference between Accuracy and Precision.	**1**	**2**
3.	Define the term "resolution" of an instrument.	**1**	**2**
4.	A wattmeter reads 154 W for a particular measurement. If the true value of measurement is 150 W, Determine the percentage of static relative error and static correction.	**1**	**3**
5.	Why ordinary wattmeter is not suitable for Low-Power Factor measurements?	**2**	**4**
6.	The secondary of current transformer should not be open. State the reason.	**2**	**4**
7.	PMMC ammeters are most widely used as DC measurement of current and voltage, identify the reason.	**2**	**4**
8.	What are the key components and mechanisms involved in the functioning of an frequency meter?	**2**	**2**
9.	Classify the range of resistance and provide a suitable method to measure their unknown values.	**3**	**2**
10.	State the significance of proper grounding technique in ensuring accurate measurements with measuring instruments.	**3**	**4**
11.	Name the sources of errors in AC bridge measurements.	**3**	**2**
12.	How leakage errors are minimized in AC bridge circuits.	**3**	**2**
13.	State the principle of data storage.	**4**	**2**

14.	Mention the principle behind the operation of digital meters.	**4**	**2**
15.	List the applications of data logging.	**4**	**2**
16.	Describe the concept of Light-Emitting Diode (LED).	**4**	**2**
17.	Distinguish between the Data logging and data acquisition.	**5**	**2**
18.	Briefly explain virtual instrumentation using Lab VIEW.	**5**	**2**
19.	State the principle of operation of capacitive transducers.	**5**	**2**
20.	List the factors influencing the choice of transducers.	**5**	**3**

PART- B (5x 10=50Marks)

		Marks	CO	RBT LEVEL
21. (a)	Consider an AC Voltmeter and explain the elements present in it by comparing it with generalized measurement system.	**(10)**	**1**	**4**
	(OR)			
(b)	By using a Permanent magnet moving coil ammeter the following readings were taken of a certain current: 12.8A, 12.2A, 12.5A, 13.1A, 12.9A and 12.4A. Calculate a. Arithmetic mean b. Deviation from mean and Average Deviation c. Standard Deviation and d. The probable error of average ten readings.	**(10)**	**1**	**3**
22. (a)	Construct a Permanent magnet moving coil ammeter that can effectively measure DC circuit current. Mention the key components that are required to ensure accurate measurement. Also derive the expression for measured DC current.	**(10)**	**2**	**3**
	(OR)			
(b)	Instrumentation amplifiers play a pivotal role in signal processing and signal conditioning. How do the fundamental principles and essential components contribute to the design and functionality of instrumentation amplifier, particularly emphasizing its role in precise signal amplification and noise rejection?	**(10)**	**2**	**4**
23. (a)	**(i)** Identify a suitable bridge circuit that measures medium value of resistance. With a neat diagram elaborate the working of the bridge circuit and derive the expression for finding unknown resistance.	**(6)**	**3**	**4**
	(ii) Given a Wheatstone bridge circuit with known resistor values of ratio arms as 1000Ω, 2500Ω and standard arm resistance as 250Ω and an unknown resistor Rx, determine the value of Rx when the bridge is balanced.	**(4)**	**3**	**3**

(OR)

(b)	Enumerate the working principle of any bridge used for measuring self inductance. Also derive the expression for self inductance.	**(10)**	**3**	**3**
24. (a)	Analyze the difference between digital energy meter with analog energy meter, and with a neat sketch elaborate the working of digital energy meter.	**(10)**	**4**	**4**

(OR)

(b)	What strategies can be employed to optimize data access and retrieval to / from SD card.	**(10)**	**4**	**3**
25. (a)	Explain in detail the generalized diagram of any One Data Acquisition Systems.	**(10)**	**5**	**2**

(OR)

(b)	With neat figure explain the construction and working principle of a digital storage oscilloscope. Compare its advantages over an analog CRO.	**(10)**	**5**	**2**

PART- C (1x 10=10Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	How does the utilization of potentiometers facilitate measurements and calibration processes, particularly in instrumentation and electronics systems and evaluate key factors influencing their efficacy and accuracy in such applications?	**(10)**	**3**	**5**

****