SYNTHETIC FIBRES & PLASTICS

INTRODUCTION

The clothes which we wear are made up of fabrics. Fabrics are made from fibres.

A fibre is a thread or filament like material which is so strong & flexible that can be converted in to clothes, ropes and nets etc.

They are of two kinds :- (1) Natural fibres (2) Synthetic fibres

(1) **Natural fibres** : - These are long thin threads which are obtained from natural polymers obtained from animals or plants eg.

(i) Cotton & Jute – From cell wall of plant cells (Cellulose, is natural polymer)

(ii) Wool – From the fleece of sheeps & goats

(iii) Linen – From stalk of a plant (Flax)

(iv) Silk – From cocoons of silk worm.

(2) **Synthetic fibres :-** Those fibres which are synthetically man made, and are polymer of small units are called synthetic fibre.

- The word polymer is made up of two Greek words **poly** which means many and **mer** means unit.
- All the synthetic fibres are prepared from raw materials of petroleum origin called petrochemical. eg. Nylon, Polyester etc.

POLYMERISATION

Synthetic fibres are polymers. A polymer is a large molcule formed by the combining of many small molecules, each of which is called a **monomer.** The process of combining the monomers to form a polymer is called **polymerisation.** Polymerisation can be of various kinds, for example : **addition polymerisation and condensation polymerisation.**

Types of Synthetic fibres

1. Rayon 2. Nylon 3. Polyester 4. Acrylic 5. Spandex

1. RAYON

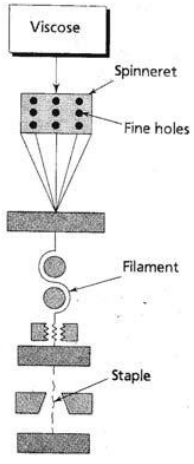
It was prepared by chemical treatment (viscose process) of wood pulp (cellulose). It is also called artificial silk because it resembles in appearance like natural silk.

Process :

Wood pulp ⟶ cellulose $\xrightarrow[2.\ CS_2]{1.\ NaOH}$ viscose $\xrightarrow{\text{Spinnerate}}$ Filament $\xrightarrow{\text{Dil. } H_2SO_4}$ Viscose rayon

staple ↓

Rayon yarn



Preparation of viscose rayon

Properties :

(i) Rayon can absorb sweat because of its tendency to absorb moisture. So it is preferred over other synthetic fabrics in summer season.

(ii) It is shiny and lustrous and resembles to silk.

(iii) It can be dyed in a wide variety of colours.

Uses :

(i) Rayon is mixed with cotton to make bed sheets and mixed with wool to make carpets.

Articles made of rayon

(ii) Shirts, ties and linings are made up of rayon fibre.

(iii) It is used to manufacture tyre cords

(iv) It is used to make bandages and surgical dressings.

2. NYLON

- Nylon was first introduced in 1930s.
- It was developed in Newyork (Ny) & London (Lon) so it was named as **Nylon**.
- It was the first man made fully synthetic fibre.
- It is a polymer made from two monomers, a **diacid** and a **diamine,** by the process called **condensation polymerisation.**
- There are various nylons such as nylon 6, nylon 6-6 and nylon 5-10.

Properties :

(i) Nylon has high strength and high elasticity. It does not lose strength even after repeated use.

(ii) It is lustrous and easy to wash.

(iii) It absorbs very little water hence known to have drip-dry property.

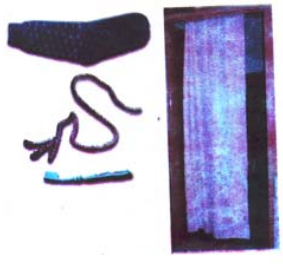
(iv) It is wrinkle resistant and keeps permanent creases.

(v) It is moth and mould resistant.

(vi) It is light, fine and durable.

Uses :

(i) In making socks, sarees, shirts and other garments.



Various articles made from nylon

(ii) It is used to blend with wool to increase the strength & used in making carpets.

(iii) Used to make tents, parachutes, umbrella, fishing nets, climbing ropes, tyre cord, strings for sports goods.

(iv) It's fibres are used for making tooth brush, car seat belt, slipping bags and curtains.

(v) It is used to make machine parts.

