E Sem 3 N.EP Reg Winter 2025 – EXTC 10.12.2025

Time: 2 Hours **Marks: 60**

N.B. (1) Question No.1 is compulsory.

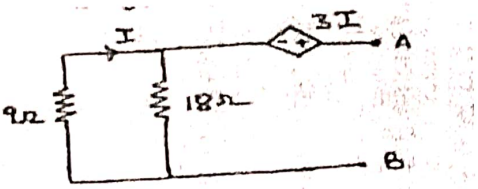
(2) Answer any three from the remaining five questions.

(3) Assume suitable data if required.

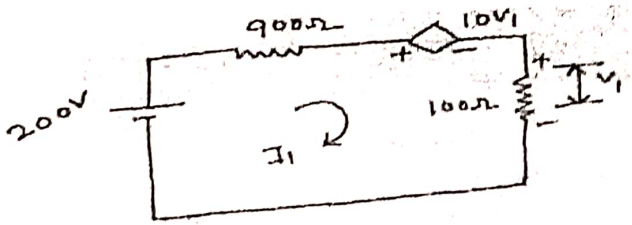
(4) Figures to the right indicate full marks.

Q1. Attempt **any five** **(15)**

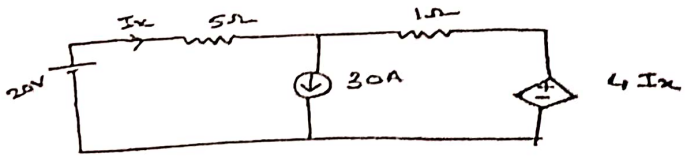
a) Define gain crossover frequency and gain margin in bode plot.
b) State the general rules for constructing a root locus plot.
c) Define open loop and closed loop control systems with examples.
d) Find the Thevenin equivalent resistance of the circuit across the terminal A-B for the shown figure.



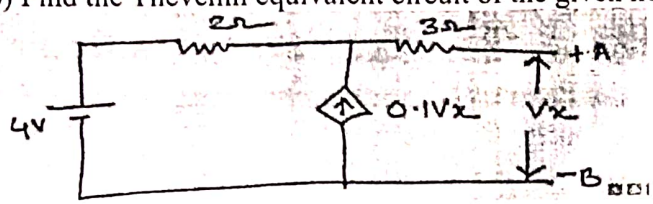
e) Define reciprocity and symmetry in two port networks.
f) Find the current I_1



Q2
a) Find the current I_x the figure given below using Superposition theorem. **(8)**

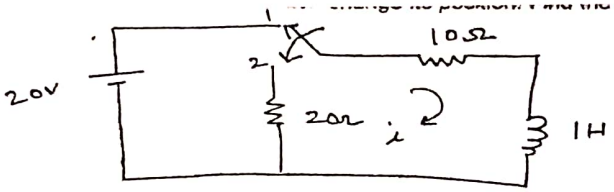


b) Find the Thevenin equivalent circuit of the given network. (7)

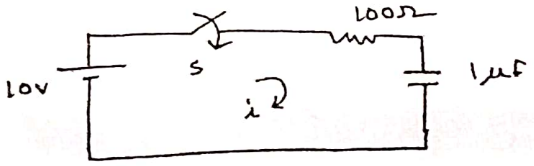


Q3

a) In the network shown in the figure switch is change position 1 to position 2 at t=0, steady condition reach before switch change its position. Find the value of i, di/dt and d^2i/dt^2 at t=0+.. .(8)

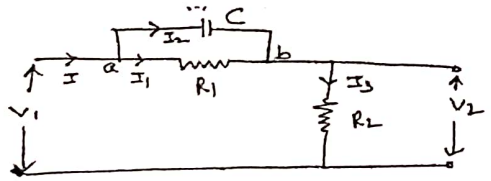


b) In the network shown in the figure switch is close at t=0. Find the value of i, di/dt and d^2i/dt^2 at t=0+. (7)

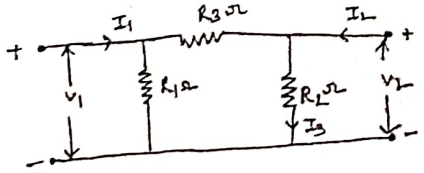


Q4

a) Determine transfer function for the given electrical network where v_1 is input voltage and v_2 is output voltage in time domain. (8)



b)Determine the Z parameters of the given network shown below. (7)



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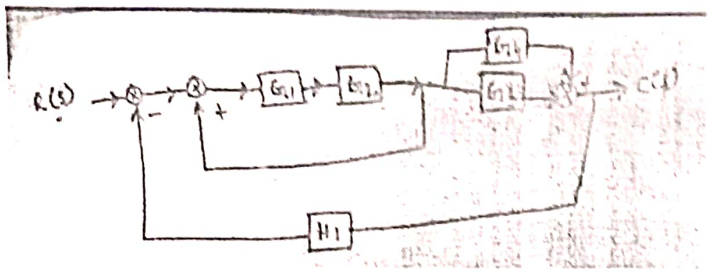
Q5 a) Using Block Diagram reduction technique, find close loop transfer function C(S)/R(S). (8)



b) Check whether the system is stable or unstable.

$S^6+3S^5+2S^4+9S^3+5S^2+12S+20=0$ (7)

Q6 a) Sketch the root Locus for a unity feedback control system with an open loop transfer function .

$G(S)=\frac{K}{S(S+1)(S+2)}$. (8)

b) Draw the Bode plot of the system.

$G(S)H(S)=\frac{8}{S(S+1)(S+4)}$. (7)
