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**B TECH**  
**(SEM-IV) THEORY EXAMINATION 2017-18**  
**ELECTRONIC MEASUREMENT & INSTRUMENTATION**

*Time: 3 Hours*

*Total Marks: 70*

**Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

**1. Attempt *all* questions in brief.**

**2 x 7 = 14**

- a. Define primary and secondary standards.
- b. What do mean by Dissipation factor?
- c. How emitter follower structure reduces voltmeter loading effect?
- d. Define importance of Kelvin double bridge over Wheatstone bridge.
- e. The measured value of a resistance is  $10.25\Omega$ , whereas its value is  $10.22\Omega$ . Determine the absolute error of measurement.
- f. What are the essential components of a CRT?
- g. What do you understand by instrument calibration?

**SECTION B**

**2. Attempt any *three* of the following:**

**7 x 3 = 21**

- a. Explain the construction of PMMC instrument. Mathematically prove that the scale of such an instrument is linear.
- b. Draw and explain the FET input voltmeter circuit with range changing.
- c. Derive an expression for finding unknown resistance and inductance for Maxwell Bridge.
- d. Draw and explain the block diagram of Oscilloscope automatic time base with proper waveforms at the output of each block.
- e. Write a short note on working and applications of X –Y recorder.

**SECTION C**

**3. Attempt any *one* part of the following:**

**7 x 1 = 7**

- a. Define systematic errors in details. A batch of resistors that each have a nominal resistance of  $330\Omega$  are to be tested and classified as  $\pm 10\%$  components at  $25^\circ\text{C}$ . If their temperature coefficient is  $-300\text{ppm}/^\circ\text{C}$ , calculate the maximum and minimum resistance for these components at  $75^\circ\text{C}$ .
- b. Explain the concept of Swamping resistance. What are the materials generally used for manufacturing these resistances? A PMMC instrument with FSD of  $0.2\text{mA}$  and the coil resistance of  $10\Omega$  is to be converted into a voltmeter. Determine the required multiplier

resistance if the voltmeter is used to measure 100V at full scale. Also determine the applied voltage when the instrument indicates 0.75, 0.5, 0.25 and 0.1FSD.

**4. Attempt any one part of the following:**

7 x 1 = 7

- a. Explain Digital Multi meter. A  $4\frac{1}{2}$  Digit voltmeter is used to measure voltage. Find ( i) Resolution (ii) How would 16.58 be displayed on a 10V range.
- b. Define dual-slope integrator and zero crossing detector. Sketch the block diagram and system waveforms for a digital voltmeter that uses a dual slope integrator.

**5. Attempt any one part of the following:**

7 x 1 = 7

- a. Show how an ammeter, a voltmeter, and a DC supply can be used to measure a resistance. Show the two possible connection, write the resistance equation for each and discuss the error.
- b. Draw the circuit of a kelvin bridge, explain its operation, and derive the equation for the unknown resistance.

**6. Attempt any one part of the following:**

7 x 1 = 7

- a. Explain the following in detail with their diagram:
  - (i) Attenuator probe
  - (ii) 1:1 Probe
- b. Write short note on DSO. Compare it with Sampling Oscilloscope.

**7. Attempt any one part of the following:**

7 x 1 = 7

- a. Sketch the basic construction of a pen type galvanometer strip chart recorder. Briefly explain the instrument operation.
- b. What is importance of calibration in instrumentation sketch the circuit for calibrating a wattmeter and explain the calibration procedure.