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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	Based on GOR ratio: Gas well: GOR ratio > 100,000 scf/stb (1 mark) Condensate well: GOR ratio is in between 100,000 to 5,000 scf/stb (1 mark)	2	CO1	BT2
2	The possible reasons are hole(s) in the tubing caused tubing casing communication: Packer seal leak (1 mark) Poor cementing job (1 mark)	2	CO1	BT2
3	The reduced area forces the same volume of gas to travel at a much higher velocity. If this velocity exceeds the critical velocity, the gas regains the kinetic energy needed to frictionally drag the liquids out of the well. (2 marks)	2	CO1	BT1
4	The systematic analysis for determination of fluid production rate and pressure at a specified node is called Nodal analysis. (1 mark) Its purpose is to find the pressures at differnt points in the flow directions. (1 mark)	2	CO2	BT1
5	1. Churn flow 2. Mist flow 3. Anular flow 4. Bubble flow 5. Slug flow Each correct flow regime carries 0.5 marks (4X0.5 = 2 marks)	2	CO2	BT1

PARTB: Answer Any 1 Following Questions. 20 M

Q.N.	Questions	M	CO	BT
06.A	For summarizing given data (1 mark) For determining: μ_{1HC} = 0.0119 cP (1 mark) μ_{1N2} = 0.00075 cp (1 mark) μ_{1CO2} = 0.00039 cP (1 mark) μ_{1H2S} = 4.9347E^{-05} cP (1 mark) μ_1 =0.013137 cP (1 mark) Pseudo critical properties P_{PC} = 696.764 psia; T_{PC} = 366.357 ^{o}R. (1 mark) Pseudo reduced properties P_{PR} = 5.1706; T_{PR} = 1.7498(1 mark) μ_r = 1.0396 cP (1 mark) μ_{gas} = 0.02129 cP (1 mark)	10	CO1	BT2

ANSWER KEY

06.B	Calculating the following properties: z-factor = ~0.885 (1 mark) Formation volume factor (B_g) = 7.95 E^{-4} rb/scf (2 mark) Well bore radius = 0.3289 ft (1 mark) Drainage radius = 1632 ft (1 mark) Using appropriate formula and procedure (3 marks) Gas well bore pressure = ~1081 psia (2 marks)	10	CO2	BT3
07.A	Summarizing the given data (1 mark) Determining the following: Product of $Y_i * MW_i$ (3 marks) sum($Y_i * MW_i$) = 18.4197 g/mole Specific gravoty = sum($Y_i * MW_i$)/MW_{air} = 0.64 (1 mark) Psudo critical properties P_{PC} = 696.231 psia(1 mark) T_{PC} = 366.699 ^oR (1 mark) Psudo reduced properties P_{PR} = 14.36697656 (1 mark) T_{PR} = 1.749854786 (1 mark)	10	CO1	BT2
07.B	Summarizing the given data (1 mark) Using proper corelation (i.e. Forchheimier Model to detrmine constants A, B and flowrate Q) (2 mark) B = 6.08 (2 marks) A = 1687.55 (2 marks) Q = ~1303 Mscf/day (3 marks)	10	CO2	BT3

PARTC: Answer Any 1 Following Questions. 20 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
08.A	Summarizing the given data (1 mark) Using proper corelation (i.e. Avg. Pressure, Back pressure Model to determinne costants C, n, and fowrate Q) (2 marks) n = 0.82 (2 marks) C = 0.0018 (2 marks) Q = ~1490 Mscf/day (3 marks)	10	CO2	BT3
08.B	Determining the Q at given P_{wf}: (8 marks) Pwf (psia) Q (Mscf/d) 4850 0 4000 815.8405 3500 1136.74 3315 1240 2800 1490.247 2450 1632 1800 1840.211 1200 1973.109 700 2042.457 Ploting graph of the above data (2 marks)	10	CO2	BT3

ANSWER KEY

09.A	Summarizing the given Data (1 mark) Calcuating S = 0.482195 (1 mark) One sample calculations (2 marks) Determining the P_{wf} at given Q: (5 marks) TPR q (Mscf/d) Pwf (psia) 308 1028.834 650 1033.141 1050 1042.023 1330 1050.654 1625 1061.838 1800 1069.461 Ploting graph of above data (1 mark)	10	CO2	BT3
09.B	Summarizing the given Data (1 mark) One sample calculations (2 marks) Determining the P_{wf} at given Q: (5 marks) IPR q (Mscf/d) Pwf (psia) 308 1920.658 650 1785.94 1050 1581.533 1330 1403.813 1625 1173.223 1800 1004.421 Ploting graph of the above data (1 mark) Identifying optimum Q = ~1700 Mscf/day and P_{wf} = ~1050 psia, from ploted graph and reprting (1 mark)	10	CO2	BT3

ANSWER KEY