D 51039 (Pages : 3)

Name.....

Reg. No.....

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

AI 09 306—ELECTRIC CIRCUITS AND NETWORK THEORY

Time : Three Hours Maximum : 70 Marks

Part A

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

1. State Thevenin's theorem.
2. Draw the following functions :
   (a) Ramp. (b) Impulse.
   (c) Step. (d) Pulse.
3. What are singularity functions ?
4. What is an attenuator ?
5. What are active filters ?

(5 × 2 = 10 marks)

Part B

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

6. Find the value of $i\left(0^{+}\right)$ for the Laplace transform given below :

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

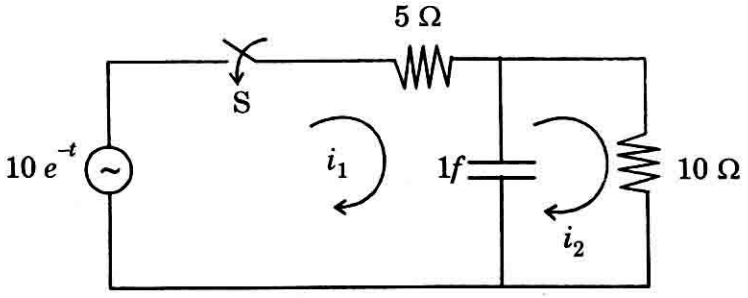
7. Find the Laplace transform of a square wave.
8. Define the terms : Voltage transfer ratio, Current transfer ratio, Transfer impedance and Transfer admittance.
9. State the necessary conditions for transfer functions.
10. Design a symmetrical bridged - T attenuator with an attenuation of 20 dB and terminated into a load of 500 Ω.
11. Design a constant *k*-high pass filter with cut-off frequency of 1 kHz and a load resistance of 700 Ω.

(4 × 5 = 20 marks)

Turn over

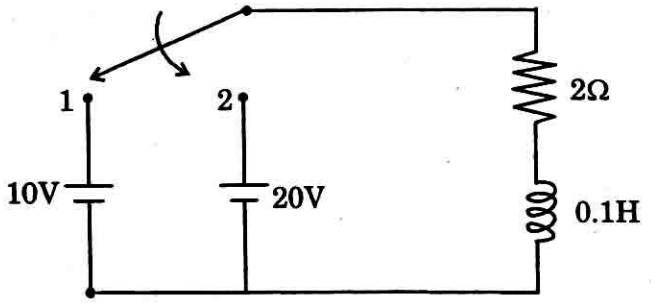
Part C

12. (a) For the following circuit, find the total current delivered by the source when the switch is closed at $t = 0$. Assume no initial charge on the capacitor.



Or

(b) For the following circuit, find the current when the switch is moved from position 1 to position 2 at $t = 0$. The switch has been in position for a long time to get steady state values.



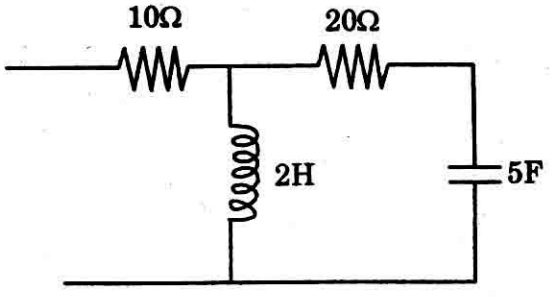
13. (a) Draw the pole zero diagram for the given network function I (s) and hence obtain $i(t)$

$$I(s) = \frac{20s}{(s+5)(s+2)}.$$

Or

(b) (i) Write notes on Bode plot.

(ii) For the following network, find the transfer impedance



14. (a) (i) Establish the relationship between open circuit impedance parameters and short circuit admittance parameters of a two port network.

(ii) Represent ABCD parameters of a two port network interms of z-parameters.

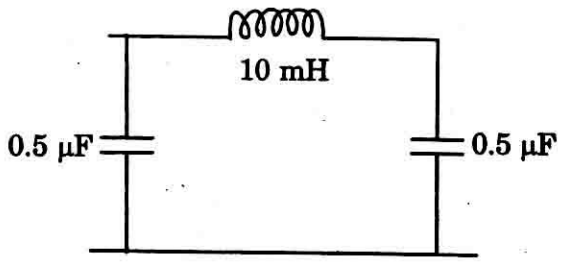
Or

(b) (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 π type attenuator to give 20 dB attenuation and to have a characteristic impedance of 100 Ω .

15. (a) (i) Design a k-type band-pass filter having a design impedance of 500 Ω and cut-off frequencies 1 kHz and 10 kHz.

(ii) Determine the cut-off frequency for the following low-pass filter.



Or

(b) (i) Discuss the characteristics of butterworth and Chebyshev filters.

(ii) Design a first-order high-pass Butterworth filter at a cut-off frequency of 1 kHz with a passband gain of 2.

(4 × 10 = 40 marks)