Code No: 158BX

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year II Semester Examinations, July/August - 2022
NATURAL GAS HYDRATES AND COAL BED METHANE
(Petroleum Engineering)

Time: 3 Hours **Max.Marks:75**

Answer any five questions
All questions carry equal marks
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1.a) Discuss the sources and uses of natural gas.
b) Explain the importance of water molecules in the formation of hydrates.
c) Describe the chemical structure and physical properties of Type II hydrates. [5+5+5]

2.a) What are Type H hydrates? Explain the three types of cages used for the construction of Type H hydrates.
b) Describe the concepts of K-factor method to predict the conditions for the formation of hydrates. [7+8]

3.a) Discuss the mechanism of two steps hydrate formation process from a thermodynamic point of view.
b) Using Ng and Robinson model, explain the calculation steps for hydrate formation in equilibria with a hydrocarbon liquid. [7+8]

4.a) State and explain the concepts of Hammerschmidt equation.
b) Discuss the estimation of heat loss from a buried pipeline using the fundamental principles of heat transfer. [5+10]

5.a) Compare the heat capacity, thermal conductivity and mechanical properties of hydrates and ice.
b) Describe the estimation for water content of sweet natural gas using McKetta – Wehe Chart. [6+9]

6.a) Discuss the dehydration of natural gas by: molecular sieves method and triethylene glycol (TEG) process.
b) Explain the equilibrium calculations for system containing acid gas and water using equilibrium computer program. [10+5]

7.a) Discuss the geological factors influencing the formation of coal.
b) Explain the mechanism of cleat system formation in coal bed methane (CBM) process. [7+8]

8.a) Describe the principle of adsorption and construction of adsorption isotherm for methane recovery in coal seams .
b) Explain the methods of analyzing gas flow and enhanced recovery in coal reservoirs. [8+7]

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