DDA-003-0011009 Seat No. _____

B. Sc. (Sem.-I) (CBCS) Examination

August - 2022

BS-IC-101 : Industrial Chemistry

Faculty Code : 003

Subject Code : 0011009

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Question paper carries total 10 questions.

(2) All the questions have general option & carry 14 marks each.

(3) Answer any 5 questions out of total 10 questions.

(4) Draw labeled diagrams wherever necessary & Assume suitable data.

1 (a) Answer the following questions : **4**

(1) Mercaptans are _____ containing compound in petroleum.

(2) Ethene is unsaturated compound in petroleum. True or False?

(3) % of carbon in petroleum is around _____.

(4) Natural gas can be obtained from _____ portion of fractional distillation column. (Top/ Bottom)

(b) Answer in brief : **2**

(1) How can we manufacture high octane gasoline from normal chain? Describe with reaction.

(c) Answer in detail : **3**

(1) How can we remove H_2S from petroleum product, describe with simple diagram.

(d) Write a note on : **5**

(1) Explain catalytic cracking process of heavy oil in detail with diagram.

2   (a)   Answer the following questions :   **4**

         (1)   Chromite is ore of _____ metal.

         (2)   Pt is elemental symbol for _____ metal.

         (3)   Give a full form of BTU.

         (4)   _____ metal can be obtained by reduction using carbon.

     (b)   Answer in brief :   **2**

         (1)   Define: Mineral

     (c)   Answer in detail :   **3**

         (1)   Write a note on froth flotation process for ore dressing.

     (d)   Write a note on :   **5**

         (1)   Write a detailed note on iron extraction process from its ore.

3   (a)   Answer the following questions :   **4**

         (1)   Bituminous is type of _____.

         (2)   % _____ =100-(%C+%H+%N+%S+%Ash)

         (3)   Write full form of CHU.

         (4)   Graphite has highest amount of ash in it. True or false?

     (b)   Answer in brief :   **2**

         (1)   Write in brief: moisture content of coal.

     (c)   Answer in detail :   **3**

         (1)   Write a brief note on proximate analysis of coal.

     (d)   Write a note on :   **5**

         (1)   Write vertical retort for carbonization of coal in detail.

4   (a)   Answer the following questions :   4

         (1)   _____ derivative of cellulose has -0(C=0)-CH_3 functional group.

         (2)   _____ is also called artificial silk.

         (3)   _____ is natural polymer. (Cellulose/ PVC)

         (4)   For nitration of cellulose _____ & _____ acids are added.

    (b)   Answer in brief :   2

         (1)   What is methanol? Write application of it.

    (c)   Answer in detail :   3

         (1)   Explain production of artificial silk in brief.

    (d)   Write a note on :   5

         (1)   Write processing of soft wood to manufacture cellulose in detail with block diagram.

5   (a)   Answer the following questions :   4

         (1)   The dimension formula of density is _____.

         (2)   Give a definition of gram atom.

         (3)   Falling film evaporator is also called Kestner long tube evaporator. True/ False?

         (4)   Which evaporator is used for evaporation of high viscous, crystalline, salty & scaling liquid solution?

    (b)   Answer in brief :   2

         (1)   Calculate the Kilogram atoms of carbon which atomic weight is 36 kg.

(c) Answer in detail : 3

(1) Define: (a) gram atom (b) gram mole (c) % volume

(d) Write a note on : 5

(1) 98 gms of sulfuric acid are dissolved in water to prepare one liter of solution. Find out Molarity & Normality of solution.

6 (a) Answer the following questions : 4

(1) What is the MKS unit of time?

(2) Give a definition of pressure.

(3) Write a dimension formula of work in SI unit.

(4) Viscous liquids can be used, is a merit of multiple effect evaporators. True/ False?

(b) Answer in brief : 2

(1) Enlist various merits and demerits of film type evaporator.

(c) Answer in detail : 3

(1) Explain in brief: Wiped film evaporator diagram.

(d) Write a note on : 5

(1) Discuss Calandaria evaporator with neat & clean diagram in detail.

7 (a) Answer the following questions : 4

(1) Adopt _____ units in case of problems with chemical reaction.

(2) Drying is carried out for removal of _____ associated with wet solid with the help of hot air.

(3) Distillation is used for separation of component of liquid mixtures by partial vaporization & condensation. True/ False?

(4) Extraction is an example of a unit operation. True/False?

(b) Answer in brief : 2

(1) Give definition of distillation & draw its block diagram for material balance without chemical reaction.

(c) Answer in detail : 3

(1) Discuss Drying operation for material balance without chemical reaction in brief.

(d) Write a note on : 5

(1) Write outline procedures for doing material balance.

8 (a) Answer the following questions : 4

(1) Weak liquor + Concentrated stream = Desired product, is the formula of _____.

(2) Clear liquid obtained from the bottom part of the filtration assembly is called _____.

(3) For any unit operation or unit process, Input = Output + Accumulation or Disappearance. True or False?

(4) Which law states that the total mass of various components involved remains constant during a unit operation or unit process?

(b) Answer in brief : 2

(1) Write importance of material balance in chemical industries in brief.

(c) Answer in detail : 3

(1) The NH_3 air mixture containing 0.2kg NH_3/ 1 kg air enters into absorption system where ammonia is absorbed in water. The gas leaving the system is found to contain 0.004 kg /1 kg of air. Find out the percentage recovery of ammonia.

(d) Write a note on : 5

(1) The feed to a continuous fractionating column analysis by weight 28 % benzene & 72 % toluene. The analysis of the distillate shows 52 weight % benzene& 5 weight % benzene is found in bottom product. Calculate the amount of distillate & bottom product per 1000 kg of feed per hour. Also calculate the % recovery of benzene

9 (a) Answer the following questions : 4

(1) Define: Relative volatility.

(2) When composition of liquid and its vapor are same than this type of liquid mixture known as _____.

(3) Cross partition ring is used as packing material in absorption tower. True/ False?

(4) Agitated tower extractor is also known as _____.

(b) Answer in brief : 2

(1) Draw only diagram of spray tower.

(c) Answer in detail : 3

(1) Explain steam distillation with neat diagram.

(d) Write a note on : 5

(1) Explain mixer settler cascade for extraction with neat diagram.

10 (a) Answer the following questions : 4

(1) Absorption required further processing for recovery of solute/ solvent than distillation. True/ False?

(2) Bubble cap is used for increasing contact between gas and _____.

(3) A diameter of plate columns is _____ more than plate tower.

(4) Define: Distribution coefficient for extraction.

(b) Answer in brief : **2**

    (1) Draw only diagram of sieve and valve tray.

(c) Answer in detail : **3**

    (1) Write any six characteristics of ideal packing materials.

(d) Write a note on : **5**

    (1) Derive Rayleigh's equation with diagram.

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