D 70377 (Pages : 4) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, NOVEMBER 2014

EE 09 303/PTEE 09 302—ELECTRIC CIRCUIT THEORY

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *the questions.*
Each question carries 2 *marks.*

1. 3 resistors 10 Ω, 15 Ω, and 12 Ω are connected in delta to form a closed triangle. Sketch the equivalent star network.
2. State Maximum power transfer theorem.
3. What is a Gate function ? Write its Laplace transform.
4. Explain the terms cutset and fundamental cutset with a simple example.
5. What is meant by image impedance ? Explain.

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Sketch a parallel RLC resonant circuit and obtain the conditions for resonance.
7. State and prove the final value theorem.
8. With an example explain how a two port network can be transformed from π section to T section representation.
9. Sketch the network graph if the incidence matrix is represented in Table form shown in Table 1

	Branches				
Nodes	1	2	3	4	5
1	1	0	0	0	1
2	– 1	1	0	1	0
3	0	– 1	1	0	0
4	0	0	– 1	– 1	– 1

Table 1

13. (a) For a square wave of amplitude 1 and period $2p$, show that the Laplace transform is, $\frac{1}{s}\tanh\left(\frac{ps}{2}\right)$. If this square wave is applied to an RL series circuit, obtain the response.

(10 marks)

Or

(b) A series RC circuit with $R = 10\,\Omega$ and $C = 4\mu$ F has an initial charge $Q_o = 800\mu C$ on the capacitor. At $t = 0$, the switch is closed to apply a constant d.c. voltage source of 100 V. sketch the transformed circuit. Find and sketch the resulting current transient if the charge on the capacitor has the same polarity as deposited by the source. If the capacitor is connected with the opposite polarity, what will be the resulting current.

(10 marks)

14. (a) Obtain the Z,Y and ABCD parameters of the circuit shown in Figure 3. Also deduce the values of other parameters from the Z parameter values using the relations connecting them.

(10 marks)

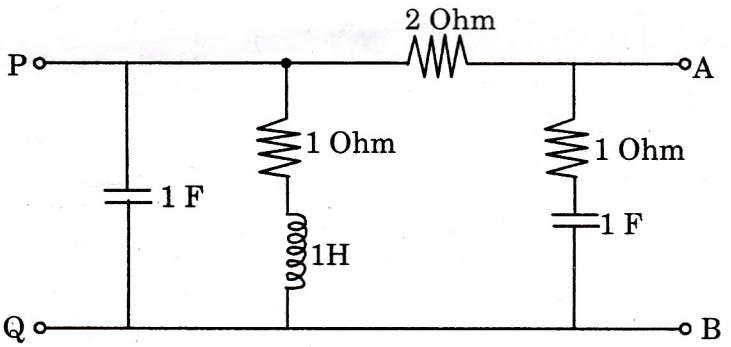

Figure 3

Or

(b) Derive the expressions for characteristic impedance and propagation constant of symmetrical T and π networks under sinusoidal steady state.

(c) Derive the design equations for a constant k low pass filter.

(6 + 4 = 10 marks)

15 (a) An impedance function is given by $Z(s) = \frac{8\left(s^2 + 25\right)}{\left(s^2 + 2\right)\left(s^2 + 4\right)}$. Realize the network in Foster I and Causer II form. Comment about the realization.

(10 marks)

Or

(b) For the circuit shown in Figure 4, draw the oriented graph. Write the tie set matrix and cut set matrix of the network and explain how the circuit can be solved to obtain various currents and voltages using the tie set matrix.

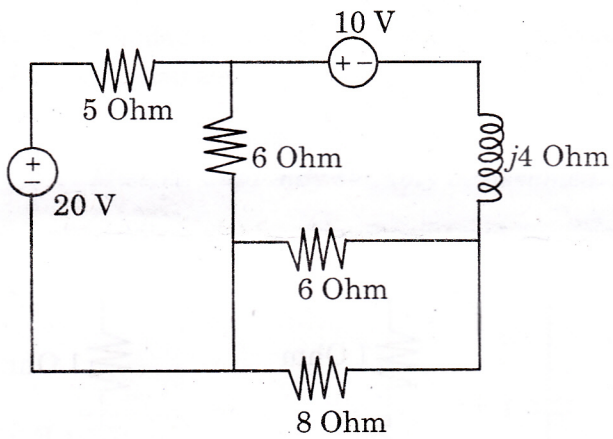

Figure 4

(10 marks)

[4 × 10 = 40 marks]