1304E124   Candidate's Seat No :

M.Sc. (Sem.-IV) Examination
508
Electronic Science

Time : 3 Hours]   April-2017   [Max. Marks : 70

Instructions:
1. All symbols carry usual meanings.
2. Total Marks : 70
3. Attempt all questions.
4. Scientific calculators are allowed

Q1 (a) Discuss Routh's stability criteria. A unity feedback control system has

$$G(s) = \frac{k}{(s+4)(s+6)(s+10)}$$

Using Routh's stability criterion, determine the range of k so that system is stable.   [7]

OR

Q1 (a) What is "Root Locus"? State the general rules to plot the root locus.
The open loop transfer function of a unity feedback system is

$$G(s) = \frac{10}{s(s+6)(s+9)}$$

Find Out the following:
(i) No of Loci and loci ending at infinity   (ii) No of asymptotes and their angles
(iii) Position of centroid   [7]

Q1 (b) The transfer function of a second order system is given by   [7]

$$T(s) = \frac{100}{s^2+10s+10}$$

Find Out the following frequency domain specifications:
(i) Damping Ratio (ξ) (ii) Resonance frequency (ω_r)
(iii) Response peak (M_r)

OR

Q1(b) For a unity feedback system with

$$G(s) = \frac{k(s+1)}{s^2+4s+5}$$

Find Out the following :
(i) Number of poles & zeros
(ii) Angle of departure of the root locus from the complex poles.   [7]

Q2(a) List various types of control actions. Describe Proportional –Integral (P-I) controller.   [7]

OR

Q2(a) With necessary diagrams explain the following terms:
(i) Gain Crossover frequency   (ii) Phase Crossover frequency   [7]
(iii) Gain Margin   (iv) Phase Margin

(P.T.O.)

Q2(b) For a unity feedback control system

$$G(s).H(s) = \frac{10}{s(10 + s)}$$ [7]

Write the above equation in Bode form and Find out:
     (i) All standard factors present   (ii) Draw Magnitude Vs Log ω curve
     (iii) Gain cross over frequency

OR

Q2(b) Discuss the steps followed to draw a Bode plot.
    For a standard factor as **first order zero**, draw Bode plot. [7]

Q3(a) What is force commutation?Discuss any method of forced commutation in thyristors. [7]

OR

Q3(a) Explain different ratings of thyristor in brief. [7]

Q3(b) What is pulse transformer? How can it be used in triggering circuits? [7]

OR

Q3(b) Write a note on optical-isolators. [7]

Q4(a) With necessary diagrams discuss Fly back type of SWITCH MODE POWER
    SUPPLY(SMPS) . [7]

OR

Q4(a) Draw and explain the circuit of Automatic Battery Charger [7]

Q4(b) Discuss UPS in detail. [7]

OR

Q4(b) Write a note on Over Voltage Protection. [7]

Q.5 Answer the following :(each question carry one mark) [14]

(i) Draw the location of poles for marginally stable system in s plane?
(ii) State Hurwitz 's stability criteria.
(iii) For a system if GM is infinity and PM is positive then it is stable .TRUE or FALSE.
(iv) Define Inverse Root locus?
(v) What is the effect of adding poles in the transfer function of a system?
(vi) The open loop transfer function of a unity feedback system is $G(s) = k.s / s + 2$
    Find out where the root locus begins and ends.
(vii) Write two advantages of Routh's stability criterion.
(viii) What is 'Burst firing'?
(ix) How *"trapped charges"* occurs at interval of the turn-off time of SCR?
(x) Write full form of the following
    (a) IRED =
    (b) LASCS =
(xi) What is voltage safety factor V_t?
(xii) Draw PNPN structure of PUT with terminal labels.
(xiii) What is **"string efficiency"**?
(xiv) Define **'Holding current'** of a thyristor.

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