

R09

Code No: 09A30204

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, May/June-2013

Electrical Circuits

(Common to EEE, ECE, ETM)

Time: 3 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

1.a) Draw the wave forms for current, power for the following elements if a voltage input shown in Figure.1 is applied to these elements.

- i) $R = 1 \Omega$ ii) $L = 1 H$ iii) $C = 1 F$.

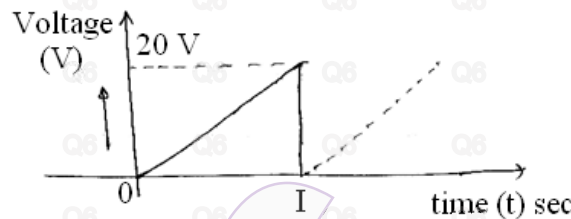


Figure: 1

b) State and prove constant flux linkages theorem. [15]

2.a) Obtain the necessary equations for star to delta conversion.

b) For the circuit shown in Figure.2, find the current through R_L using nodal analysis. [15]

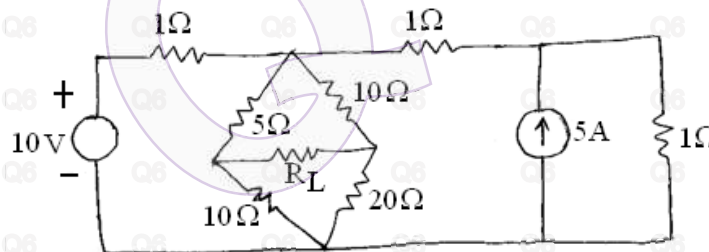


Figure: 2

3.a) Find the average value, RMS value, peak factor and form factor for the following wave form shown in Figure.3.

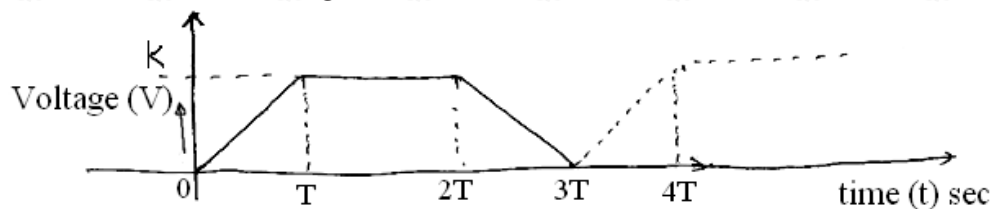


Figure: 3

b) In the circuit shown below Figure.4, the first branch takes a leading current (I_1) of 15A and has a resistance of 5Ω , while the second branch takes a lagging current (I_2) at a p.f. of 0.8. The total power supplied is 5 kW. Determine the impedances and circuit parameters. [15]

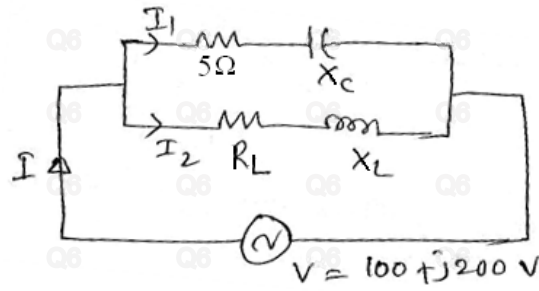


Figure: 4

- 4.a) Derive the expressions for half power frequencies for a RLC series circuit.
 b) Find the value of 'L' for which the circuit shown in Figure.5 is resonant at a frequency of $\omega = 500 \text{ rad/s}$. [15]

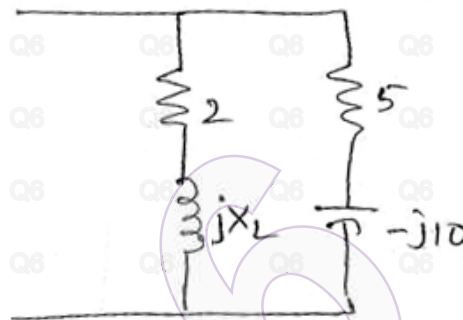


Figure: 5

- 5.a) Explain dot conversion for coupled circuits.
 b) Derive coefficient of coupling for two mutually coupled coils.
 c) Find the equivalent inductance of following circuit shown in below Figure.6. [15]



Figure: 6

- 6.a) Write the cutset and tieset matrices for the following graph as shown in Figure.7.

