CODE No.: 19BT40203 SVEC-19

Roll No. | | | | | | | | | | |

# SREE VIDYANIKETHAN ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to JNTUA, Ananthapuramu)

## II B.Tech II Semester (SVEC-19) Regular Examinations August – 2021

## ELECTRICAL MEASUREMENTS

## [ Electrical and Electronics Engineering ]

**Time: 3 hours** **Max. Marks: 60**

**Answer One Question from each Unit**
**All questions carry equal marks**

### UNIT-I

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|---|---|---|---|---|---|---|
| 1. | a) | List and describe the different static characteristics of measuring instruments. | 6 Marks | L1 | CO1 | PO1 |
| | b) | Explain the importance of damping mechanism in an instrument and how are they classified. | 6 Marks | L2 | CO1 | PO1 |
| | | **(OR)** | | | | |
| 2. | a) | Explain the construction details of attraction type moving iron instrument. Derive the Torque equation for moving iron instrument, and show that the scale is non-uniform. | 6 Marks | L5 | CO1 | PO3 |
| | b) | The Ayrton universal shunt has a total resistance of 6000 Ω and galvanometer has a resistance of 2000 Ω. Determine the multiplying power of shunt for 1000 Ω, 2000 Ω and 3000 Ω tapping. | 6 Marks | L3 | CO1 | PO2 |

### UNIT-II

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| 3. | a) | Explain with a neat circuit of single phase Dynamometer type Wattmeter and derive the equation for deflection torque. | 6 Marks | L2 | CO2 | PO1 |
| | b) | Draw the possible methods of connections of the pressure coil of a wattmeter and compare the errors. | 6 Marks | L2 | CO2 | PO4 |
| | | **(OR)** | | | | |
| 4. | a) | A 230V, 50Hz single phase energy meter has a constant of 200 revolutions per kWh. While supplying a non-inductive load of 4.4A at normal voltage, the meter takes 3 minutes for 10 revolutions. Calculate the percentage error of the instrument. | 6 Marks | L3 | CO2 | PO2 |
| | b) | Draw the connection diagram of a 3-phase energy meter and explain its working. How do you correct it, if it is found to be moving fast and justify your answer? | 6 Marks | L4 | CO2 | PO6 |

### UNIT-III

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| 5. | a) | A current transformer with turn's ratio 1:201 is rated as 1000/5A, 25VA. The core loss and magnetizing components of primary are 3A and 7A under rated conditions. Find the ratio and phase angle errors for full burden at 0.88 p.f leading. | 6 Marks | L3 | CO3 | PO2 |
| | b) | Illustrate the ratio and phase angle errors in potential transformer and explain how to overcome. | 6 Marks | L4 | CO3 | PO1 |
| | | **(OR)** | | | | |
| 6. | a) | Draw the circuit diagram of Crompton's potentiometer and explain its working. Describe the steps used when measuring an unknown resistance. | 6 Marks | L1 | CO3 | PO5 |
| | b) | A Potentiometer consisting of a resistance dial having 15 steps of 10Ω each and a series connected slide wire of 10 Ω which is divided into 100 divisions. If the working current of the potentiometer is 15mA and each division of the slide wire can read accurately up to 1/5 of its span. Calculate the resolution of the potentiometer in volts. | 6 Marks | L3 | CO3 | PO2 |

## UNIT-IV

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| 7. | a) | Explain kelvin's double bridge for measurement of low resistance with neat circuit diagram and list out the assumptions made. | 6 Marks | L2 | CO4 | PO3 |
| | b) | The four arms of a Wheatstone bridge are as follows AB=5Ω; BC=500Ω; CD=1000Ω; DA=100Ω. The galvanometer has a resistance of 100 Ω, a sensitivity of 5mm/μA and it is connected across AC. A source of 5V DC is connected across BD. Calculate the current through the galvanometer and its deflection, if the resistance of arm DA is changed from 100Ω to 102Ω. | 6 Marks | L3 | CO4 | PO4 |
| | | **(OR)** | | | | |
| 8. | a) | Show how the Wien's bridge can be used for the measurement of frequency in audio range. Derive the equation for frequency **f**. | 6 Marks | L2 | CO4 | PO1 |
| | b) | The four arms of an A.C. bridge network are as follows:<br>Arm AB: an unknown capacitance; Arm BC: a standard capacitor C3 of 1000pF; Arm CD: a non-inductive resistor R4 of 100 Ω in parallel with a capacitor C4 of 0.01μF; Arm DA: a non – inductive resistor R2 of 1000 Ω. The A.C. supply is connected across terminals B, D and the supply frequency is 50Hz. If the bridge is balanced with the above values, determine the components of the unknown impedance, while deriving the balanced conditions. | 6 Marks | L3 | CO4 | PO4 |

## UNIT-V

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| 9. | a) | Explain how frequency can be measured using Lissajous patterns in CRO and give any two examples. | 6 Marks | L2 | CO5 | PO5 |
| | b) | Explain in detail about the following characteristics of Digital meters:<br>i) Resolution ii) Sensitivity iii) Accuracy, and compare with respect to analog meters. | 6 Marks | L1 | CO5 | PO1 |
| | | **(OR)** | | | | |
| 10. | a) | List the different types of DVM. Explain working principle of ramp type Digital Voltmeter with diagram. | 6 Marks | L2 | CO5 | PO1 |
| | b) | Describe the working of Digital frequency meter with a neat diagram. | 6 Marks | L2 | CO5 | PO1 |

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