Roll No												

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST 1

Winter Semester: 2021 - 22
Course Code: PET 214
Course Name: Surface Production Operations
Program & Sem: B.Tech & VI Sem

Date: 28-04-2022
Time: 10.00 AM to 11.00 AM
Max Marks: 30
Weightage: 15%

Instructions:
(i) Read the all questions carefully and answer accordingly.
(ii) Question Paper has THREE Parts, i.e. Part A, Part B, and Part C.
(iii) Scientific and Non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks. (5Qx 2M= 10M)

1 State the differences between positive and adjustable choke. (C.O.No.1) [Comprehension]

2 Define production casing. Write its one utility. (C.O.No.1) [Comprehension]

3 What is retention time? Write the equation of it. (C.O.No.1) [Comprehension]

4 Write the two factors that affect separation. (C.O.No.1) [Comprehension]

5 What is the size range of the liquid droplets that can be separated in the gravity settling section? (C.O.No.1) [Comprehension]

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries FIVE marks. (2Qx5M=10M)

6 The diminishing income for adding a stage must more than offset the cost of the additional separator, piping, controls, space, and compressor complexities. Clarify the statement with a best possible way. (C.O.No.1) [Comprehension]

7 Characteristics of the flow stream will greatly affect the design and operation of a separator. How can you maintain the design and operation of either horizontal or vertical separator? Explain the above process with a neat diagram through various separator internals generally installed with it. (C.O.No.1) [Comprehension]

Part C [Problem Solving Questions]

Answer the Question. The question carries TEN marks. (1Qx10M=10M)

8 The amount of hydrocarbon fluid that exists in the gaseous phase or the liquid phase at any point in the surface process. How will you find out the gas and liquid phase for a CO_2 component having a 0.22% of mole fraction with a vapour-liquid ratio of 1.5 whereas K factor found to be of 1.88. Also, determine gas and liquid phase of the entire separator. (C.O.No.1) [Comprehension]

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SCHOOL OF ENGINEERING

TEST 2

Winter Semester: 2021 - 22
Course Code: PET214
Course Name: Surface Production Operations
Program & Sem: B.Tech(PET) & VI

Date: 03-06-2022
Time: 10.00am to 11.00am
Max Marks: 30
Weightage: 15%

Instructions:

(i) Read the all questions carefully and answer accordingly.
(ii) Question Paper has THREE Parts, i.e. Part A, Part B, and Part C.
(iii) Scientific and Non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks. (4Qx 2M= 8M)

1 What is the purpose of Deflection Unit? (C.O.No.3) [Knowledge]

2 The spreader is positioned__the oil-water interface for ___. (C.O.No.3) [Knowledge]

3 Gas Equalizer is using in which separator? Why? (C.O.No.3) [Knowledge]

4 State the advantages of Electrostatic Treaters. (C.O.No.3) [Knowledge]

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries THREE and HALF marks. (2Qx3.5M=7M)

5 This forces the inlet mixture of oil and water to mix with the water continuous phase in the bottom of the vessel and rise through the oil/water interface. What is the name of this process? Describe the above process with a neat diagram. [3.5M](C.O.No.3) [Comprehension]

6 The height of the oil weir controls the liquid level in the vessel. Is the statement correct? State the reason with a neat diagram. [3.5M](C.O.No.3) [Comprehension]

Part C [Problem Solving Questions]

Answer the Question. The question carries FIFTEEN marks. (1Qx15M=15M)

7 A desired oil pad height is much needed, where the water weir should be set a distance below the oil weir. Develop an equation that maintain a proper flow and collection of oil and water in their respective weirs. Assumptions should be made and shown by a proper diagram to develop the equation. The equation neglects the height of the oil and water flowing over the weir and presents a view of the levels when there is no inflow. (C.O.No.3) [Application]

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END TERM EXAMINATION

Winter Semester: 2021 - 22
Course Code: PET 214
Course Name: Surface Production Operations
Program & Sem: B.Tech & VI Sem

Date: 5th July 2022
Time: 09:30 AM to 12:30 PM
Max Marks: 100
Weightage: 50%

Instructions:

(i) Read the all questions carefully and answer accordingly.
(ii) Question Paper has THREE Parts, i.e. Part A, Part B, and Part C.
(iii) Scientific and Non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks. (10Qx 2M=20M)

1. What is an Effluent? Is it same as produced water? (C.O.No.4) [Knowledge]

2. Define sludge. Why is it important? (C.O.No.3) [Knowledge]

3. What is separator? Give two examples of it. (C.O.No.1) [Knowledge]

4. Write about three different types of casing. (C.O.No.1) [Knowledge]

5. Define Inlet Diverter. Write about the difference between two and three phase separation. (C.O.No.2) [Knowledge]

6. Why downcomer is using in 3-phase separator? (C.O.No.2) [Knowledge]

7. Slenderness is ratio of _____and_____. (C.O.No.2) [Knowledge]

8. Write the differences between Liquid Carryover and Gas Blowby. (C.O.No.3) [Knowledge]

9. This _____ system is easy to handle the solids particle because _____. (C.O.No.3) [Knowledge]

10. The standard regulations require total oil and grease content from _____mg/L to _____mg/L. (C.O.No.4) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries TEN marks. (4Qx10M=40M)

11. Because of the multicomponent nature of the produced fluid, the higher the pressure at which the initial separation occurs, the more liquid will be obtained in the separator. How many components are the common ones other than hydrocarbon components? Explain the above condition with a suitable diagram for a single component of the hydrocarbon system. (C.O.No.1) [Comprehension]

12. As more stages are added to the process there is less and less incremental liquid recovery. Is the statement correct? State the reason by mentioning different pressure ranges required for different number of stages. Explain the above process with a neat diagram.

(C.O.No.2) [Comprehension]

13. The salt content is directly related to the amount of residual water, the best desalters remove as much water as possible. Give some examples of desalters. Why desalter should use in the surface production facilities? Explain the processes with significance for both the stages with suitable diagrams. (C.O.No.3) [Comprehension]

14. Water is usually separated from oil in treaters or tanks, but a little oil may be left with the water. In major treating facilities large volumes of water are handled. When as little as 1% of this volume is oil, simple disposal of water can result in the loss of sizable volumes of oil. Why water separation is important? How many different stages of produced water treatment are available? Explain any one stage of treatment using one method with a suitable diagram. (C.O.No.4) [Comprehension]

Part C [Problem Solving Questions]

Answer both the Questions. Each question carries TWENTY marks. (2Qx20M=40M)

15. Design a Horizontal Separator with the following parameters:

Gas flow rate – 10 MMscfd at 3.71 lb/ft^3

Oil flow rate – 2000 BPD at 40 ^{O}API

Operating Pressure – 1000 psia

Operating Temperature – 60 ^{O}F

Droplet size removal – 140 microns

Given: CD=0.851; z=0.84; density of water=62.4 lb/ft^3

Out of the following diameters: d (inch) - 20, 24, 36 and 42. Which one will provide the best separation for the retention time of 3 minutes? Find out all the components that will help you to choose the best 2-phase separator? (C.O.No. 2) [Application]

16. The complexity of the ‘oily’ water treatment lies in the separation of emulsified oil. The first step in reducing oil carryover is to make sure that the primary oil/water separation process is functioning properly and the demulsifier is doing the job with respect to the treating temperature, residence time and concentration as per the requirement of the selected demulsifier. What characteristics of

produced water will you examine? Explain those characteristics with a suitable examples for the effective removal from the produced water. (C.O.No.4) [Application]