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(1st Semester)

ELECTRONICS

Paper No : EL–101

(Electronic Measuring Instruments and Circuit Analysis)

(PART : A—OBJECTIVE)

(*Marks* : 20)

Answer **all** questions

SECTION—I

(*Marks* : 5)

Each question carries 1 mark

Tick (✓) the correct answer in the brackets provided :

1. The phase difference between voltage and current in the circuit containing a pure resistor is

    (a) 90°   (   )

    (b) 180°   (   )

    (c) 0°   (   )

    (d) 360°   (   )

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2. The capacitor used in the filter circuits in order to remove the a.c. ripple from the power supply is

(a) electrolytic capacitor ( )

(b) paper capacitor ( )

(c) ceramic capacitor ( )

(d) mica capacitor ( )

3. The main purpose of laminating a transformer core is to decrease its

(a) electrical resistance ( )

(b) reluctance ( )

(c) eddy current loss ( )

(d) hysteresis loss ( )

4. What is the equivalent voltage for a current source of 5 A in series with 2 Ω resistance?

    (a)   10 V   (   )

    (b)   2·5 V   (   )

    (c)   7 V   (   ).

    (d)   3 V   (   )

5. To get the Thevenin's voltage, you have to

    (a)   short circuit the load resistor   (   )

    (b)   open the load resistor   (   )

    (c)   short circuit the voltage source   (   )

    (d)   open the voltage source   (   )

SECTION—II

(*Marks* : 15)

Answer *any* **five** questions

Each question carries 3 marks

1. Define phasor and phasor diagram.

2. Define transducer. What is the difference between passive and active transducers?

3. What are acceptor and rejector circuits? Why are they named so?

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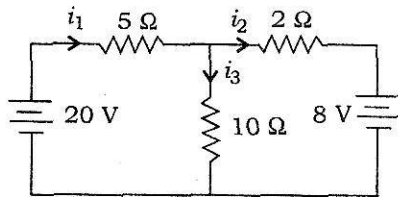**4.** Explain briefly ideal and practical current source.

5. What are the merits and demerits of a multimeter?

6. List down some uses of filter circuits.

7. For the given circuit, find i_1, i_2 and i_3 using Nodal analysis :

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8. What do you mean by varactor? What is the difference between abrupt-junction and hyper-abrupt junction of varactor?

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Full Marks : 55

Time : 2½ hours

(PART : B—DESCRIPTIVE)

(*Marks* : 35)

The figures in the margin indicate full marks for the questions

1. *(a)* What do you mean by power rating of a resistor? Describe briefly the preparation of wire-wound resistor and carbon composition resistor. 1+2+2=5

   (b) A varactor diode has a capacitance of 16 pF when the reverse bias voltage applied across it is 3 V. Determine the capacitance if the diode bias voltage is 6 V. 2

Or

(a) What do you mean by voltage rating of capacitors? Describe the preparation and uses of electrolytic capacitors. 1+3=4

(b) Define inductance. What are the different types of inductors? 1+2=3

2. Describe the principle of working of cathode-ray oscilloscope. 7

Or

Describe in detail the construction and working principle of a transformer. Why is laminated core necessary in a transformer?
2+3+2=7

3. (a) Explain how bandpass filter works. 3

(b) What is quality factor of a resonant circuit? Derive the expression for quality factor of a series resonant circuit. 1+3=4

Or

(a) A series resonance circuit has $L = 1 \cdot 01$ H, $C = 20 \, \mu$F and $R = 70 \, \Omega$ to which an e.m.f. of 100 V (r.m.s.) is applied. At what frequency of the applied e.m.f. will it resonate with maximum response? 4

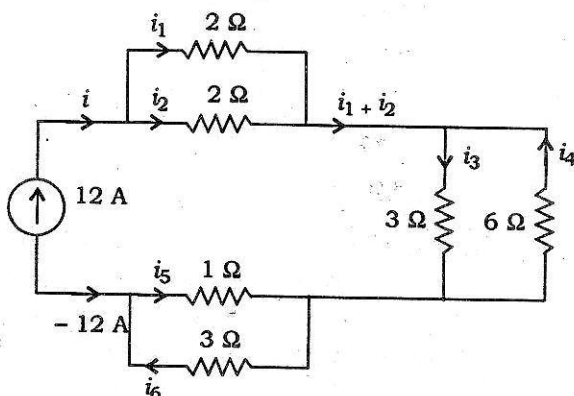(b) Derive the voltage and current relations in a.c. circuit containing R and C. 3

4. *(a)* Differentiate between the following : 2×2=4

   (i) Linear and Non-linear elements

   (ii) Unilateral and Bilateral elements

(b) For the given circuit, determine the currents indicated using current divider formula : 3
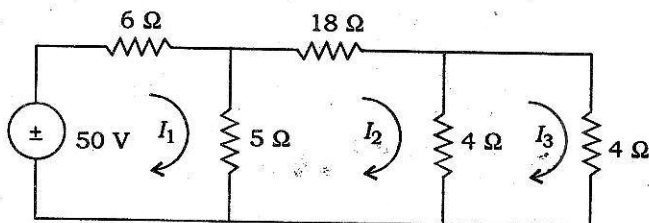

Or

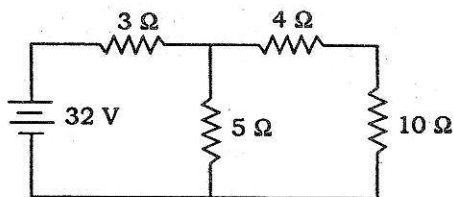*(a)* What is lumped circuit? State and explain ladder method of network analysis. 1+3=4

(b) Find I_1, I_2 and I_3 using Mesh analysis. 3

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5. *(a)* State and prove reciprocity theorem. 4

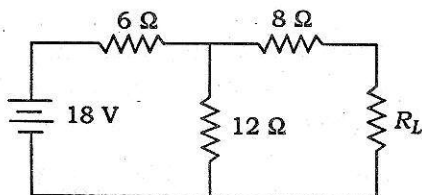*(b)* Apply Thevenin's theorem to find current through the 10 Ω resistor of the circuit shown in the figure below : 3

Or

(a) State and prove superposition theorem. 4

(b) In the following circuit, find the value of load resistance R_L to be connected across terminals *A* and *B* which would abstract maximum power from the circuit. Also find the value of this maximum power. 3

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