



Regulation 17

Subject code:1P5BA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Year I Semester Supplementary Examinations, January 2023

ELECTRICAL MEASUREMENTS & INSTRUMENTATION

(EEE)

Maximum Marks: 70

06-01-2023

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 Define 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 Write about driving and braking torques.
- 7 Write about loss of charge method.
- 8 Define measurement of loss angle.
- 9 What are advantages of electrical transducers?
- 10 Write gauge sensitivity.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 A) Explain damping and controlling torque. 5
B) Describe the principle of PMMC instrument. 5
- 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. 10
Describe the steps used when measuring an unknown resistance.
- 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 Watt meter. 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 $0.1\mu\text{F}$ 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 $1,000\text{Hz}$ and has the following constants: AB, $0.2\mu\text{F}$ pure capacitance; BC, 500Ω pure resistance; CD, unknown; DA, $R=300\Omega$ in parallel with $C=0.1\mu\text{F}$. 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 $0.2\mu\text{F}$; in arm BC, a pure resistance of 500Ω ; in arm CD, a series combination of $R=50\Omega$ and $L=0.1\text{H}$. Arm DA consists of capacitor $C=0.4\mu\text{F}$ in series with a variable resistor R_x , $\omega=5,000\text{ rad/s}$. Find the value of R_x 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 $\pm 25\text{mm}$. 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 $+18.75\text{mm}$ to -10mm .
- OR
- 20 A) Explain the force transducer with neat block diagram. 5
 B) A transducer that measures force has a normal resistance of 300Ω , forms a four-arm strain gauge bridge and is excited by 7.5V DC. When the force of 0.1N is applied, all the four strain gauge resistances are changed by 5.2Ω . Find the output voltage and determine its sensitivity. 5