



R20 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

Subject code: 3P5BB

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

B.Tech V Semester Regular Examinations, January 2023

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
(Electrical and Electronics Engineering)

Maximum Marks: 70

Date: 09.01.2023 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 which carries 10M.
 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 What is meant by accuracy of an instrument?
- 3 State the advantages of DC Crompton's potentiometer.
- 4 What are the constructional parts of current transformer?
- 5 Define Creeping error.
- 6 Classify the resistance.
- 7 What is the Wheatstone Bridge Principle?
- 8 What is Hay's bridge?
- 9 State the advantages and disadvantages of Kelvin's double bridge.
- 10 What is active transducer? Mention some examples.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 a) Discuss about errors and compensations of measuring instruments. (5M)
b) List the advantages & disadvantages of MI type instruments. (5M)

OR

- 12 a) Explain the operation of electrometer type electrostatic voltmeters. (5M)
b) Describe the principle of attracted disc type E.S. voltmeters. (5M)

- 13 a) Draw the circuit diagram of DC Crompton's potentiometer and explain its working. Describe the steps used when measuring an unknown resistance. (5M)
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)

OR

- 14 a) With neat figure, explain the working of an AC Potentiometer. (5M)
b) Discuss the significance of standardization. (5M)

- 15 a) Describe the construction of single-phase dynamometer Watt meter. (5M)
 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. (5M)
- OR
- 16 a) Explain the measurement of LPF and UPF. (5M)
 b) Discuss the errors of single-phase energy meter. (5M)
- 17 Explain how Wien's bridge can be used for experimental determination of frequency. Derive the expression for frequency in terms of bridge parameters. (10M)
- OR
- 18 Draw the circuit diagram of Anderson's bridge and derive the condition for balance. (10M)
- 19 a) Describe the principle of operation of LVDT. (5M)
 b) An LVDT with a secondary voltage of 5V has a range of $\pm 25\text{mm}$. (5M)
 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. (5M)
 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. (5M)