B.Tech I Year (R13) Supplementary Examinations December 2017

ELECTRICAL CIRCUITS

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Mention any two similarities between electrical and magnetic circuits.

(b) Highlight the difference between independent and dependent sources.

(c) An electric circuit carries a current of 10 Sin $(373.2t-15^0)$ by the emf excitation 200 Sin$(373.2t-30^0)$. Find the frequency and power factor.

(d) Show the circuit set-up for measuring active power in a 3-phase circuit using two watt meters.

(e) Why the series and parallel resonant circuits are called acceptor and rejecter circuits respectively?

(f) Differentiate Planar and Non-Planar Graphs with examples.

(g) State Reciprocity and Compensation theorems.

(h) Show the equivalent circuit of two port network governed by open circuit impedance parameters.

(i) Why does Inductor does not allow changes in currents?

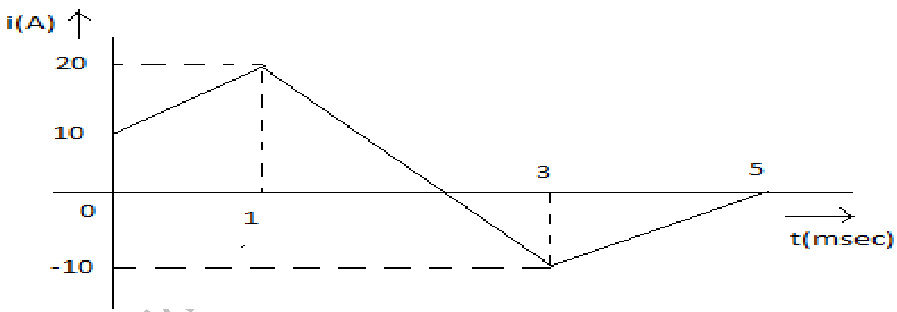
(j) Write down the time constants of RL and RC circuits.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

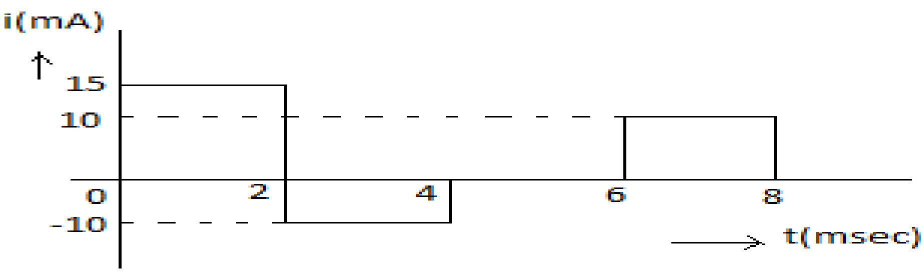
2 (a) A current i(t) shown below is made to pass through a pure inductance 20mH. Draw the voltage profile and indicate the voltages.



(b) Derive the expression for equivalent inductance between two parallel connected magnetically coupled inductances when they: (i) Aid. (ii) Oppose.

OR

3 (a) A 4 mF capacitor has the current wave form shown below. Assuming that v(0) = 10 V, Sketch the voltage waveform v(t).



(b) Explain Faraday's Laws of electromagnetic induction in detail.

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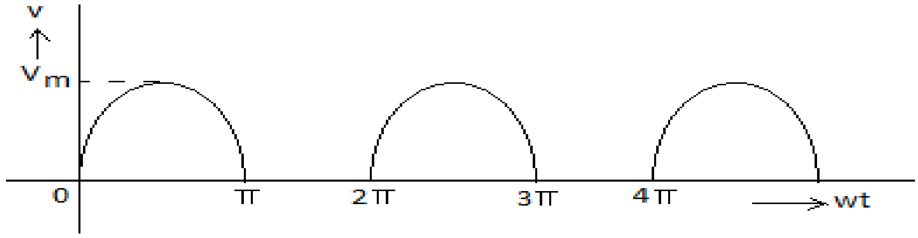
UNIT – II

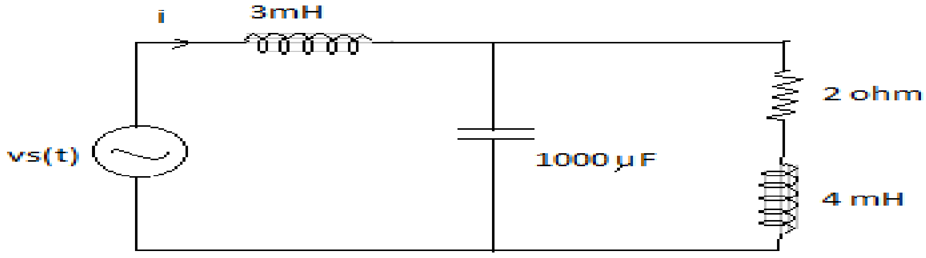
4 (a) Find the form factor for the following periodic wave.



