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Name.....................................

Reg. No.................................

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

AI 09 306—ELECTRONIC CIRCUITS AND NETWORK THEORY

Time : Three Hours

Maximum : 70 Marks

Part A

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

1. Define Laplace transform.

2. State the significance of poles and zero of a function.

3. Define characteristic impedance.

4. What is an attenuator ?

5. What are low pass and high pass filters ?

$(5 \times 2 = 10 \text{ marks})$

Part B

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

6. State and prove any *three* properties of Laplace transform.

7. For the circuit shown below, find the current $i(t)$ when the switch is closed at $t = 0$. Assume that the initial charge on the capacitor is zero.
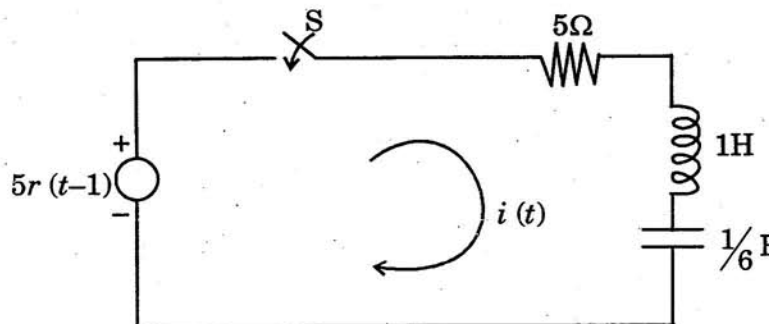
8. State the restrictions on pole and zero locations in the driving point function.

Turn over

9. Define the various z-parameters of a two-port network.

10. Design a π-type attenuator to give 20 dB attenuation and to have a characteristic impedance of 100 Ω.

11. Design a constant k high pass filter with $f_c = 4$ kHz and design impedance $R_0 = 600 \Omega$ (Assume π section).
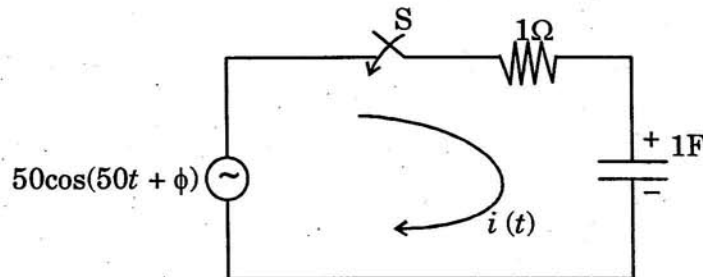
$(4 \times 5 = 20$ marks)

Part C

12. (a) In the following circuit, a sine wave is applied as input when the switch S is closed at $t = 0$. Find the current $i(t)$
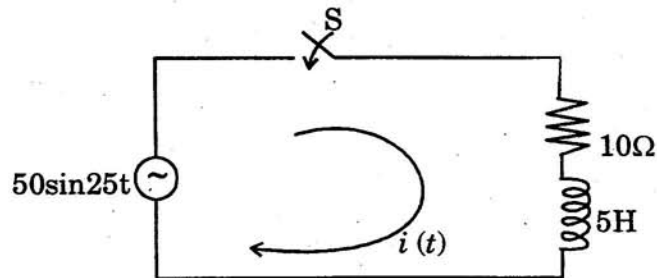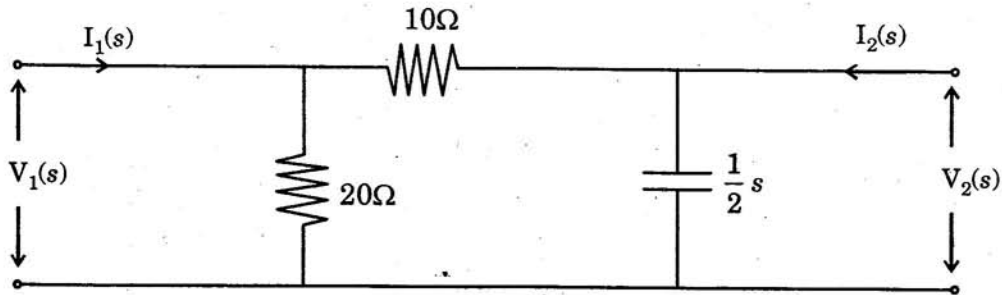

Or

(b) Find the current in the following circuit, when the switch is closed at a time corresponding to $\phi = 0$. Assume initial charge on the capacitor is 2 coulombs with polarity shown.

13. (a) Find the transfer functions $G_{21}(s)$, $z_{21}(s)$ and driving point impedance $z_{11}(s)$ of the following circuit.

Or

(b) Draw the pole zero diagram for the given network function and hence obtain $V(t)$

$$V(s) = \frac{4(s+2)s}{(s+1)(s+3)}.$$

14. (a) (i) Design a T type attenuator to give an attenuation of 60 dB and to work in a line of 500 Ω impedance.

(ii) Design a symmetrical bridged T-attenuator with an attenuation of 20 dB and terminated into a load of 500 Ω.

Or

(b) (i) The impedance parameters of a two port network are $z_{11} = 6\Omega$; $z_{22} = 4\Omega$; $z_{12} = z_{21} = 3\Omega$. Find the Y parameters and ABCD parameters and write the describing equations.

(ii) Show that each Y parameter of the parallel network is given by the sum of the corresponding parameters of the individual networks.

15. (a) Design a band elimination filter having a design impedance of 600 Ω and cut-off frequencies $f_1 = 2\text{kHz}$ and $f_2 = 6\text{kHz}$.

Or

(b) State the characteristics of butterworth and Chebyshev filters.

[4 × 10 = 40 marks]