2020

ELECTRONICS — HONOURS

Paper : CC-11

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer ***question no.* 1** and ***any four*** questions from the rest.

1. Answer ***any ten*** questions : 1×10

(a) A Galvanometer can be converted into a DC voltmeter by adding

(i) small value resistance in series

(ii) high value resistance in parallel

(iii) high value resistance in series

(iv) high value resistance in parallel.

(b) *Aquadag* is a part of

(i) Ohm meter (ii) Ammeter (iii) Voltmeter (iv) CRO.

(c) An R-C oscillator produces oscillations in the range of

(i) Audio frequencies (ii) Radio frequencies

(iii) Very high frequencies (iv) Microwave frequencies.

(d) Weighted-Resistor is a conversion technique of type :

(i) Digital to Analog (ii) Analog to Digital

(iii) both (i) and (ii) (iv) none of (i) and (ii).

(e) The unknown inductance is measured by Anderson bridge using known value of

(i) resistors (ii) capacitors

(iii) resistors and capacitor (iv) resistors, capacitor and inductor.

(f) LVDT is a

(i) variable resistance type transducer

(ii) variable inductance type transducer

(iii) variable capacitance type transducer

(iv) none of (i), (ii) and (iii).

(g) Which of the following is not a temperature transducer?

(i) RTD (ii) Thermistor

(iii) Thermocouples (iv) strain gauge.

(h) Duty cycle of a perfect square wave is

(i) < 50% (ii) 50% (iii) > 50% (iv) 100%

(i) A 12-bit ADC with a maximum dc input of 10 Volt has a resolution of

(i) 4096 mV (ii) 24 mV (iii) 2.44 mV (iv) 4.096 Volt.

(j) Best A/D conversion accuracy can be achieved by

(i) counting type converter (ii) successive-approximation

(iii) dual-slope converter (iv) none of these.

(k) An unknown resistance can be measured by

(i) Ohm-meter (ii) Wheatstone bridge

(iii) Multimeter (iv) all of (i), (ii) and (iii).

(l) The error due to shortcoming of instruments is known as

(i) Gross error (ii) Systematic error

(iii) Instrumental error (iv) Environmental error.

2. (a) How can a galvanometer be converted into an ammeter? Describe with a circuit diagram.

(b) A 100 μA meter with an internal resistance of 500 Ω is to be used to construct a 0-100 mA ammeter. Calculate the value of the shunt resistance required.

(c) What is a 3½ digit display? 4+3+3

3. (a) How phase difference between two sinusoidal voltage signals of same amplitude and frequency can be measured using Lissajous figure?

(b) Draw the Lissajous figure pattern of two sinusoidal voltages of same amplitude and frequency when the phase difference is 90°.

(c) Draw the block diagram of an oscilloscope. 5+2+3

4. (a) Why active probe is used in CRO input? What is the use of attenuators in a CRO probe?

(b) Write the full form of USB. Write the maximum data exchange rate of USB 4.0.

(c) What are the advantages of a coaxial cable?

(d) What is the use of a current probe? (2+2)+(1+1)+2+2

5. (a) Draw the circuit diagram of an Anderson's bridge. Write the use of this bridge.

(b) How can the value of an unknown inductance be measured with Maxwell's bridge? (3+2)+5

6. (a) Discuss briefly how a R-2R ladder circuit can convert a digital voltage to an analog voltage.

(b) Describe in brief how an analog voltage can be converted to digital form by successive-approximation type converter. 5+5

7. (a) What is a transducer? Give two examples of an active and a passive transducer?

(b) Write the working principle of a capacitive pressure transducer. (2+2+2)+4

8. (a) What are the differences between a sensor and a transducer?

(b) What is a Strain Gauge? What is Gauge-Factor? Write the working principle of a Strain Gauge. 2+(2+2+4)

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