OILS AND FATS

PART-A
Short Answer Questions
(2 Marks)

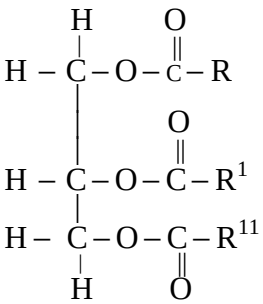
1. Write the three industrial uses of oils and fats?

A. Oils and fats have many important uses in industries. They are useful in the manufacture of soap, paints, varnishes, fatty acids. They are used in jute, leather, plastic industries.

2. Differentiate between an oil and a fat?

OIL	FAT
1. Oils are triesters of glycerol and unsaturated fatty acids.	Fats are triesters of glycerol and saturated fatty acids.
2. Oil is the substance that exists in liquid state at room temperature.	Fat is the substance that exists in solid state at room temperature.
3. **Eg:** Ground nut oil	**Eg:** Ghee

3. Write the chemical formula of oil/fat?



R, R^1, R^{11} = Long chain alkyl of alkenyl groups.

4. Write the general formula of soap and detergent?

The general formula of soap is RCOONa or RCOOK
Here R = Long chain alkyl (or) alkenyl group.
The general formula of detergents is R — CH_2 O SO_2 Na

5. Name four fatty acids?

A. Lauric acid ($C_{11}H_{23}COOH$)
Stearic acid ($C_{17}H_{35}COOH$)
Oleic acid ($C_{17}H_{33}COOH$)
Linoleinic acid ($C_{17}H_{29}COOH$)

6. Write the domestic uses of oils?

A. 1) Oils such as groundnut oil, coconut oil, sunflower oil etc., are commonly used for cooking.
2) Coconut and castor oil also find use for cosmetic purposes.
3) In olden days castor oil was used for lighting.

7. What are the difference between soap and detergent?

A.

SOAP	**DETERGENT**
1. Chemically soap is a sodium (or) potassium salt of fatty acids.	1. Chemically detergents are sodium salts of alkyl benzene sulphonates (or) fatty alcohol sulphates.
2. It does not give lather with hard water.	2. It gives lather with hard water also.
3. Cleaning action is less.	3. Cleaning action is more.
4. $C_{17}H_{33}COONa$	4. **Eg:** $C_{11}H_{23}SO_3Na$

8. How detergents are better washing and cleaning material than soaps?

A. Soap form insoluble compounds with Ca^{2+} and Mg^{2+} ions present in hard water and precipitate out. This reduces the foaming and cleaning action. So they have only a limited use.

Detergents also react with Ca^{2+} and Mg^{2+} ions in hard water but the products are still soluble and do not affect the lathering and cleaning action.

SECTION-II
Very Short Answer Questions
(1 Mark)

1. What are the commonly used oils for cooking?

A. Oils such as groundnut oil, coconut oil, sunflower oil etc., are commonly used for cooking.

2. What are unsaturated oils?

A. Oils contain fatty acids with one or more C=C double bond are called unsaturated oils.

3. What is hydrogenation of oil?

A. The process of converting vegetable oils into solid fats in the presence of nickel catalyst and also by the passage of hydrogen gas is called hydrogenation of oils.

4. What are the advantages of hydrogenation of oil?

A. Hydrogenation of oils improves preservation, taste and odour of many oils.

5. Write the two examples of saturated fats?

A. Dalda and margarine.

6. What is a soap?

A. Chemically soap is a sodium (or) potassium salt of fatty acids of long carbon chains.

7. What is saponification?

A. Soaps can be directly obtained from oils (or) fats by hydrolysis in the presence of base. This process is called saponification of oils.

8. Which oils are used in manufacture of soap?

A. Soap is manufactured from coconut, palm, cotton seed, soyabean oils (or) animal fats.

9. What are the three steps in the process of soap manufacture?

A. The three steps in the process of soap manufacture are
1) Hydrolysis of fat into fatty acids.
2) Separation of fatty acids and
3) Neutralizations of fatty acids by bases.

10. What is a detergent?

A. Detergents are salts of alkyl benzene sulphonates or fatty alcohol sulphates.

11. Why shaving soaps giving slow drying lather?

A. Shaving soaps contain considerable proportion of potassium soap and excess of stearic acid. So it gives slow drying lather soap.

