UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End-Semester Examination, December 2021

Course: Unconventional Gas Resources   Semester: VII
Program: APE (Gas)   Time : 3 hrs
Course Code: CHGS3002P   Max. Marks: 100
Instructions: The exam is closed book and closed notes. Use of unfair means will be severely dealt with.
ATTEMPT ALL QUESTIONS

SECTION A			
S. No.		Marks	CO
1	What is the main distinction between Type 1 and Type 2 adsorption isotherms?	4	CO1
2	How are naturally fractured reservoirs modelled for applications in the industry?	4	CO2
3	What is the mathematical model used for Knudson diffusion?	4	CO2
4	State the important features of a tetrakaidecahedron cage.	4	CO4

5	Define triple point and calculate its degree of freedom for:
	   a. A pure component
	   b. A binary mixture
		4	CO3

SECTION B			

1	Derive the equation and state the technique used to calculate the different parameters of:
	   a. The Langmuir adsorption isotherm
	   b. The BET adsorption isotherm
		10	CO3

2	Describe the pressure-temperature and pressure-composition diagram of the methane-water system	10	CO2
3	State and explain the primary difference of transport mechanism of natural gas in a micro-pore and in a naturally occurring fracture.	10	CO2
4	Derive the equation used for the purpose of calculating the density of gas hydrates.	10	CO4
SECTION C			
1	Describe, in detail, the experimental technique used for construction of the adsorption isotherm of a coal sample	20	CO3
2	Make a detailed calculation of the amount (in Sm3) of natural gas that can be obtained from 1 kg of pure methane hydrate having a molecular weight of 17.6H kg/kg-mol, where H is the last digit of your roll number. Take the ideal gas constant to be equal to 8.314 J mol^{-1} K^{-1}.	20	CO4