



BD-003-2011012

Seat No. _____

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

March - 2021

BS-IC-101 : Industrial Chemistry

Faculty Code : 003

Subject Code : 2011012

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) Question paper carries total 10 questions.
(2) All the questions have general option and carry 14 marks each.
(3) Answer any 5 questions out of total 10 questions.
(4) Draw labelled diagram wherever necessary and assume suitable data.

- 1 (a) Answer the following questions. 4
- (1) % of carbon in petroleum is around _____.
- (2) Berthelot and Levorsen has given _____ origin theory of petroleum.
- (3) Mercaptans are _____ containing compound in petroleum.
- (4) Propane is unsaturated compound in petroleum. True or False ?
- (b) Answer in brief. 2
- Write any ten products with their structures derived from petroleum.
- (c) Answer in detail. 3
- What is Girbotol's process ? Write it with detailed diagram.
- (d) Write a note on. 5
- Write a note on separation of components of crude oil in refinery with diagram.

- 2 (a) Answer the following questions. 4
- (1) Write chemical formula for silica.
 - (2) Galena is ore of _____ metal.
 - (3) There are three divisions of metallurgy; Physical, Chemical and _____ metallurgy.
 - (4) Zn is elemental symbol for _____ metal.
- (b) Answer in brief. 2
Define : Physical Metallurgy.
- (c) Answer in detail. 3
Write a note on magnetic separation process for one dressing.
- (d) Write a note on. 5
Explain Aluminium extraction process from its ore with diagram.
- 3 (a) Answer the following questions. 4
- (1) _____ = $100 - (\%M + \%A + \%VM)$
 - (2) Give full form of CHU.
 - (3) Ash contains metal oxide in it. True or false ?
 - (4) Anthracite is type of _____.
- (b) Answer in brief. 2
What is proximate analysis of coal ?
- (c) Answer in detail. 3
Write in detail : Coal handling and storage.
- (d) Write a note on. 5
Explain manufacturing of coking from coal.
- 4 (a) Answer the following questions. 4
- (1) Cellulose is synthetic polymer. True or False.
 - (2) _____ is also called gun cotton.
 - (3) Methanol is toxic for human being. True or False ?
 - (4) _____ derivative to cellulose has $-O(C=O)-CH_3$ functional group.

- (b) Answer in brief. 2
Write only chemical structure of any six alcohols.
- (c) Answer in detail. 3
Give production of ethyl alcohol in brief.
- (d) Write a note on. 5
Explain manufacturing of nitro-cellulose in detail.
- 5 (a) Answer the following questions. 4
(1) Evaporation is used for making solution more concentrated from dilute solution. True/False ?
(2) What is CGS unit of temperature ?
(3) Write any one demerit of multiple effect evaporators.
(4) Fixed blades are used in _____ evaporator.
- (b) Answer in brief. 2
Enlist merits and demerits of short tube evaporator.
- (c) Answer in detail. 3
Discuss in brief : Film type evaporator with diagram.
- (d) Write a note on. 5
Explain weight fraction and weight percent in detail.
- 6 (a) Answer the following questions. 4
(1) Define : Molecular weight.
(2) Give a definition of Molality.
(3) High heat transfer coefficient is the merit of _____ evaporator.
(4) Film type evaporator is also known as falling film evaporator. (True/False ?
- (b) Answer in brief. 2
Enlist merits and demerits of climbing film evaporator.
- (c) Answer in detail. 3
Explain in brief : Fundamental quantities.
- (d) Write a note on. 5
Discuss multiple effect evaporators with neat and clean diagram in detail.

- 7 (a) Answer the following questions. 4
- (1) Write a law of conservation of mass.
 - (2) For any unit operation or unit process, $\text{Input} = \text{Output} + \text{accumulation or disappearance}$. True/False.
 - (3) Filtrate is also called _____.
 - (4) Adopt _____ units in case of problems without chemical reaction.
- (b) Answer in brief. 2
- Write a short note on Mixing (definition, block diagram) for material balance without chemical reaction.
- (c) Answer in detail. 3
- Explain in brief : Absorption operation for material balance without chemical reaction.
- (d) Write a note on. 5
- 2000 kg of wet solids containing 70% solids by weight are feed to tray dryer where it is a dried by hot air. The product finally obtained to contain 1% moisture by weight. Calculate (a) Kg of water removed from wet solids and (b) Kg of product obtained.
- 8 (a) Answer the following questions. 4
- (1) $\text{Feed solution} = \text{Saturated solution} + \text{crystals}$ is the formula for material balance of Crystallization. True/False ?
 - (2) $\text{Solids in seeds} = \text{Solids in meal}$, is the material balance formula of _____ for solid.
 - (3) _____ is used for separation of component of liquid mixtures by partial vaporization and condensation.
 - (4) Drying is carried out for removal of _____ associated with wet solid with the help of hot air.
- (b) Answer in brief : 2
- Draw block diagram of evaporation and write a formula for its overall material balance.

- (c) Answer in detail. 3

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

- (d) Write a note on. 5

The waste acid from a nitrating process containing 20% HNO_3 , 55% H_2SO_4 , and 25% H_2O by weight is to be concentrated by addition of concentrated sulfuric acid containing 95% H_2SO_4 and concentrated nitric acid containing 90% HNO_3 to get desired mixed acid containing 26% HNO_3 and 60% H_2SO_4 . Calculate the quantities of waste and concentrated acid required for 1000 kg of desired mixed acid.

- 9 (a) Answer the following questions. 4

(1) Distillation is an example of unit operation. True/False ?

(2) In distillation, vapour is converted into liquid in _____ (Reboiler/Condenser) ?

(3) Packing material in gas absorption should have _____ bulk density.

(4) In extraction, selectivity should be _____. (<1, >1)

- (b) Answer in brief. 2

Discuss valve tray with diagram.

- (c) Answer in detail. 3

What is minimum and maximum azeotrope ?

- (d) Write a note on. 5

Explain continuous distillation with rectification in detail.

- 10 (a) Answer the following questions. 4
- (1) Absorption is an example of unit prices. True/False
 - (2) The solubility of solute gas in a solvent should be _____ (High/Low)
 - (3) When composition of liquid and its vapour are same then this type of liquid mixture known as _____.
 - (4) Give full form of PRV.
- (b) Answer in brief. 2
Explain sieve tray with diagram.
- (c) Answer in detail. 3
Discuss selection of solvent for extraction in detail.
- (d) Write a note on. 5
Explain Rotating Disk Contactor (RDC) with diagram in detail.
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