MAKING NYLON 6-6 : Nylon 6-6 is a commerically successful variety of nylon made from **adipic acid and hexamethylene diamine.** First 6 in 'nylon 6-6' refers to the 6 carbons of adipic acid and the second 6 to the 6 carbons of the diamine.

Adipic acid + hexamethylene diamine → nylon 6-6 + water

The reaction is carried out at high temperature and pressure. The **molten nylon 6-6** is then forced through a spinneret, with very fine holes into air where it hardens into filaments. The fibres are then stretched upon cooling.

ACTIVITY

Take an iron stand with a clamp, Take a cotton thread of about 60 cm length. Tie it to the clamp so that it hangs freely from it as shown in fig. At the free end suspend a pan so that weight can be placed in it. Add weight one by one till the thread breaks. Note down the total weight required to break the thread. This weight indicates the strength of the fibre. Now we Repeat the same activity with threads of wool, polyester, silk and nylon and Tabulate the data as shown in table. Arrange the threads in order of their increasing strength.

S.No.	Type of thread/fibre	Total weight required to break the thread
1	Cotton	10 gm
2	Wool	20 gm
3	Silk	30 gm
4	Nylon	50 gm

Total weight required to break the thread is maximum in nylon so it shows that nylon is stronger thread. You may use a hook or a nail on the wall for hanging the fibres and a polythene bag at the other end. In place of weights you may use marble (or pebbles) of similar size.

An iron stand with a thread hanging from the clamp

Q. Explain why some fibres are called synthetic?

Q. Why Rayon is different from synthetic fibre?

Q. Give examples which indicate that Nylon is very strong?

3. POLYESTER

It is made of repeating units of a chemical called "ester" which has fruit like smell. Most polyester fabrics have excellent wash and wear characteristics and therefore requires minimum care eg. Terylene and Dacron.

Blended fibres :

Fabrics are sold by names like polycot, polywool, terrycot, etc. As the name suggests, these are made by mixing two types of fibres.

Polycot → Polyester + Cotton.

Terrycot →Terrylene + Cotton.

Polywool → Polyester + Wool

Properties :

(i) It absorbs very little water so dry quickly.

(ii) It is strong, light weight, wrinkle resistant and elastic fibre.

(iii) It is not attacked by moths and ordinary chemicals.

(iv) It can be drawn in to very fine fibres that can be woven like any other yarn.

Uses :

(i) Polyester fibres are used in manufacture of textiles.

(ii) Terry wool, a blend of terylene and wool, is used for making suits,
Terrycot is used for making skirts, shirts and other dress materials.

(iii) It is used to make light weight sails, conveyor belts.

(iv) Polyester films, which is known as "mylar" are used for making magnetic recording tapes in audio cassettes, video cassettes and floppy discs.

Making Polyester : PET (polyethylene terephthalate), the commonly used polyester, is made from two monomers.**terephthalic acid** and **ethylene glycol,** by the process called **condensation polymerisation**
terephthalic acid + ethylene glycol →polyethylene terephthalate (PET) + water.

4. ACRYLIC

Synthetic fibre prepared from acrylonitrile (Monomer unit). Acrylic fibre is also known as polyacrylonitrile ("PAN") or "Orlon" or Acrilan"

Properties :

(i) It is warm, soft, light and flexible fibre.

(ii) It closely resembles to wool in its properties & cheaper than natural wool.

(iii) Acrylic yarn can be easily knitted.

(iv) They are available in variety of colours.

Uses :

(i) Acrylic fibre is used for making sweaters, socks & shawls.

(ii) It is used for making carpets and blankets.

5. SPANDEX

Spandex is known for its high elasticity which makes it suitable for use in clothes, that require snug fitting eg swimming costumes. It is also known as "LYCRA" .
When spandex is blended with cotton fabrics, stretched fabric is obtained which is used for making T-shirts and caps.

Uses : It is used in the making of costumes, caps, T-shirts etc.

ADVANTAGES AND DISADVANTAGES OF SYNTHETIC FIBRES :

	Advantages	Disadvantages
1.	Its tensile strength is high and it can bear heavy loads without breaking.	Synthetic fibres can absorb very little moisture. It becomes sticky when body sweats.
2.	These fibres are generally elastic in nature. It can regain its original shape after stretching or compressing to some extent.	These fibres have low melting points so melts easily, so it is dangerous to worn while working in the kitchen,
3.	These fibres are wrinkle resistant.	It requires very careful ironing.

