Exam. Code: 0933
Sub. Code: 6656

2074

B.E. (Electrical and Electronics Engineering)

Third Semester

ES-EE-301: Network Analysis and Synthesis

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part. Missing data (if any) can be appropriately assumed.

x-x-x

Q1 Explain briefly

A) Define Active and passive networks. (2)

B) Find condition for a 2-port network using Z and Y-Parameters to be reciprocal. (2)

C) Find $f(\infty)$If (2)

$$F(s) = \frac{5S+3}{(S+1)S}$$

D) Find the driving point impedance of the given one port network shown in fig. 1. (2)

E) Determine the resistance between the terminals AB of the network shown in fig. 2. (1)

F) Write the properties of positive real function. (1)

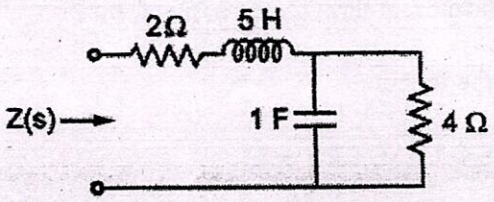

Fig.1

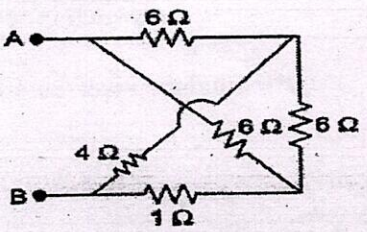

Fig.2

Part A

Q2 A) State and explain the Superposition theorem for circuit analysis. Also write its limitations. (5)

B) In the network shown in fig.3, determine the steady current in the 8 Ω inductor using Thevenin's theorem. (5)

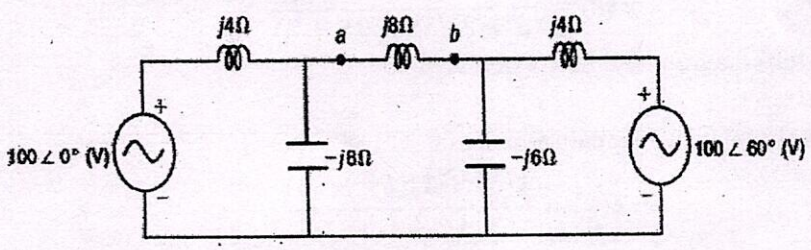

Fig. 3

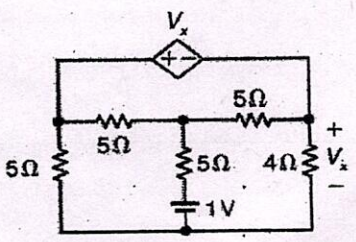

Fig. 4

P.T.O.

Q3 A) Derive an expression for power in a 3-phase star-connected system in terms of (*i*) phase values and (*ii*) line values of voltages and currents. (5)

B) The circuit of Fig. 4 contains a voltage-controlled voltage source. For this circuit, draw the oriented graph. By selecting a proper tree obtain the tie-set matrix and hence calculate the voltage V_x. (5)

Q4 A) Derive the symmetry and reciprocity conditions for ABCD parameters and h-parameters. (5)

B) Find the transmission parameters of the network shown in Fig. 5. (5)

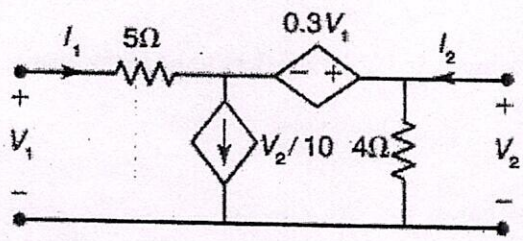

Fig.5

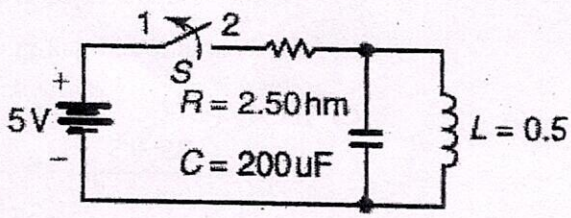

Fig.6

Part B

Q5 A) In the network shown in Fig. 6, the switch S is closed and a steady state is attained. At t = 0, the switch is opened. Determine the current through the inductor for t > 0. (5)

B) Find the inverse Laplace transform of the function

$$F(s) = \frac{2S + 1}{(S + 1)(S^2 + 2S + 5)}$$ (5)

Q6 A) What do you understand by the transfer function of a system? (2+4)
Find the stability of the function using Routh's criterion and determine the number of roots (i) with positive real parts, (ii) with zero real parts, and (iii) with negative real parts:
(a) $6S^3 + 2S^2 + 5S + 2 = 0$
(b) $S^6 + 5S^5 + 13S^4 + 21S^3 + 20S^2 + 16S + 8 = 0$

B) The transform voltage of a network is given as (4)

$$V(s) = \frac{3S}{(S + 2)(S^2 + 2S + 2)}$$

Draw its pole-zero diagram and hence obtain v(t).

Q7 Find the Foster-1 and Cauer-1 realisations of (10)

$$Z(s) = \frac{4(S^2 + 1)(S^2 + 16)}{S(S^2 + 4)}$$

x-x-x