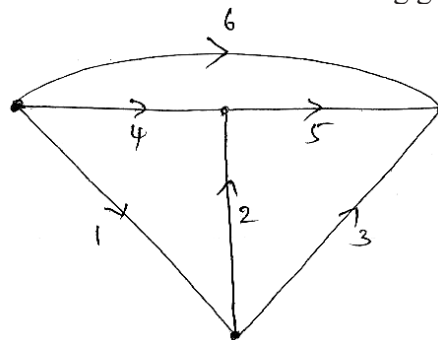


Figure: 7

- b) What a dual network? Explain the construction of a dual network with an example. [15]

- 7.a) For the circuit shown in Figure.8, determine the Norton's equivalent circuit at the terminals ab.

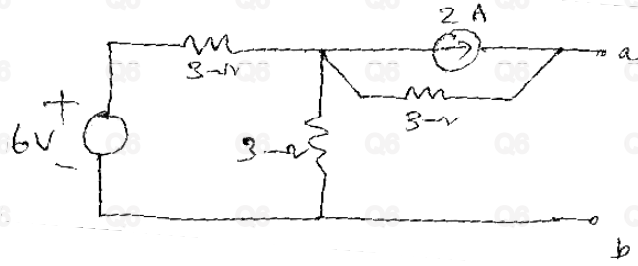


Figure: 8

- b) State and explain maximum power transfer theorem. Find the resistance 'R' in the following circuit as shown in Figure.9 which absorbs maximum power. [15]

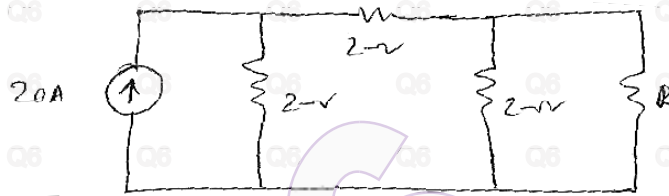


Figure: 9

- 8.a) The single source network shown the voltage source $100\angle 45^\circ$ V causes a current of I in the 5Ω branch. Find 'I' and verify the reciprocity theorem for the circuit as shown in Figure.10.

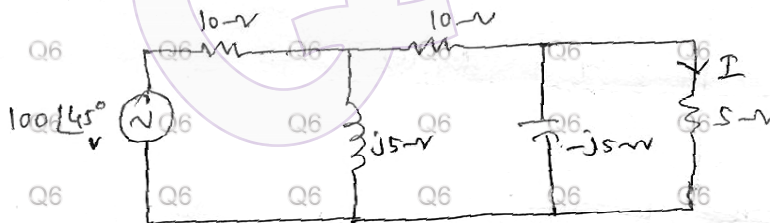


Figure: 10

- b) Determine the current through impedance Z_3 in the following circuit shown in Figure.11. [15]

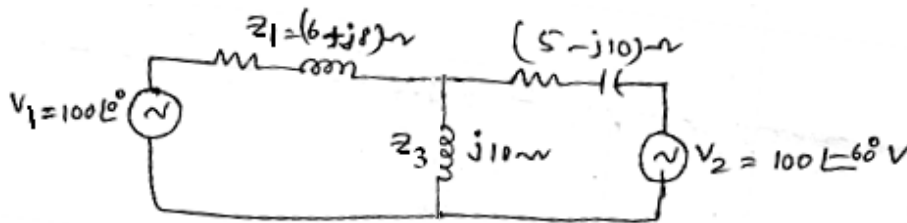


Figure: 11

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