JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, February - 2022
MEASUREMENTS AND INSTRUMENTATION
(Electrical and Electronics Engineering)

Time: 3 hours
Max. Marks: 75

Answer any five questions
All questions carry equal marks
- - -

1.a) A moving coil instrument gives a full-scale deflection of 10mA when the potential difference across its terminal is 100mV. Calculate,
i) The shunt resistance for a full-scale deflection of 100A
ii) Find the resistance for full-scale reading with 100V
Also, calculate the power dissipation in each case.
   b) Derive an equation for the torque developed in PMMC instrument.   [8+7]

2.a) A PMMC ammeter has following specification, coil dimension of 1cm×1cm, spring constant is $0.15×10^{-6}$ N-m/rad, Flux density is $1.5×10^{-3}$ wb/m². Determine the number of turns required to produce a deflection of 90⁰, when a current of 2mA flows through the coil.
   b) With the help of a neat diagram, explain the working of attracted disc type voltmeter.   [7+8]

3.a) Discuss how AC potentiometer can be used for calibration of wattmeter.
   b) Explain the procedure to calibrate voltmeter and ammeter using DC potentiometer.   [8+7]

4.a) With help of a neat diagram explain the working of coordinate type potentiometer.
   b) Draw the equivalent circuit diagram and phasor diagram of the current transformer.   [8+7]

5.a) Discuss the construction and Working Principle of Electrodynamometer type 1-ϕ wattmeter with help of a neat diagram.
   b) Explain any two errors that occur in electrodynamometer type 1-ϕ wattmeter and its compensation.   [9+6]

6.a) With help of a neat diagram, explain the construction and working of a three-phase energy meter.
   b) Two-watt meters are connected to measure the input to a balanced 3 phase circuit indicating 2000W and 500W respectively. Find the power factor of a circuit,
i) When both the reading is positive and
ii) When the latter reading is obtained after reversing the connections to the current coil of the first instrument.   [9+6]

7.a) Draw the circuit of Kelvin double bridge used for measurement of low resistance. Explain its working principle

b) An AC bridge is balanced at 2KHz with the following components in each arm: Arm AB=10KΩ, Arm BC=100μF in series with 100KΩ, Arm AD=50KΩ. Find the unknown impendence R ± jX in the arm DC, if the detector is between BD. [8+7]

8.a) Derive an equation for gauge factor in strain gauge.

b) With help of a neat diagram, explain the principle and working of LVDT. [7+8]

---ooOoo---