Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, July 2020

Course: Signals & Systems **Semester: IV**
Program: B.Tech ASE+AVE **Time 03 hrs.**
Course Code: ECEG 2010 **Max. Marks: 100**

Instructions:

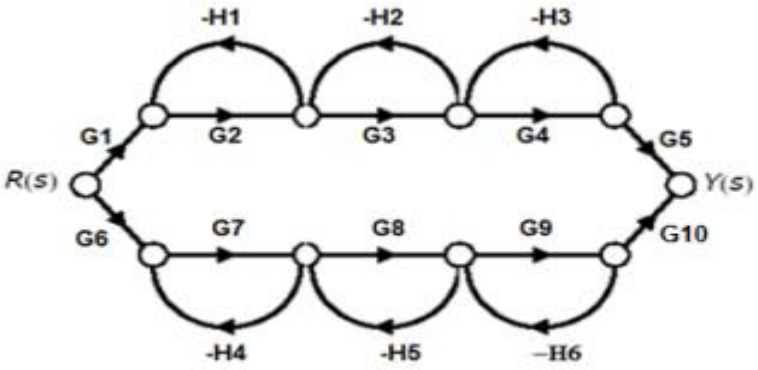
1. **Read the Instruction carefully before attempting**
2. **For Theory based : Type the Answers in word file**
3. **For Figures if any : Draw a free hand sketch and insert the same word file**
4. **For Numerical : Solve it in a paper and insert in the same word file**
5. **Upload as a single word file for all the Question in Blackboard.**

Note : Please upload the word document only, Do not upload PDF and or other format. The answer scripts will be considered for evaluation only through Blackboard. No other mode of submission is acceptable.

SECTION A [Case Based Study] 60 Marks

S. No.		**Marks**	**CO**
Q 1	Derive the transfer function model of second order system. Draw its closed loop schematic diagram. Differentiate between close loop and open loop system behavior. Distinguish between damped and natural frequencies. Classify the systems based on the value of damping coefficient Derive the unit step response for the second order system with the unity step input data. Deduce the relationship for peak overshoot and peak time.	**20**	**CO3**
Q 2	Explain the term "System". Describe its application in practical significant life with one example in brief. Also define the concept of positive and negative feedback system. Derive the relation between input and output for the both feedback systems for the following in positive and negative types of control systems. Forward path transfer function (G) and Feedback transfer function (H) Forward path transfer function (G) and unity feedback.	**20**	**CO 1**
Q 3	Classify the systems based on the value of damping coefficient Derive the unit step response for the second order system with the unity step input data. Deduce the relationship for peak overshoot and peak time. Derive the transfer function model of second order system. Draw its closed loop schematic diagram. Differentiate between close loop and open loop system behavior. Distinguish between damped and natural frequencies.	**20**	**CO 2**

NOTE : The submission time of the Question Paper Answer Sheet is 24 Hhrs from the scheduled time (*exceptional provision due to extraordinary circumstance due to COVID-19 and due to internet connectivity issues in the far-flung areas*).
No Submission will be entertained after 24 Hrs

SECTION B [Numericals and Short Answers] 40 Marks			
Q 4	The characteristic polynomial of a system is $S^7 + 5S^6 + 9S^5 + 9S^4 + 4S^3 + 20S^2 + 36S + 36 = 0$ Determine the location of roots on the s-plane and hence the stability of the system.	**8**	**CO4**
Q5	Determine the stability of a system whose overall transfer function is given below $\frac{C(s)}{R(s)} = \frac{2s+5}{s^5 + 1.5s^4 + 2s^3 + 4s^2 + 5s + 10}$	**8**	**CO4**
Q 6	Tha maximum overshoot for a ufb having its forward path transfer function as *G(s)=K/s(sT+1)* is to be reduced from 60% to 20%. The system input is unit step function. Determine the factor by which *K* should be reduced to achieve aforesaid reduction.	**8**	**CO 3**
Q 7	Derive the transfer function model for the system as shown below using M-G algorithm.  	**12**	**CO 1**
Q 8	Discuss the term Laplace, Inverse Laplace Transform, Z-transforms used for the signals and systems studies	**4**	**CO 2**

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