

Roll No



**PRESIDENCY UNIVERSITY  
BENGALURU**

**SET B**

**SCHOOL OF ENGINEERING  
END TERM EXAMINATION – MAY / JUNE 2024**

**Semester :** Semester VIII - 2020

**Course Code :** PET3010

**Course Name :** Natural Gas Production Engineering

**Program :** B.Tech.

**Date :** June 03, 2024

**Time :** 01.00pm - 04.00pm

**Max Marks :** 100

**Weightage :** 50%

**Instructions:**

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

**PART A**

**ANSWER ANY FIVE QUESTIONS**

**5QX2M=10M**

1. State the general differential equation governing the gas flow in tubing. (CO3) [Knowledge]
2. State two methods which is used to solve TPR equations (CO3) [Knowledge]
3. Outline the basic classification of chokes. (CO3) [Knowledge]
4. State the different dehydration procedures used in the industry. (CO4) [Knowledge]
5. State the instruments generally used for natural gas metering. (CO4) [Knowledge]
6. State the different types of glycols used in dehydrating the natural gas. (CO4) [Knowledge]
7. Distinguish between wet gas and dry gas. (CO4) [Knowledge]

## PART B

### ANSWER ANY FIVE QUESTIONS

5QX10M=50M

8. Estimating bottom hole pressure is a fundamental aspect of drilling and reservoir management, impacting safety, efficiency, and profitability throughout the lifecycle of an oil or gas well. Discuss the steps involved in estimating pressure profile of gas well by average temperature and compressibility factor method with relevant expressions.
- (CO3) [Comprehension]
9. The considerations for chokes in handling dry gas flow may differ slightly from those for wet gas or multiphase flow, they remain a critical component of production operations. Chokes play a key role in regulating flow rates, controlling pressure, maintaining wellbore stability, preventing hydrate formation, and minimizing erosion and corrosion in dry gas production systems  
Discuss about dry gas flow in a choke for both Sonic and subsonic flow with expressions for estimating flow rate.
- (CO3) [Comprehension]
10. The importance of chokes in oil and gas production cannot be overstated. They play a critical role in optimizing production rates, controlling pressure, separating fluid phases, preventing operational issues, and ensuring the safe and efficient operation of wells and production facilities.  
Discuss and state different types of flow in a choke. Explain the criteria for a flow to be classified as Sonic flow or subsonic flow in detail.
- (CO3) [Comprehension]
11. Selection of the appropriate acid gas removal method depends on factors such as the concentration of acid gases in the feed gas, desired purity specifications, flow rates, operating conditions, and economic considerations. Discuss iron sponge sweetening & alkanol-amine sweetening of natural gases in detail.
- (CO4) [Comprehension]
12. Turbine meters and Elbow meters are both valuable tools used in industrial applications for measuring the flow rate of natural gas. Discuss in detail Turbine meter & Elbow meter.
- (CO4) [Comprehension]
13. The choice of dehydration method depends on various factors. Each method has its advantages and limitations, and proper design, operation, and maintenance are essential for ensuring effective dehydration of natural gas. Explain the methodology of dehydration of natural gases by cooling and compression followed by cooling.
- (CO4) [Comprehension]
14. Glycol/Amine process and the Sulfinol process are effective methods for removing acid gases from natural gas streams. Each process has its advantages and limitations, and proper design and operation are essential for achieving optimal performance. Discuss Glycol/Amine Process & Sulfinol Process for natural gases in detail.
- (CO4) [Comprehension]

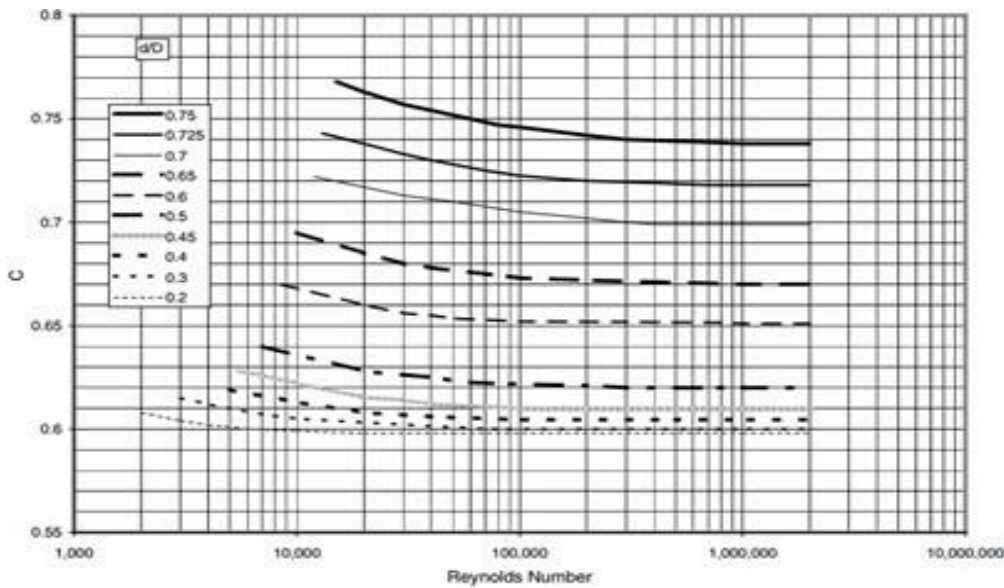
PART C

ANSWER ANY TWO QUESTIONS

2QX20M=40M

15. A 0.6 specific gravity gas flows from a 2-in pipe through a 1-in orifice-type choke. The upstream pressure and temperature are 800 psia and 75 °F, respectively. The downstream pressure is 200 psia. The gas-specific heat ratio is 1.3.

1. What is the expected daily flow rate?
2. Does heating need to be applied to assure that the frost does not clog the orifice?



(CO3) [Application]

16. Sketch and explain the process of dehydration by Adsorption (solid desiccant dehydration) with flow diagram. Also state the advantages and disadvantages of using dehydration by the adsorption process.

(CO4) [Application]

17. Explain the different problems that arises while drilling and completion of a gas well.

(CO1) [Application]