Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 41002

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018

Fourth Semester

Electrical and Electronics Engineering

EE6404 – MEASUREMENTS AND INSTRUMENTATION

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A (10×2=20 Marks)

1. A voltmeter reads 152 volts for a particular measurement. If the true value of the measurement is 154 volts, determine the percentage static relative error and static correction.

2. What is average deviation ? What does it indicate on a measuring instrument ?

3. Which type of frequency meter is used over a wide range of voltage ? Why ?

4. What makes the scale of MI instruments cramped at both the lower and upper ends ?

5. Calculate the reactance of a coil from the measurements made on an AC potentiometer. The impedance of the coil is found to be 25 ohms, the phase angle of the voltage across the coil and a standard resistance connected in series with the coil are 55° and 25° respectively.

6. How grounding is implemented in the case of a transformer whose windings on one side is connected in delta ?

7. State the reason for having complementary characteristic between the reproduce head and the amplifier connected to the reproduce head in a magnetic tape recorder ?

8. State the advantages of LED from the intensity of light and dynamic operation point of view.

9. In Capacitive transducer, which principle exhibits linear characteristic ? How ?

10. It is required to convert a range of 0 – 10V DC into digital output with a 10V reference volt. Determine the error caused when the converter used is i) 5 bit converter and ii) 10 bit converter.

PART – B (5×13=65 Marks)

11. a) i) What is measurement standard ? Explain various classification of standard ? (7)

ii) With functional block diagrams explain briefly a generalized measurement system. (6)

(OR)

b) i) Discuss in detail various static characteristics of a measurement system. (7)

ii) An electric current of 3 Ampere is flowing through a resistance of 10 ohms. It was found that the resistance was 0.2% greater than what was specified as rated and the ammeter measurement was 0.5% more than the true value. Determine the relative error in power measurement. (6)

12. a) i) Prove that for lagging power factor an electrodynamometer reads more than the true power. Also determine an expression for correcting factor to correct the error caused. (7)

ii) What is the need for lag adjustment devices ? Explain the concept of lag adjustment using "Shading Bands". (6)

(OR)

b) i) Discuss the effect of the following on the errors of Current Transformer.

1) Change of primary winding current and

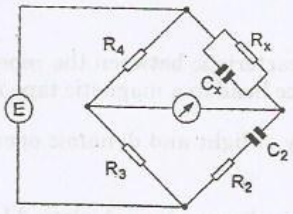
2) Change in secondary winding circuit burden. (7)

ii) Explain the measurement of iron losses through Wattmeter method with test setup and derive the expression for total iron losses. (6)

13. a) The AC Bridge shown below is used to measure the unknown capacitance C_x and resistance R_x.

1) Derive an expression for balance equations of the bridge

2) Determine the value of R_x and C_x, if $R_3 = R_4$, $R_2 = 2.5\ K\Omega$, $C_2 = 0.2\mu\ F$ and the frequency of the supply is 1 KHz. (7+6)



Question 13 (a)

(OR)

b) Explain the interference caused due to Electrostatic coupling and Electromagnetic induction and describe protection against such effects.

14. a) i) What is a plotter ? Discuss the operation of a Drum type plotter. (7)

ii) Explain the theory of seven segment LED display. Draw the circuit diagram of a common anode display. (6)

(OR)

b) i) With the help of a functional block diagram explain the operation of a Cathode Ray Oscilloscope. (8)

ii) What is a Data logger ? What are its basic components ? What are the functions of data logger ? (5)

15. a) i) What are Rosettes type strain gauges ? Under which condition rosettes are used ? Draw any two types of rosettes. (7)

ii) Explain how a Hall effect Transducer is used to measure electric current with a schematic representation. (6)

(OR)

b) i) What are the different types of A/D converters ? Compare them with respect to speed, resolution, Noise immunity and cost. (7)

ii) Discuss Active and Passive Transducers with an example briefly for each type. (6)

PART – C (1×15=15 Marks)

16. a) Write in detail about the construction and working principle of LVDT. List the advantages and disadvantages of LVDT. (12+3)

(OR)

b) i) Describe the different modes of operation of Piezo-electric transducer. (5)

ii) Explain in detail the working principle of any two digital transducers. (10)

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