Code No: 115AM

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, November/December - 2016
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) Define accuracy and precision. [2]
b) What is loading effect in voltmeter? [3]
c) Compare Moving coil with Moving iron instruments. [2]
d) Draw the internal structure of CRT and list its functions. [3]
e) Draw the block diagram of spectrum analyzer. [2]
f) What are the advantages of digital instruments over analog instruments? [3]
g) Draw the block diagram of Digital Data Acquisition System. [2]
h) Name the different temperature sensors and their advantages. [3]
i) State the LVDT principle. [2]
j) Explain the procedure of air-flow measurement. [3]

PART - B

(50 Marks)

2.a) Explain about source for different types of errors and precautions to minimize them.
b) The accuracy of five digital voltmeters are checked by using each of them to measure a standard 1.0000V from a calibration instrument. The voltmeter readings are as follows: V_1=1.001v, V_2=1.002v, V_3=0.999v, V_4=0.998v and V_5=1.0000v. Calculate the average measured voltage and the average deviation. [5+5]

OR

3.a) With a neat diagram, explain the working of a True RMS responding volt meter.
b) A PMMC instrument has FSD of 100 μ A and a coil resistance of 1K Ω . Calculate the required shunt resistance value to convert the instrument into an ammeter with (i) FSD=100mA and (ii) FSD=1A. [5+5]

4.a) What is the principle of harmonic distortion analyzer? Explain its operation with the help of a functional block diagram.
b) Compare the selectivity characteristics of the Spectrum Analyzer and Heterodyne Wave Analyzer. [5+5]

OR

5.a) With a neat sketch explain the operation of a heterodyne type wave analyzer.
b) Explain the following terms associated with Spectrum Analyzer:
i) Sensitivity ii) Dynamic Range iii) Harmonic Mixing [5+5]

6.a) Explain how Lissajous figures are used to determine the characteristics of unknown input. Show how to estimate input if the pattern is (i) Circle (ii) Ellipse (iii) Parabola.

b) Derive an expression for electrostatic deflection sensitivity of a CRO. [5+5]

OR

7.a) Draw the block diagram of storage oscilloscope and explain the function of each block.

b) Derive the expression for vertical deflection of electron beam in CRT. [5+5]

8.a) Explain how LVDT is used to measure linear displacement.

b) Show that a parallel plate capacitor serves as the most suitable transducer for measurement of linear and angular displacements. [5+5]

OR

9.a) Show that a parallel plate capacitor serves as the most suitable transducer for measurement of linear and angular displacements.

b) A transducer that measures force has nominal resting resistance of 300 Ω and is excited by 7.5V. When a 980 dyne force is applied, all four equal resistance bridge elements change resistance by 5.2 Ω . Find the output voltage E_o. [5+5]

10.a) The basic AC bridge consists of the following constants:

AB: R=400 Ω , BC: R=150 Ω , CD: unknown and DA: R=100 Ω in series with L=10mH. Oscillator frequency is 1KHz. Determine the constants of arm CD.

b) What is Wien's bridge? Derive the expression for the frequency. [5+5]

OR

11.a) Explain different methods of liquid level measurements.

b) Explain different steps adopted by a controller in data acquisition in asynchronous Mode. When asynchronous method of data acquisition is required. [5+5]

---ooOoo---