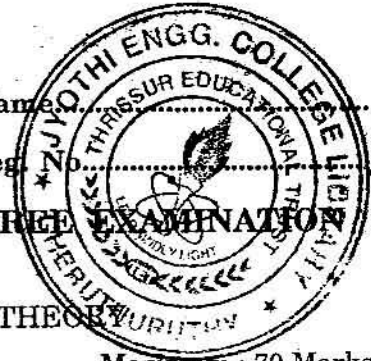


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**THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION
NOVEMBER 2013**

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. What is the concept of power factor.
2. State the first shifting theorem of Laplace transformation.
3. Define driving point immittance.
4. What is meant by Hurwitz polynomial.
5. Find the Laplace transform of a unit step function advanced in time by 'a'.

(5 × 2 = 10 marks)

Part B

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

6. Find the Norton equivalent of the circuit in Figure 1

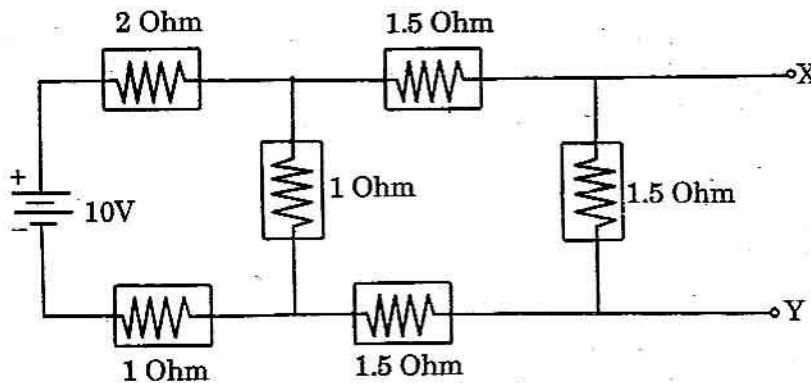


Fig.1

7. Find the Laplace transform of a square wave.

Turn over

8. Find the driving point admittance of the network in Fig. 2

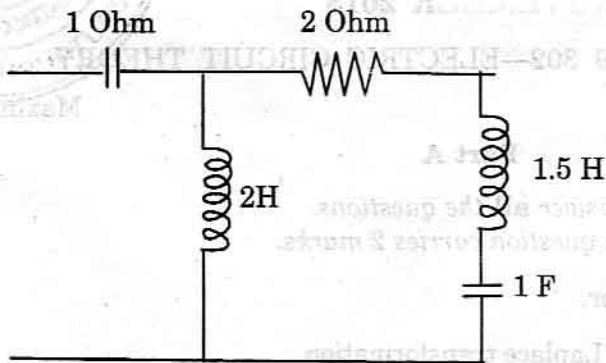


Fig. 2

9. Develop the oriented graph of the network in Fig.3 and write the incidence matrix

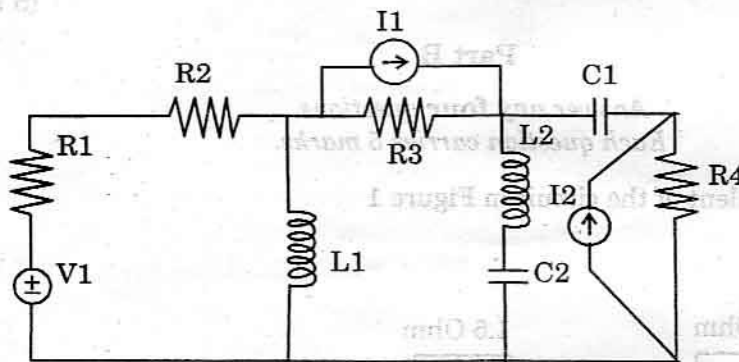


Fig. 3

10. What is meant by a constant k filter. For a constant k filter composed of a series impedance Z , and a shunt admittance Y , discuss the derivation of image impedance.
11. What are symmetrical components. Explain.

(4 × 5 = 20 marks)

Part C

Answer any four full question.

Each question carries 10 marks.

Missing data may suitably be assumed.

12. (a) Derive the transformation (i) from star to delta ($Y - \Delta$); and (ii) from delta to star ($\Delta - Y$) (10 marks)

Or

- (b) For the network shown in fig. 4, find the current I and all the branch currents and node voltages.

