

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Natural Gas Engineering
Program: B. Tech (APEU)
Course Code: CHCE3001

Semester: V
Time 03 hrs.
Max. Marks: 100

Instructions:

1. All questions are compulsory and marks of each question are indicated against each question.
2. Illustrate your answers with suitable sketches and diagrams, wherever considered necessary
3. Assume suitable data, if necessary

SECTION A

S. No.		Marks	CO
Q 1	Classify the natural gas based on the nature of occurrence.	04	CO1
Q 2	Explain the law of corresponding state.	04	CO2
Q 3	a) What are the desirable traits for a compressor? b) For a reciprocating compressor, is volumetric efficiency the same as compression efficiency? Why?	04	CO3
Q 4	a) Define rangeability with example b) What is the function of straightening vanes?	04	CO4
Q 5	Write the advantages and disadvantages of vertical separator.	04	CO5

SECTION B

Q 6	Define the following: a) Natural Gas Price Benchmark b) Heating value of Natural Gas. c) Flammability limit of Natural Gas. d) Compressibility Factor.	2.5x4	CO1
Q 7	a) Explain in detail P-T phase diagram for a variable composition. b) Elaborate on the procedure to reconstruct the bubble-point and dew-point curve.	5x2	CO2
Q 8	Explain the various steps showing various strokes and valve arrangement in a single-stage reciprocating compressor cycle.	10	CO3

Q 9	a) With the help of a diagram, discuss the venturimeter for flow measurement. b) Analyze the common measurement problems encountered in gas metering system.	5x2	CO4
SECTION-C			
Q 10	a) A well stream with the following composition: C ₁ -35%, C ₂ -25%, C ₃ -15%, C ₄ -10%, C ₅ -8%, C ₆ -4%, C ₉ -3%, passes through a three-stage separation process. Find the optimum second-stage pressure using equal pressure ratio assumption, if the inlet pressure is 800 psia b) Elaborate on the basic factors that must be considered in designing separators.	10x2	CO5
Q 11	Define the following: a) Viscosity of Gases b) SBHP c) Compression Process d) Orifice Meters	5x4	CO1+ CO2+ CO3+ CO4