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Bengaluru

Mid Term Examinations - October 2026

Date: 05/10/2026 **Time:** 11:45 AM - 01:15 PM

Course Code: PET3010 **Course Name:** Natural Gas Production Engineering

Semester: Seventh Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2
Marks	26	64

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Differentiate gas wells and condensate wells based on their gas oil ratio (GOR).	2	CO1	BT2
2	Describe the factors responsible for an increase in the casing pressure in gas wells.	2	CO1	BT2
3	Describe in detail how smaller tubing can overcome the liquid loading in gas well production.	2	CO1	BT1
4	Define nodal analysis and state its purpose in petroleum production systems.	2	CO2	BT1
5	State any four different flow regimes in the production string of the hydrocarbon reservoir.	2	CO2	BT1

PARTB: Answer Any 1 Following Questions. 20 M

Q.N.	Questions	M	CO	BT
06.A	A 0.71 specific gravity natural gas contains 0.09, 0.08, and 0.02 mole fractions of nitrogen, carbon dioxide, and hydrogen sulfide, respectively at a reservoir average pressure of 3600 psia and temperature of 182 °F. Then, predict the gas viscosity of the gas.	10	CO1	BT2
06.B	A gas well with a diameter of 7.875-inches is used to produces the gas from the above-mentioned reservoir. Which drains the gas from a 78-ft thick pay zone in an area of 192 acres, with an effective average permeability of 0.17 mD. Assuming a Darcy skin factor of 5 and a non-Darcy coefficient of 0.001 day/Mscf, then, determine the desired well bottom hole pressure to be maintained under pseudo-steady state flow condition, in-order to maintain gas reservoir deliverability at 1037 Mscf/day.	10	CO2	BT3
07.A	A natural gas consists of the following gas composition: C_1 = 0.871, C_2 = 0.084, C_3 = 0.023, CO_2 = 0.016 and H_2S = 0.006. Then compute the specific gravity, and pseudo reduced properties at 10000 psia, and 180 ^{o}F (consider MW_{air} as 28.97gm/mole).	10	CO1	BT2

07.B	The following information was acquired from the isochronal test of a gas reservoir with an average pressure and temperature of 5000 psia, and 178 °F, respectively. The following data's are observed: Data point 1: Gas Flowrate (Mscf/day): 1254 Bottom hole Pressure (psia): 3650 Data point 2: Gas Flowrate (Mscf/day): 1632 Bottom hole Pressure (psia): 2460 Then, calculate the gas reservoir deliverability (using average pressure, Forchheimer model) at bottom hole pressure of 3530 psia.	10	CO2	BT3

PARTC: Answer Any 1 Following Questions. 20 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
08.A	When a flow after flow test was performed on a gas reservoir with an average pressure and temperature of 4850 psia, and 192 °F, respectively. The following data's are observed: Test Point 1.: Gas Flowrate (Mscf/day) 1240; Bottom hole Pressure (psia) 3315 Test Point 2.: Gas Flowrate (Mscf/day) 1632; Bottom hole Pressure (psia) 2450 Then, predict the gas reservoir deliverability (using average pressure, Back pressure model) at bottom hole pressure of 2800 psia.	10	CO2	BT3
08.B	Determine the gas reservoir deliverability for the above-mentioned reservoir at the following bottom hole pressure (psia) conditions and construct the IPR (Inflow Performance Relationship) curve: 4850, 4000, 3500, 3315, 2800, 2450, 1800, 1200, and 700 psia.	10	CO2	BT3
09.A	A vertical well produces a natural gas with specific gravity of 0.68 and average gas compressibility factor of 0.897, through a 2.259-in tubing set to the top of a gas reservoir at a depth of 9,000 ft. At tubing head, the pressure is 840 psia and the temperature is 150 °F, the bottom hole temperature is 200 °F. The friction factor of the tubing is about 0.0174. Calculate the bottom hole pressure of the well for the following expected gas production rates and construct the TPR (Tubing flow Performance Relationship) curve: 308, 650, 1050, 1330, 1625, and 1800 Mscf/day. (answer should include at least one complete sample calculation)	10	CO2	BT3
09.B	Similarly, calculate the IPR (In-flow Performance Relationship) curve for the above mentioned data. With the help of following additional data: Reservoir pressure: 2,000 psia IPR model parameter C: 0.016 Mscf/d-psi^{2}n IPR model parameter n: 0.78 Then, choose the optimum operation bottom hole pressure and flowrates of the gas well. (answer should include at least one complete sample calculation of IPR point)	10	CO2	BT3