PLASTICS

Material that can be shaped by applying heat and pressure. Plastic means easy to mould. Plastic is a polymeric substance that can be moulded when soft and then hardened to produce a durable article. It is made soft by applying heat and pressure before moulding.

Types of Plastics :- On the basis of their reaction to heat, all types of plastic can be classified into two groups.

(i) Thermoplastics

(ii) Thermosetting plastics

(i) **Thermoplastics :-** Those plastics which can be melted by heating and moulded into desired shapes and sizes, repeatedly are called thermoplastics. On heating these softens and on cooling they becomes hard. This cyclic process of heating, moulding & cooling is adopted to get desired shaped article.

e.g Polythene, PVC, Nylon, Terylene and Polystyrene etc.

(ii) **Thermosetting Plastics :-** These are harder and stronger than thermoplastics and can retain their shape and size even at high temperature. These polymers once set in a given shape on heating, can not be resoftened or remelted on being reheated. eg. Bakelite, Melamine.

General Properties :-

(i) Plastic can be recyled, reused, coloured, melted, rolled into sheets or made into wires.

(ii) Plastic is non-reactive with moisture & air and insoluble in water. It is not corroded easily.

(iii) Plastic is light in weight, strong & durable and moulded into different shapes and sizes.

(iv) Plastics are poor conductor of heat and electricity, that's why electrical wire coverings, handles of screw drivers and frying pans are made of plastics.

Uses :

S.NO.	PLASTIC	USES
1.	PET (Poly ethylene terephthalate)	Containers for microwave cooking, carbonated beverage bottles and other food containers.
2.	HDPE (High Density Polyethylene)	For packaging strong and corrosive household and industrial chemicals like bleaches, acids and liquid detergents.
3.	PVC (Poly Vinyl Chloride)	PVC pipes for sanitary fittings (such as water pipes)
4.	LDPE (Low Density Polyethylene)	Polybags, grocery bags and packages of frozen foods and bread.
5.	PP (Polypropylene)	Ketchup bottles, yoghurt containers, medicine bottles, automobile battery casings.
6.	PS (Polystyrene)	Thermocol, a form of PS, is used for making disposable cups and packaging material for fragile items like computers and televisions.
7.	Melamine (Thermosetting Plastics)	Floor tiles, kitchenware and fabrics which resists fire melamine plastic is coated on uniform of fireman.
8.	Bakelite (Thermosetting Plastics)	Electrical switches and handles of various utensils.
9.	(PTFE) Teflon (Polytetra fluoro-ethylene)	For making nonstick coating on cooking pans and other cookwares on which water and oil do not sticks.

Q. Why plastic containers are favoured for stroring food?

Q. Explain the difference between theromoplastics and thermosetting plastics.

Q. Explain why the following are made of thermosetting plastics?

(i) Saucepan handles.

(ii) Electric plugs/ Switches/Plug boards

Q. Should the handle & bristles of a tooth brush be made of the same material? Explain your answer?

Q. Give example that plastics are noncorrosive in nature?

Plastic and Environment :

(i) Plastic takes several years to decompose so it is not environment friendly. It causes environmental pollution (Air, Water & Land)

(ii) (a) When plastic burns, it releases lots of poisonous gases into atmosphere causing air pollution.

(b) When plastic wastes are dumped in water they cause water pollution.

(c) Accumulation of plastic waste on road sides & collection of ugly dumps causes many diseases to humans and animals.

Q. Categorise the materials of the following products into "can be recycled" and "can not be recycled"

Telephone instruments, plastic toys, cooker handles, carry bags, Ball point pens, Plastic bowls, Plastic covering on electrical wires, plastic chairs, electric switches.

Q. Rana wants to buy shirts for summer. Should he buy cotton shirts or shirts made from synthetic material? Advise rana, Giving your reason?

Problems and solutions associated with Plastic disposal :

Problems : Environmental and health hazards problems arises with their disposal because they are non-biodegradable. Accumulation of plastics is a serious problem, because most of the method used to dispose them results in some type of pollution to the environment.

(i) Buried plastic materials prevent rain water from seeping into earth, so plant growth is affected in those areas.

(ii) Plastic waste may end up in littering road sides, floating in lakes and streams and collecting in ugly dumps. These provides homes for many diseases.

