B. E. 6th Semester (Mech. Engg.) Examination,

May–2013
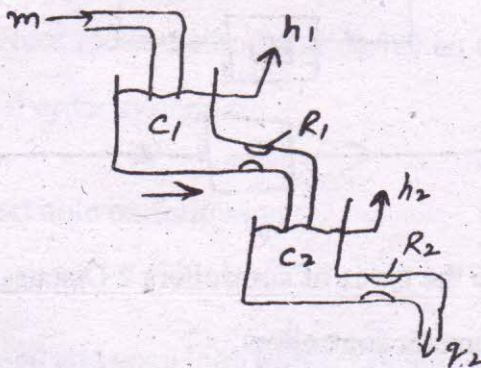
AUTOMATIC CONTROL

Paper–ME-308–E

Time allowed : 3 hours]   [Maximum marks : 100
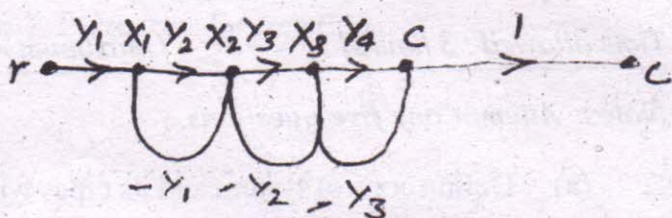
Note : Attempt any *five* questions.

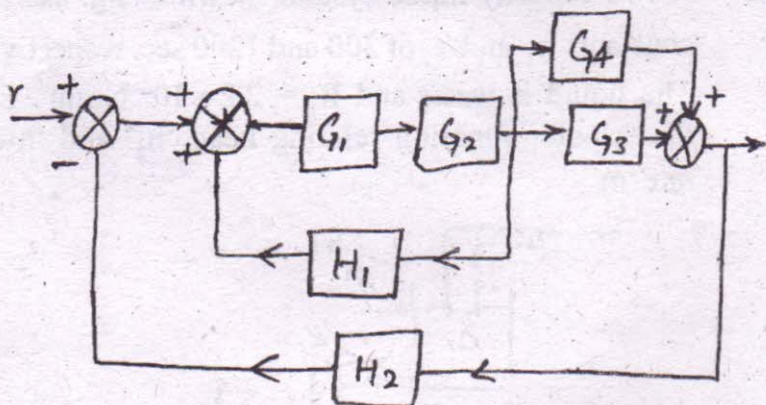1. (a) Define control system and its types with example in brief.   10

    (b) (i) What is mathematical modelling   · 5

        (ii) Write short note on Block diagram represenation.   5

2. A two capacity liquid system shown in fig. has time constants τ_1 and τ_2 of 300 and 1200 sec. respectively. The liquid is water and $R_2 = 2.2 \times 10^6$ NS/m^6. Find the transfer function relating head 'h_2' and inflow rate 'm'.   20

3. (a) A signal flow graph is shown for a system. Derive overall transfer function c/r using Mason's and also block diagram for the system.
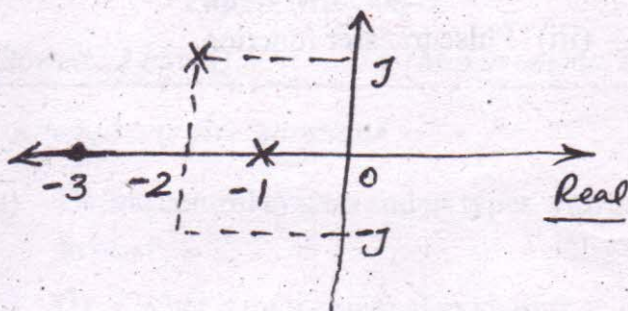

(b) For the block diagram shown in Fig. draw signal flow graph and derive expression for overall transfer function c/r.

4. What are the types of controllers ? Discuss Hydraulic and Pneumatic controllers. 20

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5. (a) Determine the transfer function if the d.c. gain is equal to 10 for the system whose pole zero plot is shown-below :

(b) If the system transfer function is

$$\frac{Y(S)}{X(S)} = \frac{S+4}{S^2+2S+5}$$

obtain the differential equation representing the system.

6. Discuss Root locus method and derive an expression for second order system.   20

7. Write short note on following :

(i) Polar plot

(ii) Closed and open loop transfer function.   20

8. Write short notes on following :

   (i) Nyquist's criterion

   (ii) State space analysis of control system.

   (iii) Pulse transfer function. 20