

1128  
B. Engg. (Electronics & Comm. Engineering)  
3<sup>rd</sup> Semester  
EE-309: Electrical Science

Time allowed: 3 Hours Max. Marks: 50

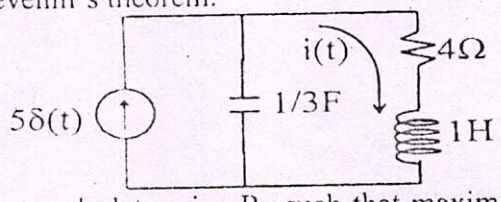
Note: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section. Use of scientific calculator is allowed.

x-x-x

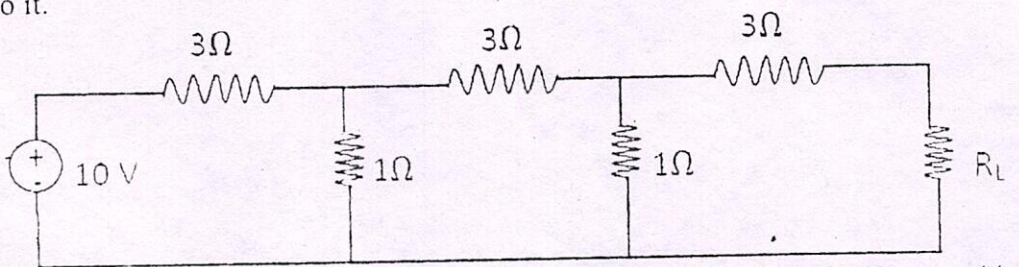
- Q1. Answer the following:-
- (a) A node where only two elements meet doesn't require a nodal equation. Why. (2)
  - (b) What is the time constant of an RC circuit excited by a DC source? (2)
  - (c) At what condition an inductor can be considered as linear device? (2)
  - (d) A unit pulse of width 1 sec is applied to an R - L series circuit with  $R = 1\Omega$  and  $L = 1H$ . Sketch the current response  $i(t)$  of the circuit. (2)
  - (e) Describe the principle of constant K low pass filter and high pass filter. (2)

SECTION A

- Q2. (a) What is the first and second form of compensation theorem? (5)
- (b) Describe and explain Norton's theorem with suitable example. (5)
- Q3. (a) Find  $i(t)$  using Thevenin's theorem. (5)



- (b) In the following network determine  $R_L$  such that maximum power is delivered to it. (5)

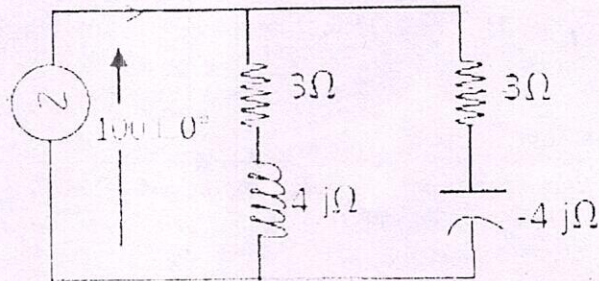


- Q4. (a) A 3-phase, 6 poles, 50 Hz, induction motor has full load speed of 960 rpm with its slip rings shorted. The motor drives a constant torque load. If the rotor speed is reduced to (a) 800 rpm (b) 400 rpm by inserting external resistance in rotor circuit, compare the rotor ohmic losses at these two reduced speed with full load (5)
- (b) Express the Z parameters of a two port network in terms of Y parameters. (5)

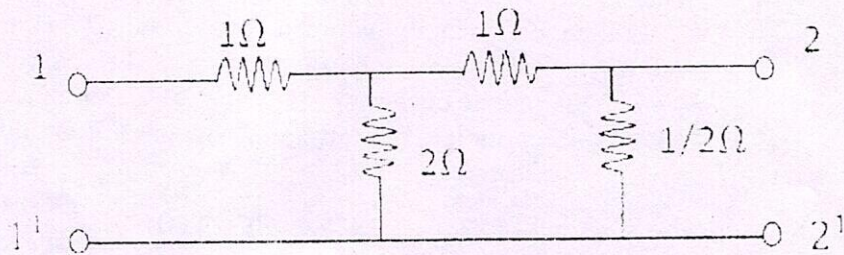
SECTION B

- Q5. (a) A voltage source  $V = V_m \sin \omega t$  is applied to a series R-L circuit. Determine the expression for the average power consumed. (5)

- (b) In the following network determine the total power supplied by the source. (5)



- Q6. (a) Find the Y and Z parameters of the following two port resistive network. Verify the relation between them. (5)



- (b) Derive relation between  $y$  and  $T$  parameters for any two port networks. (5)
- Q7. (a) In a DC machine, how coil-side emf varies towards the outer side of poles? (2)
- (b) What could be the reasons if a 3-phase synchronous motor fails to start? (3)
- (c) Describe the effect of varying the excitation on the armature current and power factor of a synchronous motor when input power to the motor is maintained constant. (5)