(iii) When wastes are dumped in water. It causes water pollution through toxic substances present in plastics. It can cause death or reproductive failure in fish and other aquatic animals.

(iv) When cows eats garbage they swallow materials like polythene bags and wrappers of food. It chokes the respiratory system of cows and forms a lining in their stomach and can be the cause of their death.

(v) The polybags thrown carelessly here and there are responsible for clogging the drains.

Solutions :

(i) Avoid the use of plastics as far as possible.

(ii) Use cotton or jute bags instead of plastic bags when we go for shopping.

(iii) Biodegradable and Nonbiodegradable waste should be collected separately and disposed off separately.

(iv) Recycle the plastic waste. Take care in collection, sorting and processing the plastic waste with this aim that it can be used in manufacturing of other products.

(v) Knowledge should be given to people about "green bin" and "blue bin" provided by municipality for separation of biodegradable waste such as food items (Green bin) and Nonbiodegradable waste such as plastics (Blue bin).

(vi) People should also be advised to follow 4R principles. The "4R" principles are –

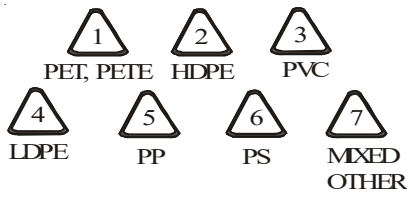
(a) Reduce (b) Reuse (c) Recycle (d) Recover

It will make environment friendly.

To overcome the problem of disposal of solid polymer waste, scientists were trying to make such type of plastics which should be "biodegradable" (decomposed by microorganisms) and "Photodegradable" (decomposed by sunlight) some polymers have been made. examples are –

(ii) **Poly β – Hydroxybutyrate – co – β – Hydroxy valerate (PHBV)**
It is biodegradable and used in speciality packaging, orthopaedic devices and in controlled release of drugs.

(iii) **Nylon – 2 – Nylon – 6 (Biodegradable)**
To identify the plastics, numbers have allotted to different types of plastics. The principle used for it is, smaller the number, easier is to recycle.



RECYCLING CODES

Q. Avoid plastics as far as possible, comment on this advice
Q. Manufacturing synthetic fibres is actually helping conservation of forests. Comment

ACTIVITY

To determine effect of flame on different kinds of fibres.

Materials required :

- 10 cm long fibre of (i) cotton, (ii) Rayon (iii) Wool, (iv) Silk, (v) nylon (vi) Polyester and (vii) acrylic
- A spirit lamp or a candle
- Fire-tongs
- A plate made of chine clay or glass.

Method

Light the spirit lamp or the candle and place it on the table. Next to it place a plat of chine clay or glass. Hold the cotton fibre in the fire-tongs and then hold it over the flame, till it catches fire. Shift the burning fibre over china clay plate and make observations till a small amount of it is left. Drop this small burning fibre in the china plate. Repeat the activity with the fibres of other materials. Your observations wil be as listed under:

FIBRE		OBSERVATION
1	**Cotton**	(i) Burns vigorously producing a large flame. (ii) The smell of burning fibre is like that of burning paper. (iii) Very little ash or beady residue is formed.
2	**Rayon**	(i) Burns vigorously producing a large flame. (ii) The smell of burning fibre is like that of burning paper. (iii) A hard black globular mass is left behind as residue.
3	**Wool**	(i) Burns poorly without any flame. (ii) The smell of burning fibre is like that of burning hair. (iii) The residue forms a kind of grey ball along the burning portion.
4	**Silk**	(i) Burns poorly without any flame. (ii) The smell of burning fibre is like that of burning hair. (iii) The residue swells up to form black ash.
5	**Nylon**	(i) It melts and burns with difficulty. (ii) The fibre shrinks from flame, forming beady residue. (iii) The smell of burning fibre is like that of burning hair.
6	**Polyster**	Same as nylon, except that it produces black smoke.
7	**Acrylic**	(i) It produces a sooty flame. (ii) The fibre shrinks from flame forming black beads.

