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B 2168

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Fourth Semester

Electronics and Communication Engineering

EC 245 — MEASUREMENTS AND INSTRUMENTATION

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the need for measurement?
2. Write the need for calibration.
3. Mention some of the requirements of signal generator.
4. Write the function of distortion analyzer.
5. How are the digital voltmeter classified?
6. What is the need for guarding?
7. What is known as persistence?
8. List the basic components of magnetic recorders.
9. What are the drawbacks of manual test systems?
10. List the benefits of computer based measurement.

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PART B — (5 × 16 = 80 marks)

11. (a) (i) A Wheatstone bridge has ratio arms which are accurate within $\pm 0.025\%$ and a variable arm within $\pm 0.05\%$. What is the possible error in a resistance measurement on this bridge? (6)
- (ii) Explain how self inductance can be measured in terms of a standard capacitor using an AC bridge and give the detectors commonly used in AC bridges. (10)

Or

- (b) (i) A voltmeter having a sensitivity of $1.5 \text{ k}\Omega/\text{V}$ reads 80 V on its 150 V range when connected across an unknown resistor in series with a milliammeter. The ammeter reads 15 mA. Calculate
- (1) Apparent resistance
(2) Actual resistance of unknown resistor
(3) Error due to loading effect of voltmeter
(4) % relative accuracy. (8)
- (ii) Explain how resistance at different temperature can be found out using semiconductor resistance temperature transducers, their advantages and disadvantages. What happens if there is self heating in the transducer? (8)
12. (a) (i) What is Fast Fourier Transform (FFT) and how can this be used for spectral analysis? Explain with a block diagram. (12)
- (ii) How does a FFT spectrum analyser differ from real time spectrum analyser? (4)

Or

- (b) (i) Discuss some of the salient features of a function generator. (5)
- (ii) With a neat sketch explain the working of a function generator for obtaining square, sine and triangular waves. (8)
- (iii) List the advantages and disadvantages of sweep generator. (3)

13. (a) (i) A $3\frac{1}{2}$ digit DVM has an accuracy specification of $\pm 0.5\%$ of the reading ± 1 digit. (6)
- (1) What is the error in volts, when the reading is 5.0 V on its 10 V range.
- (2) What is the 1% error of reading, when the reading is 0.1 V on its 10 V range.
- (ii) Draw the schematic of DMM and explain its working. Also bring out its advantages over analog multimeters. (10)

Or

- (b) (i) List the features and applications of vector voltmeter. (4)
- (ii) Explain how capacitive effects can be avoided by shielding. (3)
- (iii) In very low frequency range, time period measurement gives good accuracy rather than direct frequency measurement. Justify the statement and describe the working of time period measurement. (9)
14. (a) (i) Write short notes on curve tracer and powerscope. (8)
- (ii) How does the sampling oscilloscope increase the apparent frequency response of an oscilloscope? (6)
- (iii) What is delayed sweep and when is it used? (2)

Or

- (b) (i) What is oscilloscope probe compensation? How is this adjusted? What effects are noted when the compensation is not correctly adjusted? (6)
- (ii) What are the types of null recorders and explain any one recorder in detail. (6)
- (iii) Compare line and dot matrix printer. (4)

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15. (a) Explain the testing of an audio amplifier and a radio receiver. (16)

Or

(b) Discuss the working of following instruments in computer controlled instrumentation :

(i) Frequency counter (8)

(ii) Synthesised signal generator (8)

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