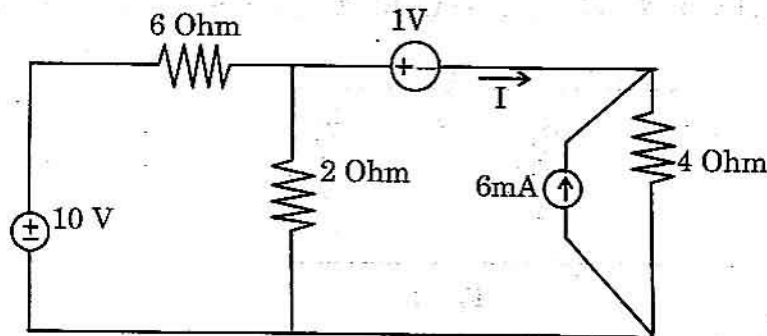


Fig. 4

(10 marks)

13. (a) An RLC parallel circuit with 1Ω resistor in first parallel path, an inductor of $1H$ in second parallel path and a capacitance of $1F$ in third parallel path is fed by a current source of $4A$ and the switch across the current source is opened at $t = 0$. Assuming zero initial conditions obtain an expression for voltage across the parallel path using Laplace transform technique.

(10 marks)

Or

- (b) For the initially de-energized RC series network with $R = 2\Omega$ and capacitance $1F$, find the voltage across the capacitor for $t > 0$, if the input voltage is $v(t) = 5u(t)$ where $u(t)$ is unit step function.
- (c) Write notes on dot convention used to indicate the relative polarity in coupled circuit.

(6 + 4 = 10 marks)

14. (a) Derive the condition for symmetry and reciprocity in Z parameter representation of a two port network.

Turn over

- (b) A symmetrical T network in fig. 5 has an open circuit impedance of 800 ohms and short circuit impedance of 600 Ohms. Determine the impedances, Z1 and Z2.

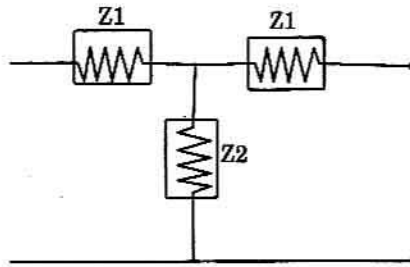


Fig. 5

(6 + 4 = 10 marks)

Or

- (c) For the 2 port network shown in fig. 6, find the voltage transformation ratio if $C1 = 1F$, $C2 = 2F$, $L1 = 2H$ and $L2 = 2H$. Also obtain the Z parameters of the network.

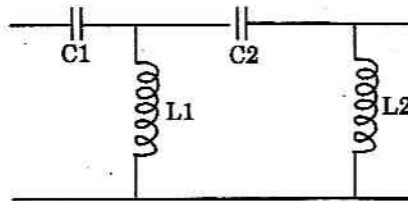


Fig. 6

(10 marks)

15. (a) Find the Foster form I and Cauer form I realization of the function, $\frac{4(S^2 + 1)(S^2 + 16)}{S(S^2 + 9)}$

(10 marks)

Or

- (b) For the network shown in Fig. 7, find the tie set matrix and write the Kirchoff's Voltage law equations using graph theoretical approach.

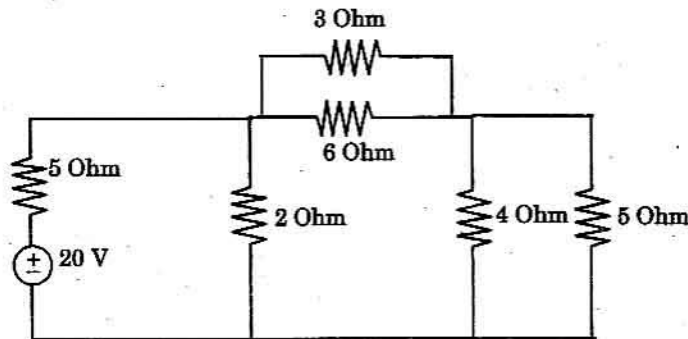


Fig. 7

(10 marks)

[4 × 10 = 40 marks]