

2012

(1<sup>st</sup> Semester)

**ELECTRONICS**

FIRST PAPER

**(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. Which of the following would be used as filter capacitor for 1000 V power supply?
- (a) Paper capacitor ( )
  - (b) Air capacitor ( )
  - (c) Mica capacitor ( )
  - (d) Electrolytic capacitor ( )

( 2 )

2. If a multimeter which has a sensitivity of  $1000 \Omega$  per volt reads 50 V full-scale, its internal resistance is
- (a)  $20 \text{ k}\Omega$  ( )
  - (b)  $50 \text{ k}\Omega$  ( )
  - (c)  $10 \text{ k}\Omega$  ( )
  - (d)  $100 \text{ k}\Omega$  ( )
3. In which part of L-C-R circuit, dissipation of energy occurs?
- (a) Capacitor ( )
  - (b) Resistor ( )
  - (c) Inductor ( )
  - (d) All three above ( )
4. Which factor makes the resistor, capacitor or inductor a non-linear element?
- (a) Variation in pressure ( )
  - (b) Variation in temperature ( )
  - (c) Variation in density of the substance ( )
  - (d) Constituents of the substance ( )
5. The Norton resistance of network is  $20 \Omega$  and the shorted-load current is 2 A. If the network is loaded by a resistance equal to  $20 \Omega$ , the current through the load is
- (a) 20 A ( )
  - (b) 0.5 A ( )
  - (c) 4 A ( )
  - (d) 1 A ( )

( 3 )

SECTION – II

(Marks : 15)

*Each question carries 3 marks*

1. How is coefficient of coupling related to mutual and self-inductance of two coils? What is its significance?

(4)

2. Explain the working principle of Cathode-Ray-Oscilloscope (CRO).

(5)

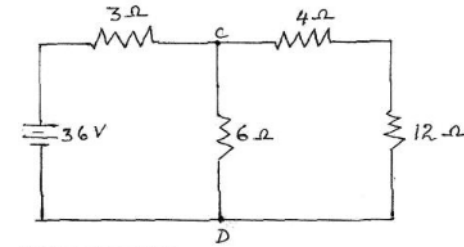
3. Derive the relation between current and voltage in an a.c. circuit having inductance  $L$  and capacitance  $C$  in series.

(6)

4. State and explain Kirchhoff's current and voltage law.

(7)

5. Using Norton's theorem, calculate the current flowing through the  $12\ \Omega$  resistor in the figure given below:



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*Full Marks : 55*

*Time : 3 hours*

(PART : B – DESCRIPTIVE)

*(Marks : 35)*

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

UNIT – I

1. (a) Define coupled circuits and coefficient of coupling. 1+1
- (b) Show that the effective impedance of the primary circuit is modified, when it is coupled inductively with a secondary circuit. 5

*Or*

- (a) Describe the construction of ceramic capacitor. Why is ceramic capacitor preferred over mica or paper capacitor? 2+2
- (b) Compare air-core, iron-core and ferrite-core inductors. 3

UNIT – II

2. (a) Explain the theory of transformer and discuss its working. Describe the various losses occurring in transformers. 4
- (b) Explain the uses of transformer losses with special reference in long distance power transmission. 3

*Or*

( 2 )

- (a) What is multimeter? Define the sensitivity of a multimeter. 1+1
- (b) Explain with circuit diagram, the working of multimeter as voltmeter and ammeter. 5

UNIT – III

3. Explain the method of solving a.c. problems using complex number notations. Investigate such a technique in the behavior of L-C-R series circuit. 3+4

*Or*

- (a) What is  $j$ -operator? Briefly explain the significance of  $j$ -operator. 1+3
- (b) Define filter of a circuit. Explain band-pass and band-stop filters. 1+2

UNIT – IV

4. (a) Explain nodal analysis and matrices of circuit analysis of a network.  $2\frac{1}{2} + 2\frac{1}{2}$
- (b) What do you mean by active and passive elements? 2

*Or*

- (a) State and explain ladder method of network analysis. 4
- (b) How will you convert a voltage source into a current source? 3

( 3 )

UNIT – V

5. (a) State and explain the Norton's theorem. 1+3
- (b) Show that the Norton's equivalent circuit can be found from the Thevenin's equivalent circuit. 3

*Or*

- (a) State maximum power transfer theorem and give its applications. 3+1
- (b) Explain the reciprocity theorem. 3

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