C.O.E.P

ELECTRICAL CIRCUIT ANALYSIS [EE-202]

END SEMESTER EXAM-2011

Branch: Electrical **Total: 50 marks**

S.Y.B.Tech **Time: 3:00hr**

Note:- **(i) Write the answers precisely and legibly.**

(ii) All questions are compulsory.

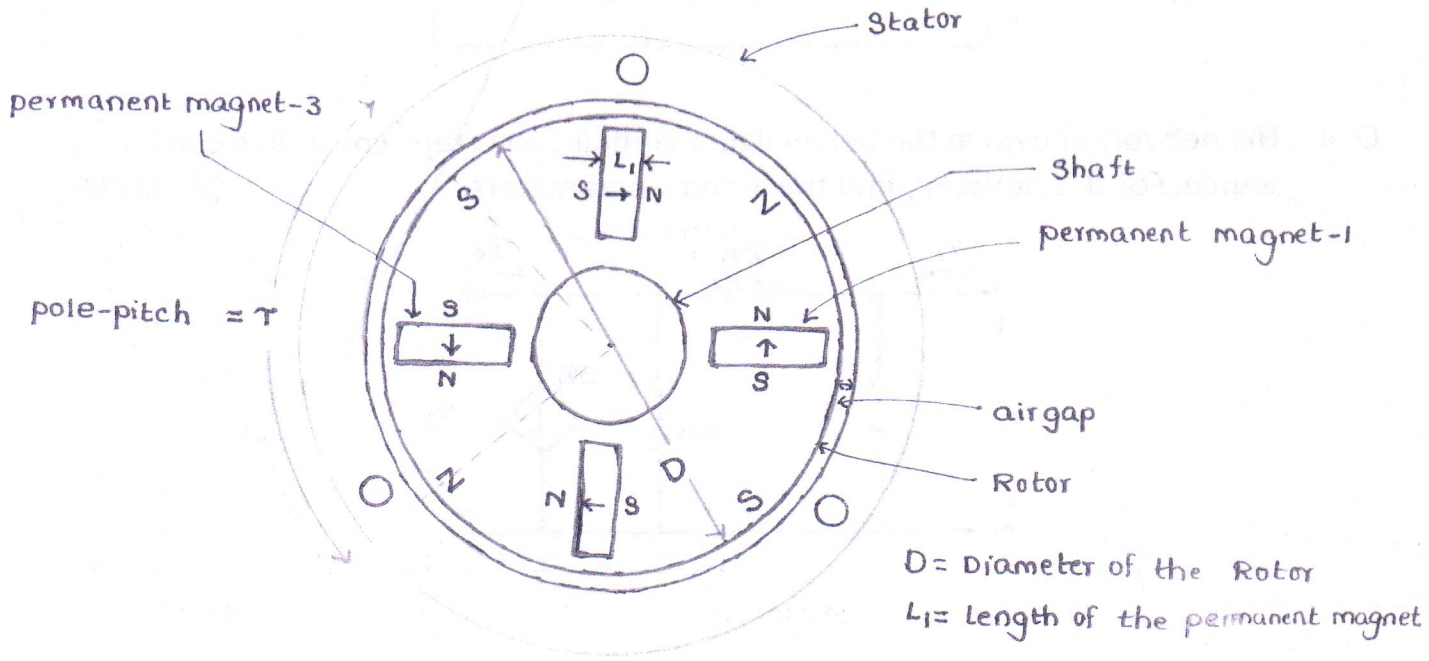
Q. 1 The figure shown below represents the two-dimensional view of a Permanent Magnet Synchronous Machine (PMSM). This machine consists of four permanent magnets inside the rotor and arrow inside the permanent magnets represents the direction of magnetization. Diameter of the rotor is D meters and the peripheral distance between the two successive opposite pole is defined as one pole-pitch(τ) Stator magnetic field is assumed to be zero and there is only rotor magnetic field in the air gap (due to Permanent Magnets).

(a) Draw the flux density waveform in the air gap of the machine neglecting the length of the magnet.

(b) Draw the flux density waveform in the air gap of the machine taking the length of the magnet into account, and represent the waveform in Fourier series.

[NOTE: X-axis is the periphery of the rotor for the flux density waveform]

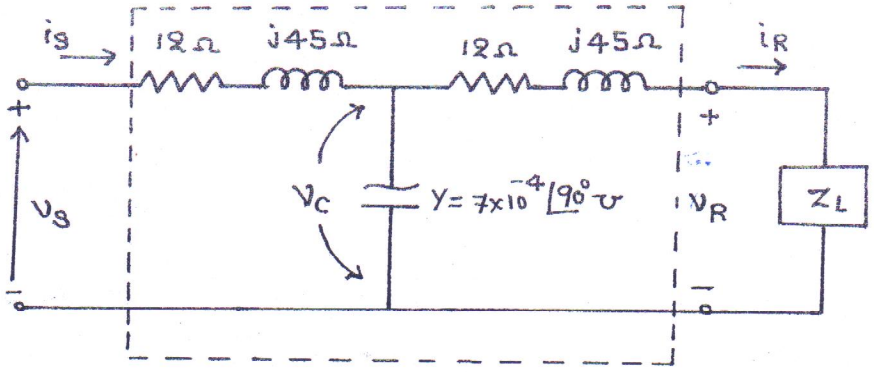
[10 MARKS]



