(Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

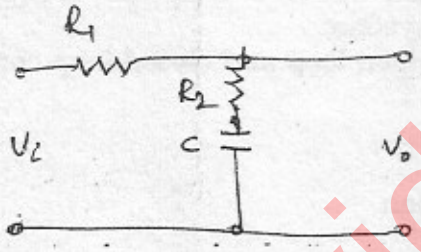
FOURTH SEMESTER [B.TECH] MAY-JUNE 2017

Paper Code: ETEE-212	Subject: Control Systems
Time: 3 Hours	Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory. Assume missing data if any.

Q1 Write short notes on: **(5x5=25)**
(a) Servomechanism
(b) Signal flow graph
(c) Feedback Compensation
(d) Magnetic Amplifier
(e) Minimum Phase Network

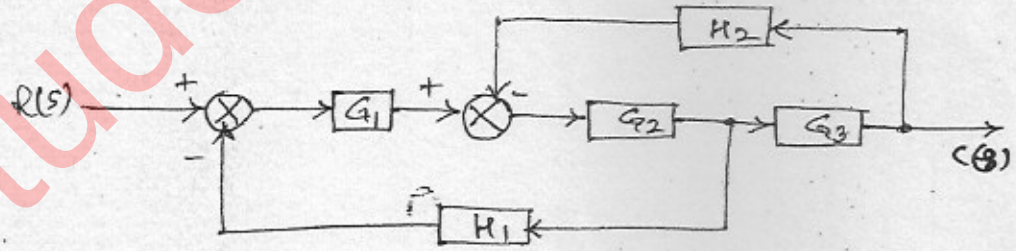
Q2 (a) Obtain transfer function for the circuit shown: **(5)**



(b) Derive expression for the output of an undamped unity negative feedback second order system to a unit step input. **(7.5)**

Q3 (a) Sketch polar plot for $G(s) = 3/[(s+0.5)(s+1)]$ and find its intersection with imaginary axis. **(5)**
(b) Open loop transfer function of a UNFB system is $G(s) = k/[s(s^2+6s+4)]$ where k = 8 is forward path gain. Find the value of k for which there is a pair of closed loop poles on $j\omega$-axis. Find also the third closed loop pole and gain margin. **(7.5)**

Q4 (a) Obtain signal flow graph of the system whose block diagram is shown and from that determine transfer function using Manson's formula. **(7.5)**



(b) For a system function $G(s) = 4(s+5)/[s(s+1)]$, find the frequency at which (i) phase angle = -124^0, (ii) magnitude is unity. **(5)**

Q5 (a) Enumerate steps adopted for sketching Root-Locus graph for a normal second order control system. **(6)**
(b) Draw Root-Locus for $G(s).H(s) = K(s+3)/[s^2(s+5)]$. **(6.5)**

Q6 (a) Bode's plot for a system is shown here. **(7.5)**
Obtain its transfer function.

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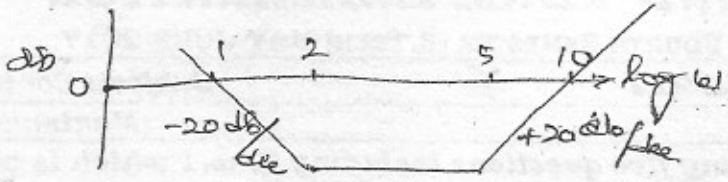

(b) Give five examples of popular open loop control systems. **(5)**

Q7 (a) State and example Nyquist's stability criterion as applied to feedback control systems. **(7.5)**

(b) For a system having $G(s).H(s) = 5/(s-1)$ investigate, using Nyquist's criterion, if the system is stable. **(5)**

Q8 (a) Explain the co-relation between time and frequency response of a typical second order system. **(5)**

(b) Distinguish between open loop and closed loop control systems. **(7.5)**

Q9 Write short note on:

(a) PID Controllers **(6)**

(b) Routh Hurwitz Criterion **(6.5)**

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