



B.Tech III Semester Regular/Supplementary Examinations, March/April 2023

ELECTRICAL CIRCUIT ANALYSIS

(ELECTRICAL & ELECTRONICS ENGINEERING)

Maximum Marks: 70

Date: 29.03.2023 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 How is Thevenin's theorem related to Norton's theorem?
- 2 Write the duality of R,L,C Elements.
- 3 A dc voltage of 20V is applied in a RL circuit where $R=5\ \Omega$ and $L=10H$. Find time constant.
- 4 Why the current in a pure inductance cannot change in zero time.
- 5 List out few Advantages of 3-phase system over single-phase system.
- 6 What is the phase relationship between voltage and current at resonance?
- 7 How do you transform a time-domain circuit into the Laplace domain?
- 8 Write the necessary conditions for transfer function.
- 9 List out few real time Applications of Hybrid parameters.
- 10 Define the Z Parameters.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 Find the value of R_L for maximum power transfer in the circuit of Fig. Find the maximum power. 10M

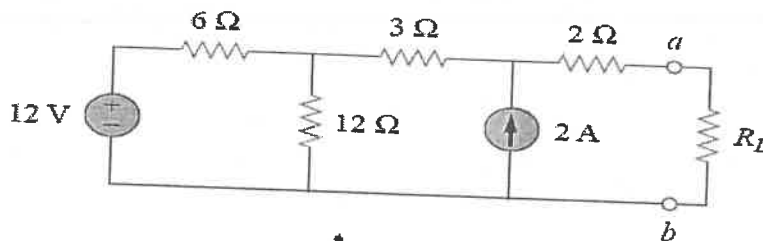


Fig.

OR

- 12 Apply Superposition theorem to calculate current flowing through $R_4 = 10 \Omega$ resistor as shown in Fig. 10M
 ($R_1=8 \Omega$, $R_2=5 \Omega$, $R_3=9 \Omega$, $R_4 = 10 \Omega$, $R_5 = 2 \Omega$) ($V_1=100V$, $V_2=20V$, $V_3=30V$)

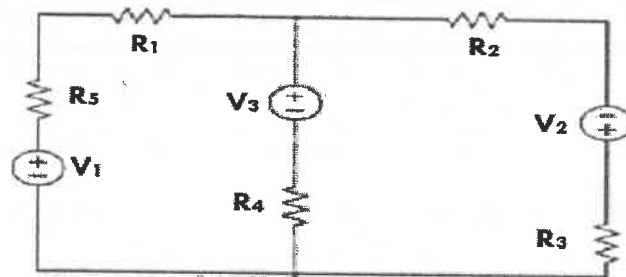


Fig.

10M

- 13 In the circuit shown in Fig., the switch is put in position-1 for 1 msec and then thrown to position-2. Find the transient current in both intervals. 10M

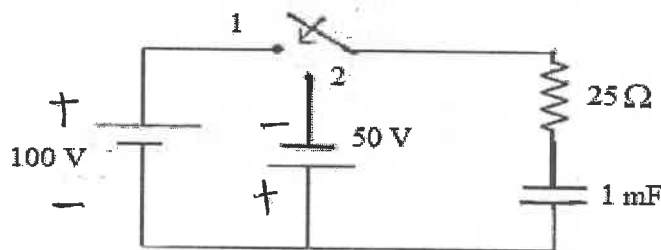


Fig.

OR

- 14 Derive the expression for transient response of R-L-C series circuit with required diagrams. 10M
- 15 A Capacitor C is connected in series with a 40Ω resistor across a supply of frequency 50 Hz . A current of $3A$ flows and the circuit impedance is 50Ω . Calculate 10M
 (a) the value of the Capacitance, C ,
 (b) the supply voltage
 (c) the phase angle between the supply voltage and current
 (d) the potential drop across the resistor, and
 (e) Draw the phasor diagram.

OR

- 16 (a) Derive the effective value in the context of a sine waveform. 6M
 (b) Write a short note on Ideal Transformer. 4M

17

Find $f(t) = \mathcal{L}^{-1} [F_1(s) \cdot F_2(s)]$ by using convolution theorem for the functions

i. $F_1(s) = \frac{1}{s}, F_2(s) = \frac{1}{s+2}$

10M

ii. $F_1(s) = \frac{1}{s(s+1)}, F_2(s) = \frac{1}{s^2+1}$

OR

18 Find the Laplace transform of the half period of the sine function shown in fig.

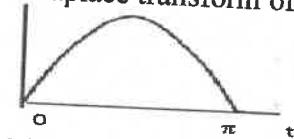


Fig.

10M

19 Calculate the transmission parameters of the network shown below Fig. Also verify the Reciprocity & symmetry of the network.

10M

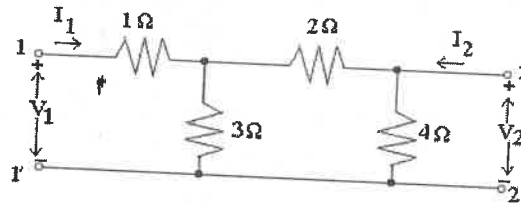


Fig.

OR

20 Obtain the Y parameters for the circuit shown below fig.

10M

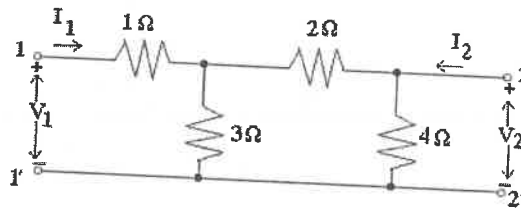


Fig.

