K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22

(Autonomous College Affiliated to University of Mumbai)

End Semester Exam

Nov – Dec 2021

B. Tech Program: Electronics and Telecommunication Engineering

Examination: SY Semester: III

Course Code: **1UEXC304** and Course Name: Electronic Instrumentation & Control System

Duration: 03 Hours Max. Marks: 60

Instructions:

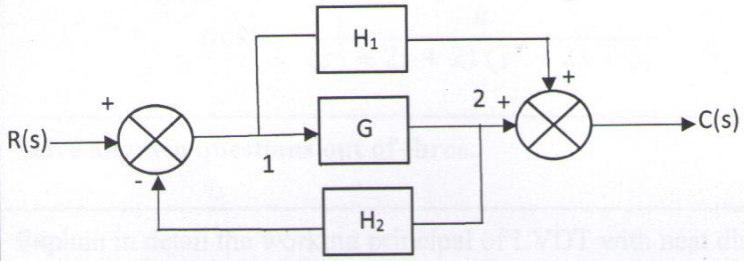
(1) All questions are compulsory.

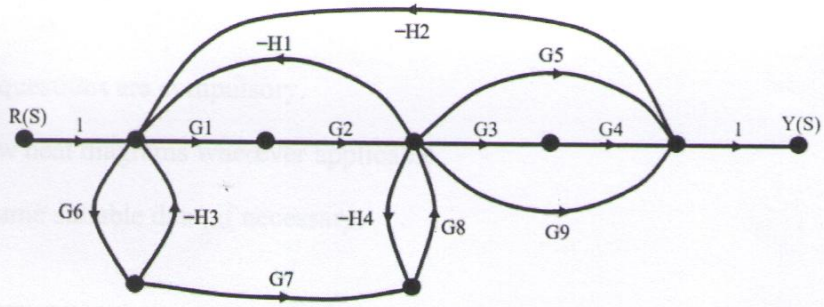
(2) Draw neat diagrams wherever applicable.

(3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	**Solve any six questions out of eight:**	**12**		
i)	List various types of temperature transducers and write the applications of each transducer.	**02**	CO1	R
ii)	How will you select the transducers for our need?	**02**	CO2	U

iii)	Draw the signal flow graph for the following set of equations. $x_2 = x_1 + ax_5$ $x_3 = bx_2 + cx_4$ $x_4 = dx_2 + ex_3$ $x_5 = fx_4 + gx_3$ $x_6 = x_5$	**02**	CO3	Ap
iv)	The open loop transfer function of unity feedback system is given by $G(s) = \frac{50}{(1 + 0.1s)(s + 10)}$ Determine the static error coefficients Kv, and Ka	**02**	CO4	U
v)	State limitations of Routh-Hurwitz criterion.	**02**	CO6	U
vi)	Explain which compensator improves transient response	**02**	CO5	U
vii)	Distinguish between type and order of a system.	**02**	C04	U
viii)	What is polar plot?	**02**	CO5	U
Q.2	**Solve any four questions out of six.**	**16**		
i)	The open loop transfer function of a servo system with unity feedback is given by $G(s) = \frac{10}{(S + 2)(s + 5)}$ Determine the damping ratio, undamped natural frequency of oscillation. What is the percentage overshoot of the response to a unit step input.	**04**	CO5	Ap

ii)	Determine the ratio $\frac{C(s)}{R(s)}$ 	04	CO4	U
iii)	What is cold junction compensation in thermocouples?	04	CO2	R
iv)	Derive an expression for the resistance using Wheatstone bridge for balanced condition.	04	CO1	R
v)	The characteristic equation for certain feedback control system is given below, determine the range of value K for the system to be stable. $S^4 + 20\,KS^3 + 5S^2 + 10s + 15 = 0$	04	CO6	Ap
vi)	Draw the polar plot for given transfer function $G(s) = \frac{10}{s+2}$	04	CO5	Ap
Q.3	**Solve any two questions out of three.**	**16**		
i)	Explain kelvin's double bridge and its application in low resistance measurement.	08	CO1	U
ii)	The output of a control system is $C(t) = 1 + 0.25e^{-50t} - 1.25e^{-10t}$ i) Obtain the expression for closed loop transfer function of the system. ii) Determine undamped natural frequency and damping ratio. Assume unit step input.	08	CO3	Ap

iii)	Sketch the root locus for the system having $$G(S) = \frac{k}{(s^2 + 2s + 2)\,(s^2 + 2s + 5)}$$	**08**	CO5	Ap
Q.4	**Solve any two questions out of three.**	**16**		
i)	Explain in detail the working principal of LVDT with neat diagram and explain its application., also mention the residual voltage role.	**08**	CO2	U
ii)	For the control system whose signal flow graph is shown below, using Mason's formula, find the system transfer function Y(s)/R(s). 	**08**	CO4	Ap
iii)	Draw the Bode plot for a system having $G(s)H(S) = \frac{100}{s(S+1)(S+2)}$ Find out gain margin, phase margin, gain crossover frequency and phase cross over frequency.	**08**	CO6	Ap