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ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2023

ELECTRICAL AND ELECTRONICS ENGINEERING  
IV SEMESTER  
EE5404 & MEASUREMENT AND INSTRUMENTATION  
(Regulation 2019)

Time: 3hrs

Max.Marks: 100

CO 1	Able to understand the fundamental art of measurement in engineering
CO 2	Able to understand the structural elements of various instruments.
CO 3	Able to understand the importance of bridge circuits.
CO 4	Able to understand about various transducers and their characteristics by experiments
CO 5	Able to understand the concept of digital instrumentation and virtual instrumentation by experiments.

**BL – Bloom's Taxonomy Levels**

(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

**PART- A (10 x 2 = 20 Marks)**  
(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	Mention the types of static error.	2	1	L1
2	Differentiate precision and accuracy?	2	1	L2
3	What is megger?	2	2	L1
4	Differentiate moving MI & MC instruments.	2	2	L2
5	Draw the circuit diagram of instrumentation amplifier?	2	3	L2
6	What are the types of DC bridges?	2	3	L1
7	Classify the types of transducers?	2	4	L2
8	How to measure the angular velocity?	2	4	L2
9	What is data logger?	2	5	L1
10	Write the different instrument standard with example?	2	5	L1

**PART- B (5 x 13 = 65 Marks)**  
(Restrict to a maximum of 2 subdivisions)

Q. No	Questions	Marks	CO	BL
11 (a)	Briefly discuss the static characteristics of measurements.	13	1	L2
OR				
11 (b) (i)	Explain the elements of measurement system.	7	1	L2
(ii)	A set of independent current measurements were recorded as 10.03, 10.10, 10.11 and 10.08 A. Calculate a) the average current b) the range of error.	6	1	L4
12 (a) (i)	Explain the construction and principle of working current transformer and potential transformer	7	2	L2
(ii)	Draw the construction diagram of dynamometer type of wattmeter.	6	2	L3
OR				
12 (b)	Describe the construction and working of PMMC instrument. Derive the equation for deflection if the instruments are spring controlled.	13	2	L3

13 (a) (i)	Derive the bridge hay bridge with neat diagram.	7	3	<u>L4</u>
(ii)	Describe the circuit of Kelvin double bridge used for measurement of low resistance.	6	3	<u>L4</u>
<b>OR</b>				
13 (b)	Derive the bridge balance condition for the Maxwell bridge and Schering bridge	13	3	<u>L3</u>
14 (a) (i)	Describe in detail about the different pressure transducers.	7	4	<u>L4</u>
(ii)	Explain the principle of operation of piezo electric transducer.	6	4	<u>L2</u>
<b>OR</b>				
14 (b) (i)	Explain about the RTD and thermocouples.	7	4	<u>L2</u>
(ii)	Explain the construction and principle of working of a LVDT	6	4	<u>L3</u>
15 (a) (i)	Describe in details the successive approximation method of ADC.	7	5	<u>L3</u>
(ii)	Discuss R-2R ladder type DAC.	6	5	<u>L3</u>
<b>OR</b>				
15 (b) (i)	Write simple PLC program for any application.	7	5	<u>L4</u>
(ii)	Briefly explain the function of DSO with neat diagram.	6	5	<u>L2</u>

**PART- C (1 x 15 = 15 Marks)**  
(Q.No.16 is compulsory)

Q. No	Questions	Marks	CO	BL
16. (i)	A Wheatstone bridge has four resistances 400Ω, 60Ω, 600Ω, and 60Ω. If the bridge is connected to a 1.5 V battery, calculate the currents through individual resistors.	8	CO 3	<u>L6</u>
(ii)	Derive the equation for Wheatstone bridge.	7	CO 3	<u>L5</u>

