



**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION- JAN 2023

Course Code: PET 214

Course Name: Surface Production Operations

Program : B.Tech

Date: 30-JAN-2023

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 produced water? Why is it needed? (C.O.No.4) [Knowledge]
2. Define sludge. State the significance. (C.O.No.3) [Knowledge]
3. What is separator? Give two examples of it. (C.O.No.1) [Knowledge]
4. Recall the three different types of casing. (C.O.No.1) [Knowledge]
5. What is Inlet Diverter. Write about the difference between two and three phase separation. (C.O.No.2) [Knowledge]
6. Is downcomer is using in 3-phase separator? Why? (C.O.No.2) [Knowledge]
7. Slenderness is ratio of _____ and _____. (C.O.No.2) [Knowledge]
8. State 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? Discuss the above condition with a suitable diagram for any 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? Describe the different pressure ranges required for different number of stages 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. (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 all 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/ft³

Oil flow rate – 2000 BPD at 40 °API

Operating Pressure – 1000 psia

Operating Temperature – 60 °F

Droplet size removal – 140 microns

Given: $CD=0.851$; $z=0.84$; density of water=62.4 lb/ft³

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]