

4E4132

Roll No. _____

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B. Tech. IV Sem. (Main) Exam., June/July-2014
Electronics & Communication Engg.
4EC3A Electronic Measurement & Instrumentation

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.

1. _____

2. _____

UNIT-I

Q.1. (a) Explain the phenomenon of hysteresis in measurement systems. Also explain the terms, 'threshold', 'maximum input hysteresis' 'maximum output hysteresis', 'Dead zone' and backlash with neat diagrams. [3+5=8]

(b) Current was measured during a test as 30.4A, flowing in a resistor of 0.105Ω . It was found later that the ammeter reading was low by 1.2 percent and the marked resistance was high by 0.3 percent. Find the true power as a percentage of the power that was originally calculated. [8]

OR

Q.1. (a) Define the following for Gaussian distribution data

(i) Precision index

(ii) Probable error

(iii) Standard deviation of mean

(iv) Standard deviation of standard deviation [4×2=8]

(b) Two resistors R_1 and R_2 are connected in series and then in parallel. The value of resistances are:

$$R_1 = 100.0 \pm 0.1 \Omega$$

$$R_2 = 50 \pm 0.03 \Omega$$

Calculate the uncertainty in the combined resistance for both series and parallel arrangements. [8]

UNIT-II

Q.2. (a) Describe the circuit diagram and operation of a true rms reading voltmeter using thermocouples. Explain how these voltmeters are free from waveform errors.

[6+2=8]

(b) Explain the operation and functional block diagram of vector impedance meter. Describe how phase angle measurements are carried out with it. [6+2=8]

OR

Q.2. (a) Describe the methods of measurement of voltage and power at radio frequencies. [8]

(b) Write short note on following:

(i) Q-meter

(ii) Shielding and grounding

[4+4=8]

UNIT III

Q.3. (a) Derive an expression for vertical deflection and deflection sensitivity of an electron beam in a CRT. [8]

(b) Explain the following with reference to analog type storage oscilloscope: [4×2=8]

(i) Bistable persistence storage

(ii) Bistable storage

(iii) Fast storage

(iv) Secondary emission

OR

Q.3. (a) Describe the phenomenon of synchronization of vertical input signal to its sweep generator. Explain the need of it. [6+2=8]

(b) Describe the principle of working and circuit details of a sampling oscilloscope. Discuss about delayed sweep. [6+2=8]

UNIT- IV

Q.4. (a) Describe the Working of a sweep frequency generator. What are the sweeper errors? [6+2=8]

(b) Explain the term "total harmonic distortion". Describe the functioning of a total harmonic distortion meter. [2+6=8]

OR

Q.4. (a) What is a frequency synthesizer? Explain in working with circuit details. [3+5=8]

(b) Explain the principle and working of spectrum analyzer. Discuss its applications.

[6+2=8]

UNIT- V

Q.5. (a) Describe the construction, theory and working of thermocouples. Explain the different types of compensations used in the measuring system. [6+4=10]

(b) In a piezoelectric transducer, a flat frequency response within 5% is required. Find the value of minimum frequency in terms of time constant for which it can be used. If the time constant of the transducer is 1.5ms, find the value of minimum frequency. Find the phase shift at this frequency. [6]

OR

Q.5. (a) Why are dummy gauges used? In what way do they affect the output of a strain gauge bridge? [3+5=8]

(b) Write short note on following:

(i) Ultrasonic flow meter.

(ii) Load cells and its applications.

[4+4=8]