SOME IMPORTANT POINTS FOR COMPETITIVE EXAMINATION

- Stones are readymade building material.
- Granite stones are very strong and long lasting.
- Most famous temples of South India are made of granite stones.
- Nagarjunsagar dam on river Krishna is made of granite stones.
- Red Fort at Delhi and palaces of Fatehpur Sikri (Agra) are made of sandstone.
- The famous Taj Mahal at Agra is made of white marble.
- Bricks were extensively used by the people of the Indus Valley Civilization.
- In 1824, British engineer Joseph Aspdin discovered Portland cement.
- Cement is manufactured from silica, alumina, limestone and iron oxide.
- Gypsum is mixed during manufacture of cement to slow the setting (hardening) process.
- Cinder concrete is used to build bridges.
- Glasses are super cooled liquids.
- Glasses are made from silica and silicates.
- Soda-lime silica glass is used to make bottle, crockery, mirrors, etc.
- Plate glass is used in shop windows and doors.
- Bullet proof glass is made by safety glass and is laminated with a thin layer of plastic (polyvinyl butyral).
- Lead crystal glass has high refractive index.
- Boro silicate glass is resistant to heat.
- Photochromic glasses contain silver iodide.
- Glass fibres are woven with cotton fibres to make water-proof and fire-proof sheets.
- Water proof sheet layers are joined together by adhesives to form fibre glass material.
- Optical fibres are very fine glass tubes.
- Optical fibres are used in endoscopy.
- Ceramic pottery is produced by treating clay at high temperatures.
- The simplest and oldest type of pottery is earthenware.
- Terra cotta is a primitive unglazed kind of pottery.
- Porcelain is made from white clay and is translucent.
- Porcelain was first made in China and is also known as Chinaware or Bone China.
- Porcelain is used as insulator for high tension electric cables.
- Plant cellulose is a natural polymer.
- Wool and silk are also natural polymers having long chains of protein molecules.
- Polythene is thermoplastic and is used for packing milk.
- Polystyrene is very light, when blown contains many air bubbles.
- Perspex is extremely light and transparent.
- Teflon is used as a nonstick coating for cooking utensils.
- Rayon has silky look and is similar to cotton.
- Soap has two-headed molecule, i.e., hydrophilic (have affinity with water) and hydrophobic (repel water molecule).
- Soaps do not produce lather in hard water.
- Detergents are made chemically from petroleum hydrocarbons.
- Household detergents are mostly alkaline in nature.
- Ammonia is main basic constituent of nitrogenous fertilizers.
- Weedicides are used to eliminate weeds.
- Use of DDT and BHC is banned in some countries.
- DDT and BHC are pesticides having long lasting effects.
- Some pesticides enter in food chains, thus cause serious health hazards.
- Glass is made by fusing sand (silica) with sodium carbonate and calcium carbonate.
- Many man-made substances are not biodegradables.
- Formica and Melamine are generally used for making cups and crockery.
- Thermosets do not soften upon heating.
- Bakelite is a common example of thermoset.

SUMMATIVE ASSESSMENTS

1. Which of the following is a natural fabric ?

(A) Polyethylene (B) PVC (C) Nylon (D) Cotton

2. ..... is an example of natural fibre.

(A) Nylon (B) Rayon (C) Jute (D) Terylene

3. Which is known as artificial silk ?

(A) Rayon (B) Nylon (C) Dacron (D) Polyester

4. The fibre obtained from cellulose is .....

(A) Polyester (B) Nylon (C) Acrylic (D) Rayon

5. Which resembles in properties with wool ?

(A) Acrylic (B) Orlon (C) Acrilan (D) All of these

6. By which fabrics terrycot is made ?

(A) Polyester + Cotton (B) Cotton + Orlon (C) Cotton + Nylon (D) Cotton + Rayon

7. The raw material used in preparation of synthetic fibres is :

(A) Petrochemicals (B) Petrol (C) Gasoline (D) Coaltar

8. Which of the following do not contain polyester fabric ?

(A) Terrywool (B) Terrycot (C) Terylene (D) Orlon

9. Why one should not wear polyester clothes while working in kitchen ?

(A) It catches fire & sticks on the body (B) Clothes are costly

(C) Moisture absorbing capacity is less (D) They are uncomfortable

10. PET bottles and utensils are made from :-

(A) Polyester (B) Nylon (C) Teflon (D) Orlon

SELECTION TYPE QUESTIONS

1. Cotton, silk, linen and wool are ..... fibres.
2. The fibre developed in Newyork & London, Simultaneously is .....
3. Rayon is mixed with ..... to make ..... and mixed with ..... to make .....
4. The fibre used in parachute making and ropes for rope climbing is .....

