

Sub Code: BEET - 301

ROLL NO.....

**III<sup>rd</sup> SEMESTER EXAMINATION, 2022-23**

**II<sup>nd</sup> Year, B.Tech. – Electrical Engineering**

**Electrical Measurements & Instrumentation**

**Duration: 3:00 hrs.**

**Max. Marks: 100**

**Note: - Attempt all questions. All questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.**

**Q 1. Answer any four parts of the following.**

**5\*4 = 20**

- a) Explain different types of torques present in indicating type instrument? **CO1, L1**
- b) Calculate the value of multiplier resistance on the 50V range of a DC voltmeter that uses a 500  $\mu$ A meter movement with an internal resistance of 1K $\Omega$ ? **CO1, L3**
- c) Derive the deflecting torque developed in the PMMC? **CO1, L2**
- d) Discuss the properties of resistance and its classification? **CO2, L1**
- e) Calculate the sensitivity of a 200  $\mu$ A meter movement which is to be used as a DC voltmeter? **CO1, L3**
- f) Discuss the different types of characteristics of instrument
  - i) Resolution
  - ii) Sensitivity
  - iii) Accuracy
  - iv) Precision. **CO1, L1**

**Q 2. Answer any four parts of the following.**

**5\*4 = 20**

- a) Explain the electro-dynamometer wattmeter and derive the deflecting torque produced in it? **CO1, L2**
- b) Discuss the difference between AC and DC Bridge and different types of Null detector? **CO4 L1**
- c) Discuss the rectifier meter and derive the sensitivity expression for half wave rectifier meter? **CO3, L2**
- d) Discuss the Energy meter used in domestic application and its different mechanism? **CO4, L1**
- e) Explain the Blondel's theorem and derive the equation of active power and reactive power for 2 wattmeter method? **CO2, L3**

**Q 3. Answer any two parts of the following.**

**10\*2 =20**

- a) Draw the block diagram of CRO and discuss different types of CRO? **CO4, L1**
- b) What is Megger for the measurement of high resistance? **CO2, L1**
- c) Discuss difference between Thermocouple, Thermistor and RTD for the measurement of temperature? **CO5, L2**

**Q 4. Answer any two parts of the following.**

**10\*2 =20**

- a) A 3-phase, 10 kVA load has a PF of 0.342. The power is measured by two wattmeter method. Find the reading of each wattmeter when the PF is (i) Lagging and (ii) Leading ?**CO2,L5**
- b) Discuss the method of measurement of displacement via LVDT? **CO5, L2**

- c) Analyze the phase angle error and ratio error in current transformer and discuss the methods of reducing these errors? **C3,L3**

**Q 5. Answer any two parts of the following.**

**10\*2 =20**

- a) Discuss the Hay's bridge for the measurement of inductance? **CO2, L3**
- b) A 240 volt, 5 ampere, single phase energy meter has a constant of 1200 revolutions per kilo watt hour (KWh). When tested by applying 240 volts, the meter took 99.8 seconds to complete 40 revolutions. Find the percentage error. Is it running fast or slow? **CO4, L4**
- c) Analyze kelvins double bridge for the measurement of resistance?**CO2, L3**