Name: **Enrolment No:**	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May - 2023

Course: Pipeline Transportation of Oil & Gas **Semester: VI**
Program B. Tech: CE+RP **Time: 03 hrs.**
Course Code: CHGS 3007P **Max. Marks: 100**

Instructions: Assume suitable and necessary data if required and Justify

SECTION A
(5Qx4M=20Marks)

S.No		Marks	CO
Q 1	What is the Impact of API gravity, Pour point of crude oil to a pipeline transporter?	**4**	**CO1**
Q 2	Determine MAOP of 22" Diameter & 0.281" wall thickness of API-5L grade X - 65 Pipe	**4**	**CO2**
Q 3	What are the components and functions of SCADA systems	**4**	**CO3**
Q 4	State the affinity laws as applicable to centrifugal pumps.	**4**	**CO4**
Q 5	How corrosion can be prevented in pipelines?	**4**	**CO5**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Determine the outlet pressure in a natural gas pipeline, NPS 16 with 0.250 in. wall thickness, 15 miles long. The gas flow rate is 100 MMSCFD at an inlet pressure of 1000 psia. The gas gravity is 0.6 and viscosity is 0.000008 lb/ft-sec. The average gas temperature is 80°F. Assume base pressure as 14.73 psia, base temperature as 60°F and pipeline efficiency of 0.92. (Use Panhandle A equation)	**10**	**CO2**
Q 7	Discuss the pre-construction surveys required for a pipeline project and the land acquisition procedure	**10**	**CO3**
Q 8	The following parameters were observed during performance testing of pump: Flow rate : 78 m^3/hr; Discharge head : 50 m; Suction head : 3 m below pump center line Measured power : 16 kw ; Motor Efficiency: 90%. Determine pump efficiency	**10**	**CO4**
Q 9	Explain in detail impressed current C.P system and sacrificial anode system for protecting a pipeline?	**10**	**CO5**

SECTION-C
(2Qx20M=40 Marks)

Q 10	Crude oil is to be transported from an oil field to a refinery, located 600 kilometers away from the source through a steel pipeline 400 mm diameter. The difference in level between the two is negligible. Determine theoretically power required to overcome friction in line. Since maximum allowable pressure in any section of the line is 300 N/cm^2 it will be necessary to insert additional pumping stations at suitable intervals along the line. Each station increases the pressure which drop to 170 N/cm^2 at the inlet to the next pumping station. How many pumping stations are required? Data: Viscosity of Crude Oil = 47 cP, Specific Gravity of Crude oil = 0.87 Flow rate = 300 m^3/hr. Friction Factor = $0.0014 + 0.125/Re^{0.32}$	**20**	**CO4**
Q 11	a. Discuss in detail the various types of pigs used in cross country pipelines. b. Describe with neat sketch pig launching and receiving procedures.	**10+10**	**CO5**

END