# 2008

## M.Sc.

## 3rd Semester Examination

## ELECTRONICS

### PAPER—EL-2102

*Full Marks :* 50

*Time :* 2 hours

*The figures in the right-hand margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

*Illustrate the answers wherever necessary.*

Answer *Q. No. 1* and any *three* questions from the rest.

**1.** i) Define 'Gain Margin' and 'Phase Margin'.

ii) What is the function of 'Astimatism' in a 'CRO'?

iii) A system is described by the following differential equation :

$$2\frac{d^2y}{dt^2}+\frac{5dy}{dt}+6y=3\frac{dx}{dt}+x$$

where, 'x' is the input and 'y' is the output.

Find the transfer function of the system.

iv) Find the Z-transform of $a^K$.

v) For the system having

$$G(s)H(s) = \frac{S+5}{(S+1)(S+3)}$$

Find its characteristics equation. 2×5

**2.** A system is described x by the following set of algebric equation :

$$X_2 = 20X_1 - 5X_3 - 2X_4 - X_5$$
$$X_3 = 10X_2$$
$$X_4 = 4X_3 + 2X_4$$
$$X_5 = 3X_3 + X_4$$

i) Draw the completer signal flow graph.

ii) Using the results of (i), find the over all gain of system using Mason's formula. 4+6

**3.** (i) Sketch the Bode Plot of H(s) given by

$$H(s) = \frac{s+2}{(s+1)(s+5)}$$

(ii) Find the OPAMP circuit as shown in Fig. Q 3(ii), find the output voltage.

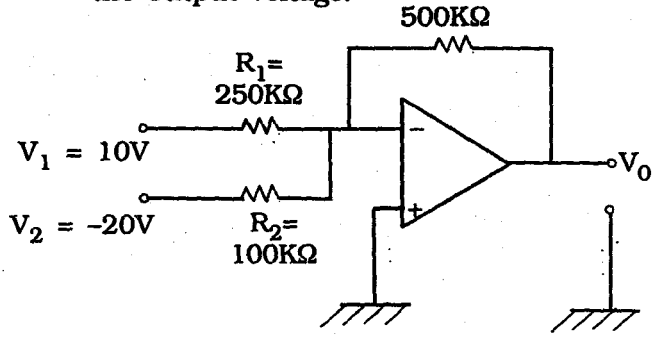


*Fig. Q.(3)(ii)* 7+3

**4.** i) The open loop transfer function of a feedback control system is given by

$$G(s)\,H(s) = \frac{K}{s(s+4)(s^2+2s+2)}$$

Using Routh criteria, determine the range of 'K' for which system will be stable.

ii) For the closed loop control system as shown in Fig. 4(ii), determine the value of 'K' and 'a' such that the system has a damping ratio of 0.7 and undamped natural frequency of 4 rad/s.

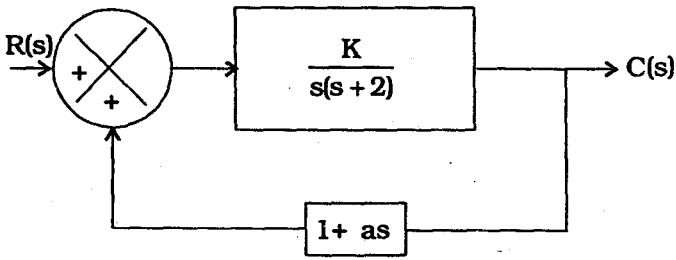


*Fig. Q.(4)(ii)* $5+(2\frac{1}{2}+2\frac{1}{2})$

**5.** i) Draw the block diagram model of Cathode Ray Tube and label it.

ii) a) Draw the schematic diagram of a noise measurement system using differential amplifier.

b) A balanced output source provides a difference signal of 60 mV for a differential amplifier. The noise common to both terminals is 600 mV. The difference gain of the amplifier is 150, while the common mode gain is 0.04.

What is the Signal to Noise ratio? Find the percentage-reduction in noise signal.

(3+1)+(2+2+2)

6. i) Draw the block diagram model of a function generator and explain its operation.

ii) What is wave analyser? Discuss the operation of a tuned circuit harmonic analyser with necessary diagram. (2+3)+(1+4)

Internal Assessment — 10