

2 0 1 4

(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 coefficient of coupling between two coils is given by (symbols have usual meanings)

(a) $K = M / L_1 L_2$ ()

(b) $K = M / \sqrt{L_1 L_2}$ ()

(c) $K = \sqrt{L_1 L_2} / M$ ()

(d) $K = L_1 L_2 / M$ ()

2. In an a.c. circuit, maximum power is consumed in

(a) L ()

(b) C ()

(c) R ()

(d) LC ()

3. In a parallel resonant circuit, at resonance

(a) current is maximum ()

(b) current is minimum ()

(c) impedance is minimum ()

(d) current and voltage are in antiphase ()

4. Kirchhoff's voltage law agrees with the principle of conservation of

(a) charge ()

(b) energy ()

(c) mass ()

(d) momentum ()

5. Maximum power is transferred from a source to a load, when the load resistance

(a) is made equal to the internal resistance of the source ()

(b) is the complex conjugate of internal impedance ()

(c) is more than internal impedance ()

(d) is less than internal impedance ()

(4)

SECTION—II

(Marks : 15)

Each question carries 3 marks

1. Briefly explain the working principle of a choke coil.

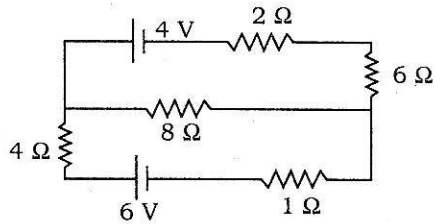
(5)

2. Discuss the construction of an electrolytic capacitor.

3. What is the value of the capacitor in a series circuit containing $R=10\ \Omega$, $L=0.5\text{ H}$ at resonance, connected to a 50Hz a.c. mains?

(7)

4. Using Kirchhoff's laws, calculate the potential difference across $8\ \Omega$ resistance shown below :



5. State and prove the reciprocity theorem.

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Paper No : EL-101

**(Electronic Measuring Instruments and
Circuit Analysis)**

Full Marks : 55

Time : 2 hours

(PART : B—DESCRIPTIVE)

(Marks : 35)

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

1. (a) Define self-inductance of a coil. 2
- (b) Derive the inductance of a long inductor. 5
- Or*
- (a) Describe the construction of mica capacitor. What do you mean by voltage rating of capacitors? 2+2
- (b) Discuss the principle of working of varactor. 3

(2)

2. (a) Describe the principle, construction and working of a transformer. 5

(b) What is an autovoltage transformer? 2

Or

(a) Describe the principle of working and construction of a multimeter. 5

(b) What are thermistor and strain gauge? 2

3. (a) Derive the expression for power consumed in an a.c. circuit. 5

(b) What do you mean by sharpness of resonance in resonant circuit? 2

Or

(a) Derive the expression for resonant frequency for a parallel resonant circuit. 4

(b) Discuss how a low-pass filter works. 3

4. (a) State and explain Kirchhoff's current and voltage laws. 4

(b) What do you mean by active and passive circuit elements? Give examples of each. 3

Or

(a) Discuss the current and voltage division laws. 4

(b) How will you convert a current source into a voltage source? Explain in detail. 3

(3)

5. (a) State and prove maximum power transfer theorem. 4

(b) State and explain Thevenin's theorem. 3

Or

(a) State and explain Norton's theorem. 3

(b) Apply Norton's theorem to calculate the current through $12\ \Omega$ resistor in the following circuit : 4

