R22 Regulation *Subject code: 4E5BB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech V Semester Supplementary Examinations, May 2025

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

(EEE)

Maximum Marks: 60 Date: 19.06.2025 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	Give the expression for the deflecting torque for moving iron type instruments.	1M	1	2
b)	Write the errors in measuring instruments?	1M	1	1
c)	Why a potentiometer does not load the voltage source whose voltage is being determined.	1M	2	4
d)	Define standardization.	1M	2	3
e)	How to measure active power in a balanced and unbalanced systems?	1M	3	5
f)	What is the purpose of tri-vector meter?	1M	3	4
g)	List out the methods to measure resistance?	1M	4	3
h)	Write about measurement of loss angle.	1M	4	2
i)	Define gauge factor.	1M	5	1
j)	What are the advantages of electrical transducers?	1M	5	2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Write the permissible Errors in Ammeters and Voltmeters?	5M	1	4
	b) An electrostatic voltmeter consists of two attracted plates (movable and fixed provided with guard rings). When a potential difference of 10 kV is applied between the plates, there is a pull of 5×10^{-3} N on the movable plate. Find the change in capacitance produced due to the change in the position of the movable plate by 1mm. Diameter of the movable plate is 100mm.	5M		5
	OR			
3	a) Explain deflecting, controlling and damping torques.	5M	1	3
	b) Describe the principle of PMMC meters.	5M		2
4	a) Draw the circuit diagram of Crompton's potentiometer and explain its working. Describe the steps used when measuring an unknown resistance.	5M	2	3
	b) Power is measured with an a.c. potentiometer. The voltage across a 0.1Ω standard resistance connected in series with the load is 0.35– j0.10V. The voltage across 300:1 potential divider connected to the supply is 0.8 + j0.15V. Determine the power consumed by the load and the power factor.	5M		4

	OR			
5	A current transformer with 5 primary turns has a secondary burden consisting of a resistance of 0.16Ω and an inductive resistance of 0.12Ω, when the primary current is 200A, the magnetizing current is 1.5A and the iron loss current is 0.4A. Determine any expressions used, the number of secondary turns needed to make the current ratio 100:1 and also the phase angle under those conditions.	10M	2	4
6	a) Explain the operation of single- phase induction type energy meter. b) A 50A, 230V meter on full load test makes 61 revolutions in 37s. If the normal disc speed is 520 revolutions per kWh, find the percentage error.	5M 5M	3	2 4
	OR			
7	a) Explain how to provide extension of range in wattmeter's. b) Brief about phantom loading.	5M 5M	3	2 1
8	Show how Wien's bridge can be used for the measurement of frequency in audio range. Derive the equation for frequency f.	10M	4	4
	OR			
9	a) Describe Carey Foster's bridge. b) A bridge is balanced at 1,000Hz and has the following constants: AB, 0.2μF pure capacitance; BC, 500Ω pure resistance; CD, unknown; DA, R=300Ω in parallel with C=0.1μF. Find the R and C or L constants of ard CD, considered as a series circuit.	5M 5M	4	3 4
10	a) With the help of characteristics, discuss the principle of operation of LVDT and its advantages. b) Enumerate the differences between a PN diode and a Photo diode and briefly explain the working of Photo diode.	5M 5M	5	2 1
	OR			
11	a) Brief about Thermistors & Thermocouples. b) Explain Strain gauge and its principle of operation.	5M 5M	5	1 2