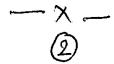**SARDAR PATEL UNIVERSITY**
EXTERNAL EXAMINATION
B.SC. INDUSTRIAL CHEMISTRY
(THIRD SEMESTER)
US03CICH21: Chemical Process Principles & Engineering Materials
FRIDAY, 22nd November, 2019

Time: 2:00 pm to 5:00 pm   Total Marks: 70

Q-1   Answer the following multiple choice question.   **[10]**

1. For the reaction $H_2 + Br_2 = 2HBr$, If 25 k mole H_2 & 20 k mole Br_2 per hour feed in the reaction. What should be % excess reagent?
   a.   100%   c.   50%
   b.   70%   d.   25%

2. The number that precedes the formula of the component involved in a chemical reaction is called_____.
   a.   Stoichiometric coefficient   c.   Selectivity
   b.   Yield   d.   Material factor

3. For which of the following ^{0} Brix specific gravity scale is developed?
   a.   Polymer industry   c.   Pharmacy industry
   b.   Petroleum industry   d.   Sugar industry

4. The process in which amount of moisture is increased in atmosphere is called____.
   a.   Dehumidification   c.   Humidification
   b.   Drying   d.   Evaporation

5. Molal humidity is the ratio of
   a.   Moles of water vapor/moles of   c.   Weight of water vapor/moles of
        liquid   dry air
   b.   Moles of water vapor /moles of dry d.   None of the above
        air

6. Combustion reaction is always_____.
   a.   Bond formulation   c.   Endothermic
   b.   Exothermic   d.   None of these

7. Which of the following scientist had invented celluloid?
   a.   Hyatt and Bakelite   c.   Jon Maxwell
   b.   Povel   d.   Tom Harry

8. Which of the following is organic synthetic polymer?
   a.   Cellulose   c.   Starch
   b.   PVC   d.   Ceramic

9. Steel alloy containing Al, Ni, Co is called_____.
   a.   Duriron   c.   Invar
   b.   Alnico   d.   Platinite

10. Which of the following is purest form of iron?
   a.   Wrought iron   c.   Pig iron
   b.   Steel   d.   Cast iron

Q-2   Answer any ten of following.   **[20]**
1. Difference between boiling point and vaporization.
2. What is average molecular weight?
3. What is Dalton's law?
4. What is adsorption isobar?

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(P.T.O.)

5. Difference between relative saturation and % saturation.
6. What is latent heat of vaporization?
7. What is crystal structure?
8. Write the chart interaction between materials and their application.
9. Enlist the classification of engineering material.
10. Why annealing of glass is carried out?
11. Enlist the advantages of alloy.
12. Why carbon content is increased in steel?

Q-3 a. Discuss about specific gravity scales. [05]
    b. Discuss about vaporization & condensation in detail. [05]
                              OR
Q.3 a. An evaporator is fed with 15000 kg/hr of a solution containing 10% NaCl, 15% [05]
       NaOH and rest water. In operation, water is evaporated and NaCl is
       precipitated as crystals. The thick liquor leaving the evaporator contains 45%
       NaOH, 2% NaCl and rest water. Calculate the following:
          1. kg/h water evaporated
          2. kg/h salt precipitated
          3. kg/h thick liquor obtained
    b. What are the different steps to be followed for solving material balance [05]
       problems? Discuss it.

Q-4 What is adsorption isotherm? Discuss Langmuir adsorption isotherm in detail [10]
    with industrial application of adsorption.
                              OR
Q-4 What is the first law of thermodynamics? Discuss and derive it's the equation [10]
    for steady state flow process.

Q-5 What is material science? Discuss in detail about the different factors required [10]
    for selecting materials for engineering design.
                              OR
Q-5 Discuss the manufacturing, properties and application of refractories. [10]

Q-6 Discuss the detail note on Nickel and its alloys. [10]
                              OR
Q-6 Discuss the various glass types and write the manufacturing of glass. [10]

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