

EC - 303 B.E. III Semester
Examination, December 2013

Electronic Instrumentation

Time: Three Hours Maximum Marks :70

Note: Solve one question from each unit. All questions carry equal marks.

1. a) Define

- i) Accuracy and precision ii) Linearity iii) Loading Effect iv) Hysteresis
b) Describe any one method of measurement of power at radio frequency.

Or

2. a) Explain the operating principle of

- i) Rectifier
ii) Peak Responding Voltmeter
b) Describe the principle of operation of chopper type DC voltmeter.

Unit - II

3. a) Explain the electrostatic focusing arrangement and derive the expression for deflection.

b) Describe the following types of oscilloscopes

- i) Dual trace type
ii) Dual beam type

Or

4. a) Draw the block diagram of a general purpose CRO and describe each block in brief.
b) Describe an overview of applications of a CRO.

5. a) A bridge consists of the following: Arm ab: a choke coil having a resistance R_1 and inductance L_1 Arm bc: a non-inductive resistance R_3 . Arm cd: a mica condenser C , in series with a non-inductive resistance R_4 . Arm da: a non-inductive resistance R_2 . When this bridge is fed from a source of 500 Hz, balance is obtained under following conditions:

$$R_2 = 2410\Omega; R_3 = 750\Omega; C_4 = 0.35\mu F; R_4 = 64.5\Omega.$$

The series resistance of capacitor = 0.4Ω . Calculate the resistance and inductance of the choke coil. The supply is connected between a and c and the detector is between b and d .

b) Differentiate between the following citing suitable examples:

- i) Transducer and Inverse Transducer ii) Active and Passive Transducer
ii) Primary and Secondary Transducer iv) Analog and Digital Transducer.

Or

6. a) Describe the different modes of operation of piezoelectric transducers. Draw the equivalent circuit of piezoelectric transducers. Derive the expression for magnitude of voltage across the load by making simplifying assumptions.

b) Describe the construction and working of photovoltaic cells. Draw their characteristics. Name the different materials used for these cells.

7 a) Describe the circuit of a square wave generator which generates square, triangular and sine wave shapes.

b) Describe the construction and working of light emitting diodes. Explain the direct and indirect recombination modes.

8. a) Explain

i) Planar display ii) Non-planar display iii) Segmental display iv) Dot matrices.

b) Describe the working of a sweep frequency generator. What are the sweeper errors?

Unit - V

9. a) Describe the principle of operation of basic digital multimeter with a circuit diagram. Explain how current can be measured by digital multimeter.

b) Explain the operating principle of voltage to time (Ramp) and voltage to frequency (Integrating) A/D converter.

Or

10. a) Describe the following terms:

i) Resolution

ii) Sensitivity

b) Consider a 6 bit D/A converter with a resistance of $320\text{ K}\Omega$ in LSB position. The converter is designed with weighted resistive network. The reference voltage is 10 V . The output of the resistive network is connected to an OPAMP with a feedback resistance of $5\text{ K}\Omega$. What is the output voltage for a binary input of 111.010?

c) Describe in details the successive approximation method of analog to digital (A/D) conversion.