

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Backlog), Nov.-Dec. 2015

B. Tech in EE & ECE & CS..... Engineering, Semester I

Roll No.....

COURSE CODE: EE101

Time: 3 hours

Max. Marks: 100

COURSE TITLE: Electrical & Electronics

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

- Q.1A Objective type multiple choice questions (10 questions @ 1 mark) 10
- i. A network has 12 branches and 8 independent loops. How many nodes are there in the network?
(a) 19 (b) 17 (c) 5 (d) 4
 - ii. The power factor of an R-C circuit is
(a) Often zero
(b) Between zero and 1
(c) Always unity
(d) Between zero and -1
 - iii. The current through a branch in a linear network is 2 A when input source voltage is 10 V. If the voltage is reduced to 1V and the polarity is reversed, the current through the branch is:
(a) -2 A (b) -0.2 A (c) 0.2 A (d) 2 A
 - iv. A load is connected to a network. At the terminals to which the load is connected, $R_{th}=10\ \Omega$ and $V_{th}=40\text{ V}$. the maximum power supplied to the load is
(a) 160 W (b) 80 W (c) 40 W (d) 1 W
 - v. When the total charge in a capacitor is doubled, the energy stored:
(a) remains same
(b) is halved
(c) is doubled
(d) is quadrupled
 - vi. If $v_1 = 30\sin(\omega t + 10^\circ)\text{ V}$ and $v_2 = 20\sin(\omega t + 50^\circ)\text{ V}$, which of these statement is true?
(a) v_1 and v_2 are in phase
(b) v_1 leads v_2
(c) v_2 lags v_1
(d) v_2 leads v_1
(e)
 - vii. The imaginary part of impedance is called
(a) Admittance
(b) Susceptance

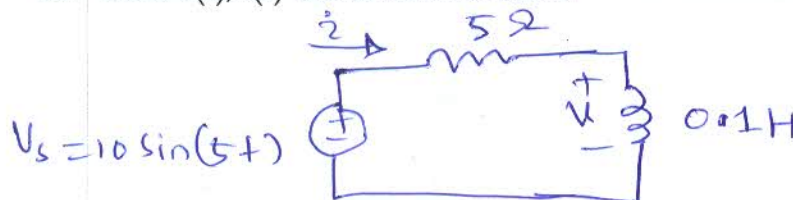
- (c) Conductance
- (d) Reactance

- viii. A quantity that contains all the power information in a given load is
- (a) apparent power
 - (b) average power
 - (c) reactive power
 - (d) complex power
- ix. Two parameters that are equal when a parallel resonant circuit is operating at its resonant frequency are:
- (a) L and C
 - (b) R and C
 - (c) R and L
 - (d) X_c and X_L
- x. Reactive power is measured in
- (a) Watts
 - (b) VA
 - (c) VAR
 - (d) none of the above

Q.2 Short answer type questions (4 questions @ 2.5 marks)

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- i. What is power factor?
- ii. Transform these sinusoids to phasors
- (i) $v(t) = 4\sin(30t + 20^\circ)$
 - (ii) $i(t) = 6\cos(50t - 40^\circ)$
- iii. Find $v(t)$, $i(t)$ in the circuit below

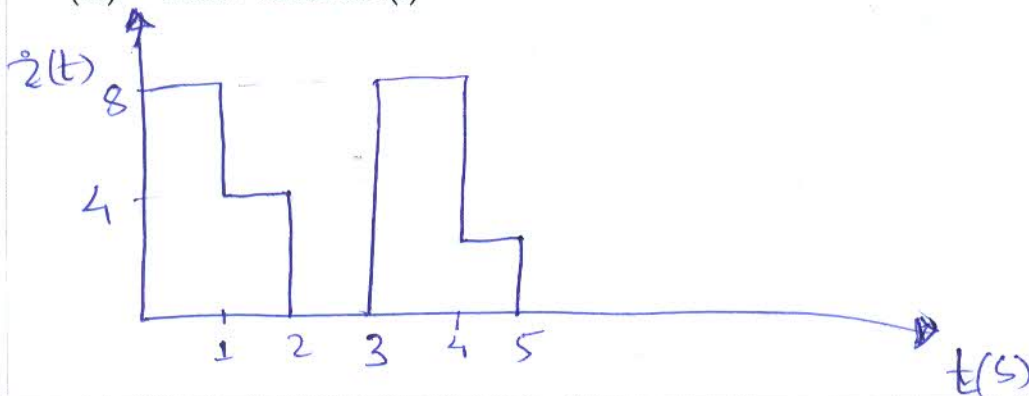


- iv. Define quality factor.

