Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Term Examination – May 2023

Program: B.Tech APE (Gas) **Semester: VI**
Course: Pipeline Transportation of Oil & Gas **Time: 03 hrs.**
Code: CHGS 3007P
Max Marks :100
Instructions: Assume necessary data if required and Justify

SECTION A (4x5=20)

S. No.	Short Notes	Marks	CO
1	What are the different advantages of using pipelines for transportation, and how do they differ from other modes of transportation?	**4**	**CO1**
2	Illustrate stages of HDD in brief.	**4**	**CO4**
3	Compare the terms "NPSHA" & "NPSHR".	**4**	**CO3**
4	Summarize methods of estimation of friction factor.	**4**	**CO3**
5	What are the basic facilities that are typically found at a receiving terminal for petroleum products, and what are their primary functions?	**4**	**CO1**
	SECTION B (10x4=40)		
6	The head and efficiency versus capacity data for a centrifugal pump with a 10 in. impeller is as shown below. Q, gal/min: 0, 850, 1650, 2450, 3050 H, ft: 3185, 3150, 2950, 2350, 1850 a) The pump is driven by a constant-speed electric motor at a speed of 3600 RPM**.** Determine the performance of this pump with an 12 in. impeller, using Affinity Laws. **(b)** If the pump drive were changed to a variable frequency drive (VFD) motor with a speed range of 3000 to 4000 RPM, calculate the new H-Q values for the maximum speed of 4000 RPM with the original 10 in. impeller.	**10**	**CO3**
7	Categorize leak detection methods & describe in brief.	**10**	**CO5**
8	Illustrate preliminary survey of pipeline route selection.	**10**	**CO4**
9	A certain liquid has a temperature versus viscosity relationship as given: Temp °F: 65, 185 Viscosity (cSt): 755, 30 (a) Show the constants A and B that define the viscosity versus temperature correlation for this liquid Using ASTM equations.	**10**	**CO1**

	(b) Assuming C and D values remains same as in the first case ,what is the estimated viscosity of this liquid at 85°F.?		
SECTION-C (20x2=40)			
10	i) Using the Miller equation determine the pressure drop in a 14 in. diameter,0.250 in. wall thickness, crude oil pipeline at a flow rate of 3000 gal/min. The crude oil specific gravity is 0.825 at 60°F and the viscosity is 15 cSt at 60 °F. ii) A 3 in. (internal diameter) smooth pipeline is used to pump 100 gal/min of water. Using the Hazen-Williams equation, determine the head loss in 3000 ft of this pipe. Assume a C-factor of 140.	**(10+10)**	**CO2**
11	i) Develop a pigging strategy for a hypothetical pipeline project, including a selection of appropriate pig types and operational parameters. Justify your choices and assumptions based on the pipeline's specific requirements and constraints. ii) Discuss design of pigs for pipeline operations, including a detailed description of its construction, features, and functions. Explain how your design addresses specific challenges and limitations of existing pig types, and how it improves the efficiency, safety, and environmental sustainability of pigging operations.	**(10+10)**	**CO5**