

B.TECH
(SEM V) THEORY EXAMINATION 2022-23
ELECTRONIC INSTRUMENTATION & MEASUREMENTS

Time: 3 Hours**Total Marks: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

- (a) Calculate the maximum percentage error in the difference of two measured voltage when $V_1 = 100 \pm 1\%$ and $V_2 = 80 \pm 5\%$
- (b) Define swamping resistance used in PMMC instrument.
- (c) What is mean by calibration in measuring instrument?
- (d) Define 1:1 & 20 :1 probes.
- (e) Discuss the balance equation of Wheatstone bridge.
- (f) What is mean by residual resistance and inductance in the Q meter?
- (g) What is the role of time base circuit in CRO?
- (h) Define the interpolation in oscilloscope system.
- (i) Define force transducer in measurement system.
- (j) Draw the block diagram of data acquisition systems.

SECTION B

2. Attempt any three of the following: 10 x 3 = 30

- (a) Explain the DC ammeter and DC voltmeter in measurement system.
- (b) Explain the different type of digital multimeter system using proper diagram.
- (c) A Hay bridge operating at a supply frequency of 100 Hz is balanced when the components are $C_3 = 0.1 \mu\text{F}$, $R_1 = 1.26 \text{ K}\Omega$, $R_3 = 65 \Omega$ and $R_4 = 600 \Omega$. Calculate the inductance and resistance of measured inductor. Also, the Q factor of the coil.
- (d) Draw the block diagram and waveform of D.S.O with its unique application.
- (e) Describe the hall-effect transducers with their application.

SECTION C

3. Attempt any one part of the following: 10 x 1 = 10

- (a) Explain the working principle of PMMC type equipment using torque equation.
- (b) The following values were obtained from the measurements of the values of 41.7, 42.0, 41.7, 42.0, 42.1, 41.6, 42.0, 41.9, 42.5 & 41.8 calculate:
 - (i) The arithmetic mean
 - (ii) The standard deviation
 - (iii) The probable error of one reading.
 - (iv) The probable error of mean
 - (v) Range.

4. Attempt any *one* part of the following: 10 x 1 = 10
- (a) What are the different types of probes used in measurement? Draw and explain with using proper circuit diagram.
 - (b) Explain the working principle of AC electronics voltmeter circuits using proper circuit diagram.
5. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Derive the equation for Maxwell bridge and solve a Maxwell inductance bridge uses a standard capacitor $C_3 = 0.1$ micro farad and operate at a supply frequency of 100Hz. Balance is achieved when $R_1 = 1.26$ kohms, $R_3 = 470$ Ohms, and $R_4 = 500$ Ohms. Calculate the inductance and resistance of the measured inductor, and determine its Q factor.
 - (b) Explain method of measuring low resistance using Kelvin double bridge and derive the balance conditions
6. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Explain the working principle, block diagram and waveform of sampling Oscilloscope.
 - (b) Draw the block diagram and waveform diagram of Dual trace oscilloscopes.
7. Attempt any *one* part of the following: 10 x 1 = 10
- (a) What is transducer? Explain the various type of transducers used in measurement.
 - (b) Where are thermocouple used? Explain various types of thermocouple in detail.