MATCH THE FOLLOWING

1. Match the terms of column A correctly with the statement given in column B.

Column-A	Column-B
(A) Polyester	(i) Prepared by using wood pulp
(B) Acrylic	(ii) Used for making parachutes and stockings
(C) Rayon	(iii) Used to make sweaters & shawls
(D) Nylon	(iv) Fabrics do not wrinkle easily

HOTS (HIGH ORDER THINKING SKILLS)

1. What are synthetic fibres? Give two example.
2. What are natural fibres? Give two examples.
3. Why is rayon called artificial silk ?
4. Why parachutes and ropes are made from Nylon ?
5. Give two disadvantages of synthetic fibres.
6. Why in summer wearing of cotton clothes is preferred in comparison to synthetic clothes ?
7. Why rayon clothes are generally preferred over other synthetic fabrics in summer ?
8. Why Nylon socks are generally preferred ?
9. Why Nylon is blended with wool ?
10. Why synthetic fibres are more popular than natural fibres ?
11. Which type of synthetic fibre is used to make sweater and blankets ?
12. By which properties synthetic fibres are preferred to make dress material ?
13. Why Rayon is called as artificial silk while Nylon also appears like silk and has flexibility ?

SUMMATIVE ASSESSMENTS

1. Which of the following is a thermoplastic ?
   (A) Bakelite (B) Melamine (C) Phenol (D) P.V.C.
2. Which is used in making of thermocoal ?
   (A) Polypropylene (B) Polyethylene (C) Polystyrene (D) High density polyethylene
3. Which polymer is used in making automobile battery casing ?
   (A) High density polyethylene (B) Polyester
   (C) PVC (D) Poly propylene
4. Which of the following plastic is a thermosetting plastic ?
   (A) Polystyrene (B) Polyethylene (C) PVC (D) Bakelite
5. Which is used to make disposable cups?
   (A) Low density polyethylene (B) Polypropylene
   (C) Polystyrene (D) PVC
6. Plastic products are identified by the use of some special numbers. These numbers represent for :-
   (A) Electrical conductivity of plastic product (B) Thermal resistance of plastic product
   (C) Durability of plastic product (D) Recycling of plastic product
7. Why the waste created by plastics is not friendly with environment ?
   (A) Plastics are non biodegradable
   (B) Plastics are biodegradable
   (C) On burning it causes pollution due to evolution of poisonous gases
   (D) A & C both
8. Disposal of plastic is a major problem becasue :-
   (A) It is non biodegradable (B) It is biodegradable
   (C) It takes several years to decompose (D) A & C both

SELECTION TYPE QUESTIONS

1. Melamine is a ..... plastic.
2. Like synthetic fibres plastic is also a .....
3. A material which gets decomposed through natural processes is called .....
4. The name of the fire proof plastic is .....
5. A special plastic on which oil and water do not stick is .....
6. Plastic which gets deformed easily on heating and can be bent easily is .....
7. Plastics which when moulded once, can not be softened by heating is .....
8. Containers which are light weight, lower price, good strength and easy to handling is made up of .....
9. ..... material is responsible for the cause of animal death.
10. Most of the thermoplastics can be .....

MATCH THE FOLLOWING

1.

Column-A	Column-B
(A) Polymer	(i) Poly tetra fluoroethylene
(B) Polyethene	(ii) Thermosetting plastic
(C) Bakelite	(iii) Thermoplastic
(D) Teflon	(iv) Biodegradable
(E) Wollen cloth	(v) Small units combine to form large single units

HOTS (HIGH ORDER THINKING SKILLS)

1. Why plastic is known as polymer?
2. Give the two differences between thermoplastics and thermosetting plastic.
3. Give two examples each of thermoplastics and thermosetting plastic.
4. Write five uses of melamine plastic.
5. Write five names of different kinds of plastic containers that you use in daily life.
6. Write two uses of plastic in medical.
7. Write two names of polymer which are biodegradable.
8. What are "4R" principle?
9. Give reason why?
   (A) Uniforms of fireman have coating of melamine plastic.
   (B) Bakelite is used for making electrical switches.
   (C) Plastic is used in place of metals.
10. Why it is dangerous to leave plastic bags near fire?
11. Why accumulation of plastic is considered a serious problem ?
12. What are the hazards of disposal of plastic in to water?
13. Explain how polybags thrown here & there carelessly are responsible for the deaths of animals, especially cows?
14. What are the "two main solutions" of "Plastic disposal problems"?
15. Why teflon is used to make nonstick cooking pans and other cookwares?
16. Why plastics are used as covering material in electrical appliances?

