QP Code: S253A027 | Reg. No | | | | | | | | | | | AY 23

# Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
## (GIET University)

B. Tech (Third Semester – Regular & Supplementary) Examinations, November 2025

## 23BECPC23002 – Electronic Measurements and Instrumentation

(ECE)

Time: 3 hrs | Maximum: 60 Marks

**Answer ALL questions**

**(The figures in the right-hand margin indicate marks)**

**PART – A** **(2 x 5 = 10 Marks)**

| | | CO # | Blooms Level |
|---|---|---|---|
| Q.1. | Answer ***ALL*** questions | | |
| a. | What is a ladder diagram, and why is it used in control systems? | CO1 | K1 |
| b. | Name the two main coils of an electrodynamometer wattmeter with a suitable diagram. | CO2 | K2 |
| c. | Why is a second set of ratio arms used in the Kelvin's Double Bridge? | CO3 | K2 |
| d. | What is a potentiometer and what is it used for? | CO2 | K2 |
| e. | Determine the resolution of a moving coil voltmeter having a uniform scale with 50 divisions; the full-scale reading is 50V and $1/10^{th}$ of a scale division can be estimated with a fair degree of certainty. | CO4 | K3 |

**PART – B** **(10 x 5 = 50 Marks)**

| | | Marks | CO # | Blooms Level |
|---|---|---|---|---|
| | Answer ***ALL*** the questions | | | |
| 2. a. | Differentiate clearly between accuracy and precision as static characteristics of a measuring instrument. Give one practical example where an instrument can be precise but not accurate. | 5 | CO1 | K2 |
| b. | Explain the measurement of low resistance by Kelvin's Double Bridge. | 5 | CO3 | K2 |
| | (OR) | | | |
| c. | The suspended coil of a galvanometer has a 5mm × 2.5mm mean area and is situated in a magnetic field of 1.1 tesla. The moment of inertia of moving parts is $0.25 \times 10^{-6}$ kg-m and the control string constant is $35 \times 10^{-6}$ Nm/radian. If a current of 12 mA produces a deflection of 110°, calculate the number of turns of the suspended coil. | 6 | CO4 | K3 |
| d. | Explain the three main phases of a PLC operation in the correct sequential order. | 4 | CO5 | K2 |
| 3.a. | Describe how a Maxwell's Inductance-Capacitance Bridge is used to measure inductance. Include a suitable diagram in your explanation. | 5 | CO3 | K2 |
| b. | A 3-phase, 440V motor load has a power factor of 0.6. Two wattmeters connected to measure the power show the input to be 25 kW. Find the readings on each instrument. | 5 | CO4 | K3 |
| | (OR) | | | |
| c. | Describe the construction and working of a simple DC potentiometer. | 5 | CO2 | K4 |
| d. | Draw and explain the basic structure of a Programmable Logic Controller (PLC). | 5 | CO5 | K2 |
| 4.a. | Explain the working of electrodynamometer type wattmeter. | 5 | CO2 | K4 |
| b. | Explain the construction and working principle of PMMC instrument along with its torque equation. | 5 | CO2 | K3 |
| | (OR) | | | |

| | | | | |
|---|---|---|---|---|
| c. | Derive the equation of balance of a Schering Bridge. | 6 | CO3 | K3 |
| d. | A circuit was tuned for resonance by eight different students, and the values of resonant frequency in kHz were recorded as 532, 548, 543, 535, 546, 531, 543, and 536. Calculate:<br>(i) The arithmetic mean<br>(ii) Deviation from mean<br>(iii) Standard deviation<br>(iv) Variance | 4 | CO4 | K2 |
| 5.a. | Explain the working principle of a D'Arsonval galvanometer with a labelled diagram. | 5 | CO2 | K1 |
| b. | Explain the measurement of three phase power by two wattmeter method. | 5 | CO4 | K3 |
| | (OR) | | | |
| c. | Explain the importance of timers and counters in PLC-based control systems. | 5 | CO5 | K2 |
| d. | Discuss the common sources of error in AC bridge. How are they eliminated? | 5 | CO3 | K3 |
| 6.a. | The three resistors $R_1$, $R_2$ and $R_3$ have the following ratings:<br>$R_1 = 25\ \Omega \pm 4\%$, $R_2 = 65\ \Omega \pm 4\%$, $R_3 = 45\ \Omega \pm 4\%$<br>Determine the following:<br>(i) Limiting value of the resultant resistance<br>(ii) Percent limiting error of series combination of resistance | 6 | CO4 | K3 |
| b. | How is logic implemented in a ladder diagram for starting and stopping a motor? | 4 | CO5 | K3 |
| | (OR) | | | |
| c. | Derive the resistance/strain relationship for a strain gauge. | 5 | CO4 | K3 |
| d. | Discuss the construction and connection diagram of a ratiometer type frequency meter. | 5 | CO2 | K2 |

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