Code: 13A02101 **R13**

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

ELECTRICAL CIRCUITS

(Electrical and 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) An energy source forces a constant current of 2 A for 10 sec to flow through a light bulb. If 2.3 kJ is given off in the form of light and heat energy. Calculate the voltage drop across the bulb.

(b) Derive the expression for the energy in the coupled circuit.

(c) For a sinusoidal waveform define form factor, average value and RMS value.

(d) Find the amplitude, phase, period and frequency of the sinusoid $V(t) = 12\cos(50t + 10°)$.

(e) Derive the expression for the resonant frequency for a series resonant circuit.

(f) Define graph, tree, cutset and Tieset with an example.

(g) State Thevenin and Nortons theorems.

(h) What are h-parameters? Explain them briefly with derivation.

(i) Determine the Laplace transform of each of the following functions:
(i) u(t). (ii) $e^{-at}u(t), a \geq 0$.

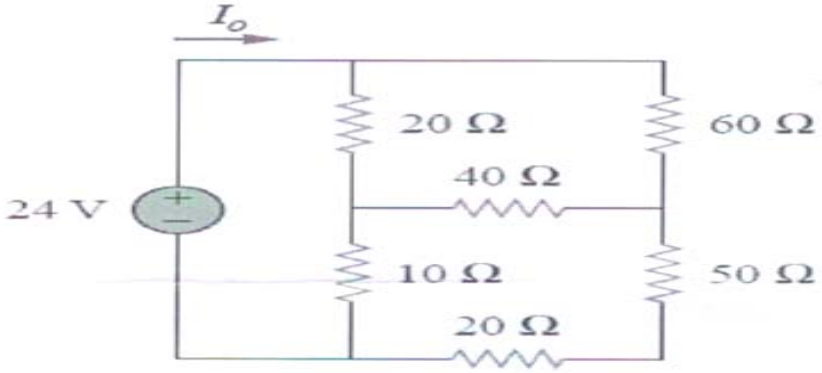
(j) State the differentiation theorem of Fourier transform.

PART – B

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

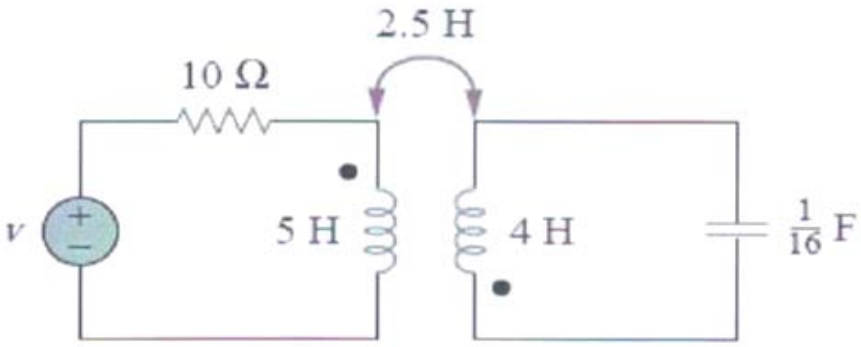
UNIT - I

2 Calculate I_0 for the circuit shown in figure below.



OR

3 Consider the circuit shown in figure below. Determine the coupling coefficient calculate the energy stored in the coupled inductors at time t = 1 sec, if $V = 60\cos(4t + 30°)V$.



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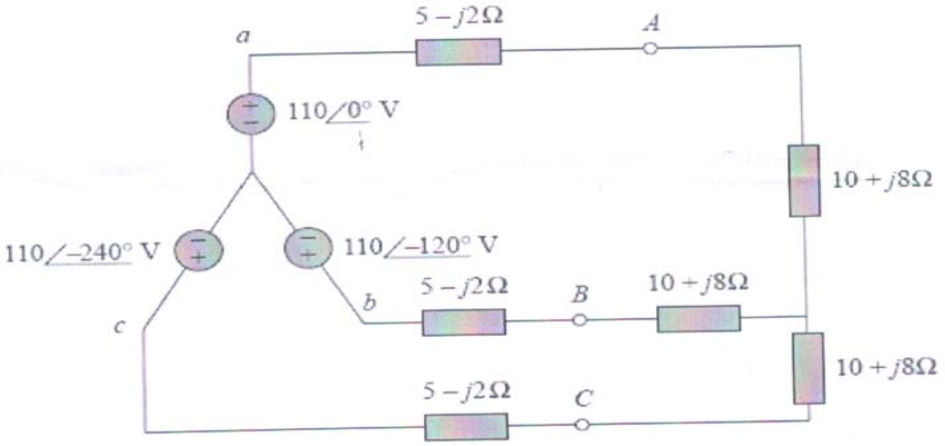
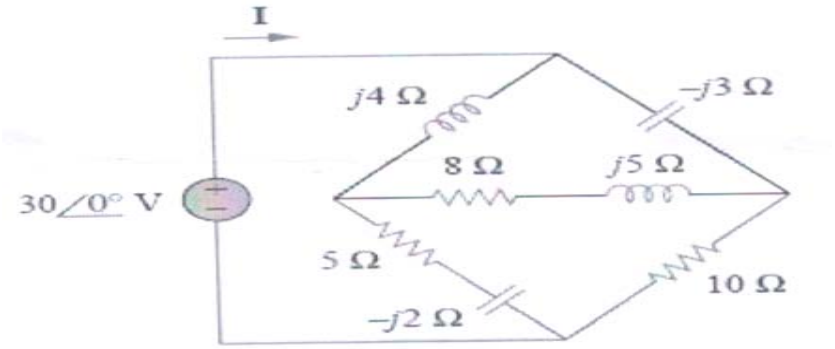
UNIT - II

4 Refer to the circuit shown in figure below. Calculate the average active power and reactive power at source and the load.



