SARDAR PATEL UNIVERSITY
B.Sc. (SEMESTER-II) EXTERNAL EXAMINATION
INDUSTRIAL CHEMISTRY VOCATIONAL
US02CICV51: (Process Calculations & Mechanical Operations)
Wednesday, 27th April- 2022

Time: 12:00 P.M. To 2:00 P.M.   Total Marks: 70

Note: Figures to the right indicate full marks.

Q.1 Answer the given multiple choice questions. (All are compulsory)   [10]

1. Molecular Weight of Na_2CO_3 is _____ g/mol.
    (a) 106 (b) 63.5 (c) 18 (d) 98

2. The average atmospheric pressure of mercury is_____.
    (a) 29.92 psi (b) 17.40 (c) 15.90 psi (d) 14.70psi

3. Number of gram moles of solute dissolved in one liter of solution.
    (a) Molarity (b) Molality (c) Normality (d) None of these

4. The energy which is associated with system due to its motion is known
   As _____.
    (a) kinetic energy   (c) internal energy
    (b) solar energy   (d) renewable energy

5. On which criteria the excess air requirement depends on_____.
    (a) Type of fuel   (c) moisture content of fuel
    (b) Availability of air   (d) source of heat

6. An operation used to increase the amount of vapour in gas stream is
   known as_____.
    (a) Saponification   (c) humidification
    (b) Dehumidification   (d) Sulfonation

7. Which of the filter medium is used for alkaline slurry filtration?
    (a) Nylon cloths (b) Wool cloth (c) Silk (d) Glass

8. The filter used to remove small amount of solids to produce
   sparkling clear liquid isknown as_____.
    (a) Clarifying filters (b) Cake Filter (c) Rotary Filter (d) None of these

9. For mixing solids with solids which equipment is employed?
    (a) Agitated tank (b) Tumbling mixer
    (c) Kneader   (d) Dryer mixer

10. In which unit operation the separation of solids from a suspension in a
    liquid is gainedby gravity settling is known as_____.
    (a) Sedimentation   (b) Drying (c) Filtration (d) Distillation

Q.2 Are the following statements TRUE or FALSE? (All are compulsory)   [08]

1. Number of gram moles of solute dissolved in one kg. of solvent is called Molality.
2. In chemical science unit of density is expressed as gm/cc.
3. 25-60 % of excess air is required for solid fuels.

4. The energy which is related due to its position of system is known as Potential energy.
5. Filters are operated with less than atmospheric pressure is known as Centrifugal filters.
6. Granular material is used to increase the porosity of the filter cake is known as Filter aid.
7. Baffled tank prevent formation of swirling and vortex formation.
8. The crusher in which movable jaw is pivoted at the top is known as Blake jaw crusher.

Q.3 Answer the following short questions (Attempt any 10 out of 12) [20]

1. Differentiate between Unit operation and Unit Process with suitable examples.
2. State and explain Dalton's law of partial pressure.
3. Define the term weight percentage.
4. Define : Adiabatic process
5. Define energy and write down various forms of energy.
6. What do you mean by heat of combustion? Explain with suitable example.
7. Explain constant rate filtration and constant pressure filtration
8. List different filter media used in filtration.
9. Name any tow batch filters.
10. State various types of mixing operation.
11. Write a difference between crushing and grinding operation.
12. State and explain Rittinger's law.

Q.4 Answer the following Long questions (Attempt any 4 Out of 8) [32]

1. Discuss in brief about evaporation, filtration, and extraction unit Operation with their overall material balance.
2. Write a note on bypass and purge operation.
3. Derive a relation between C_P & C_V for ideal gas law
4. Explain in details about Hess law of constant heat summation.
5. Write a note on Magnetic drum separator.
6. Write construction, working, advantages and disadvantagesof plate and frame filter press.
7. Write a short note on mixing solid with solid in details.
8. Discuss in detail about Jaw crusher.

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