

Registration No. :

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Total number of printed pages – 3

B. Tech  
BEES 2211

Third Semester Back Examination – 2014

NETWORK THEORY

BRANCH(S) : AEIE, CSE, EC, EEE, EIE, ELECTRICAL,  
ETC, IEE, IT

QUESTION CODE : L 332

Full Marks – 70

Time : 3 Hours

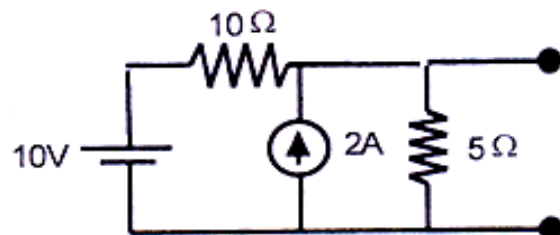
Answer Question No. 1 which is compulsory and any five from the rest.

The figures in the right-hand margin indicate marks.

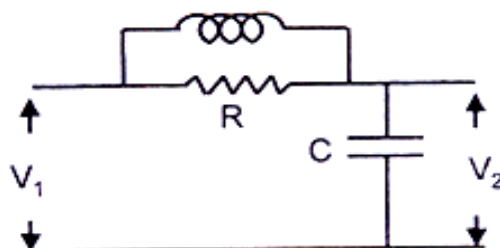
1. Answer the following questions :

2 × 10

(a) Determine ' $V_{th}$ ' in the circuit given below :



- (b) Check the positive realness of the function. :  $y(s) = \frac{s^2 + 2s + 20}{s + 10}$
- (c) A two-port network is defined by the relation  $I_1 = 2V_1 + V_2$ ,  $I_2 = 2V_1 + 3V_2$ . Find the value of  $h_{11}$  and  $h_{12}$ .
- (d) Write the properties of a tree.
- (e) Calculate the transfer function of the given network.

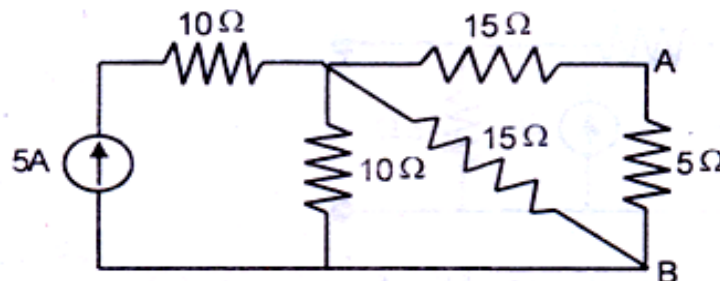


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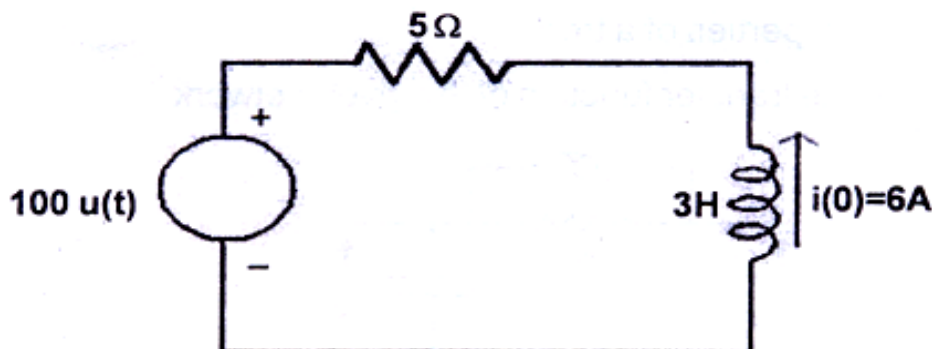
- (f) What are different methods to find out inverse laplace transform ?
  - (g) How average value is found from fourier series ?
  - (h) What are critical frequencies ? Why they are so called ?
  - (i) Distinguish between steady state and transient response.
  - (j) What is the relation between ramp function and parabolic function ?
2. (a) If  $f(t) = \sin t$  and is periodic function. Find out its laplace transform. 5
- (b) Obtain the pole zero plot and hence the time domain response for the given network function. 5

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

3. (a) Design the 'T' & 'Π' section of a prototype High pass filter having cut-off frequency of 20 kHz and design impedance  $460 \Omega$ . Find its characteristics impedance and phase constant at 25 kHz. Also find the attenuation at 4 kHz. 5
- (b) Verify Reciprocity theorem across A-B. 5

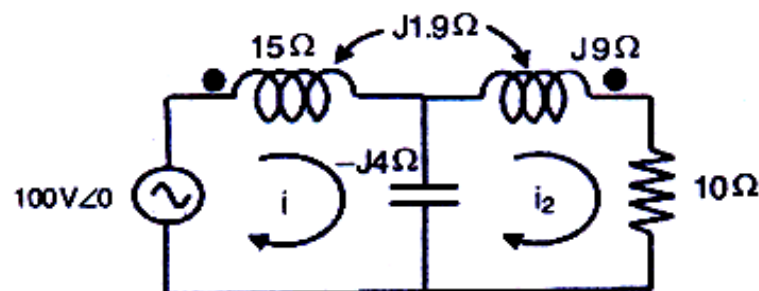


4. In the circuit of the figure shown below, find the expression for the transient current and the initial rate of growth of the transient current. 10



5. (a) Calculate the power across  $10\Omega$  resistor.

5



- (b) Describe the graphical procedure for finding time domain behaviour from pole zero plot. 5
6. (a) What are the various types of interconnections possible in 2 port network? 5
- (b) Calculate half power freq, resonant freq., bandwidth and Q-factor for series RLC circuit with  $R = 0.2\text{ ohm}$ ,  $L = 100\text{ m H}$  and  $C = 50\mu\text{ F}$ . 5
7. (a) Synthesize the given network function in the first form of Cauer. 5

$$Z(s) = \frac{(s+2)(s+5)}{(s+1)(s+3)}$$

- (b) The Z-parameter of a two port network are  $Z_{11}=25\Omega$ ,  $Z_{12}=50\Omega$ ,  $Z_{21}=Z_{22}=75\Omega$ . Find the port currents  $i_1$  and  $i_2$  when a 20V source is connected at port-1 and a  $50\Omega$  resistor at port-2. 5
8. (a) A DC voltage of 20V is applied in a R-L circuit where  $R=5\text{ ohms}$  and  $L=10\text{H}$ . Find the 5
- (i) Time constant
- (ii) The maximum value of stored energy
- (b) Explain why the current in a pure inductance cannot change in zero time. 5