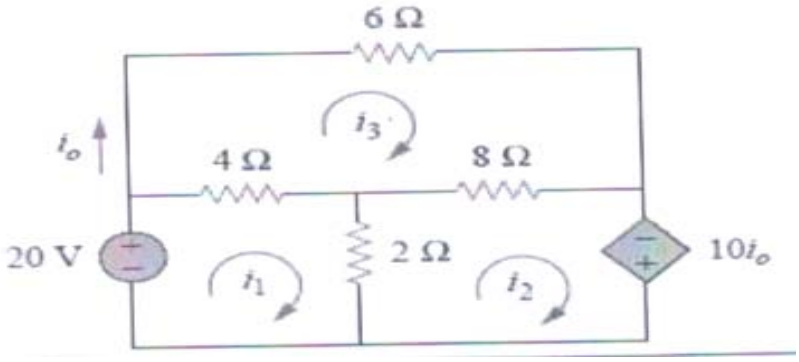
OR

5 Determine the current I for the circuit shown in figure below.



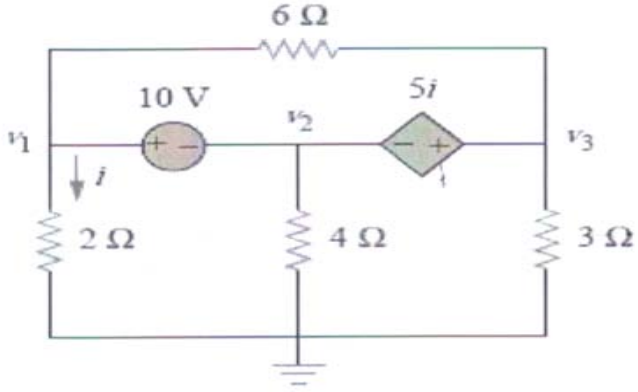
UNIT - III

6 Using Mesh Analysis find I_0 for the circuit shown in figure below.



OR

7 Find V_1, V_2, V_3 using nodal analysis for the circuit shown in figure below.



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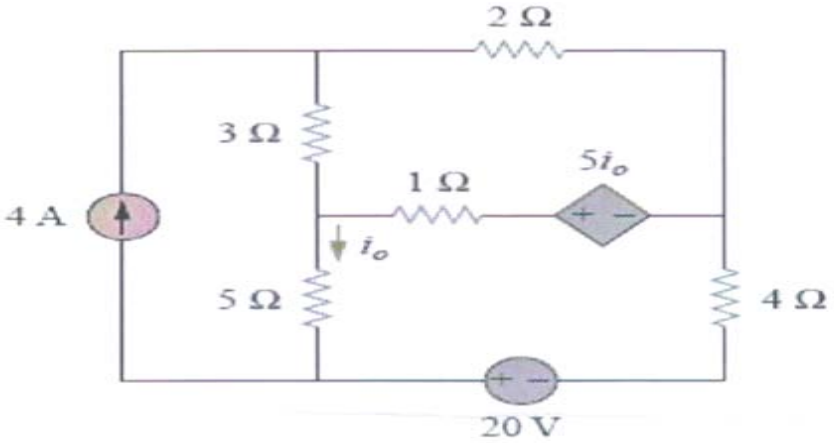
Code: 13A02101 **R13**

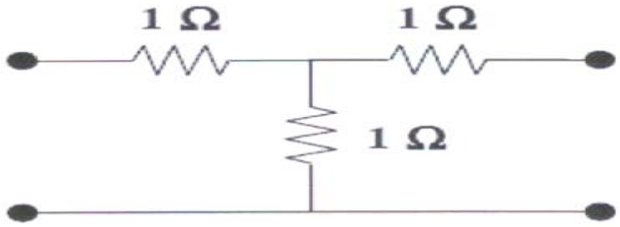
UNIT - IV

8 Find I_0 for the circuit shown in figure below, using Superposition theorem.



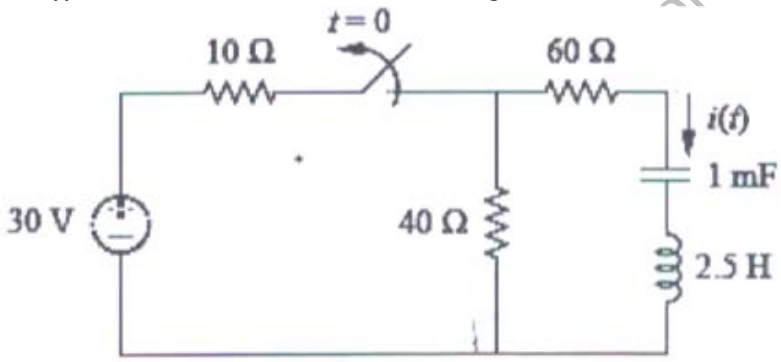
OR

9 Determine z-parameters for the circuit shown in figure below.



UNIT - V

10 Find i(t) for t > 0 for the circuit shown in figure below.



OR

11 Determine the Fourier transform for the following functions:

(a) Gate function $u(t) - u(t-1)$.

(b) $f(t) = te^{-2t}u(t)$.

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