

Enrollment No: \_\_\_\_\_

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**B. Tech Mid Semester Exam**

Semester: 8<sup>th</sup>

Subject Code: (203120451)

Subject Name: (Unconventional Energy Resources)

Date: (31/01/2024)

Time: (1hr: 30min)

Total Marks: 40

Sr. No.		Marks
Q.1	(A) Five One-line Questions (1) What is coal rank? Explain it in short. (2) Define gas hydrate? Explain stable conditions of gas hydrate? (3) Explain basic difference between conventional gas and un-conventional gas in short? (4) Define the composition of coal gas? (5) Write down the forces causes oil retained in the reservoir?	05
	(B) Five Fill in the blanks (1) _____ m <sup>3</sup> of gas is generated for each ton of coal while maturation from peat to lignite? (2) The particular characteristics of heavy oils are mainly attributed to a _____ process? (3) With pressurization, gas hydrate remains stable at temperature up to _____? (4) Gas hydrate formation is usually described as a crystallization process with nucleation _____ agglomeration _____? (5) In chemical structure of water molecules, the HOH angle in degree _____ and OH bond length is _____?	05
Q.2	Attempt any four (Short Questions)	12
	(1) Define any three from the following. (a) Clathrates and crystalline clathrate solids (b) Storage of hydrogen in clathrates (c) Process of gas transport mechanism in CBM reservoir (d) Porosity system in the coal bed methane reservoir	
	(2) What do you mean by heavy oil? Explain, on the basis of which parameters we can define the heavy oil? Define the generation of heavy oil?	
	(3) What is the storage mechanism of methane in the coal bed methane reservoir? Explain it in short. Define the physical properties of coal briefly?	

	(4) What is stability of gas hydrate and hydrate stability regions? Explain the following. (a) Pressure-Temperature diagram of CO <sub>2</sub> (b) Methane hydrate stability curve	
	(5) Define the following with diagram. (a) Biogenic gas (b) Thermogenic gas (c) Microbial gas	
Q.3	Attempt any two questions	08
	(1) What do you mean by coal bed methane (CBM)? Explain generation of methane? Define the geological basis of coal formation?	
	(2) What is production and recoverability technology for gas hydrate? Define the following extraction method for methane hydrate. (a) Thermal stimulation (b) Depressurization (c) Chemical inhibitor	
	(3) What are the basic differences between conventional gas reservoir and coal bed methane reservoir? Explain in detail with necessary examples.	
Q.4	(A) What do you mean by macerals? Explain different types of macerals group in detail with examples? The fixed carbon percentage at atmospheric temperature and pressure was found to be 50% accompanied by 15% ash and 10 % moisture. Estimate the vitrinite reflectance percentage of the coal.	05
	(B) What is the concept of gas hydrate origin and formation? Explain the different types of gas hydrate structure in detail?	05
	OR	
	(B) What are laboratory studies for CBM prospect evaluation? Define the following in detail. (1) Proximate analysis (2) Ultimate analysis	05