12. Which catalysts are used in the hydrolysis of fat into fatty acids?

A. Catalyst such as zinc oxide (or) calcium oxide (or) magnesium oxide use for this purpose.

13. Quality of soap depends on what factor?

A. The quality of soap depends upon the composition of fatty acids in the mixture.

Long Answer Questions
(4 Marks)

1. How is soap industrially manufactured?

A. In general coconut, palm, cotton seed, soyabean oils (or) animal fats are used in manufacturing of soaps. In this the three important steps are
1. Hydrolysis of fat into fatty acids.
2. Separation of fatty acids, and
3. Neutralization of fatty acids by bases.

1. The oil is taken in a stainless tower. Catalyst such as zinc oxide (or) calcium oxide (or) magnesium oxide is added. The mixture is heated to 240-250°C and a pressure of 4.1 m.pa is applied. The mixture is blended by steam. The hydrolysis is carried out for 2-3 hours. The glycerol obtained in the reaction in water soluble and is distilled off.

2. The fatty acids, usually a mixture, are dried and subjected to fractional distillation and the mixture is separated. The quality of soap depends upon the composition of fatty acid in the the mixture and the soap maker choose the required fatty acids and then mixes in the required proportion according to the properties desired.

3. The soap is then prepared by continuous neutralization of fatty acids with bases like KOH, NaOH, $Mg(OH)_2$, $Ca(OH)_2$, triethanolamine etc.,

2. How is detergent industrially manufactured?

A. Detergents, chemically sodium salts of alkyl benzene sulphonates (or) fatty alcohol sulphates.

In manufacturing of detergents industrially, there are three steps.

Step-1: When alkyl benzene (AB) is made to react with oleum, alkyl benzene sulphonate (ABS) is formed (or) when oleum is made to react with fatty alcohol, fatty alcohol sulphate (FAS) is obtained.

Step-2: Alkyl benzene sulphonate (ABS) (or) fatty alcohol sulphate (FAS) is made to react with sodium hydroxide (NaOH) to give sodium salt of ABS (or) FAS.

Step-3: Sodium salt of ABS (or) FAS is made to react with builders to produce detergent.

3. How do you test the quality of soap?

A. **Quality of soap - Testing**

Dissolve 1.5 gms of soap in 100 ml. of distilled (or) soft water. Take 10 ml of this soap solution in a boiling tube. Close the boiling tube with a rubber stoper and shake it vigorously for 15 seconds. Allow the solution to stand for 30 seconds. Observe the level of foam. Perform the same experiment on different kinds of soap available in the market. A good soap is that which gives the largest lather (or) of greatest height.

Add 4 drops of 4% $CaCl_2$ solution and observe the foam level after shaking for 15 seconds and allowing settling for 30 seconds. Add 1gm of Na_3PO_4 to this solution. Shake for 15 seconds and allow it to stand for 30 seconds. Observe the foam level.

Upon addition of $CaCl_2$ the foam level decreases because Ca^{2+} is hard water ion. Addition of Na_3PO_4 again increases the foam level because Na_3PO_4 removes the Ca^{2+} ions.

$2Na_3PO_4 + 3\ CaCl_2 \rightarrow Ca_3(PO_4)_2 + 6\ NaCl$

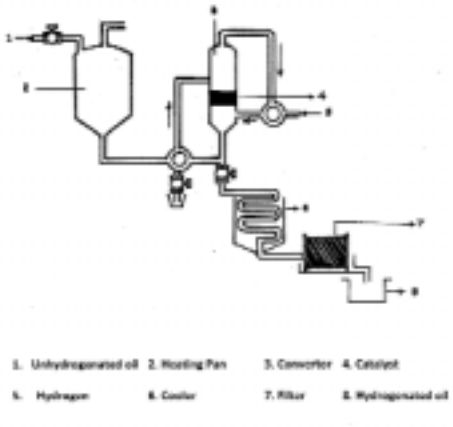
4. Write the uses of soap?

A. **Uses of soap**

1) A soap of K^+ salt of fatty acid is used as a toilet soap.
2) A soap of Na^+ salt of fatty acid is used as laundry soap.
3) A soap of Ca^{2+} and Al^{3+} fatty acids is used in water proof texure.
4) A soap of Mg^{2+} fatty acid is used as face powder.
5) A soap of Li^+ salt is used as grease.
6) A soap of Triethanol ammonium salt of fatty acids is uesed in dry-cleaning and cosmetics.

