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**Question Paper Code : P 1250**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

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. Differentiate accuracy from precision.
2. In a wheatstone bridge, a change of  $6\ \Omega$  in the unknown arm of the bridge is required to produce a change in deflection of 2.4 mm of the galvanometer. Determine : (a) Sensitivity (b) Deflection factor.
3. State the advantages of electronic instruments.
4. What are the applications of 'CRO'?
5. How are signal generators classified?
6. What is the dynamic range of a spectrum analyzer if the noise level of the display is equal to  $-80\ \text{dB}$  and two  $-10\ \text{dB}$  signal produce third order intermodulation products that just appear above the noise?
7. A digital frequency counter which has a 3-digit display, gated period of 10 milliseconds, is selected to measure an unknown frequency. The readings is 045. What is the frequency of the system?
8. What is a vector voltmeter?
9. What is a data acquisition system?
10. How much loss will be experienced if a fiber of numerical aperture of 0.3 is the source for a fiber with a numerical aperture of 0.242?

11. (a) Explain the following :
- (i) Instrument errors. (4)
  - (ii) Limiting errors and environmental errors. (6)
  - (iii) A 15-volt moving iron voltmeter has a resistance of  $300\ \Omega$  and an inductance of  $0.12\ \text{H}$ . Assuming that this instrument reads correctly on D.C. What will be its readings on A.C at 15 volts when frequency is (1) 25 Hz and (2) 100 Hz. (6)

Or

- (b) A bakelite sheet of 5 mm thickness is tested at 50 Hz between the electrodes 12 cm in diameter. The Schering bridge (fig. 1) used has an air capacitor  $C_2$  of  $106\ \text{pF}$ , a non-reactive resistance of  $R_1$  of  $(1000/\pi)\ \Omega$  in parallel with a variable capacitor  $C_1$  and a non-reactive variable resistance  $R_3$ . Balance is obtained with  $C_1 = 0.55\ \mu\text{F}$  and  $R_3 = 270\ \Omega$ . Determine the following :
- (i) Capacitance. (6)
  - (ii) Power factor and (4)
  - (iii) Relative permittivity of the sheet. (6)

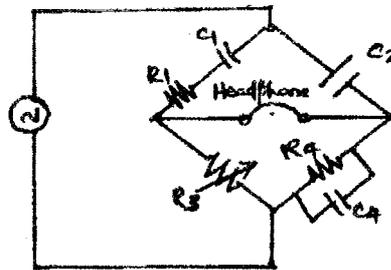


Fig. 1

12. (a) With a neat block diagram explain the function of a general-purpose oscilloscope. Also define deflection sensitivity of a CRT. (16)

Or

- (b) (i) Explain with the help of a circuit, the working of a Q-meter. (8)
- (ii) Explain briefly the following methods of measuring power
- (1) Bolometer method. (4)
  - (2) Calorimeter method. (4)

13. (a) Write short notes on the following :
- (i) Wave Analyzer. (5)
  - (ii) Spectrum Analyzer. (6)
  - (iii) Harmonic Distortion Analyzer. (5)

Or

- (b) Explain the Laboratory type square wave and pulse generator. (16)

14. (a) Explain briefly with neat diagrams the working of the following instruments.

(i) Ramp type DVM. (6)

(ii) Dual-slope integrating type DVM. (5)

(iii) Integrating type DVM. (5)

Or

- (b) Describe a "digital multimeter" with a help of a block diagram. Explain its working. (16)

15. (a) (i) Discuss briefly the working of IEEE – 488 bus system. (8)

(ii) Explain with neat diagram the working of single channel and multichannel data acquisition system. (8)

Or

- (b) Describe the following in detail

(i) Fiber optic power measurement. (8)

(ii) Optical time-domain reflector. (8)