Roll No. .....  Total Pages : 3

# 007301

**December 2023**

**B.Tech (EL) III Semester**

**ELECTRICAL CIRCUIT ANALYSIS**

**(ELPC-301)**

Time: 3 Hours]  [Max. Marks. : 75

*Instructions :*

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Assume relevant data wherever required.*

## PART-A

**1.** (a) What is the condition on transmission parameters for a reciprocal network. (1.5)

(b) Explain the concept of duality and dual networks. (1.5)

(c) Draw the phasor diagram of RL and RC circuit. (1.5)

(d) Explain the term-Power triangle. (1.5)

(e) Explain the significance of zero input response and zero state response. (1.5)

(f) What are the advantages of three phase system?(1.5)

(g) Compare voltage resonance and current resonance.(1.5)

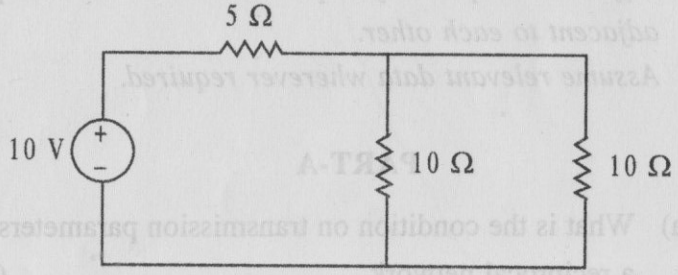
(h) Obtain the Z parameters of the network in term of Y Parameters. (1.5)

(i) Explain the reason for negative sign in $I_2$ current of ABCD Parameter's equation. (1.5)

(j) Draw the equivalent circuit of a 2-port network in terms of Z parameters. (1.5)

## PART-B

**2.** (a) In the circuit given below, the resistance R is changed from 10 ohms to 5 ohms. Verify compensation theorem. (10)

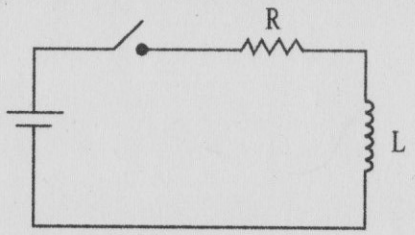



(b) State and Explain Reciprocity Theorem using suitable example. (5)

**3.** (a) Explain the significance of time constant of RL Circuit. (5)



(b) Consider a series R-L circuit as shown. The switch S is closed at $t = 0$. Find the current i (t) through and voltage across the resistor and inductor. (10)




**4.** Derive the condition for series and parallel interconnection of two port networks. (15)

**5.** (a) For the current $i(t)=5\ U(t) - 3e^{-2t}$. find I(s) and hence determine the value of i(0+) and $i(\infty)$. (8)

(b) Derive the expression for Q factor of a coil. (7)

**6.** (a) If $f_1(t)=2\ u(t)$ and $f(t)=e^{-3t}u(t)$.Determine the convolution between $f_1$ and $f_2$. (8)

(b) Explain Dot convention in coupled circuit. (7)

**7.** (a) A voltage of 230V $\angle 45°$, 50 Hz is applied across an RLC series circuit where the input current is 10 $\angle -30$ A. If R = 5 ohms, $X_L$ = j8 ohms.Find the value of capacitance reactance. (10)

(b) Write short note on ideal transformer. (5)