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R 3293

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

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 × 2 = 20 marks)

1. Define standards. Classify them.
2. Bring out the differences between moving coil and moving iron instruments.
3. Draw the block diagram of an Electronic multimeter. Briefly explain the function of each block.
4. What is a vector impedance meter? State its application.
5. State the need for isolation between the signal generator output and oscillator? How can be this done?
6. What is the maximum frequency and resolution for an analyser using a 1.5 s window and a 100 kHz sample rate?
7. State typical digital instrument accuracy specifications. Compare the accuracy of digital and analog multimeters.
8. A frequency meter with 1 MHz clock source is used for measuring the time period of input wave. Determine the measured time period when 1560 pulses are registered on the display.
9. Briefly discuss about the handshake signals in the IEEE 488 Bus system.
10. Define numerical aperture.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Define any four of the static and dynamic **characteristics**. Compare different measurements systems. State the **type** suited for static measurements and dynamic measurements. **Justify** your answer.
- (ii) Explain the construction and working of **moving iron** meter. Derive its torque expression.

Or

- (b) (i) Draw the circuit diagram and phasor **diagram for Anderson** bridge. Derive the expression for unknown Inductance.
- (ii) Explain how to determine frequency using **Wein** bridge with neat circuit diagram. Obtain the expression.
12. (a) (i) Draw the block diagram of dual trace **oscilloscope** and explain the function of each block.
- (ii) Briefly discuss the problems in RF power measurements.

Or

- (b) (i) With the help of block diagram explain the working of sampling oscilloscope.
- (ii) Explain the functioning of vector voltmeter with neat diagram.
13. (a) (i) Draw and explain the working of Frequency synthesised signal generator.
- (ii) What is the resolution of the spectrum analyser using an IF filter with a 3-db bandwidth of 30 kHz.

Or

- (b) (i) Draw the block diagram for fundamental suppression distortion meter and explain its operation.
- (ii) Draw and discuss about the spectrum analyzer displays produced by the following inputs :
- (1) Two pure sine wave inputs with different frequencies and amplitudes.
- (2) A sine wave with small amount of harmonic distortion.

14. (a) (i) With neat block diagram state the operation of Ramp type digital voltmeter. Draw the necessary waveforms.
- (ii) Determine the minimum number of output bits required for an ADC to give a quantizing error less than 0.5%.

Or

- (b) (i) Draw a block diagram to show how decade counters may be used for frequency division. Show the waveforms and explain its operation.
- (ii) Briefly discuss the methods used to increase the range of frequency counter.
15. (a) (i) With neat schematic diagram explain the functioning of Multi-Channel Data Acquisition system.
- (ii) Differentiate between analog multiplexers and digital multiplexers.

Or

- (b) (i) Draw the schematic of IEEE 488 Instrumentation Bus and explain its features.
- (ii) Draw the block diagram of optical time-domain reflectometer and discuss its operation.