NEC-403

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 131403-N

Roll No.

B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Time : 3 Hours] [Total Marks : 100

Note : (1) Attempt all questions.
(2) All questions carry equal marks.

1 Attempt any four parts : 5×4=20

(a) Define measurement. Calculate percentage error in determination of time period of a pendulum given by

$$T=2\pi\sqrt{\frac{l}{g}}.$$

Where l and g are measured in ± 2% and ± 3% errors.

(b) Differentiate between Gross errors and Systematic errors. List a few ways of minimizing the effect of errors in measurement.

(c) A batch of resistors that each have a nominal resistance of 330 Ω are to be tested and classified as ± 10 % components at 25 °C. If their temperature coefficient is -300ppm/ °C, calculate the maximum and minimum resistance for these components at 100 °C.

(d) A thin wire has a length of 21.7 cm and radius 0.46 cm. Calculate the volume of the wire correct to required significant figures.

(e) Explain the construction of a PMMC instrument. Mathematically prove that the scale of such an instrument is linear.

(f) Explain the concept of Swamping resistance. What are the materials generally used for manufacturing these resistances.

2 Attempt any four parts : 5×4=20

(a) What do you mean by Loading Effect? How does electronic voltmeter help in minimizing the loading effect?

(b) Draw and explain the FET input voltmeter circuit with range changing.

(c) Explain the -working of precision rectifier based voltmeters.

(d) A Half wave rectifier Op-Amp based voltage amplifier circuit has a feedback resistance of 2.4kΩ and a

3 Attempt any two parts : 10×2=20

(a) Give numerical example to explain the sensitivity of a Wheatstone bridge. What is the main advantage of using Kelvin's bridge over Wheatstone bridge?

(b) Explain how AC bridges are balanced with proper phase diagrams. Derive the expressions of converting series inductor circuits into parallel equivalent circuits.

(c) Write the mathematical expressions for inductor Q-factor and capacitor D-factor. Explain the working of inductance Comparison Bridge.

4 Attempt any two parts: 10×2=20

(a) Draw and explain the block diagram of Oscilloscope automatic time base with proper waveforms at the output of each block.

(b) Explain the operation of Sampling Oscilloscopes. Also explain individual circuits of staircase generator and sampling gate.

(c) What do you mean by interpolation? Briefly explain the operation of a DSO storage and display system.

5 Attempt any two parts: 10×2=20