Regulation 18 *Subject code:2P6BB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, June/July 2023

ELECTRICAL MEASUREMENTS&INSTRUMENTATION

(EEE)

Maximum Marks: 70 Date:24.06.2023 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

All the following questions carry equal marks (10x2M=20 Marks)

1 For moving iron type instruments, give the expression for the deflecting torque.
2 Write the errors in measuring instruments.
3 Write the basic principle of operation of a d.c. potentiometer.
4 Why a potentiometer does not load the voltage source whose voltage is being determined.
5 Mention errors in dynamometer wattmeters.
6 Define driving and braking torques.
7 Write about the loss of charge method.
8 Define measurement of loss angle.
9 What are advantages of electrical transducers?
10 Define gauge sensitivity.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 a) Explain driving and braking torques. 5

b) Describe the principle of PMMC meters. 5

OR

12 a) Explain the operation of electrometer type electrostatic voltmeters. 5

b) Describe the principle of attracted disc type E.S. voltmeters. 5

13 Draw the circuit diagram of DC Crompton's potentiometer and explain its working. Describe the steps used when measuring an unknown resistance. 10

OR

14 Describe how high currents and voltages are measured with the help of instrument transformers. Draw diagrams to illustrate your answer. Describe the advantages of instrument transformers as regards extension of range of current and voltage on high voltage a.c systems. 10

15 a) Describe the construction of single phase dynamometer wattmeter. 5

b) The total resistance of pressure circuit of a watt-meter is 4000Ω and the inductance of the pressure coil circuit is 6.5mH. Give the shunted capacitor method of compensating the inductance error and determine across what portion of the series resistance a 0.1μF capacitor should be shunted to effective compensation. 5

OR

16 a) Explain the operation of single phase induction type energy meter. 5

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. 5

17 a) Describe Carey Foster's bridge. 5

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 arm CD, considered as a series circuit 5

OR

18 a) Explain the principle of Owen's bridge. 5

b) An ac bridge has in arm AB a pure capacitance of 0.2μF; in arm BC, a pure resistance of 500Ω; in arm CD, a series combination of R=50Ω and L=0.1H. Arm DA consists of capacitor C=0.4μF in series with a variable resistor Rx, ω=5,000 rad/s. Find the value of Rx to obtain bridge balance. 5

19 a) Describe the principle of operation of LVDT. 5

b) An LVDT with a secondary voltage of 5V has a range of ±25mm. 5

i) Find the output voltage when the core is –18.75mm from centre,

ii) Plot the output voltage versus core position for a core movement going from +18.75mm to -10mm.

OR

20 Explain the force transducer with neat block diagram. 10