

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

Course: Process Instrumentation and Control Engineering
Program: B.Tech. - FSE
Course Code: ECEG 3009

Semester: VI
Time : 03 hrs.
Max. Marks: 100

Instructions: Attempt all questions

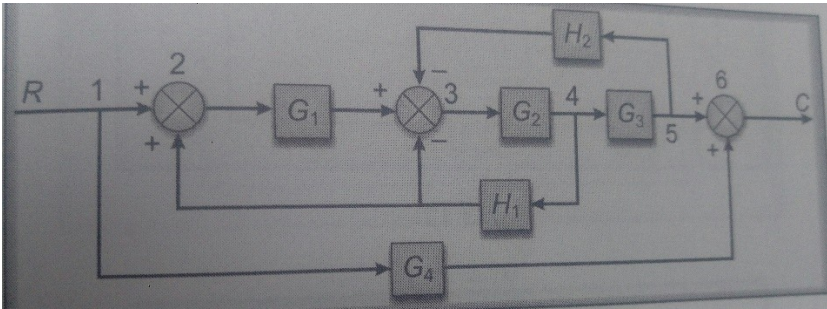
SECTION A

S. No.		Marks	CO
Q 1	What are various sources systematic errors? How do these errors influence the accuracy of measurements?	4	CO1
Q 2	A pressure sensor has a span of 25 to 150 psi. Specify the error when measuring 107 psi, if the accuracy of the gauge is (a) $\pm 1.5\%$ of span (b) $\pm 1.3\%$ of reading	4	CO1
Q 3	Explain pneumatic system of transmission of power in brief.	4	CO1
Q 4	What is the difference between a constant area variable pressure drop flowmeter and a constant pressure drop variable area flowmeter?	4	CO3
Q 5	Classify the following as open or closed loop system a. Missile b. A deep freezer c. Electric lift d. A human operator controlled valve system	4	CO4

SECTION B

Q 6	Compare and contrast a thermocouple with thermistor as a temperature transducer.	10	CO3
Q 7	Draw the block diagram of a refrigerator system in which after setting the desired temperature, the refrigerator is started by use of manual switch. The refrigeration process is controlled by the compressor to have the output temperature as desired temperature.	10	CO2
Q 8	It is not always necessary that all the features of proportional, derivative and integral actions should be incorporated in the controller. Brief a general guideline for selection of Controller mode, as suggested by Liptak	10	CO2
Q 9	With the help of schematic sketch explain a typical Hydraulic Servomechanism.	10	CO4

SECTION-C

Q 10	<p>Find the transfer function for the block diagram shown below:</p>  <p>The block diagram shows a control system with the following components and connections: - Input R splits into two paths: one through summing junction 1 (positive) and another through block G_4 to summing junction 6 (positive). - Summing junction 1 is followed by block G_1. - The output of G_1 goes to summing junction 3 (positive). - Summing junction 3 is followed by block G_2. - The output of G_2 goes to summing junction 6 (positive) and also through block H_1 to summing junction 3 (negative). - The output of G_2 also goes to block G_3. - The output of G_3 goes to summing junction 6 (positive) and also through block H_2 to summing junction 3 (negative). - The output of summing junction 6 is C.</p>	20	CO2
Q 11	<p>Derive the expression of sensitivity of overall transfer function (closed loop) for the following:</p> <ol style="list-style-type: none"> With respect to G With respect to H With respect to K 	20	CO4