

8. Write short notes on any *three* : $5 \times 3 = 15$
- (a) Transient response on R-L circuit.
 - (b) Norton's theorem.
 - (c) Maximum power transfer theorem.
 - (d) RMS value, Average value, Form factor of alternating current.
 - (e) Define Parameters, Linear circuits, Bilateral circuit and Electric Network.

Total No. of printed pages = 8

END SEMESTER EXAMINATION - 2019

Semester : 4th (New)

Subject Code : EI-401

ELECTRICAL CIRCUIT AND NETWORK

Full Marks - 70

Time - Three hours

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

Instructions :

1. All questions of PART-A are compulsory.
2. Answer any *three* questions from PART-B.

PART - A

Marks - 25

Time - One hour

1. Fill in the blanks : $1 \times 10 = 10$
- (a) A linear circuit is one whose parameters are constant ; they do not change with _____ and _____.

- (b) A network having one or more than one source of emf is known as _____ network.
- (c) Admittance is equal to the reciprocal of _____.
- (d) The equation of reactive power is _____.
- (e) An ideal voltage source should have _____ source resistance.
- (f) Number of cycles per second is called _____.
- (g) Power taken by a resistance of 200 ohm with a flow of 10 amp current is _____ kwatt.
- (h) In delta connected three phase system, the line voltage is equal to _____.
- (i) In the two parallel branches of a parallel circuit, more current will flow through that branch which has _____ impedance.
- (j) At resonant condition of RLC series circuit _____.

2. Write true or false :

$1 \times 10 = 10$

- (a) Kirchoff's first law is based on the principle of law of conservation of charge.
- (b) The voltages across all components in a parallel circuit are equal.

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- (c) Thevenin's resistance is found by removing voltage sources along with their internal resistance.
- (d) Form factor is the ratio of rms value and average value.
- (e) A lagging power factor implies that voltage is lagging the current.
- (f) Product of voltage and reactive component of current gives reactive power.
- (g) Capacitor behaves like a short-circuit in DC excitation.
- (h) Thevenin's theorem can be applied only to DC circuit.
- (i) The total resistance in a parallel circuit is always less than the least resistor.
- (j) When a voltage of $v = V_m \sin \omega t$ is applied to a purely resistive circuit, the current flowing through it will be $i = I_m \sin \omega t$.

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3. Choose the correct answers :

1×5=5

(a) The nodal method of circuit analysis is based on

(i) KVL and Ohm's Law

(ii) KCL and Ohm's Law

(iii) KCL and KVL

(iv) KCL, KVL and Ohm's

(b) A Network contains only an independent current and resistors. If the values of all resistors are doubled, the value of the node voltage will

(i) become half

(ii) remain unchanged

(iii) become double

(iv) None of the above

(c) Unit of admittance is

(i) Ohm

(ii) Siemens

(iii) Henry

(iv) Farad

(d) A R-L circuit has 6 ohm resistance and an inductive reactance. Its impedance will be _____ ohm

(i) 6

(ii) 10

(iii) 8

(iv) 12

(e) In a three phase AC circuit, the sum of all three generated voltage is

(i) Infinite

(ii) One

(iii) Zero

(iv) None of these

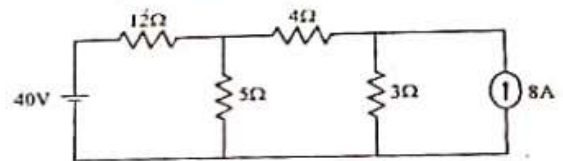
PART - B

Marks - 45

Time - Two hours

4. (a) State and explain Kirchhoff's laws with the help of suitable example. 6

(b) Explain Superposition Theorem. Find the current passing through the 4 ohm resistor of the figure given below: 6



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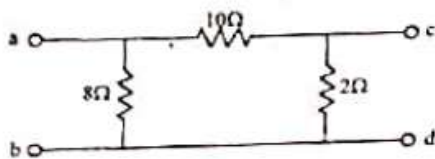
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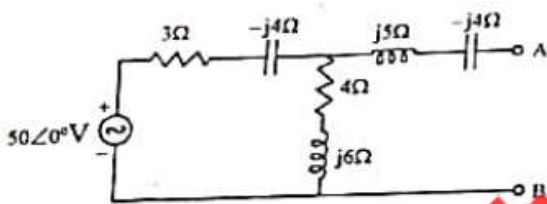
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(c) Convert the following Δ to Y. 3



5. (a) State Thevenin's theorem for an AC Network. Obtain the Thevenin's equivalent Network for the terminals A and B in fig below: 3+6=9



(b) Prove that the resonance frequency of a parallel circuit is given by 6

$$f_0 = \frac{1}{2\pi} \sqrt{\frac{1}{LC} - \frac{R^2}{L^2}}$$

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6. In a series parallel circuit the parallel branches A and B are in series with C. The impedances are $Z_A = 5 + j3$, $Z_B = 9 - j7$ and $Z_C = 6 + j5$. If the voltage applied to the circuit is 180V at 50 Hz, calculate

(i) Total Impedance Z_{AC}

(ii) Current I_A , I_B and I_C

(iii) The total power factor for the whole circuit. 15

7. (a) For three phase star and delta connected system, write down the relationship between

(i) Line current and phase current

(ii) Line voltage and phase voltage. 6

(b) A balanced delta connected load of impedance $(8 - j6)$ ohms per phase is connected to three-phase, 230V, 50 Hz supply. Calculate

(i) Power factor,

(ii) Line current and

(iii) Reactive power. 3×3=9

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