Code No:21ES1107 **RM21** **SET - 1**

I B.Tech- I Semester Supply Examinations, NOV -2022

Basic Electrical Engineering-I

(Com. to ECE Branch Only)

Time :3 Hours Max.Marks:70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

UNIT -I

1 A) Classify the electrical circuit parameters. 6M

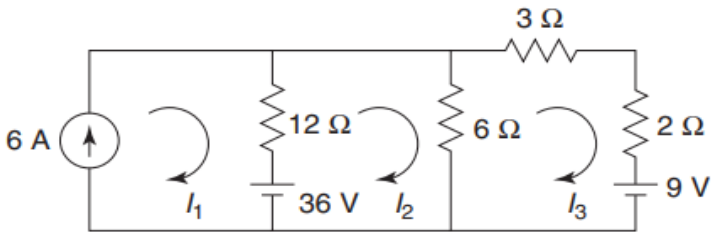
B) Explain the Electric charge and current. 4M

C) Explain the electric energy and potential. 4M

OR

2 A) Derive the expressions for resistances when a network is converted from delta to star and star to delta transformation. 7M

B) Find the current through the 2 Ωresistor in the network of fig. using mesh analysis. 7M



UNIT -II

3 A) Illustrate the terms associated with periodic functions for a sinusoidal waveform: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor 7M

B) Derive the mathematical expressions for a sinusoidal quantity response to a series connected elements resistance and inductance (R-L) across a sinusoidal excitation. 7M

OR

4 A) A 60 Hz sinusoidal voltage v = 141 sin ω t is applied to a series R-L circuit. The values of the resistance and the inductance are 3 Ω and 0.0106 H respectively. (i) Compute the r.m.s. value of the current in the circuit and its phase angle with respect to the voltage. (ii) Write the expression for the instantaneous current in the circuit. (iii) Compute the r.m.s. value and the phase of the voltages appearing across the resistance and the inductance. (iv) Find the average power dissipated by the circuit. (v) Calculate the p.f. of the circuit. 7M

B) Develop the mathematical expressions for a sinusoidal quantity response to an element of a pure resistance connected across a sinusoidal excitation. 7M

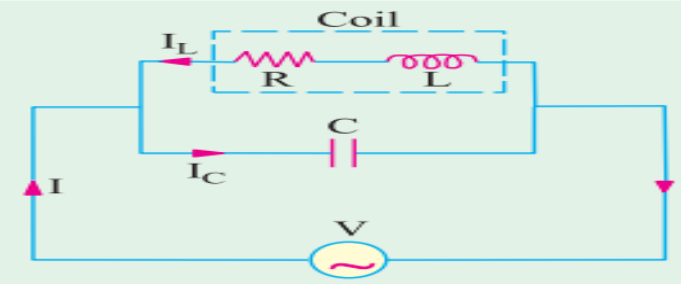
UNIT -III

5 A) Descend the mathematical expression for coefficient of coupling(K) in a magnetic circuit. 7M

B) Two coils, A and B, have self-inductances of 120 μH and 300 μH respectively. A current of 1 A through coil A produces flux linkages of 100 μWb turns in coil B. Determine (i) the mutual inductance between the coils (ii) the coupling coefficient and (iii) the average e.m.f. induced in coil B if a current of 1 A in coil A is reversed at a uniform rate in 0.1 sec 7M

OR

6 A) Define Q-factor? Obtain it for the parallel circuit shown.

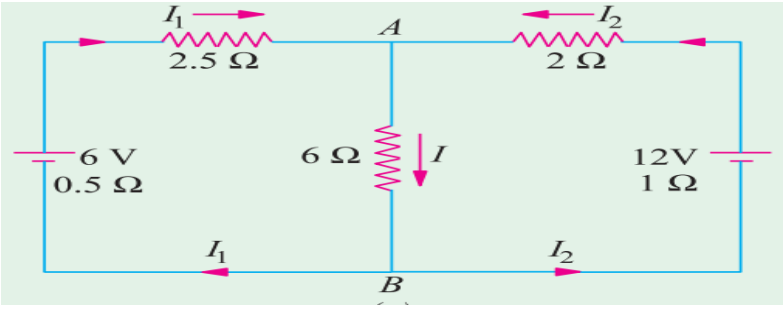


7M

B) A coil of resistance 20 Ω and inductance 200 μH is in parallel with a variable capacitor. This combination is in series with a resistor of 8000 Ω. The voltage of the supply is 200 V at a frequency of 106 Hz . Determine (i) the value of C to give resonance (ii) the Q of the coil (iii) the current in each branch of the circuit at resonance. 7M

