

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Term Examination – December 2019

Program: B.Tech APE (Gas)
Course: City Gas Distribution and Pipeline Network Analysis
Code: CHGS 3001
Max Marks :100
Assume date if necessary

Semester: V
Time: 03 hrs.

SECTION A (20)

1	What are applications of natural gas in residential and commercial sectors	05	CO1
2	List different valves used in CGD and their functions.	05	CO3
3	Develop a diagram of knockout drum and explain in brief.	05	CO2
4	Explain operational preparedness in CGD	05	CO5

SECTION B (40 Marks)

5	Examine industry specific impacts on environment due to CGD activities	10	CO5
6	Describe facilities at DRS with diagram	10	CO2
7	Explain advantages of CNG in detail	10	CO2
8	A natural gas transmission line transports 4 million m ³ /day of gas from a processing plant to a compressor station site 100 km away. The pipeline can be assumed to be along a flat terrain. Determine the minimum pipe diameter required such that the maximum pipe operating pressure is limited to 8500 kPa. The delivery pressure desired at the end of the pipeline is a minimum of 5500 kPa. Assume a pipeline efficiency of 0.92. The gas gravity is 0.60, and the gas temperature is 18°C. Use the Weymouth equation and panhandle A equation, considering a base temperature = 15°C and base pressure = 101 kPa. The gas compressibility factor Z = 0.90. i) Weymouth Equation ii) Panhandle A Equation and conclude your result	10	CO1

$$Q = 3.7435 \times 10^{-3} E \left(\frac{T_b}{P_b} \right) \left(\frac{P_1^2 - e^f P_2^2}{GT_f L_e Z} \right)^{0.5} D^{2.667}$$

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

SECTION-C

9 Discuss design aspects of steel grid network in detail

20

CO3

10 Natural gas is supplied through a low-pressure distribution pipe 1200m in length with an initial pressure 50 mbar (gauge) at A and a final pressure of 30mbar at B. It is required to increase the flow rate by 20%, 40 %, 60 %, 80 % and 100% by reinforcing the existing pipe with parallel Pipe of the same diameter as the original pipe. What length of reinforcement pipe must be installed if the pressure drop is to remain unchanged?
Plot a graph of capacity vs reinforcement and conclude your results.

20

CO4

Or

Determine flow rate in each pipe by using Hardy Cross Method. Use maximum three iterations.

20

CO4

