CLASS: BE   SEMESTER: IV
BRANCH: EEE   SESSION : SP/2019

SUBJECT : EE4201 ELECTRICAL MEASUREMENT AND INSTRUMENTATION

TIME: 1.5 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1   (a)   Current was measured during a test as 30.4 A, flowing in a resistor of 0.105 ohm. It was   [2]
           discovered later that the ammeter reading was low by 1.2 percent and the marked
           resistance was high by 0.3 percent. Find the true power as a percentage of the power
           that was originally calculated.
     (b)   Define Threshold and Resolution and also tell the difference between the two. A   [3]
           Wheatstone bridge requires a change of 7 ohm in the unknown arm of the bridge to
           produce a change in deflection of 3mm of the galvanometer. Determine the sensitivity.

Q2   (a)   The expression for the mean torque of electrodynamometer wattmeter is expressed as   [2]
           $T \propto M^p E^q Z^t$, where M is the mutual inductance between fixed and moving coil, E is
           the applied voltage and Z is the impedance of the load circuit. Determine the value of
           p, q, t from the dimensions of the quantities and not from memory.
     (b)   Draw the block diagram of a generalized measurement system and explain the function   [3]
           of various blocks.

Q3   (a)   An analog voltmeter uses external multiplier settings. With a multiplier setting of 20 kΩ,   [2]
           it reads 440 V and with a multiplier setting of 80 kΩ, it reads 352 V. What will be the
           voltmeter reading for a multiplier setting of 40 kΩ,
     (b)   Write short note on the compensation/adjustment to be made in single phase induction   [3]
           type energy meter.

Q4   (a)   What is a transfer instrument? Explain why an electrodynamometer type of instrument   [2]
           can be used both on ac and dc.
     (b)   Give the comparison between spring and gravity control. A PMMC voltmeter is connected   [3]
           across a series combination of DC voltage source V_1 = 2 V and AC voltage source V_2 (t) =
           3 sin (4t) V. What will be the reading of the meter?

Q5   Write short note on Hay's Bridge. Check if the expression of unknown resistance is   [5]
           dimensionally correct or incorrect. In case there is an error point out the term which
           needs correction.

Q6   (a)   Give the constructional difference between the types of moving iron instrument.   [2]
     (b)   The four arms of a bridge network are made up as follows: ab, a resistor of 50 Ω in   [3]
           parallel with an inductor of 0.1 H; bc, a resistor of 100 Ω; cd, an unknown resistor R in
           parallel with an unknown capacitor C; da, a resistor of 1000 Ω. A 50 Hz voltage supply is
           applied across ac. Find R and C when a vibration galvanometer connected across bd is
           undeflected.