

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE
BRANCH: CHEM. ENGG. / CEP&P

SEMESTER: III
SESSION : MO/2019

SUBJECT : CL204 CHEMICAL PROCESS CALCULATION

TIME: 2:00 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.

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- Q1 The heat capacity of sulfuric acid has the units $J/(gmole)(^{\circ}C)$, and is given by the relation [5]
Heat capacity = $139.1 + 1.56 \times 10^{-1}T$
Where T is expressed in $^{\circ}C$. Modify the formula so that the resulting expression has the associated unit of $Btu/(lb\ mol)(^{\circ}R)$ and T is in $^{\circ}R$
- Q2 A producer gas has the following composition by volume CO -23%, CO_2 -4.4%, O_2 -2.6% and [5]
Rest is N_2 (70%).
Determine the cubic ft of gas at $70^{\circ}F$ and 750 mm of Hg pressure per lb of carbon present.
- Q3 An evaporator is fed with 15000 Kg/hr of a solution containing 10% sodium chloride, 15% [5]
NaOH. In operation water is evaporated and NaCl is precipitated as crystal. The thick liquor leaving the evaporator containing 45% NaOH, 2% NaCl and rest is H_2O .
Determine:
(a) Kg/hr water evaporated.
(b) Kg/hr salt precipitated.
(c) Kg/hr thick liquid.
- Q4 What is the boiling point of water at a place where the atmospheric pressure is 600 mm? [5]
($l_v = 540\ Cal/gm$)
- Q5 Soyabean seed are extracted with hexane in batch Extracter. The flaked seed contain [5]
18.6% oil, 69.0% solid and 12.4 % moisture. At the end of the process, cake of milk is separated from the hexane oil mixture. The cake analysis yield 0.8% oil, 87.7% solid and 11% moisture. Find the % recovery of oil. All % are by wt only.

:::::: 24/09/2019 :::::E