(b) Explain how total reactive power consumption is measured in a 3-phase circuit using single wattmeter with the help of phasor diagram.

OR

5 (a) The voltage across the capacitor is given by $v_c(t) = 100\ \mathrm{Cos}(500t+45^0)$. Find $v_s(t)$ and $i(t)$.



(b) The input power to a three phase load is 10 kW at 0.8 power factor. Two watt meters are connected to measure this power. Find individual readings of the watt meters.

UNIT – III

6 (a) A resistance of 100 ohms, inductance of 5H and capacitance of 100 μF connected in series and supplied with an AC source of voltage 10 V. Find: (i) Resonant frequency. (ii) Band width. (iii) Current at resonance. (iv) Q-factor. (v) Voltage magnification ratio.

(b) Explain the importance of Incidence matrix with help of suitable example.

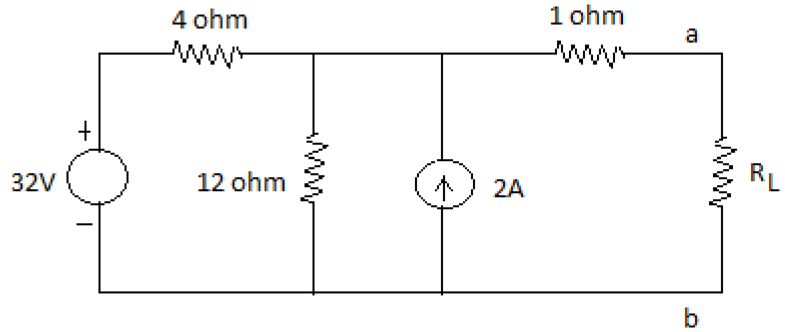
OR

7 (a) A 50 ohms variable resistance is connected in series with a pure inductance of reactance 25 ohms (fixed value) and excited by a 200 V, 50 Hz supply. Plot the Locus diagram of current and mark the range of current for maximum and minimum values of resistance. Also find maximum power consumed in the circuit and the corresponding current and power factor.

(b) Write short notes on Graph, Tree and Link with examples.

UNIT – IV

8 (a) Find the current flowing through load resistance using Thevinin's theorem for R_L values of 6 ohms and 16 ohms.



(b) Inter relate different parameters of two port network and explain.

OR

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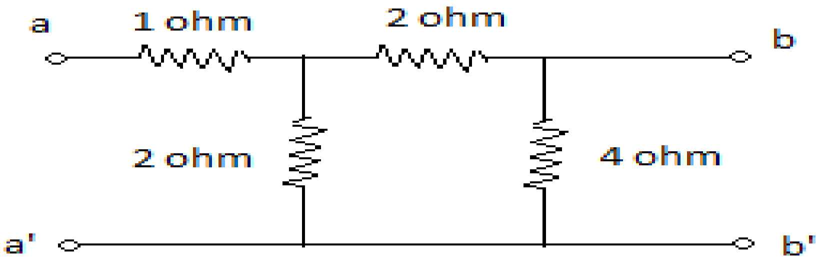
9 (a) Explain the superposition theorem with suitable example.
(b) Find the h parameters of the network shown below.

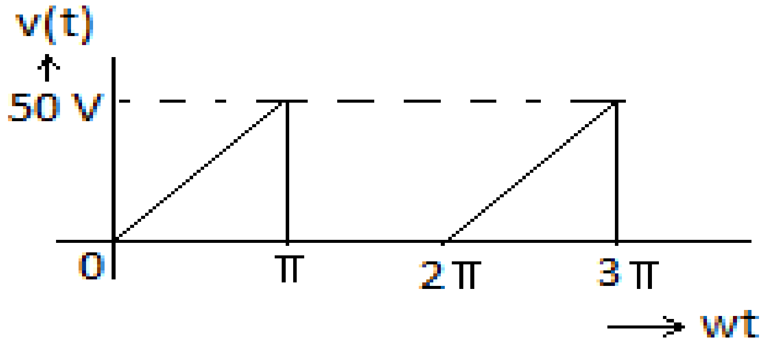


UNIT – V

10 A series RLC circuit having 10 ohms resistance, 0.5H inductance and 200 μF capacitance is to be excited by a sinusoidal voltage V = 150 Sin(200t+φ) by a switch. If the switch is closed when φ = 30^0, obtain the current equation.

OR

11 Find the trigonometric Fourier Series for the wave form shown below and plot the spectrum.



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