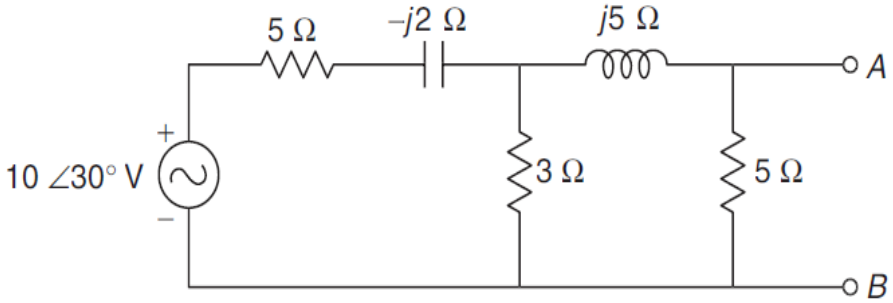
UNIT -IV

7 A) Illustrate the statement of Superposition theorem and verify it for the circuit shown.



7M

B) Illustrate Thevenin's Theorem statement and verify it for the circuit shown.

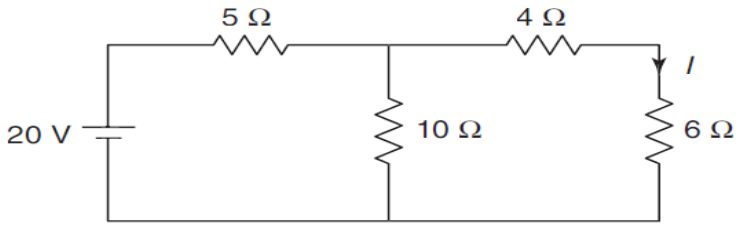


7M

OR

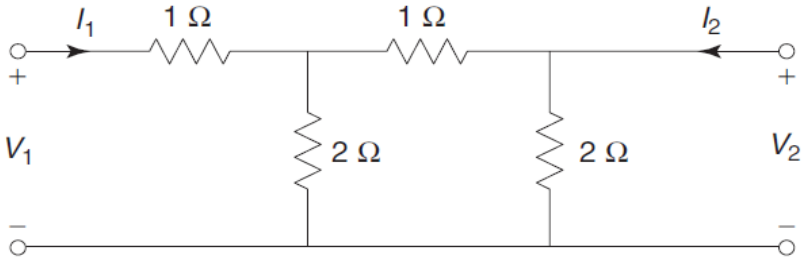
8 A) Illustrate Norton's Theorem statement and prove it with a suitable circuit for dc excitation. 7M

B) Estimate the current I and verify the reciprocity theorem for the network shown infig. 7M

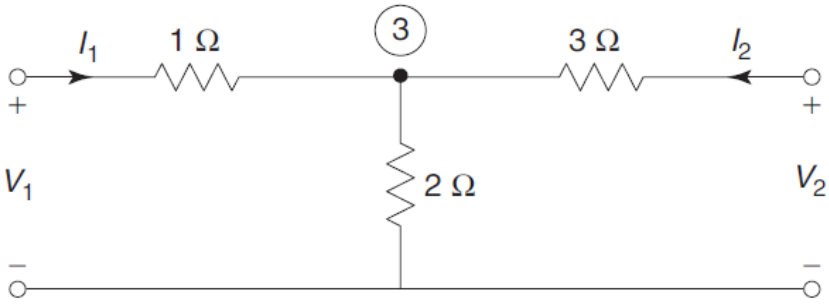


UNIT -V

9 A) Find Impedance (Z) parameters for the network shown in Fig. 7M



B) Find Admittance (Y) parameters for the network shown in fig. 7M



OR

10 A) Obtain the necessary condition for reciprocity for Transmission (ABCD) parameters. 7M

B) Determine hybrid parameters for the network of fig.Determine whether the network is reciprocal. 7M