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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE-UP EXAMINATION - JULY 2024

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| **Semester: VII** | **Date: 11.07.2024** |
| **Course Code: PET2007** | **Time: 01.30PM TO 4.30PM** |
| **Course Name: Oil and Gas Surface Facility Design** | **Max Marks: 100** |
| **Program: B. Tech.** | **Weightage: 50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *The question paper consists of 3 parts.*
3. *Scientific and non-programmable calculators are permitted.*
4. *Do not write any information on the question paper besides Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 2M=10M** | | | |
| 1 | Draw a schematic of a cross-sectional view of FWKO and label all the sections. | (CO 1) | [Knowledge] |
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| 2 | State the use of Gun Barrel in designing an oil and gas surface facility. | (CO 1) | [Knowledge] |
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| 3 | Sketch the cutaway view of a horizontal indirect-fired heater. | (CO 2) | [Knowledge] |
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| 4 | Write the role of a Heater-Treater in designing an oil and gas surface facility. | (CO 3) | [Knowledge] |
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| 5 | Sketch the Baffles, installed in the coalescing section, causing the emulsion to follow a back-and-forth path up through the oil setting section. | (CO 3) | [Knowledge] |
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| 6 | State the disposal standards for produced water in onshore operations. | (CO 4) | [Knowledge] |
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| 7 | Express the chemical process through which the Precipitated Solids may be treated in an Oil and Gas Surface Facility. | (CO 4) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Explain the need for a Gun Barrel when designing an oil and gas surface facility with a properly labeled schematic. | (CO 1) | [Comprehension] |
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| 9 | Discuss the scenarios of using indirect and direct-fired heaters when designing an oil and gas surface facility with a properly labeled schematic. | (CO 1) | [Comprehension] |
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| 10 | The Figure below is a schematic of a Vertical Heater-Treater. Redraw it and label each line with the appropriate identification from the group of devices located at the top of the Figure. | (CO 2) | [Comprehension] |
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| 11 | Explain the “Emulsion Treating Theory” and the various factors affecting the stability of the Emulsions. | (CO 4) | [Comprehension] |
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| 12 | (a) Assess the importance of crude oil desalting. (4)  (b) Draw the labeled process flow diagrams of single and 2-stage desalting systems. (3+3=6) | (CO 2) | [Comprehension] |
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| 13 | Determine the significance of using an Electrostatic Heater Treater in designing an oil and gas surface facility with a properly labeled schematic. | (CO 4) | [Comprehension] |
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| 14 | Elaborate on the effects of “Dissolved Gases” and “Oil in Water Emulsions” during the flow of crude oil to the oil and gas surface facilities. | (CO 3) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 14 | Crude oil desalting systems are essential in oil and gas surface facilities to remove salts and other impurities that can cause corrosion and fouling in downstream equipment. Effective desalting improves the quality of crude oil, ensuring smoother refining processes and extending the lifespan of processing equipment. Being an upcoming petroleum engineer, design the process of Single- and Two-Stage Desalting systems using proper process flow diagrams. | (CO 3) | [Application] |
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| 15 | Innovative scale inhibition and removal techniques, such as chemical inhibitors and advanced mechanical cleaning, are essential to mitigate the costly impacts of scale formation and deposition in oil and gas surface facilities. As the industry shifts towards more sustainable practices, exploring environmentally friendly scale management solutions can revolutionize operational efficiency and reduce the environmental footprint of oil and gas production. Design an elaborative solution to remove scale using chemical methods in Oil and Gas Surface Facilities. | (CO 2) | [Application] |
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| 16 | “Gravity separation” and “coalescence” demand precise engineering to effectively handle diverse fluid mixtures, posing challenges in achieving optimal phase separation efficiency. Innovations in coalescing materials and techniques could significantly enhance separation performance, driving sustainable oil and gas surface facility advancements.  (a) Explain the importance of “Gravity separation” in designing Surface Facilities. (10)  (b) Compose the effects of “coalescence” in designing Surface Facilities. (10) | (CO 4) | [Application] |
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