

2017

(Pre-CBCS)

(1st Semester)

ELECTRONICS

Paper No : EL – 101

(Electronic Measuring Instruments and Circuit Analysis)*Full Marks :55**Time : 2½ hours*

(PART : A - OBJECTIVE)

*(Marks : 20)**The figures in the margin indicate full marks for the questions*

SECTION – I

(Marks : 5)

Put a Tick (✓) mark against the correct answer in the brackets provided for it : 1×5 =5

1. No colour coding in a resistor indicates the tolerance of

(a) 5%	()	(b) 10%	()
(c) 20%	()	(d) 25%	()
2. Working of a transformer essentially depends on

(a) mutual inductance	()	(b) self-inductance	()
(c) magnetic circuit	()	(d) number of turns of coil	()
3. In an a.c. circuit, maximum power is consumed in

(a) L	()	(b) C	()
(c) R	()	(d) L-C	()
4. Kirchhoff's voltage law agrees with the principle of conservation of

(a) charge	()	(b) energy	()
(c) mass	()	(d) momentum	()
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 load voltage source	()
(d) open the voltage source	()

(2)

SECTION – II
(Marks : 15)

Answer *any five* questions:

3×5=15

1. Discuss the factors that control the capacitance of a capacitor.
2. Define Transducer. What is the difference between passive and active transducers?
3. Briefly explain the working principle of a choke coil.
4. State and explain Kirchhoff's current and voltage law.
5. State and prove the reciprocity theorem.
6. Describe how a band-pass filter works.
7. Describe the relation between current and voltage in an a.c. circuit having inductance L and capacitance C in series.
8. Differentiate between unilateral and bilateral elements giving one example each.

(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 6V. 2

Or

- (c) Describe the construction of ceramic capacitor. Why is ceramic capacitor preferred over mica or paper capacitor? 2+2=4
(d) How is coefficient of coupling related to mutual and self-inductance of two coils? What is its significance? 3
2. (a) Describe in detail the construction and working principle of a transformer. Mention two uses of a transformer. 3+2=5
(b) What are thermistor and strain gauge? 2

Or

(3)

Describe the construction and principle of working of cathode-ray oscilloscope (CRO). 3+4=7

3. (a) Derive an expression for power consumed in an a.c. circuit. 5
(b) What do you mean by sharpness of resonance in resonant circuit? 2

Or

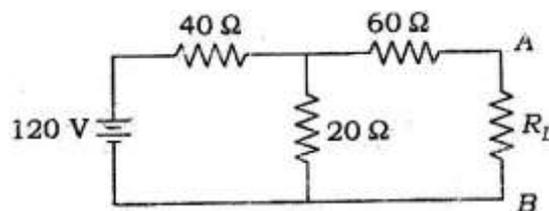
- (c) What is quality factor of a resonant circuit? Derive the voltage and current relations in an a.c. circuit containing R and C . 1+3=4
(d) Define filter. Differentiate between high-pass filter and low-pass filter. 1+2=3
4. (a) What are active and passive elements? 2
(b) Discuss the current and voltage division law. 5

Or

- (c) State and explain ladder method of network analysis. 4
(d) Define branch and node. Briefly explain nodal analysis. 1+2=3
5. (a) State and explain superposition theorem. 1+3=4
(b) Show that the Norton's equivalent circuit can be found from the Thevenin's equivalent circuit. 3

Or

- (c) State Thevenin's theorem and prove it in case of a two-terminal network. 4
(d) Calculate the value of load resistance R_L to which maximum power may be transferred from the circuit below. Also find the maximum power transferred: 2+1=3



★ ★ ★