Registration No : | | | | | | | | | | |

Total Number of Pages: 03 **B.Tech**
BEES2211

3rd Semester Back Examination 2017-18
Network Theory
BRANCH : AEIE, CSE, ECE, EEE, EIE, ELECTRICAL, ETC, IEE, IT
Time : 3 Hours
Max Marks : 70
Q.CODE : B1234
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) Two coils are wound side by side on a paper tube. An emf of 0.25 V is induced in coil 1 when the flux linking it changes at the rate of 10^{-3} Wb/s. A current of 2A in coil 2 causes a flux of 10^{-5} Wb to link coil 1. What is the mutual inductance between the coils?

b) What is Millman's theorem?

c) Find the oriented graph and the corresponding tree of the network shown below in Fig. 1.

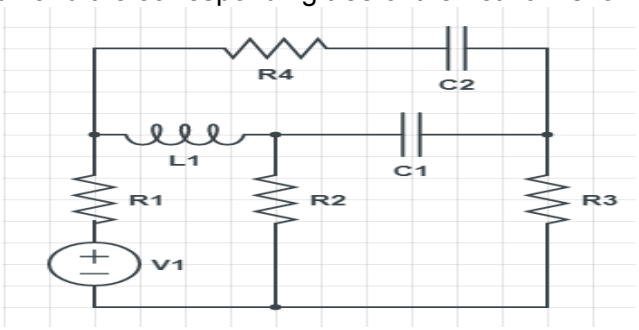


Fig. 1

d) Define time constant and its unit.

e) Determine the initial and final values of the current where

$$I(s) = \frac{0.42}{s(s^2 + 0.35s + 0.816)}$$

f) What is Dirichlet conditions for Fourier series?

g) Write the reciprocity and symmetry condition in h-parameter?

h) Calculate the voltage transfer ratio $\frac{V_1(s)}{V_2(s)}$ of the network shown below in Fig. 2.

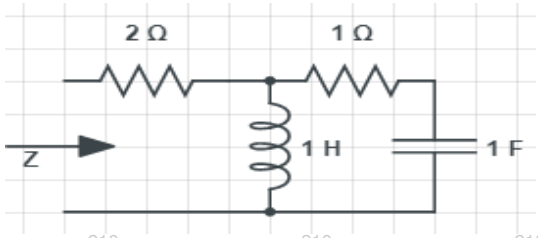


Fig. 2

i) What is Routh-Hurwitz criterion of stability of network function?

j) A parallel RLC circuit has inductance of 10Mh resistance of 4Ω. Find the value of the capacitance that will produce resonance frequency of 8kHz. Also calculate the Quality factor of the circuit.

Q2 **a)** Find I_1 & I_2, for the given circuit below in Fig. 3, with k=1. **(5)**

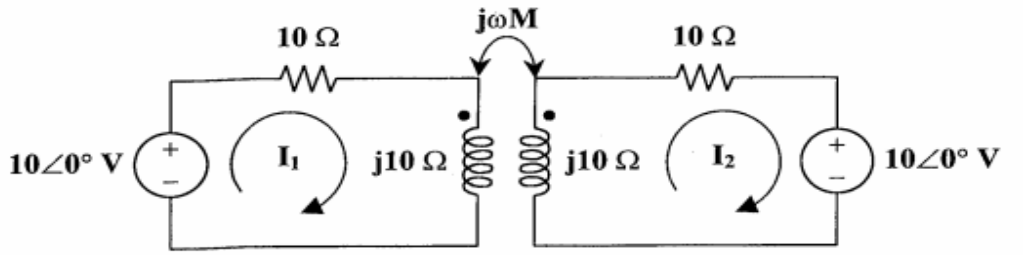


Fig. 3

b) Determine the current through R_L in the circuit shown below in Fig. 4, using super position theorem. **(5)**

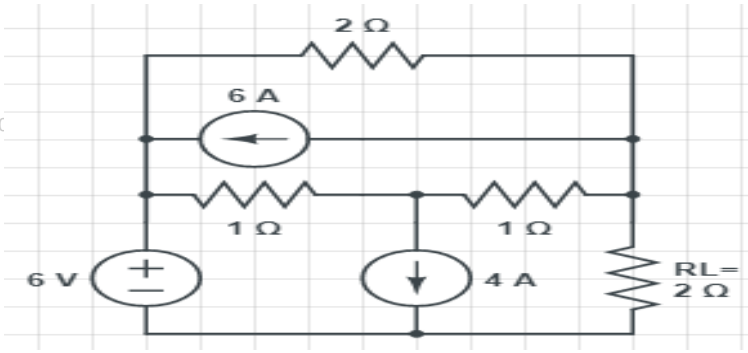


Fig. 4

Q3 **a)** Using Foster Form II, synthesis the function. **(5)**

$$Y(s) = \frac{(s^2+5)(s^2+13)}{s(s^2+9)}$$

b) Synthesize the function $Z(s) = \frac{4\,(s+1)(s+3)}{s\,(s+2)}$, using the Cauer Form I of realization. **(5)**

