



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester:III
Class:SY	Program:B.Tech
Branch Code:ELE	Pattern:2022
Name of Course:Measurement and Instrumentation	Course Code:ELE222003
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains __03__ page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Question No. 1 Attempt following Question

- 1) Solve any one (6) CO1

a) Explain in detail the working of Repulsion type moving iron instruments with a neat diagram.

OR

b) Describe the errors in instruments transformer

Question No. 2 Attempt following Question

- 2) Solve any one (6) CO1

a) Explain in detail the working conventional energy meter with a neat diagram

OR

b) Explain in detail the working of low power factor type wattmeter with a neat diagram.

Question No. 3 Attempt following Question

- 3a) With neat diagram, deduce an expression for unknown resistance in ammeter voltmeter method. (8) CO2

OR

- 3b) With suitable circuit diagram and phasor diagram explain Maxwell inductance capacitance bridge for measurement of inductance. Write the expression for unknown inductance in terms of bridge parameters. (8) CO2

- 3c) A bridge consists of following: (8) CO3

Arm ab-a choke coil having a resistance R_1 and inductance L_1 Arm bc-a non inductive resistance R_3

Arm cd-a mica condenser C_4 in series with a non inductive resistance R_4 .

Arm da-a non-inductive resistance R_2 .

When this bridge is fed from a source of 500 Hz balance is obtained under following conditions
 $R_2=2410\Omega$, $R_3=750\Omega$, $C_4=0.35\mu F$, $R_4=64.5\Omega$

The series resistance of capacitor is $=0.4\Omega$ Calculate the resistance and inductance of the choke coil the supply is connected between a and c and the detector is between b and d.

OR

- 3d) The arms of a five node bridge are as follows: (8) CO3

arm ab: an unknown impedance (R_1, L_1) in series with a non-inductive variable resistor r_1 ,

arm bc: a non-inductive resistor $R_3 = 100\Omega$,

arm cd: a non-inductive resistor $R_1 = 200\Omega$,

arm da: a non-inductive resistor $R_2 = 250\Omega$,

arm de: a non-inductive variable resistor r .

arm ec: a loss-less capacitor $C = 1\mu F$, and

arm be: a detector. An a.c. supply is connected between a and c.

Calculate the resistance R_1 , and inductance L_1 ,

when under balanced condition $r_1 = 43.1\Omega$ and $r = 229.7\Omega$.

Question No. 4 Attempt following Question

- 4a) With suitable block diagram explain working Successive approximation ADC (8) CO1

OR

- 4b) What is DAS ? also explain types of DAS (8) CO1

- 4c) A 5 bit converter is used for a d.c. voltage range of 0-10 V. Find the weight of MSB and LSB. Also the exact range of the converter and the error. Find the error if a 10 bit converter is used (8) CO3

OR

- 4d) An Analog voltage signal whose highest significant frequency is 1 KHz is to be digitally coded with resolution of 0.01 percent covering a voltage range of 0-10 V Determine i) minimum number of bits in the digital code ii) analog value of LSB iii) rms value of quantization error iv) minimum sampling rate v) departure time required for A/D converter and vi) dynamic range of converter in db (8) CO3

Question No. 5 Attempt following Question

- 5a) With suitable diagram explain electrical transducer and also write its basic requirements. (8) CO3

OR

- 5b) State any four advantages and any two disadvantages of semiconductor strain gauges (8) CO3

- 5c) Solve the following (8) CO4

- a) Draw and explain output characteristics of LVDT.
- b) State any two desirable characteristics of resistance strain gauge

OR

5d) With suitable diagram explain construction of CRO

(8) CO4

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