R20 Regulation *Subject code: 3P5BB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, July 2024

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION

(EEE)

Maximum Marks: 70 Date:22.07.2024 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 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	CO	Bloom Tx
All the following questions carry equal marks (10X2M=20 Marks)			
1	What are the errors in MI Instruments?	1	1
2	Define controlling torque and deflecting torque.	1	1
3	What are instrument transformers? What are their uses?	2	1
4	What are the types of errors in current transformers?	2	1
5	Define driving and braking torques of induction type energy meter.	3	1
6	What are the main sources of errors in wattmeters?	3	1
7	Draw the circuit diagram for H. V. Schering Bridge and write its uses.	4	2
8	What are the different methods for measurement of low, medium & high resistance?	4	1
9	Write the working principle of strain gauge and define its gauge factor.	5	1
10	Write the advantages & disadvantages of LVDT	5	1
	Part-B		
Answer All the following questions. (5X10M=50Marks)			Bloom Tx level
11	a) Explain the principle and working of electrometer type volt meter and describe their range extension. [5M] b) Derive the equation for deflection if the instruments are spring controlled. In PMMC instrument. [5M]	1	2 4
	OR		
12	a) A moving coil instrument gives a full-scale deflection of 10mA when the potential difference across its terminal is 100mV. Calculate: [5M] 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. [5M]	1	3 4
13	a) Describe the principle and operation of D. C. Crompton's potentiometer with a neat diagram and explain how unknown resistance and voltage is measured using it. [5M]	2	1 4

	b) Derive the expressions for the phase angle errors of a current transformer with a neat phasor diagram. [5M]		
	OR		
14	a) Compare C. T with P. T. [5M] b) Derive the expression for ratio error of a C. T. [5M]	2	2 4
15	a) With help of a neat diagram, explain the construction and working of a three-phase energy meter. [5M] 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. [5M]	3	2 1
	OR		
16	a) Explain with neat sketches the measurement of active and reactive powers in balanced and unbalanced systems. [5M] b) Explain the extension of ranges of watt meters using instrument transformers with help of neat diagrams. [5M]	3	2 2
17	a) Draw the circuit of Kelvin double bridge used for measurement of low resistance. Explain its working principle. [5M] 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. [5M]	4	2 2
	OR		
18	a) Draw the neat sketch of Anderson's Bridge and describe it's working. [5M] b) Explain with a neat circuit the working of Wein's bridge for measurement of capacitance and frequency of the supply voltage and derive the expression for unknown capacitance and frequency. [5M]	4	1 2
19	a) Discuss in detail about the principle of operation of capacitive transducers. [5M] b) Explain the working of i) Thermocouple ii) Thermistors. [5M]	5	2 2
	OR		
20	a) Explain about Piezo electric transducers. [5M] b) Explain the methods of measurement of torque on rotating shafts using strain gauges with help of neat sketches. [5M]	5	2 2