UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Term Examination – December 2022

Program: B.Tech APE (Gas) **Semester: V**
Course: Introduction to City Gas Distribution **Time: 03 hrs.**
Code: CHGS 3023
Max Marks :100
Assume data if necessary

SECTION A (4x5=20)

S. No.	Short Notes	Marks	CO
1	A natural gas mixture consists of 84% Methane, 10% Ethane, & 6% Propane. Calculate pseudocritical temperature & pressure. $$T_{pc} = 170.491 + 307.344\,G$$ $$P_{pc} = 709.604 - 58.718\,G$$	4	CO1
2	Illustrate common measurement problems in metering system in brief	4	CO3
3	Summarize auxiliary devices used in CGS	4	CO2
4	Outline applications of Network analysis for gas system?	4	CO4
5	Evaluate different reasons of air emission in gas pipeline?	4	CO5

SECTION B (10x4=40)

7	Identify applications of natural gas in electricity sector in detail	10	CO1
8	Evaluate 'Meters used in CGD'.	10	CO3
9	Describe CNG filling stations	10	CO2
10	A natural gas transmission line transports 4.2 million m3/day of gas from a processing plant to a compressor station site 120 km away. The pipeline can be assumed to be along a flat terrain. Calculate the inlet pressure. The delivery pressure desired at the end of the pipeline is a minimum of 5500 kPa. 400mm is OD and thickness is 10mm. Absolute roughness is 0.02mm and viscosity = 0.000119 Poise. Assume a pipeline efficiency of 0.92. The gas gravity is 0.60, and the gas temperature is 18°C. considering a base temperature = 15°C and base pressure = 101 kPa. The gas compressibility factor $Z = 0.90$. Use Panhandle A and Panhandle B. Comment in your result.	10	CO2

$$Q = 4.5965 \times 10^{-3} E \left(\frac{T_b}{P_b} \right)^{1.0788} \left(\frac{P_1^2 - e^s P_2^2}{G^{0.8539} T_f L_e Z} \right)^{0.5394} D^{2.6182}$$

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SECTION-C (20x2=40)

11	i) Evaluate industry specific impacts on society due CGD activities? Suggest recommendations to overcome these issues.	**10**	**CO5**
	ii) Derive equation for temperature gradient in pipeline	**10**	**CO5**
12	Solve following network by Hardy cross method.	**20**	**CO4**