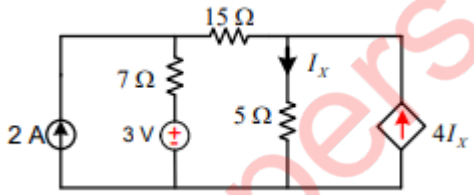
Time: 2 hours **Marks: 60**

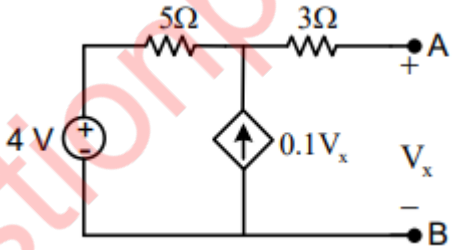
1. Attempt any five questions. **(15)**

a) Compare independent and dependent energy sources with appropriate example.
b) What do you mean by initial conditions with reference to time domain analysis of R-L-C circuit?
c) What is two port network? Compare it with one port network.
d) With suitable examples, write comparisons of open loop and closed loop control system.
e) Define delay time, rise time and settling time of second order control system.
f) What is breakaway point in root locus/ how will you decide the valid breakaway point.
g) What is GM and PM in Bode plot/ how to decide stability of system with the help of GM and PM.

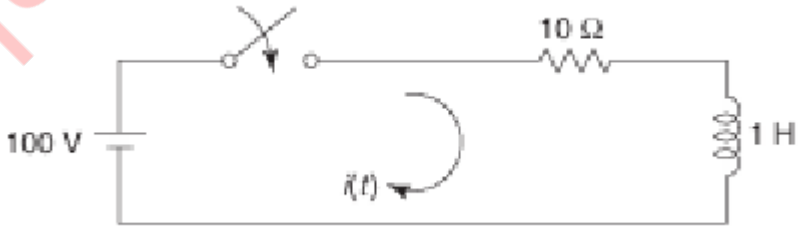
2 a) Use superposition theorem to find **Ix** in the circuit shown in following Figure **(08)**



2 b) Determine the Thevenin's equivalent of the circuit across terminals A-B shown in following network **(07)**

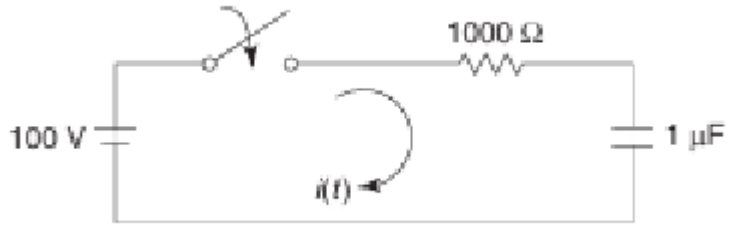


3 a) In the following network, the switch is closed at t=0. With zero initial conditions, find i, di/dt and di^2/dt^2 at t=0+ **(08)**

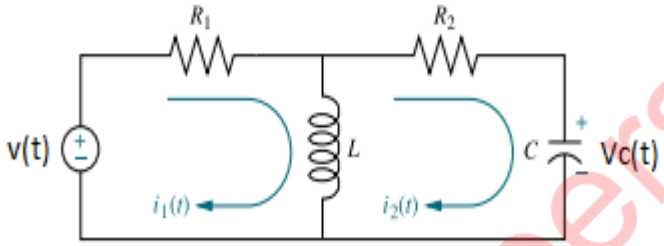


X525Y519C3EX525Y519C3EX525Y519C3EX525Y519C3E

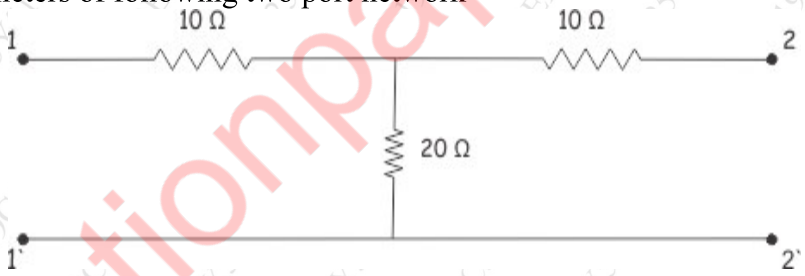
3 b) In the following figure, the switch is closed at t=0. With the uncharged capacitor, find i, di/dt and di^2/dt^2 at t=0+ **(07)**



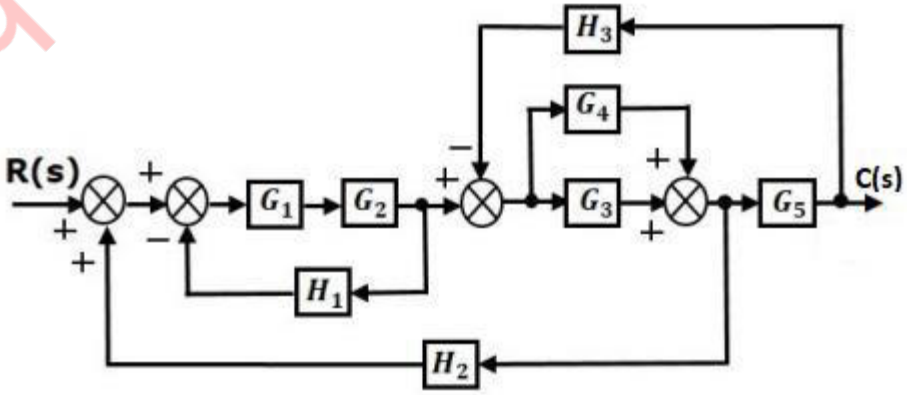
4 a) Determine transfer function for the given electrical network where v(t) is input voltage and Vc(t) is output voltage in time domain **(08)**



4 b) Determine Z-parameters of following two port network **(07)**



5 a) Determine the transfer function of a control system shown by following block diagram **(08)**



5 b) Determine the stabilty of a system shown by $S^5+2S^4+4S^3+6S^2+2S+5$ using Routh Hurwitz criterion. Also, comment on location of its roots on S-plane. **(07)**

X525Y519C3EX525Y519C3EX525Y519C3EX525Y519C3E

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6 a) The open loop transfer function of a unity negative feedback system is given by

$$\frac{\mathbf{K}}{\mathbf{s(s+1)(s+2)}}$$

Draw the root locus as the value of k varies from zero to Infinity. **(08)**

6 b) Draw Bode plot for the unity feedback system shown by transfer function **(07)**

$$G(s) = \frac{100}{s(s+2)(s+25)}$$

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