

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, July 2020

Programme Name: B.Tech. (APEG)

Semester : VI

Course Name : Natural Gas Processing

Time : 3 Hrs.

Course Code : CHGS3003/PTEG363

Max. Marks : 100

Nos. of page(s) : 2

Instructions:

1. The answers are to be hand written (no printed formats) on white sheets (A4 size), scanned (or snapshot) and uploaded (as single file) in the submission link on blackboard platform only. Before uploading the file make sure to name the file with your Roll number.
2. Write all the details like program, semester, course name, course code, Enrollment Number, SAP ID at the top and signature at the bottom (right hand side bottom corner) on all pages.
3. Answers to questions carrying 5 marks should not exceed 300 words each.
4. Answers to questions carrying 10 marks should not exceed 750 words each.
5. Answers to questions carrying 15 marks should not exceed 1000 words each.

| S. No. | | Marks | CO |
|--------|--|-------------------|-----|
| Q 1 | <p>A new innovation in dehydration system is cMIST technology developed by ExxonMobil.</p> <p>a) Draw the neat process sheet of this technology, label all the equipment's and write the function of each process equipment.</p> <p>b) How this technology is different from the conventional technology?</p> | (10) + (5) | CO1 |
| Q 2 | <p>A glycol dehydrator plant is to be designed for handling XX (last digit of Roll No + 10) MMscfd of the sour gas ($N_2 = 8.5\%$, $H_2S = 5.4\%$, $CO_2 = 0.5\%$, $C_1 = 77.6\%$, $C_2 = 5.8\%$, $C_3 = 1.9\%$, $n-C_4 = 0.1\%$, $i-C_4 = 0.1\%$, $i-C_5 = 0.1\%$). The glycol circulation rate is 4 gal TEG/lb water, lean glycol concentration is 99 %, glycol specific gravity is 1.10, inlet gas temperature and pressure are 120⁰F and 800 psia, and the absorption tower uses bubble-cap trays. For an exit water content of YY (last digit of Roll No + 10) lb/MMscf gas, determines the followings:</p> <p>a) Inlet water content of the natural gas.</p> <p>b) Maximum gas rate that can flow in the system.</p> <p>c) The actual number of trays needed in the contactor.</p> <p>d) Settling volume of separator for retention time of 5 min</p> <p>e) Reboiler load.</p> | (25) | CO1 |
| Q 3 | <p>If physical absorption processes are the most preferred choice for natural gas sweetening.</p> <p>a) List three physical absorbents used in industry for natural gas sweetening with their relative advantages and disadvantages.</p> <p>b) Draw the neat process flow sheet of any one process which uses above mentioned absorbent, label all the equipment's and write the function of each process equipment. Mention the reason for selecting the process.</p> | (10) + (10) | CO2 |

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|------------|--|--|------------|
| Q 4 | <p>a) What are the different operating conditions/reasons for choosing a particular technology to separate natural gas liquids from natural gas?</p> <p>b) Explain the cryogenic refrigeration process with the help of neat process flow diagram, label all the equipment's and write the function of each process equipment.</p> | <p>(10) + (10)</p> | CO3 |
| Q 5 | <p>a) Natural gas is considered as the most preferred feedstock. Justify the statement.</p> <p>b) Elaborate on the evolution of processes for synthesis gas production with the help of block diagram, with their advantages and disadvantages</p> | <p>(5) + (15)</p> | CO4 |