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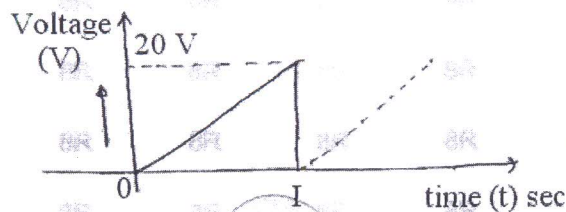   i) $R = 1\ \Omega$ ii) $L = 1\ H$ iii) $C = 1\ F$.

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.
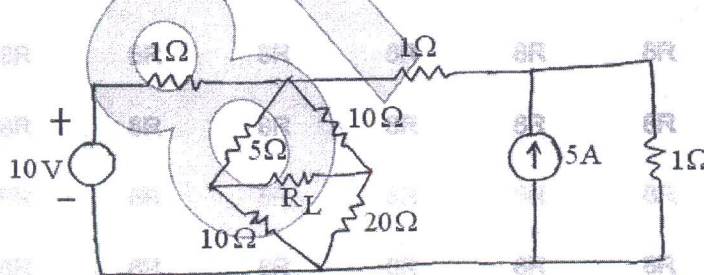   [15]

Figure: 2

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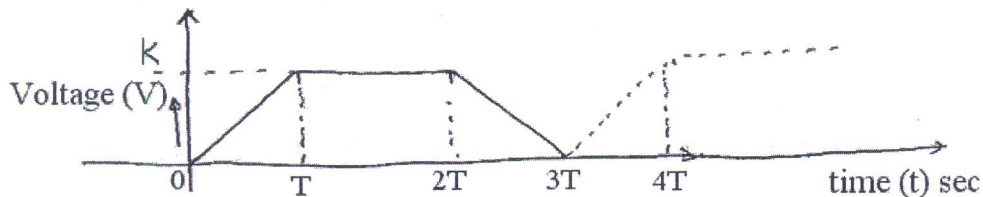

Figure: 3

   b)   In the circuit shown below Figure.4, the first branch takes a leading current (I_1) of 15A and has a resistance of 5 Ω, 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]
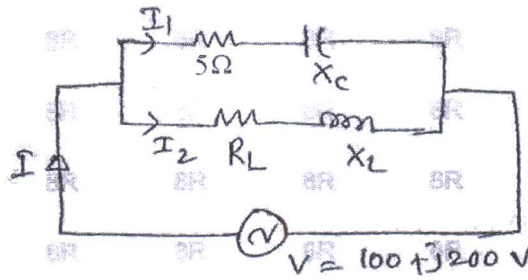
Figure: 4

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 $\omega = 500$ rad/s. [15]
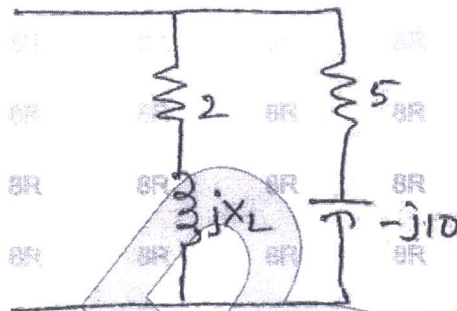

Figure: 5

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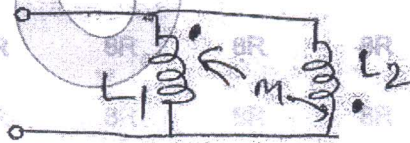c) Find the equivalent inductance of following circuit shown in below Figure.6. [15]

Figure: 6

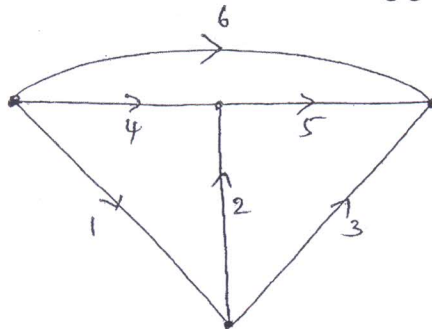6.a) Write the cutset and tieset matrices for the following graph as shown in Figure.7.

Figure: 7

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

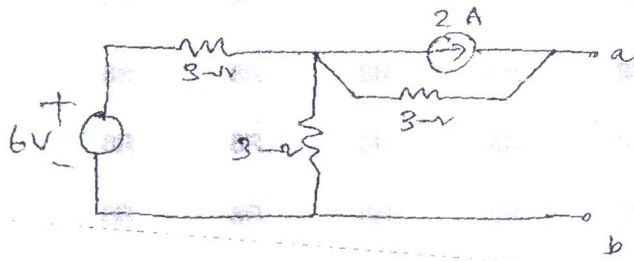7.a) For the circuit shown in Figure.8, determine the Norton's equivalent circuit at the terminals ab.

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]
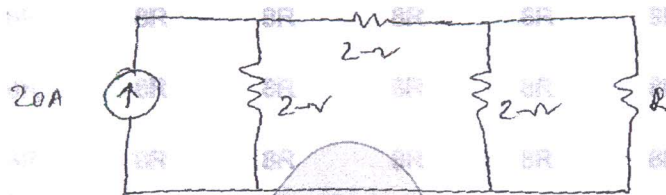

Figure: 9

8.a) The single source network shown the voltage source $100\lfloor45^0\ V$ causes a current of I in the 5 Ω branch. Find 'I' and verify the reciprocity theorem for the circuit as shown in Figure.10.
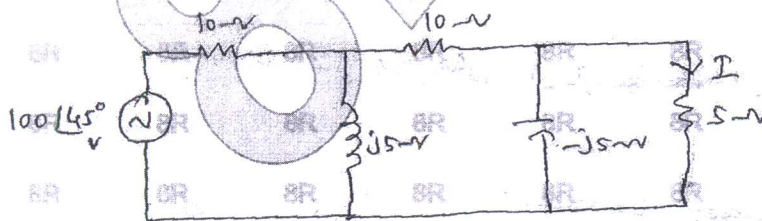

Figure: 10

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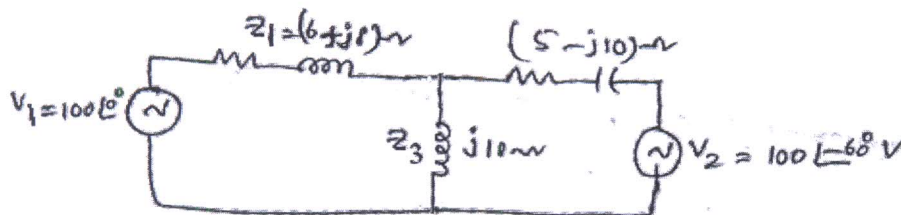

Figure: 11

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