5. Draw the diagram of Hydrogenation of Oils.

A.



Part - B
Multiple Choice Questions
(1/2 Mark)

1. The chief sources of oils is

a) Petroleum b) Coal and coke
c) Animals and plants d) Soaps and detergents

2. Which of the following is a saturated fatty acid?

a) Myristoleic acid b) Lauric acid
c) Palmitoleic acid c) Linoleic acid

3. Which of these is used as catalyst in hydrogenation of oils?

a) Ni b) Mg c) C*l* d) N_2

4. 'Oleic acid ester' is in the seed of

a) cotton b) groundnut c) coconut d) all the above

5. Vanaspathi (dalda) is a fat obtain by the catalytic hydrogenation of

a) Vegetable oil b) Butter c) Milk d) Castor oil

6. Of all these which fatty acid is belongs to coconut
   a) Lauric acid b) Stearic acid c) Oleic acid d) Linoleinic acid

7. For which purpose the castor-oil is used?
   a) Cooking b) Cleaning c) Medicine d) Cosmetic

8. In the manufacturing of soap which of these is used as base.
   a) Triethanol b) Triethanol oxide
   c) Triethanol dioxide d) Tri ethanolamine

9. The cation of soap useful for dry cleaning is
   a) K b) Na
   c) Tri ethanol ammonium d) Mg^{2+}

10. Shaving soap contains excess of
    a) Builders b) Perfume c) Glycerol d) Stearic acid

11. Detergent are useful even in hard water because
    a) They do not react with hard water ions
    b) The react with hard water ions but do not form precipitate
    c) They destroy the hard water ions
    d) They sediment undesirable ions in hard water

KEY

1) c	2) b	3) a	4) a	5) a
6) a	7) d	8) d	9) c	10) d
11) b				

Fill in the Blanks
(1/2 Mark)

1. By chemical composition, oils and fats are ———— of glycerol with fatty acids.
2. In olden days ———— oil was used for lighting.
3. ———— oils have medicinal value.
4. The saturated oils have ———— melting points.
5. In the hydrogenation of oleic acid is converted to ————
6. Almost all soaps contain ———— water.
7. Transparent soap contains some ————
8. The quality of soap depends upon the composition of ———— in the mixture.
9. Deodorant soap or antimicrobal soap contains ————
10. $H_2 + \text{Oil} \xrightarrow{Ni} (\text{unsaturated})$ ————
11. The formula of stearic acid is ————

12. Oils are triesters of ———— and ————
13. ———— and ———— are examples of oil giving seeds.
14. Hydrogenation of oils give ————
15. Hydrogenation improves ————
16. Chemical formula of soap is ————
17. Li^+ Salt is used as ————
18. Detergents differ from soaps in their action with ———— water.
19. $2\ Na_3\ PO_4 + 3\ CaCl_2 \rightarrow 6\ NaCl +$ ————
20. The formula for Linolenic acid is ————

KEY

1) Triesters	2) Castor	3) Fish liver
4) Highly	5) Stearic acid ester	6) 30%
7) Glycerol	8) Fatty acids	9) 3, 4, 5-tribromo salicylanilide
10) Fat	11) $C_{17}H_{35}COOH$	12) Glycerol, fatty acids
13) Cotton, groundnut	14) Fats	15) Preservation, taste and odour
16) $C_{17}H_{33}COONa$	17) Grease	18) Hard
19) $Ca_3(PO_4)_2$	20) $C_{17}H_{29}COOH$	

MATCHING
(1/2 Mark Each)

I.

Group-A		**Group-B**
1) Luric acid	( )	a) $C_{17}H_{33}COONa$
2) Stearic acid	( )	b) $C_{11}H_{23}COOH$
3) Oleic acid	( )	c) $C_{17}H_{29}COOH$
4) Linolenic	( )	d) $C_{17}H_{35}COOH$
5) Soap	( )	e) $C_{17}H_{33}COOH$

II.

Group-A		**Group-B**
1) Dry cleaning	( )	a) Triethanol ammonium salt
2) Greases	( )	b) Na^+ Salt
3) Water proof texture	( )	c) K^+ Salt
4) Laundry soap	( )	d) Al^{3+} Salt
5) Toilet soap	( )	e) Li^+ Salt

KEY

I.	1-b	2-d	3-e	4-c	5-a
II.	1-a	2-e	3-d	4-b	5-c