Total No. of Questions – [6] Total No. of Printed Pages: 03

G.R. No.	

Paper code - U239-133 (ESE)

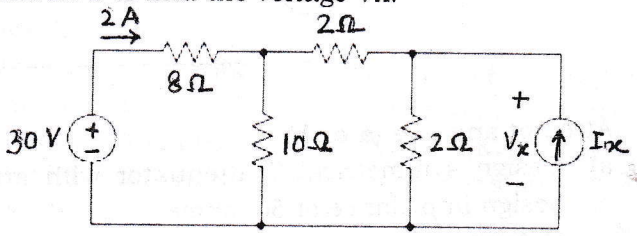
DECEMBER 2019 ENDSEM
S. Y. B.TECH. (E & TC) (SEMESTER –III)
COURSE NAME: ENGINEERING CIRCUIT ANALYSIS
COURSE CODE: ETUA21183
(PATTERN 2018)

Time: [2 Hours] [Max. Marks: 50]

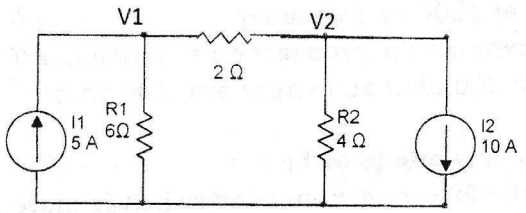
(*) Instructions to candidates:
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.
4) Assume suitable data where ever required.

Q.1) Attempt any **one (a or b)**

a) Use KCL and KVL to find the voltage Vx. [4]

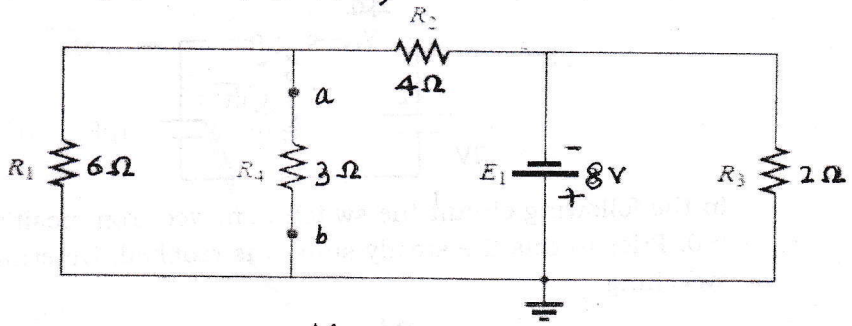


b) Use nodal analysis to find the voltages at the nodes V_1 and V_2 in the circuit of fig. [4]



Q.2) Attempt any **one (a or b)**

a) Obtain the Thevenin's equivalent network for the network shown below (between a and b) [4]



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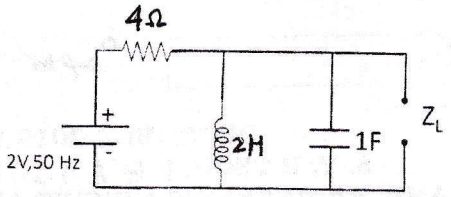
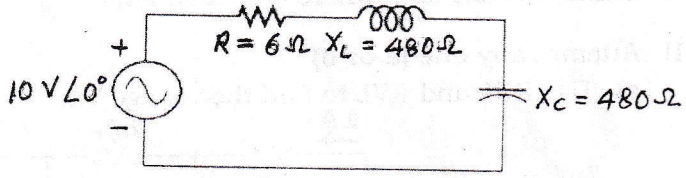
b) What should be the value of impedance Z_L for maximum power transfer? [4]



Q.3) Attempt any **one (a or b)**

a) A parallel circuit has a fixed capacitor and variable inductor having constant quality factor of 4. Find value of inductance and capacitance for circuit impedance of 1KΩ at resonating frequency of 2.4 MHz. What is bandwidth of circuit? [6]

b) Determine the Quality factor, Voltage across inductor at resonance and current through the circuit at resonance. [6]



Q.4) Attempt any **one (a or b)**

a) Design symmetrical T attenuator with attenuation of 40 dB and design impedance of 500ohms. [10]

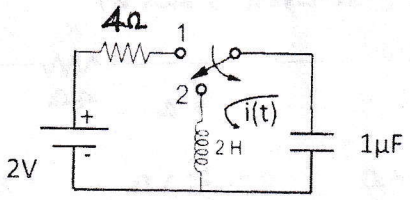
Determine the open circuit and short circuit impedance of a T network with each series arm 100 ohm and shunt arm 200 ohm.

b) Design a LPF T network with design impedance 660 ohm and cut off frequency 1000 Hz. Compute phase angle β at 500 Hz and α in dB at 1500 Hz frequency. [10]

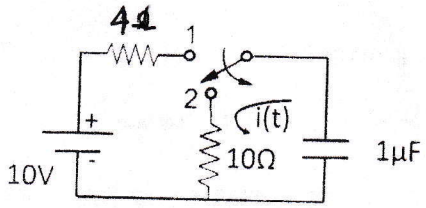
Determine the propagation constant of a T network with each series arm 200 ohm and shunt arm 100 ohm.

Q.5) Attempt any **one (a or b)**

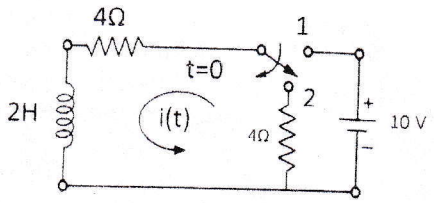
a) In the following circuit the switch is moved from position 1 to 2 at t=0. Prior to this the steady state was reached. Determine i(t) after switching. [13]



In the following circuit the switch is moved from position 1 to 2 at t=0. Prior to this the steady state was reached. Determine i(t) after switching.



b) Give the significance of the complex frequency 's' and how damping parameter affects the nature of the output signal. [13]
Derive the S domain model for the inductor.
In the following circuit the switch is moved from position 1 to 2 at t=0. Prior to this the steady state was reached. Determine i(t) after switching.



Q.6) Attempt any **one (a or b)**

a) In transmission line describe its primary and secondary constants. [13]
Find the characteristics impedance, attenuation in db suffered by a telephone line of 100km length at frequency 1KHz.At this freq. Also find velocity of propagation and phase constant. The primary constants for line are-

$$R = 6\Omega / Km, L = 2.2mH / Km, G = 0.25mho / Km, C = .005\mu F / Km$$

b) Using transmission line equations prove that, if the finite length line is terminated in characteristics impedance Z_0, its input impedance is also Z_0. [13]

A telephone line has characteristics impedance, 100Ω and attenuation 0.1 neper/km. The phase constant for the line is 0.2 rads/km. When 1V signal is applied at the sending end current of 100mA flows. What will be the current at the point on the line 30km away from sending end. The length of a line is 100km.

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