BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH   SEMESTER: III
BRANCH: EEE   SESSION: MO/2022

SUBJECT:EE201 ELECTRICAL MEASUREMENT AND INSTRUMENTATION

TIME: 2 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	**BL**

Q1 (a) Draw the block diagram of a generalized instrumentation system and explain the function of various blocks.   [3] CO1 BL2

Q1 (b) Define and explain precision and resolution for a measuring instrument.   [2] CO1 BL1

Q2 (a) What are gross errors. Give example. How can gross errors be avoided.   [2] CO1 BL1

Q2 (b) The resistance of an unknown resistor is determined by wheatstone bridge. The solution for the unknown resistance is stated as $R_4 = R_1R_2/R_3$ where limiting values of various resistances are R_1 = 500 Ω ± 1% , R_2 = 615 Ω ± 1% , R_3 = 100 Ω ± 0.5%. Calculate (a) the nominal value of the unknown resistor (b) the limiting error in percent of unknown resistor.   [3] CO1 BL5

Q3 (a) Starting from the dimensions of M, L and T obtain the relationship between electrostatic and electromagnetic system of units.   [2] CO1 BL4

Q3 (b) Explain how controlling torque can be obtained in a measuring instrument by gravity control.
A permanent magnet moving coil (PMMC) instrument has a full scale deflection of 90^0 for a current of 2 A. The deflecting torque in a PMMC ammeter is directly proportional to current in the moving coil. Find the value of current required for a deflection of 30^0 if the instrument is (a) spring controlled (b) gravity controlled   [3] CO2 BL2

Q4 (a) A basic d' Arsonval movement with a full scale reading of 50 μA and an internal resistance of 1800 Ω is available. It is to be used for two ranges 0 - 1 V and 0 -5 V using individual multipliers for each range. Calculate the values of the individual multipliers.   [2] CO2 BL5

Q4 (b) Explain the construction and working of an attraction type moving iron instrument.   [3] CO2 BL2

Q5 (a) The inductance of a moving iron instrument is given by
L = (10 + 5θ - $θ^2$) μH
where θ is the deflection in radian from zero position. The spring constant is 12 x 10^{-6} N-m/rad. Find the deflection for a current of 5 A.   [2] CO2 BL5

Q5 (b) Describe the constructional details and working of an electrodynamometer type wattmeter. Obtain the expression for power.   [3] CO2 BL2