B.TECH. SEM -V BIO MEDICAL 2014 COURSE (CBCS) :
SUMMER - 2018
SUBJECT : INSTRUMENTATION & CONTROL SYSTEM

Day : **Monday** | **S-2018-2375** | Time : **10.00 AM TO 01.00 PM**
Date : **21/05/2018** | Max. Marks : 60

N. B. :

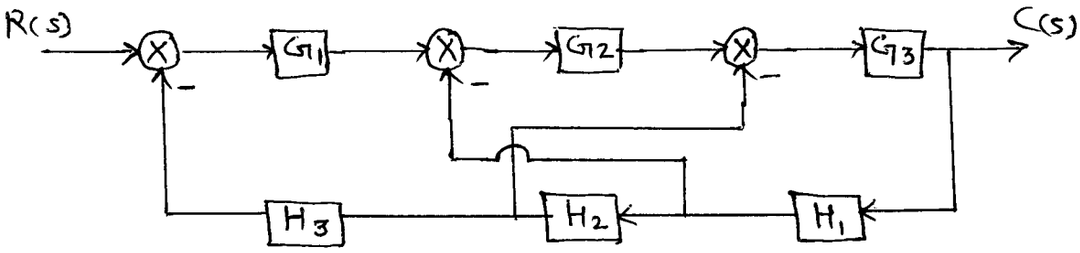
1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non programmable calculator is **ALLOWED**.
4) Draw neat and labeled diagram **WHEREVER** necessary.
5) Assume suitable data, if necessary.

Q. 1 Define: **(10)**

i) System **iii)** Input

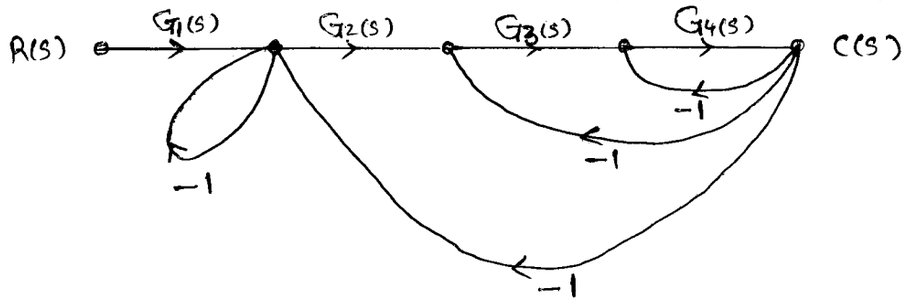
ii) Control system **iv)** Output

Also Find Transfer Function for the block diagram given below:



OR

Q.1 Using Massoin's gain formula find 'Transfer Function' of system given below: **(10)**



Q. 2 a) Explain construction and working principle of Thermocouple. **(06)**

b) A platinum thermometer has a resistance of 100 Ω at 25^0C. **(04)**
Find :

i) its resistance at 65^0C if the platinum has a resistance temperature coefficient of 0.00392/ ^{0}C

ii) If the thermometer has a resistance of 150 Ω, calculate the temperature.

OR

Q. 2 Describe the working principle of LVDT. What is residual voltage? Explain characteristics of LVDT. **(10)**

P. T. O.

Q. 3 **a)** A unity feedback system has $G(s) = \dfrac{K(2s+1)}{s(4s+1)(s+1)^2}$, determine the value of 'K' if the steady state value of error to be less than 0.1 when an input $r(t) = 1 + 5t$ is applied. **(06)**

b) Find K_p, K_v and K_a for a unity feedback system with : **(04)**

$$G(s) = \frac{10(s+3)}{(s+1)(s^2+2s+2)} .$$

OR

Q.3 **a)** Derive expression for Unit step response of First order system. **(06)**

b) The closed loop transfer function of unity feedback system is given by : **(04)**

$\dfrac{C(S)}{R(S)} = \dfrac{10}{s^2+4s+5}$. Determine : ω_n, ξ and $\%M_p$.

Q. 4 Sketch the root locus for system given by : **(10)**

$$G(s)\,H(s) = \frac{K}{s(s+1)(s^2+4s+5)} .$$

OR

Q.4 **a)** State and explain Routh's stability. **(06)**

b) Explain effect of addition of poles and zeros on system stability. **(04)**

Q. 5 Draw Bode plot for the transfer function: **(10)**

$$G(s) = \frac{200(s+2)}{s(s^2+10s+100)} .$$

OR

Q.5 **a)** Describe frequency domain specifications. **(06)**

b) Discuss Nyquist stability criteria. **(04)**

Q. 6 **a)** Describe PLC architecture in detail. **(06)**

b) Explain proportional [P] control action. **(04)**

OR

Q.6 Write type of controllers. Describe On-Off controller in detail. **(10)**

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