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PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2023

Semester : Semester V - 2020
Course Code : PET3009
Course Name : Sem V - PET3009 - Natural Gas Reservoir Engineering
Program : B.Tech. Petroleum Engineering

Date : 16-JAN-2023
Time : 9.30AM - 12.30PM
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.

PART A

ANSWER ALL THE TEN QUESTIONS **10 X 2 = 20M**

1. State the differences between proved reserves and proven reserves.

(CO1) [Knowledge]

2. The gas deviation factor has _____ values for _____ temperatures.

(CO2) [Knowledge]

3. List all the sectors when the consumption of natural gas started.

(CO1) [Knowledge]

4. When the reservoir temperature is above the cricondentherm Tct of the HC mixture then it is called as _____. Draw a diagram of this reservoir.

(CO2) [Knowledge]

5. In order to prevent loss of condensate in the reservoir, the pressure in condensate fields / reservoirs is maintained at or close to the initial pressure by_____ into the formation _____after surface processing.

(CO3) [Knowledge]

6. Define moles of gas produced.

(CO4) [Knowledge]

7. The normal abandonment pressure will nearly always be inside the _____. Two phases will be present in the reservoir at the time of _____.

(CO3) [Knowledge]

8. Define energy plot.

(CO4) [Knowledge]

9. Recognize a heating value range, if we burn 1 m3 of natural gas.

(CO1) [Knowledge]

10. Oil accounted for 39 percent, while natural gas and coal provided _____ percent and _____ percent, respectively.

(CO2) [Knowledge]

PART B

ANSWER ALL THE FOUR QUESTIONS **4 X 10 = 40M**

11. It provides warmth for cooking and heating, and it fuels power stations that provide electricity to homes and businesses. Indicate this term. Explain the utility of this product w.r.t USA.

(CO1) [Comprehension]

12. Properties of natural gas include _____, _____ pressure and temperature, _____, _____, gas density, and gas compressibility. Discuss all above properties with suitable reasons.

(CO2) [Comprehension]

13. If the gas enters the two-phase region, a liquid phase will _____& be produced from the surface separators. Discuss the above situation with a proper diagram.

(CO3) [Comprehension]

14. The volumetric equation is useful in reserve work for estimating gas in place at any stage of depletion. During the development period before reservoir limits have been accurately defined, it is convenient to calculate gas in place per acre-foot of bulk reservoir rock. Identify the significant paramter that need to be calculated when pressure and compressibility factor given. Describe the entire method with the help of equations.

(CO4) [Comprehension]

PART C

ANSWER ALL THE TWO QUESTIONS **2 X 20 = 40M**

15. Gas production rate achievable from reservoir at a given bottom-hole pressure. It is a major factor affecting well deliverability. Describe reservoir deliverability that depends on several factors with the help of a diagram. Also, explain the various flow regimes with the help of diagrams.

(CO2) [Application]

16. Data used to estimate the gas-bearing reservoir PV include, but are not limited to, well logs, core analyses, bottom-hole pressure (BHP) and fluid sample information, along with well tests. This data typically is used to develop various subsurface maps. The volumetric equation is useful in reserve work for estimating gas in place at any stage of depletion. A gas reservoir has the following characteristics:

A = 3000 acres h = 30 ft f = 0.15 Swi = 20%

T = 150°F pi = 2600 psi

p	z
2600	0.82
1000	0.88
400	0.92

Calculate cumulative gas production and recovery factor at 1000 and 400 psi.

(CO4) [Application]

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