Q.3A Find

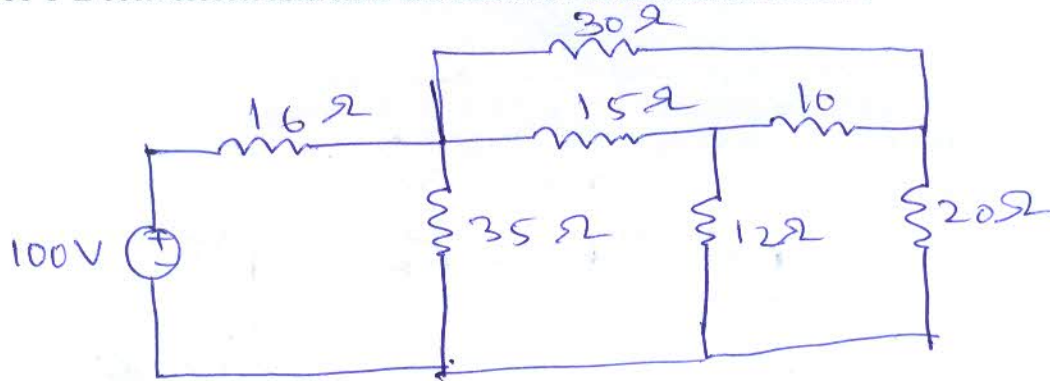
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- (i) Period of $i(t)$
- (ii) Average value of $i(t)$
- (iii) r.m.s value of $i(t)$



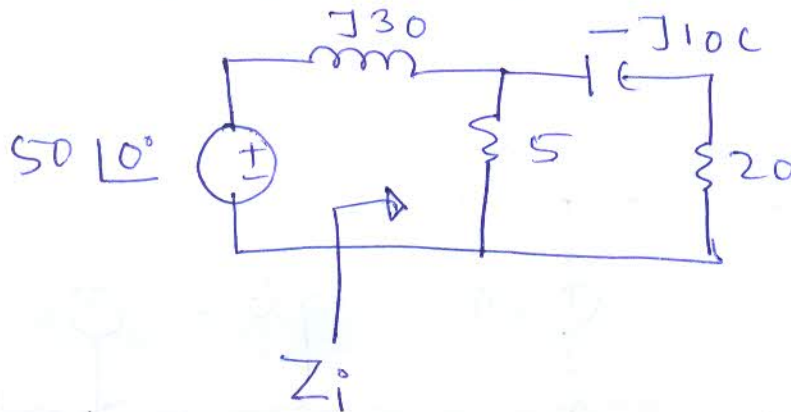
Q.3B Use Y- Δ conversion and find the current I in the circuit below.

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Q.4A Find the input Impedance Z_i and input current I_i .

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Q.4B Describe the charging and discharging process of a capacitor with detail diagram

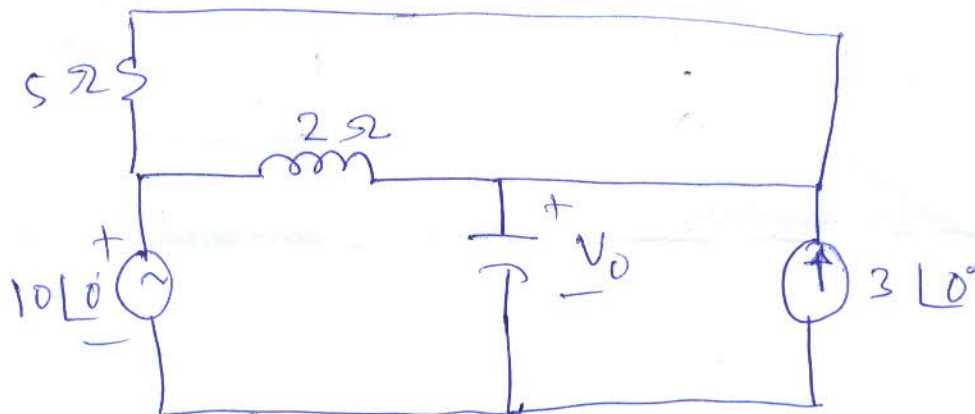
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Q.5A What is magnetic circuit and composite magnetic circuit? Give a comparison between magnetic circuit and electrical circuit.

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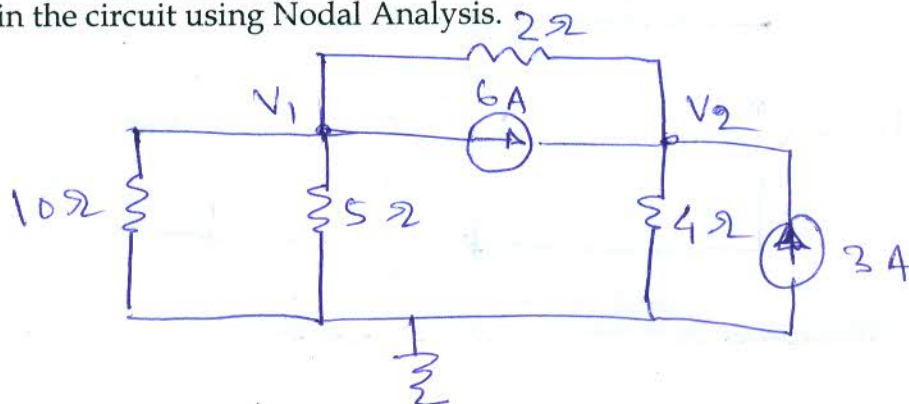
Q.5B Solve for V_o in the circuit using mesh analysis.

