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**PRESIDENCY UNIVERSITY
BENGALURU**

SET B

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024**

Semester : Semester VII - 2020

Course Code : PET2007

Course Name : Oil and Gas Surface Facility Design

Program : B.Tech.

Date : 01 -JAN-2024

Time : 9:30AM - 12:30 PM

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.
 - (iv) Do not write any information on the question paper other than Roll Number.
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PART A

ANSWER ALL THE QUESTIONS

5 X 2M = 10M

1. Define the term "separator" used in petroleum industry.
(CO1) [Knowledge]
2. Identify the type of separator used in petroleum downstream industry when GOR is low.
(CO2) [Knowledge]
3. Describe four important actions required for the demulsifier.
(CO3) [Knowledge]
4. Describe "desalter" process.
(CO4) [Knowledge]
5. Identify the types of synthetic membrane filtration system.
(CO3) [Knowledge]

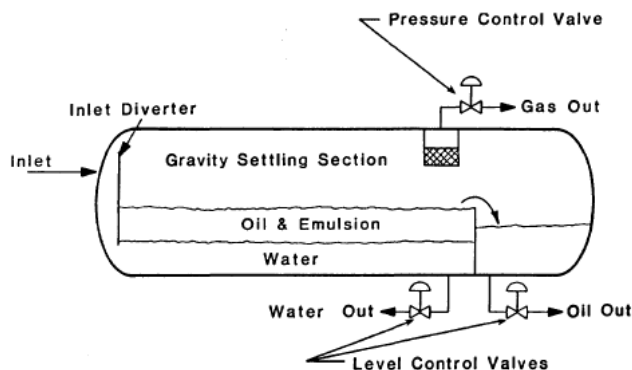
PART B

ANSWER ALL THE QUESTIONS

5 X 10M = 50M

6. Explain the fundamental principles underlying the oil-water primary treatment process. Provide a detailed overview of the scientific and engineering principles governing the design and operation of primary treatment systems.
(CO4) [Comprehension]

7.



Explain the fundamental principles underlying the identified above figure in the petroleum industry. Describe how the components and features contribute to the overall functionality of the equipment or process.

(CO2) [Comprehension]

8. Develop a comprehensive plan for preventing and managing foaming issues in a specific separating vessel application. Consider factors such as the nature of the fluids being processed, vessel design, and operating conditions. Address each dimension of the threefold problem and provide detailed steps for implementation and ongoing monitoring.

(CO3) [Comprehension]

9. Draw a detailed sketch of a standard cone bottom three-phase separator, illustrating the key components and their arrangement. Apply your understanding of the fundamental principles to annotate the sketch, explaining how each component contributes to the effective separation of oil, gas, and water. Consider factors such as the cone angle, inlet design, and outlet locations in your sketch.

(CO2) [Comprehension]

10. Explain the fundamental principles underlying the removal of water vapor from gas. Describe the mechanisms and technologies commonly employed for this purpose, highlighting how they prevent hydrate formation during cooling and corrosion issues. Provide a clear and concise overview of the science behind these methodologies.

(CO4) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 20M = 40M

11. "For a vessel, 50% full of liquid, and separation of 100-micron liquid drops from the gas" by using the following prediction evaluate the effective length. Assume that the vessel is the horizontal separator.

(CO3) [Application]

12. A three-phase separator separates water from oil and gas with the following parameters

1. Rate of gas flow – 10 MMscfd at 3.71 lb/ft³
2. Rate of oil flow – 2000 BOPD at 40 OAPI
3. Maintaining operating Pressure – 1000 ps
4. Maintaining Temperature – 60 degree F
5. Removal of droplet = 140 microns
6. Given: Drag co-efficient = 0.851; z = 0.84; density of water = 62.4 lb/ft³
7. Retention time is 3 mi

Out of the following diameters: d (inch)- 20, 24, 36 and 42 determine which one is suitable.

(CO4) [Application]