D 30915 (Pages : 3) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, OCTOBER 2012

Applied Electronics and Instrumentation

AI 09 306—ELECTRIC CIRCUITS AND NETWORK THEORY

(2009 Admissions)

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. State Norton's theorem.
2. Find the Laplace transform of a pulse signal.
3. What is Complex frequency ?
4. Draw *two*, 2-port networks.
5. What are passive filters ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*

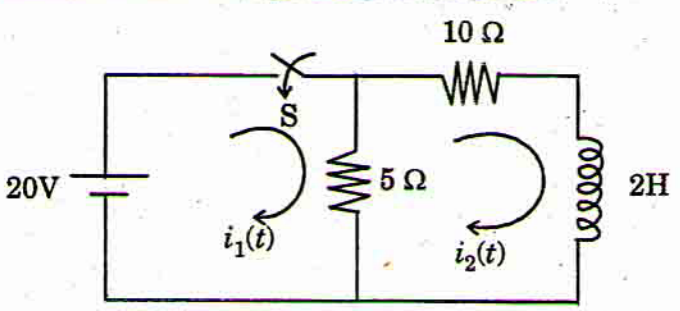
6. State and prove initial and final value theorems.
7. State the necessary conditions for driving point function.
8. Write notes on Bode plot.
9. Explain the various admittance and impedance parameters of a two-port network.
10. Two identical sections of the following network are connected in parallel. Find the Y parameters of the combination.
11. Derive the expression for cut off frequency of constant-K low pass filter.

(4 × 5 = 20 marks)

Part C

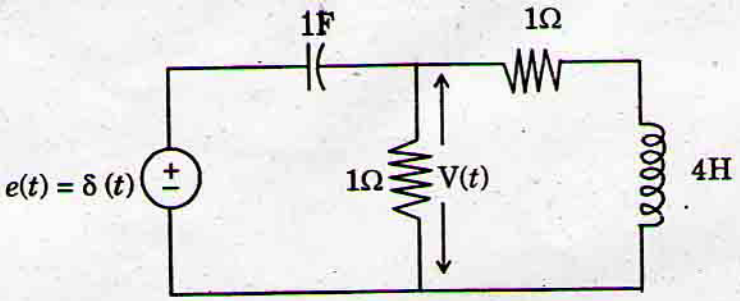
Answer **all** *questions.*

12. (a) For the circuit shown below, find the current in the 10Ω resistor when the switch is closed at $t = 0$. Assume initial current through the inductor is zero.



Or

(b) Find the voltage V (t) in the following circuit. The capacitor and inductor are initially de-energised



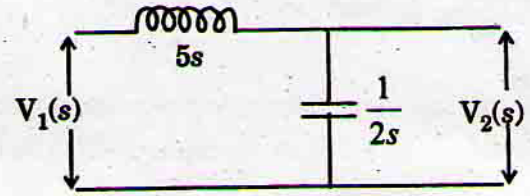
13. (a) For the given network function, draw the pole zero diagram and hence obtain the time domain response i (t).

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

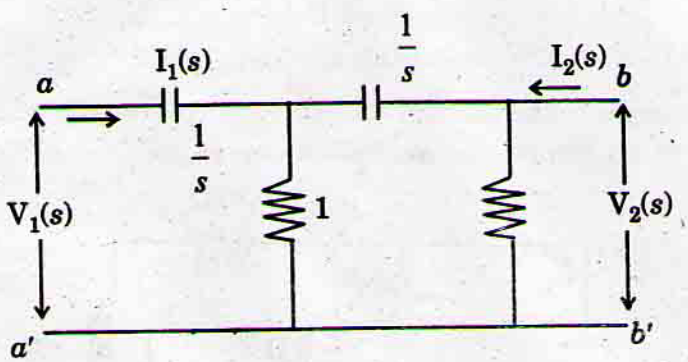
Or

(b) (i) A rectangular pulse of unit height and T seconds duration is applied to a series R–C combination at $t = 0$. Find the current in the capacitor as a function of time. Assume the capacitor is initially uncharged.

(ii) For the following network, find the transfer functions $G_{21}(s)$ and Z_{21} (s).



14. (a) Find the Z parameters of the following RC network.



Or

(b) Derive the design equations fo a T and π type attenuators.

15. (a) (i) Derive the expression for the cut off frequency of a constant K high pass filter.

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

Or

(b) (i) Design a first order Butterworth low pass filter at a cut off frequency of 1 kHz with a passband gain of 2.

(ii) Discuss the characteristics of Chebyshev filters.

(4 × 10 = 40 marks)