

Subject Code: 24EE11RC10

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GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous)

(Affiliated to Andhra University, Visakhapatnam)

II B.Tech. - II Semester Regular Examinations, April – 2026

ELECTRICAL MEASUREMENTS

[Electrical and Electronics Engineering]

1. All questions carry equal marks
2. Must answer all parts of the question at one place

Time: 3Hrs.

Max Marks: 70

UNIT-I

1. a. Derive the expression for deflecting torque in an electrostatic voltmeter and explain its construction. [7M]
b. A dynamometer-type wattmeter is rated at 10 A, 150 V. The pressure coil has a resistance of 3000 Ω and an inductance of 10 mH. For a load drawing 8 A at 0.4 power factor lagging: [7M]
 - a) Calculate the phase angle error introduced by the pressure coil
 - b) Determine the true power
 - c) Calculate the wattmeter reading
 - d) Find percentage error
- OR
2. a. Explain the working of single-phase energy meter and discuss errors and compensation methods. [7M]
b. Explain the construction and working of Weston type synchroscope. [7M]

UNIT-II

3. a. Derive the balance equation of Wheatstone bridge and explain its limitations. [7M]
b. A Wheatstone bridge has arms, $P = 1000 \Omega$, $Q = 1000 \Omega$, $R = 150 \Omega$, $S = ?$, A galvanometer of resistance 200 Ω and sensitivity 2 mm/ μ A is used. When S changes by 2 Ω , galvanometer deflects by 4 mm. [7M]
 - a) Find unknown resistance S at balance
 - b) Calculate current through galvanometer
 - c) Determine bridge sensitivity
- OR
4. a. Derive the expression for inductance using Maxwell's bridge. [7M]
b. A Schering bridge has a standard capacitor of 100 pF, resistances $R_3 = 1000 \Omega$ and $R_4 = 500 \Omega$, operating at 1 kHz. Derive the expressions for unknown capacitance and dissipation factor. Hence, calculate the unknown capacitance, loss angle, and power loss in the capacitor. [7M]

UNIT-III

5. a. Explain Crompton's DC potentiometer with diagram and derive working equation. [7M]
b. A DC potentiometer has a 10 m wire with total resistance 500 Ω and is supplied with 2 V. It is standardized using a standard cell of 1.018 V at 5.09 m length. [7M]
 - a) Calculate working current
 - b) Find unknown voltage if balance point is at 7.25 m
 - c) Calculate percentage error if measured voltage is 1.45 V

OR

6. a. Derive ratio error and phase angle error of current transformer. [7M]
b. A current transformer of nominal ratio 1000/5 supplies a burden of $10\ \Omega$ at 0.8 power factor lagging. The secondary current is 4.8 A. The exciting current consists of a magnetizing component of 0.5 A and a core loss component of 0.2 A. [7M]
a. Draw phasor diagram
b. Calculate actual transformation ratio
c. Determine ratio error and phase angle error

UNIT-IV

7. a. Explain working principle of LVDT with neat diagram. [7M]
b. Classify transducers and explain capacitive transducer. [7M]

OR

8. a. Explain thermocouple and thermistor with characteristics. [7M]
b. A strain gauge of resistance $120\ \Omega$ is connected in a Wheatstone bridge supplied with 5 V. When strain is applied, the resistance of the gauge increases by $0.24\ \Omega$. The gauge factor of the strain gauge is 2. Determine the strain developed in the gauge, calculate the output voltage of the bridge. [7M]

UNIT-V

9. a. Explain block diagram of CRO and its operation. [7M]
b. Explain measurement of frequency using Lissajous patterns with derivation. [7M]

OR

10. a. Explain successive approximation type DVM with diagram. [7M]
b. Explain working of digital tachometer and derive expression for speed. [7M]