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

Question Paper Code : 91490

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fourth Semester

Electrical and Electronics Engineering

EE 6404 – MEASUREMENTS AND INSTRUMENTATION

(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is calibration ?
2. A 600V voltmeter is specified to be accurate within ±2% at full scale. Calculate the limiting error when the instrument is used to measure a voltage of 250V.
3. What is loading effect ?
4. Define creeping.
5. List any four applications of AC potentiometers.
6. What is meant by transformer Ratio Bridge ?
7. Define deflection sensitivity.
8. List any two advantages of direct recording.
9. For a 5 bit ladder, if the input levels are 0 = 0V and 1 = +10V. What are the output voltages for each bit ?
10. What is piezoelectric effect ?

PART – B (5×13=65 Marks)

11. a) i) What is standard and explain in detail about different types of standards ? (5)

ii) What are the different types of error in measurement ? Explain. (6)

iii) A set of ten measurements were recorded in the laboratory with the following values : 98, 101, 102, 97, 101, 100, 103, 98, 106 and 99. Calculate the precision of the 6th measurement. (2)

(OR)

b) i) Explain the static and dynamic characteristics of an instrument ? (10)

ii) The expected value of the voltage across a resistor is 80V. However the measurement gives a value of 79V. Calculate :

i) absolute error,
ii) percentage of error,
iii) relative error and
iv) percentage of accuracy. (3)

12. a) With a neat diagram, explain in detail the construction of a PMMC instrument ? (13)

(OR)

b) With a neat diagram explain the construction and working of an electrodynamometer type wattmeter. (13)

13. a) What is Hay's bridge ? Derive its balance equation. When it is preferred over Maxwell bridge ? (13)

(OR)

b) i) Explain the different techniques of grounding. (7)

ii) Write short notes on Electromagnetic interference. (6)

14. a) With a neat block diagram, explain the function of a general purpose oscilloscope. (13)

(OR)

b) Explain the operating principle of liquid crystal display. Discuss the advantage, disadvantage and various application of LCD. (13)

15. a) With a neat diagram, explain the construction and working principle of LVDT. State the advantage and disadvantage of LVDT. (13)

(OR)

b) Explain schematic block diagram of a general Data Acquisition System (DAS) and give its objectives. (13)

PART – C (1×15=15 Marks)

16. a) i) Explain with a neat block diagram, the operation of linear ramp digital voltmeter. (8)

ii) A 4½ digital voltmeter is used for voltage measurements. (4)

i) Find its resolution.

ii) How would 12.98V be displayed on a 10V range ?

iii) How would 0.6973 be displayed on 1V and 10V range ?

iii) Calculate the unknown inductance and resistance measured by Hay's bridge. The bridge elements at the balancing conditions are $C_1 = 1\mu F$, $R_1 = 2k\Omega$, $R_2 = 10k\Omega$, $R_3 = 1k\Omega$. The supply angular frequency is 3000 rad/sec. (3)

(OR)

b) i) Write brief notes on optical encoders. (6)

ii) A 12 bit DAC has a step size of 8mV. Determine the full scale output voltage and percentage resolution. Also find the output voltage for the input of 010101101101 ? (4)

iii) A moving coil ammeter has fixed shunt of 0.01Ω with a coil resistance of 750Ω and a voltage drop of 400 mV across it, the full scale deflection is obtained. Calculate the current through shunt and the resistance of meter to give full scale deflection if the shunt current is 50A. (5)

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