

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(End SEMESTER EXAMINATION SP2023)

CLASS: B. TECH
BRANCH: CHEMICAL/CHEMICAL P&P

SEMESTER: VI
SESSION: SP/2023

SUBJECT: CL330 NATURAL GAS ENGINEERING

TIME: 03 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data handbook/Graph paper etc. to be supplied to the candidates in the examination hall.
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Q.1(a) Write the difference between proved reserve and potential resources of natural gas reserves.	[2]	1	1
Q.1(b) A natural gas consists of the following (molar) composition: C ₁ = 0.871, C ₂ = 0.084, C ₃ = 0.023, CO ₂ = 0.016 and H ₂ S = 0.006. Calculate the gas gravity to air.	[3]	1	3
Q.1(c) Calculate the pseudo real pressure at 900 psia using following data:	[5]	1	3

Pressure (psia)	Gas viscosity (cP)	Compressibility (Z)
0	0	0
150	0.01238	0.9856
300	0.01254	0.9717
450	0.01274	0.9582
600	0.01303	0.9453
750	0.01329	0.9332
900	0.01360	0.9218

Q.2(a) Write briefly about inflow performance, wellbore performance, and choke performance relationship for a gas well.	[2]	2	1
Q.2(b) Discuss the various pressure approaches with a neat diagram for inflow performance relationship.	[3]	2	2
Q.2(c) Using the following data: downstream pressure: 300 psia, Choke size: 32 1/64 in, Flowline ID: 2 in, Gas production rate: 2500 Mscf/d, Gas specific gravity = 0.75, Gas specific heat ratio = 1.3, Upstream temperature = 110° F, Choke discharge coefficient = 0.99, check whether the flow is sonic or subsonic flow. Also calculate upstream pressure at choke using sonic flow equation.	[5]	2	3
Q.3(a) Write the reasons why gases are compressed in multistage.	[2]	3	1
Q.3(b) Write the advantages and disadvantages of membrane systems of removing acid gases in a gas treatment plant.	[3]	3	1
Q.3(c) Explain the process flow diagram for removing acid gases using primary amine with the help of a neat diagram.	[5]	3	3
Q.4(a) What is retrograde condensation, and why is it important in gas processing?	[2]	4	1
Q.4(b) Write the problems which arise due to presence of oxygen a low concentration in gas processing.	[3]	4	1
Q.4(c) Explain with a neat diagram for regenerated caustic Merox™ process for treating sour products.	[5]	4	3
Q.5(a) Write the names of the unconventional categories reserves of natural gas.	[2]	5	1
Q.5(b) Why are gas hydrates such a potential problem and how are the problems minimized?	[3]	5	1
Q.5(c) Explain the Coal Bed Methane (CBM) production in detail. What are the major differences between CBM and conventional gas production?	[5]	5	3

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