Q4 **a)** Find the Y-parameter for the two-port network shown in Fig. 5. **(5)**

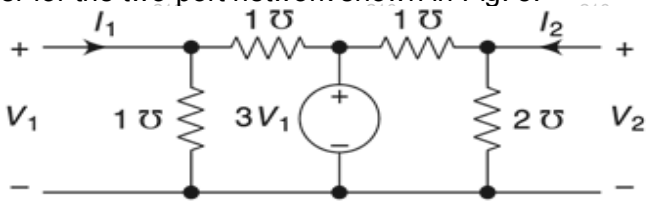
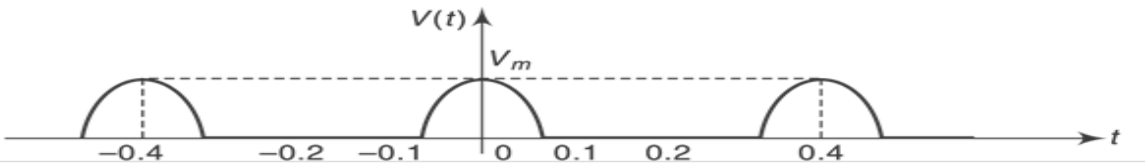


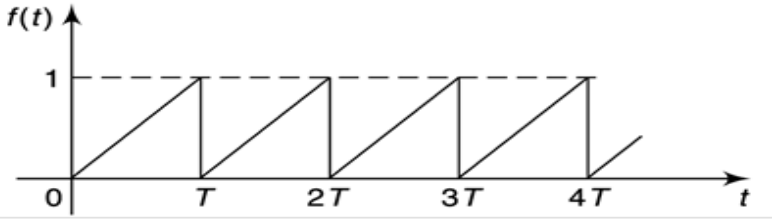
Fig. 6.

b) Check whether the polynomial $s^4 + 6s^3 + 2s^2 + s + 1$ is Hurwitz or not. **(5)**

Q5 **a)** Determine the Fourier series of voltage response obtained at the output of a half-wave rectifier shown in the Fig. 7. Plot the discrete spectrum of the waveform. **(5)**



b) Obtain the Laplace transform of the sawtooth waveform as shown in Fig. 7. **(5)**



Q6 **a)** Find the currents $i_1(t)$ and $i_2(t)$ for the circuit in Fig. 8, when the switch is closed at t=0. **(5)**

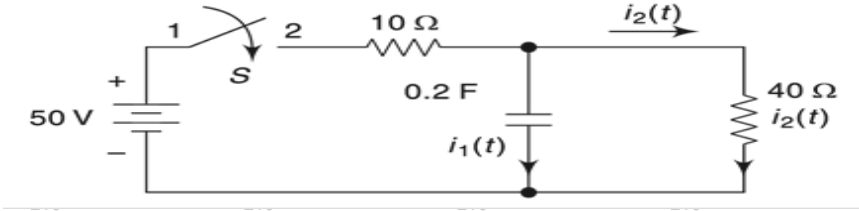


Fig. 8

b) From the circuit in Fig. 9, make a graph and find one tree. How many mesh currents are required for solving the network? Find the possible trees. **(5)**

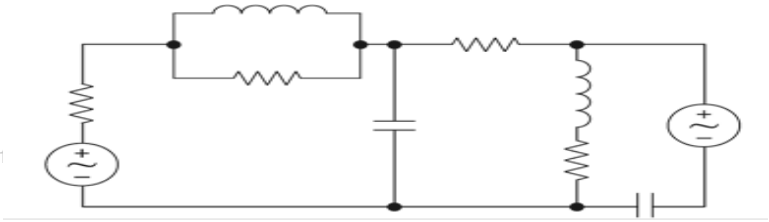


Fig. 9

Q7 Determine $G_{12}(s), \propto_{12}(s), Z_{11}(s), Z_{21}(s)$of the network shown in Fig. 10. **(10)**

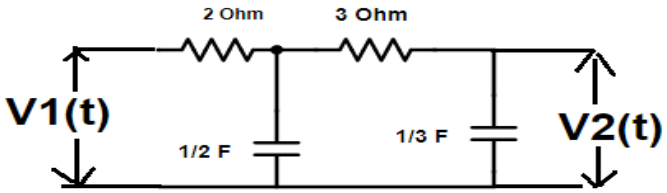


Fig. 10

Q8 **Write short answer on any TWO :** **(5 x 2)**

a) Positive real functions.
b) Classification of filters.
c) Cut set and Tie Set Matrix.
d) Time domain behavior of pole-zero plot.