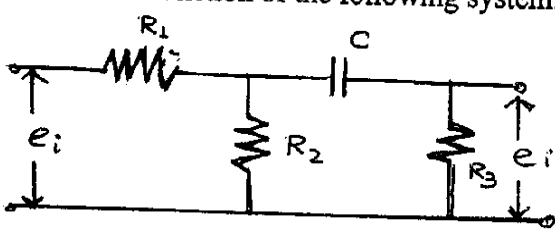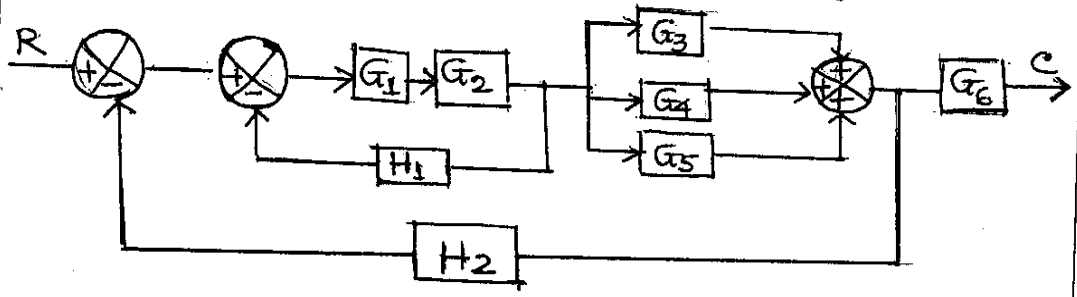# B.E.PRINTING ENGINEERING THIRD YEAR SECOND SEMESTER EXAMINATION-2018

Subject: CONTROL APPLICATION IN PRINTING

Time: Three hours

Full marks: 100

Different parts of the same question should be answered together.

CO1 [10]	Answer any one from (a) and (b) in this block (a) Find the force –voltage analogy of a translational mechanical system. [10] (b) Design the mathematical modelling of a thermal system. [10]
CO2 [20]	Answer any one from (a) and (b) in this block (a)Find the time response of a first order system for unit step signal. Define settling time, peak time and rise time. [11+9] (b)Explain with suitable example pole,zero and order of a system .Draw the pole-zero mapping of the given equation $$\frac{s^2 (s+3)(s-4)}{(s^2+4)(s^2+3s+5)}$$ [9+11]
CO3 [20]	Answer any two from (a) ,(b)and (c) in this block (a)Draw the block diagram of a control system and explain the function of each block.Explain various types of feedback control system and mention the merits and demerits of the system. [5+5] (b) Deduce the transfer function of the following system. [10] (c) Find the transfer function of the given below diagram using lock diagram reduction method. [10]

CO4 [10]	Answer any one from (a) and (b) in this block (a)What do you mean by sensor and transducers and state the difference between them? A resistance strain gauge is used to measure the strain on steel. The steel is stressed at 1400 kgf/cm^2.Calculate % change of resistance if its gauge factor is 2. Take Young's modulus of steel is 2.1×10^6kgf/ cm^2 . [5+5] (b)Define gauge factor of a strain gauge. Derive the expression of the gauge factor of a strain gauge. [2+8]
CO5 [40]	Answer any two from (a) ,(b)and (c) in this block (a) Draw an op-amp based electronic PID controller and derive the transfer function of that controller. Mention the different tuning parameters of a control system. [4+10+6] (b) The characteristic equation for a feedback control system is given by $S^4 + a_1 S^3 + a_2 S^2 + a_3 S + K = 0$.If the numerical values of $a_1 = 22, a_2 = 10$ and $a_3 = 2$,find the values of K for which the system will be stable using ROUTH-criterion. [20] (c) The characteristic equation for a feedback control system is given by $S^4 + 9S^3 + 11S^2 + 6S + K = 0$. Determine the value of K for which the system is absolutely stable and marginally stable. Also determine the frequency of sustained oscillation using ROUTH-criterion. [20]