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Question Paper Code : 41229

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fifth Semester

Electrical and Electronics Engineering

080280038 — NETWORK ANALYSIS AND SYNTHESIS

(Common to 080280015 – Network Analysis and Synthesis B.E. (Part-Time) – Second Semester – Electrical and Electronics Engineering)

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. A resistance R and a 3 μF capacitor are connected in series across a 240 V dc supply. A voltmeter is connected across the capacitor. Calculate R so that the voltmeter reads 160 V at 5.5 sec after closing the switch.

2. A series RL circuit having R = 5Ω and L = 12 mH is connected to 230 V, 50 Hz single phase supply. Calculate

   (a) The reactance

   (b) The impedance

   (c) The current drawn by the circuit.

3. Define Neper and radian frequency.

4. Write the Fourier series representation of any two periodic inputs.

5. Define driving point impedance and admittance of a network.

6. What is meant by image impedance and image constant?

7. Give the classification of filters.

8. State the advantages of m-derived filters.

9. State the properties of positive real function.

10. Draw the representation of foster form II of LC circuit.

PART B — (5 × 16 = 80 marks)

11. (a) A series RLC circuit with R = 10Ω, L = 0.5 H and C = 200 μF has a sinusoidal voltage of v = 150 sin(200t + φ). If the switch is closed when φ = 30°, determine the current equation. (16)

Or

(b) Derive the expression to obtain the time response of series RL circuit for step input using Laplace transform method. (16)

12. (a) (i) Explain how the frequency response is obtained from the Pole-zero configuration. (10)

(ii) Draw the pole-zero diagram for the network functions

$$I(s)=\frac{5S}{(S+1)(S^2+4S+8)}.$$ (6)

Or

(b) Explain the concept of physical interpretation of complex frequency. (16)

13. (a) Determine the open circuit impedance parameters (Z-parameters) of the network shown in Fig. 13(a). (16)

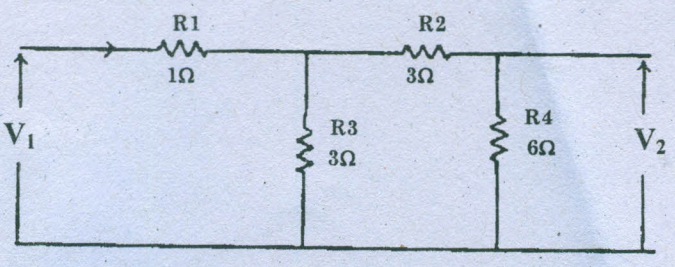

Fig. 13(a)

Or

(b) Obtain the ABCD parameters for the network shown in Fig. 13(b). (16)

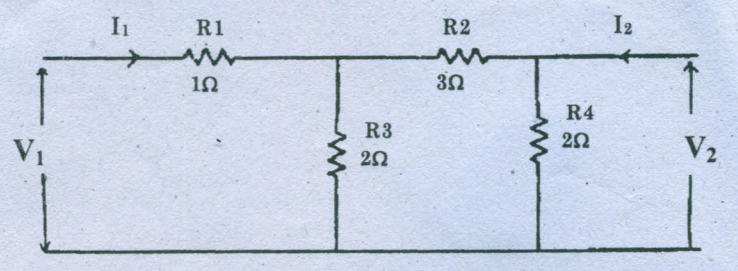

Fig. 13(b)

14. (a) Design a m-derived low pass filter having the cut-off frequency of 1 KHz, impedance of 400Ω and the resonant frequency 1100 Hz. (16)

Or

(b) Derive an expression to obtain the propogation constant for T-Network. (16)

15. (a) Check whether the polynomials are Hurwitz or not.

(i) $P(s)=s^4+s^3+3s^2+2s+12$ (8)

(ii) $P(s)=s^3+4s^2+5s+2$. (8)

Or

(b) Find the two Foster realization of $Z(s)=\left[4\left(s^2+1\right)\left(s^2+16\right)\right]/\left[s\left(s^2+4\right)\right]$. (16)