Name:

Enrolment No:

UPES
UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, July 2020

Programme Name: M. Tech. RE | **Semester** : II
Course Name : Instrumentation & Process Control of Rotating Equipment | **Time** : 3 hrs
Course Code : CHPD7019 | **Max. Marks** : 100
Nos. of page(s) : 03
Instructions : Assume any missing data. Draw the diagrams wherever necessary.

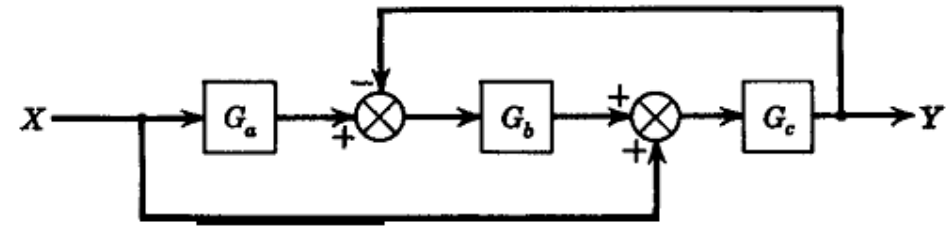
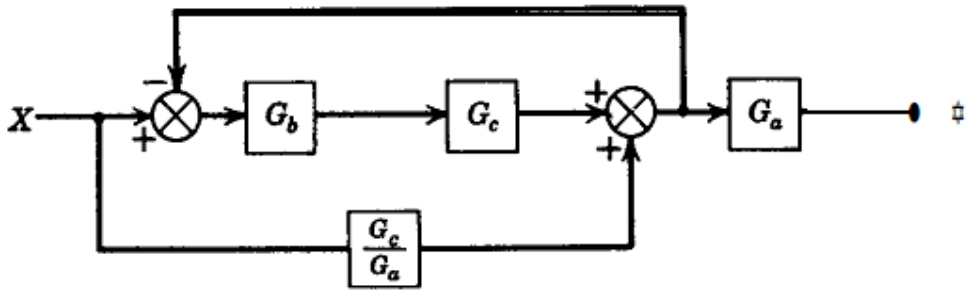
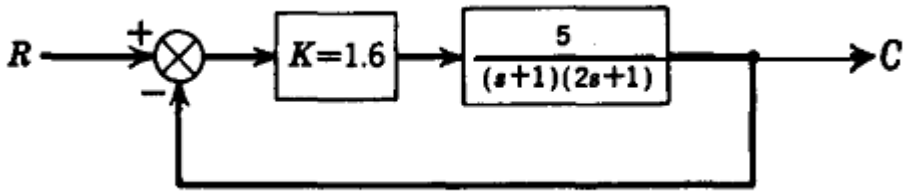
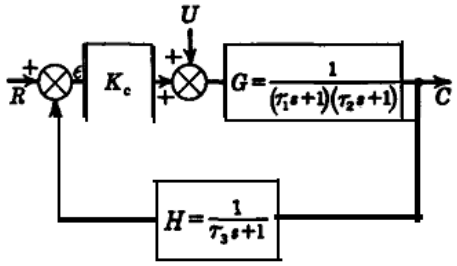
SECTION A
(20 marks)

S. No.		Marks	CO
Q 1	**Outline** the dynamic characteristics of the instruments with appropriate transfer function.	5	CO1
Q 2	**List** the instruments used for the temperature measurement with range.	5	CO1
Q 3	**Describe** the piezo electric instrument with an example.	5	CO2
Q 4	With a neat diagram **explain** the working and principle of optical pyrometer	5	CO2

SECTION B
(40 marks)

Q 5	With a neat diagram **recall** the working of LVDT.	10	CO1
Q 6	A pneumatic PI controller has an output pressure of 10 psi when the set point and pen point are together. The set point and pen point are suddenly displaced by (last one digit of your SAP ID) inch (a step change is introduced in the error), and the following data is obtained. **Calculate** actual gain and integral time.	10	CO2
Q7	**Demonstrate** the control action in various industrial electronic controllers. **OR** **Predict** the offset of proportional integral controller with an example	10	CO3

Time (sec)	-0	+0	20	60	90
Pressure (psig)	10	8	7	5	3.5

Q 8	 (a)  (b) **Determine** the transfer function Y(s)/X(s) for the block diagrams shown above	**10**	**CO3**
SECTION-C **(40 marks)**			
Q 9	The set point is given a change of 0.1 units of step change. Determine the offset. 	**20**	**CO4**
Q10	**Determine** the stability of the system given below for which proportional integral control is used. Use τ_1=1, τ_2=1/2, τ_3=1/4, Kc= last one digit of your SAP ID and (integral time) τ_I=0.25.  **OR** **Illustrate** the root locus for the open loop transfer function $\boldsymbol{G = \frac{K}{(s+1)(2s+1)}}$	**20**	**CO4**