NOTE : Assume B_f is the peak value of the flux Density in the air gap

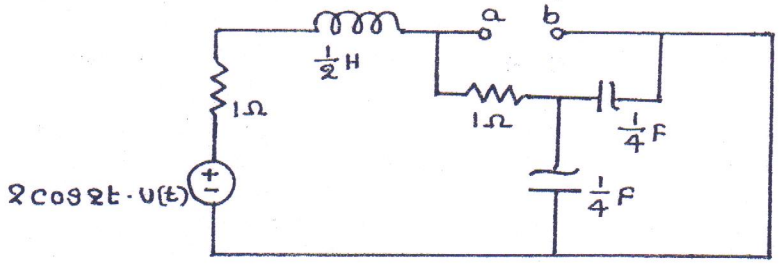
Below figure represents the nominal-T representation of a medium transmission line. If the load impedance Z_L=250+j100 ohms is connected at the receiving end of the transmission line and it is observed that magnitude of voltage across the load impedance is 2KV. **Find** (a) Transmission line parameters of the nominal-T network. (b) Sending end current of the transmission line. (c) Sending end voltage of the transmission line. (d) Sending end and receiving end power factor. (e) Draw the phasor diagram of a medium transmission line for the given load impedance.

[NOTE: all the data given in this problem is assumed to be per phase quantity]

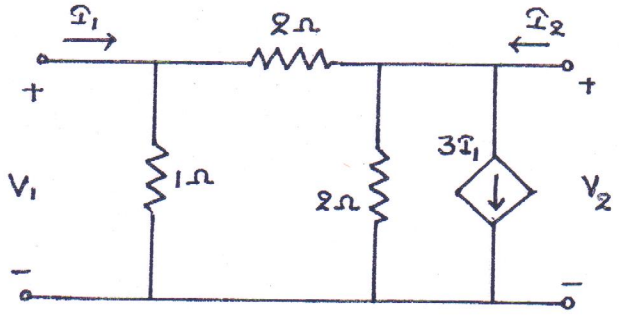


[10 MARKS]

Q. 3 Using either Thevenin's are Norton's theorem, determine an equivalent network for the terminals a-b in the figure shown below for zero initial conditions. [5 MARKS]



Q. 4 The network shown in the below figure contains a current-controlled current source. For this network, find the y and z parameters. [5 MARKS]



Find the RMS values of the signals shown in the below figures. [5 MARKS]

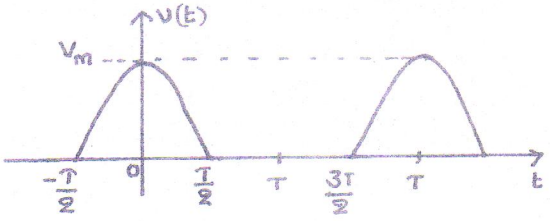
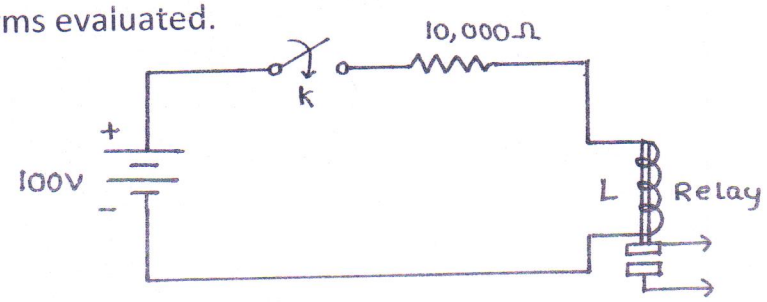


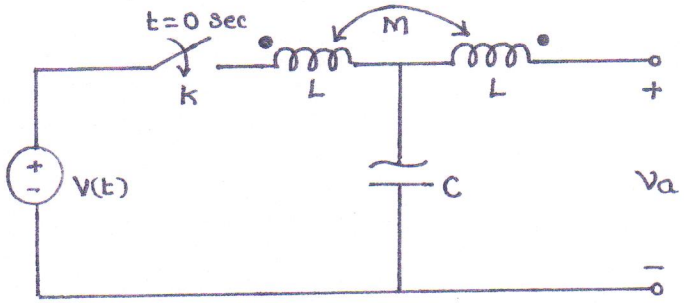
Fig. Q.5a

Fig. Q.5b

Q. 6 The circuit shown in the below figure consists of a resistor and a relay with inductor L. The relay is adjusted so that it is actuated when the current through the coil is 0.001 amps. The switch K is closed at t=0, and it is observed that the relay is actuated when t=0.1 sec. Find (a) the inductance L of the coil, (b) the equation of i(t) with all terms evaluated. [5 MARKS]



Q.7 The network shown in the below figure consists of two coupled coils and a capacitor. Network is initially relax,at t=0, the switch K is closed connecting a generator of voltage, $v(t) = V\sin(t/\sqrt{MC})$. Find $v_a(0^+)$, $\frac{dv_a}{dt}(0^+)$ and $\frac{d^2v_a}{dt^2}(0^+)$. [5 MARKS]



Q.8 A switch is closed at t=0 connecting a battery of voltage V with a series RL circuit. (a) Find an expression for the energy in the resistor as a function of time. (b) Find an expression for the energy in the magnetic field as a function of time. [5 MARKS]