Registration No.: | | | | | | | | | | |

Total Number of Pages: 02 **Course: B.Tech/IDD**
Sub_Code: EEPC2004

4th Semester Regular Examination: 2024-25
SUBJECT: Electrical Measurement & Instrumentation
BRANCH(S): EEE, ELECTRICAL
Time: 3 Hours
Max Marks: 100
Q.Code: S432

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) A 0 to 200 V voltmeter has a guaranteed accuracy of 1% of full-scale reading. The voltage measured by this instrument is 50 V. What is the limiting error?
b) What is the piezoresistive effect?
c) Explain the phenomena of Creeping and Errors in the energy meter.
d) Discuss different types of transducers.
e) In the two-wattmeter method of measuring 3-phase power, the power factor is 0.5, then one of the wattmeters will read?
f) What is the difference between reliability and resolution?
g) The current flowing in a circuit consists of a DC of 3A and an AC of peak value 2A. The readings of a moving coil ammeter and a moving iron ammeter will be.
h) Give the different stages inside the CRT tube.
i) An energy meter having a meter constant of 1200 rev per KWH is found to make five revolutions in 75 seconds. What is the load power?
j) Write down the main advantages of Wagner Earth devices used in A.C. bridge circuits.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Write down the working principle of power factor meters.
b) Explain the different types of errors in measuring instruments
c) The exciting current of a ring core CT of ratio 1000/5 A. When operating at full primary current and with a secondary burden of noninductive resistance of 1 ohm is 1A at a p.f. of 0.4. (I) Calculate the phase displacement between the primary and secondary current. (II) The ratio error at full load, assuming that there has been no compensation.
d) Explain the characteristics of a Current Transformer.
e) Evaluate the unknown capacitance by using the Schering Bridge.
f) Draw the circuit diagram of the Maxwell-inductance Bridge. Draw the phase diagram of the Maxwell-inductance Bridge.
g) The inductive reactance of the pressure coil circuit of a dynamometer wattmeter is 0.4% of its resistance at normal frequency 50 Hz and the capacitance is negligible. Find the percentage error and correction factor due to the reactance for load at 0.707 p.f. lagging.

h) Write down the working principle of thermocouples.

i) A linear resistance potentiometer is 100 mm long and is uniformly wound with a wire of total resistance 10000 ohms. Under normal conditions, the slider is at the center of the potentiometer. Determine the linear displacement when the resistance of the potentiometer, as measured by the Wheatstone bridge, is 3700 ohms. If it possible to measure a minimum value of 5 ohms of resistance with the above arrangement, determine the resolution of the potentiometer in mm.

j) Derive the expression for the gauge factor of the strain gauges.

k) Write the function of the attenuator in CRO.

l) Describe the construction and working principle of a D'Arsonval galvanometer.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four) **(16 x 2)**

Q3 Explain the working of an electrodynamometer-type wattmeter. Derive the expression for torque when the instrument is used on AC. **(16)**

Q4 Derive the general torque equation for the Moving iron instrument. **(16)**
The inductance of a moving iron meter is given by the following expression: $L = 20 + 10\alpha - 2\alpha^2$ micro hennery, where α is deflection in radians. The spring constant is 24×10^{-6} Nm/rad. Calculate the value of deflection for a current of 5A.

Q5 Describe the construction and working principle of the Vibrating Reed Type and the electrical Resonance Type frequency meter. **(16)**

Q6 Draw the basic block diagram of an oscilloscope and state the function of each block. Describe the Oscilloscope specifications and performance. **(16)**