1. South-Indian temples are made of :-
(A) Granite (B) Sandstone (C) Limestone (D) Concrete

2. Dams on rivers are mostly made by :-
(A) Sandstone (B) Limestone (C) Metamorphic rocks (D) Granite

3. Red Fort at Delhi and palace of Fatehpur Sikri are made of :-
(A) Granite (B) Sandstone (C) Limestone (D) Concrete

4. Who discovered cement?
(A) Agassiz (B) Albertus Magnus (C) Joseph Aspdin (D) Janseen

5. Which of the following is used to build bridges?
(A) Cinder concrete (B) Sandstone (C) Limestone (D) None of these

6. Which of the following is used to reinforce cement?
(A) Bricks (B) Stones (C) Steel rods or bars (D) Mortar

7. Photochromic glass contains :-
(A) Silver bromide (B) Silver iodide (C) Silver chloride (D) All of these

8. Which of the following is used in endoscopy?
(A) Optical fibres (B) Glass fibres (C) Glass wool (D) None of these

9. Purple-blue coloured glass is obtained by the addition of :-
(A) Chromium salts (B) Ferrous oxide (C) Cobalt salts (D) None of these

10. Terra cotta is :-
(A) Kaolin (B) Clay (C) Unglazed primitive pottery (D) Porcelain

11. Porcelain is made from :-
(A) Clay (B) Kaolin (C) Quartz (D) White clay

12. Which of the following is a natural polymer?
(A) Cellulose (B) Nylon (C) Polythene (D) PVC

13. Which of the following have long-chains of protein?
(A) Jute (B) Cotton (C) Silk and wool (D) All of these

14. Thermocole is made from
(A) Polythene (B) Polystyrene (C) Perspex (D) Teflon

15. Which of the following is thermoplastics?
(A) Polythene (B) Bakelite (C) Both of these (D) None of these

16. Contact lenses are made from :-
(A) Polyvinyl chloride (B) Polystyrene (C) Lucite (D) Teflon

17. Which of the following is used as non-stick coating for cooking utensils?
(A) Perspex (B) Styrofoam (C) Polystyrene (D) Teflon

18. Which of the following are thermosets?
(A) Formica and Melamine (B) Polystyrene
(C) Polythene (D) Thermocole

19. Which of the following is similar to cotton?
(A) Nylon (B) Dacron (C) Rayon (D) Terylene

20. Which of the following do not soften upon heating?
(A) Lucite (B) Bakelite (C) Polystyrene (D) Polythene

21. Which of the following does not produce insoluble carbonates in hard water?
(A) Soap (B) Detergent (C) Both of these (D) None of these

22. Which of the following is alkaline in nature?
(A) Soap (B) Detergent (C) Both of these (D) None of these

23. Which of the following is the basic constituent of Nitrogenous fertilizers?
(A) Amide (B) Ammonia (C) Sulphuric acid (D) Hydrochloric acid

24. Heptachlor is :-
(A) Fungicide (B) Weedicide (C) Insecticide (D) All of these

25. Which of the following pesticide is banned in some contries?
(A) DDT (B) Dieldrin (C) Chlordane (D) Parathion

26. The correct order of increasing size of particles is :-
(A) Sand, silt, clay (B) Clay, sand, silt (C) Clay, silt, sand (D) Sand, clay, silt

EXERCISE-1

(SYNTHETICS FIBRES)

- **Objective Type Questions**

1. D 2. C 3. A 4. D 5. D 6. A 7. A 8. D 9. A 10. A

- **Fill in the blanks**

1. Natural 2. Nylon 3. Cotton, bed sheets, wool, carpets. 4. Nylon

- **Match the Column**

1. (A) → (iv) ; (B) → (iii) ; (C) → (i) ; (D) → (ii)

EXERCISE-2

(PLASTICS)

- **Objective Type Questions**

1. D 2. C 3. D 4. D 5. C 6. D 7. D 8. D

- **Fill in the blanks**

1. Thermosetting 2. Polymer 3. Biodegradable 4. Melamine 5. Teflon 6. Thermoplastic
7. Thermosetting 8. Plastic 9. Plastic 10. Recycled

- **Match the Column**

1. (A) → (v) ; (B) → (iii) ; (C) → (ii) ; (D) → (i) ; (E) → (iv)

EXERCISE-3

(FOR COMPETITIVE EXAMINATION)

1. A 2. D 3. B 4. C 5. A 6. C 7. B 8. A 9. C 10. C
11. D 12. A 13. C 14. B 15. A 16. C 17. D 18. A 19. C 20. B
21. B 22. B 23. B 24. C 25. A 26. C

1. Explain why some fibres are called synthetic.

Ans. Some fibres are called synthetic because they are made by human beings.