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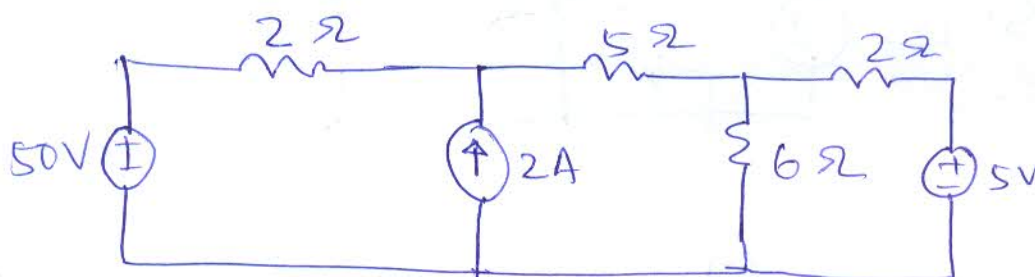
Q.6A Find V_1 and V_2 in the circuit using Nodal Analysis.

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Q.6B Find V_o in the circuit using superposition theorem.

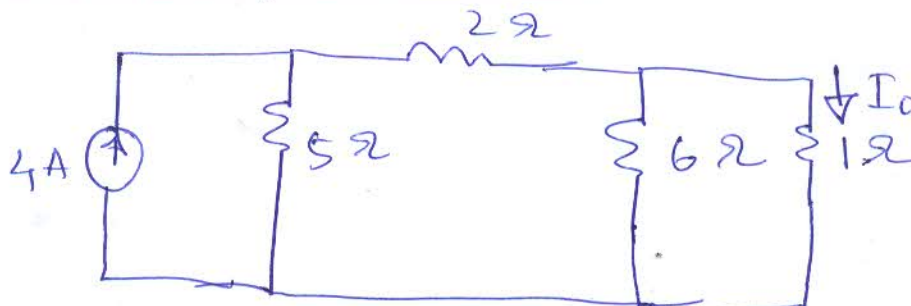
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OR

Q.6B Find I_o in the circuit using source transformation.

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Q.7A An inductive circuit draws 10 A and 1 KW from a 200 V, 50 Hz a.c supply. Determine

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- the impedance in Cartesian form ($a+jb$)
- the impedance in polar form $Z \angle \theta$
- the power factor
- the reactive power
- the apparent power

Q.7B Draw the phasor diagram for each of the following combinations

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- R and L in series
- R and C in series
- R, L and C in series with $X_L > X_C$ when a.c voltage source is connected to it.

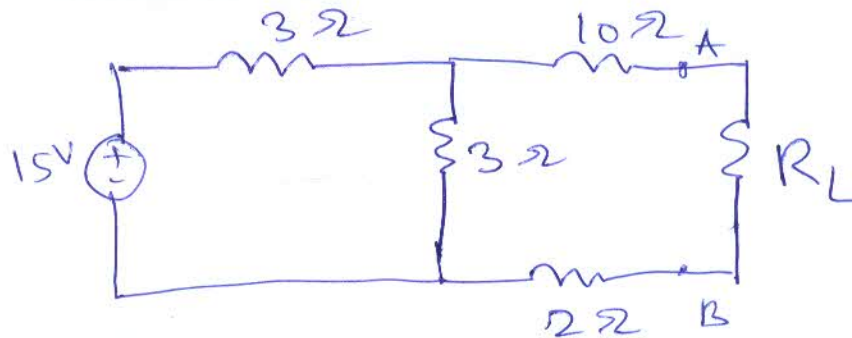
OR

- Q.7B A resistance of $20\ \Omega$ an inductance of $0.2\ \text{H}$ and a capacitance of $100\ \mu\text{F}$ are connected in series across $220\ \text{V}$, 50Hz mains. Determine the following
- Impedance
 - Current
 - Voltage across R , L and C
 - Power in watts and VA
 - Power factor

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- Q.8A (i) State and prove maximum power transfer theorem in d.c circuit.
(ii) find the value of R_L for maximum power transfer in the circuit given below. Find maximum power.

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- Q.9A What is a transformer? With diagram explain different types of transformer ?
Derive the e.m.f equation of a single phase transformer.
- Q.9B Compare the series and parallel resonance of R-L-C series and R-L-C parallel circuit.

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OR

- Q.9B Define apparent power and power factor in a.c. circuits. Describe parallel resonance and list it's important properties.

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