53 (IE 504) ELIN

2017

ELECTRONIC INSTRUMENTATION

Paper : IE 504

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* Discuss the uses of Electronic instrumentation. 4

   (b) Define the terms : 3

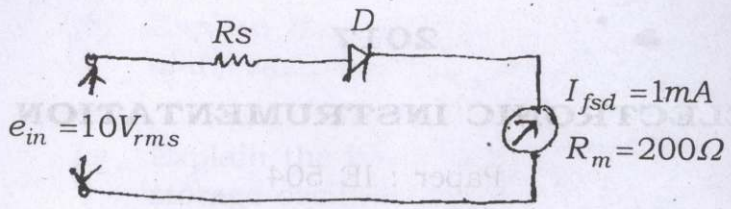
   (i) Accuracy

   (ii) Precision

   (iii) Resolution.

   (c) What is loading effect ? 1

(d) Calculate the value of the multiplier resistor for a $10V$ *rms* range on the voltmeter shown 2



(e) With the help of neat block diagram explain the working principle of vector voltmeter. 10

2. (a) What is the application of Q meter ? Explain different methods for connecting unknown components to the test terminals of a Q meter. 2+9=11

(b) With the signal generator frequency of a Q meter set to 1·25 *MHz*, the Q of a coil is measured as 98 when $C = 150\,pF$. Determine the coil inductance and resistance. 3

(c) Explain the working principle of True RMS Voltmeter. 6

3. *(a)* Draw the block diagram of sine-wave generator. Also discuss the operation of a Hartley Oscillator. 8

(b) Find the operating frequency of a transistor Hartley oscillator if $L_1 = 100\mu H$, $L_2 = 1mH$, mutual inductance between the coils $M = 20\mu H$ and $C = 20pF$. 3

(c) With the aid of a neat block diagram explain phase locked loop for frequency synthesizer. 6

(d) What is Harmonic distortion ? Give the drawbacks of tuned circuit harmonic analyzer. 1+2=3

4. *(a)* Explain the block diagram of general purpose oscilloscope. 7

(b) Name the control knobs to control beam density in oscilloscope. 3

(c) Explain the following : 5+5=10

(i) Hall effect sensor in oscilloscope probe

(ii) Dual trace oscilloscope.

5. *(a)* With a schematic view explain the working of bistable storage tube. 5

(b) Explain the simplified block diagram of the sampling circuitry of oscilloscope. 8

(c) Explain the block diagram of a digital storage oscilloscope. 7

6. *(a)* What do you mean by data loggers ? 5

(b) Describe the operation of magnetic tape recorder. 5

(c) Discuss briefly the working of IEEE 488 instrumentation bus system. 10

7. Write short notes on the following : 5×4=20

(i) Astable multivibrator

(ii) Function Generator

(iii) Delay line in oscilloscope

(iv) Wavemeter

(v) DMM
