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D 4152

B.E/B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2008.

Fourth Semester

Electronics and Communication Engineering

EC 1255 — MEASUREMENTS AND INSTRUMENTATION

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What are the different type of errors?

2. An AC Bridge has the following constants. $AB = 1\,k\Omega$, parallel with $C = 159\,nF$, $BC = 1\,k\Omega$, $CD = 500\,\Omega$, $DA = 0.636\,\mu F$ in series with an unknown resistance. Find the value of the resistance in an DA to produce balance.

3. How can a millivoltmeter be constructed to measure Radio frequency energy?

4. What is the velocity of electrons that have been accelerated through a potential of 2000 V?

5. How can frequency be synthesised using indirect method?

6. A signal is sampled for 4 seconds at 20 kHz rate using 10 bit conversion. Calculate the dynamic range, spectral frequency and resolution.

7. How does placing a fixed attenuator ahead of a spectrum analyser affect

   (a) the third order intercept

   (b) noise figure.

8. A digital voltmeter has a read out range from 0 to 9999 counts. Determine the resolution of the instrument in volts when the full scale reading is 9.999 V.

9. Briefly specify the analog data acquistion systems element.

10. For a Given Quantum efficiency 82% of a diode is illuminated with 75×10^{-6} W of 1300 nm photons. Find current developed in it.

PART B — (5 × 16 = 80 marks)

11. (a) (i) With a neat sketch of a bridge, explain how high Q inductances can be measured. (8)

(ii) State the necessity of Jewel bearing in instruments. (8)

Or

(b) (i) Explain the working of moving iron instruments. (8)

(ii) List the advantages of Rectifier type measuring systems and explain how ac and dc voltages can be measured. (8)

12. (a) (i) With a neat sketch explain the working principles of Digital Storage Oscilloscope. (12)

(ii) Extend the above principle to highlight the features of a Dual Trace Oscilloscope. (4)

Or

(b) Develop the working principle of a sine generator and extend the principle to develop a function generator. Illustrate them with neat sketches. (16)

13. (a) (i) How a spectrum analyser can be used to operate and measure VHF? Draw the waveforms and block diagram. (12)

(ii) State the basic difference between network analyser and a spectrum analyser. (4)

Or

(b) (i) Explain the operation of a RAMP type AC voltmeter. Draw and explain with its gating circuit. (10)

(ii) What is the basic principle of Successive Approximation type? (6)

14. (a) How can the frequency range of counters be extended? Brief any one of the method? (16)

Or

(b) (i) Explain rating error, Time base error, Trigger level error. (8)

(ii) Draw the circuit of a FET type indicating meter and how it can be used for indication purpose. (8)

15. (a) (i) Explain the optical time domain reflectometer. (8)

(ii) How can the frequency counter be modified for operation of IEEE 488 bus? (8)

Or

(b) (i) Explain the elements of digital data acquisition systems. Differentiate between Analog DACS and Digital DACS. (12)

(ii) Explain Spatial Encoders. List their Applications. (4)