2. Marks (✓) the correct answer :

Rayon is different from synthetic fibres because.

(a) It has a silk like appearance

(b) It is obtained from wood pulp

(c) Its fibres can also be woven like those of natural fibres.

Ans. (b) It is obtained from wood pulp.

3. Fill in the blanks with appropriate words :

(a) Synthetic fibres are also called ..... or ..... fibres.

(b) Synthetic fibres are synthesised from raw material called ..... .

(c) Like synthetic fibres, plastic is also a ..... .

Ans. (a) Artificial, man-made.

(b) Petrochemicals

(c) Polymer

4. Give examples which indicate that nylon fibres are very strong.

Ans. Parachutes and ropes for rock climbing.

5. Explain why plastic containers are favoured for storing food.

Ans. Three main advantages of using plastic containers for storing food are :

(i) They do not react with food items.

(ii) They do not get rusted.

(iii) They are light, strong and durable.

6. Explain the difference between thermoplastic and thermosetting plastics.

Ans. Thermoplastics can be softened by heating and can be bent easily whereas thermosetting plastic cannot be softened by heating and break when forced to bend.

7. Explain why the following are made of thermosetting plastics.

(a) Saucepan handles

(b) Electric plugs/switches/plug boards.

Ans. Above articles are made up of bakelite (a thermosetting plastic) because it is –

(a) Poor conductor of electricity

(b) Heat resistant.

8. Categories the materials of the following products into 'can be recycled' and 'cannot be recycled' :

Telephone instruments, plastic toys, cooker handles, carry bags, ball point pens, plastic bowls, plastic covering on electrical wires, plastic chairs, electrical switches.

Ans.

Can be recycled	Cannot be recycled
Toys, carry bags, plastic bowls, electric wire, covering , plastic chairs	Telephone instruments, cooker handles, ball point pens, electrical switches.

9. Rana wants to but shirts for summer. Should he buy cotton shirts or shirts made from synthetic material? Advise Rana, giving your reason.

Ans. Synthetic fabric soaks less water than cotton fabric. In summers we have extensive sweating which must be soaked up by our clothings. Since synthetic fabric is poor in this property we prefer cotton clothes in summers.

10. Give examples to show that plastics are noncorrosive in nature.

Ans. (i) It does not react with the chemical or other items stored in the containers made of it.

(ii) It does not get rusted when exposed to moisture and air.

(iii) It does not decompose when left in open for a long period.

11. Should the handle and bristles of a toothbrush be made of the same material? Explain your answer.

Ans. Handle and bristles of a toothbrush should be made of different materials because they have different uses and require different properties in the material e.g., bristles should be much more flexible than the handle.

12. 'Avoid plastics as far as possible.' Comment on this advice.

Ans. Since plastic takes several years to decompose, it is not environment friendly. It causes environmental pollution. Besides, when the synthetic material is burnt it takes a long time to get completely burnt. In the process it releases a lot of poisonous fumes into the atmosphere causing air pollution.

13. Match the terms of Column A correctly with the phrases given in Column B.

	A	**B**
(i)	**Polyester**	**(a) Prepared by using wood pulp**
(ii)	**Teflon**	**(b) Used for making parachutes and stockings**
(iii)	**Rayon**	**(c) Used to make non-stick cookwares**
(iv)	**Nylon**	**(d) Fabrics do not wrinkle easily**

Ans.

	A	B
(i)	Polyester	(d) Fabrics do not wrinkle easily
(ii)	Teflon	(c) Used to make non-stick cookwares
(iii)	Rayon	(a) Prepared by using wood pulp
(iv)	Nylon	(b) Used for making parachutes and stockings

14. 'Manufacturing synthetic fibres is actually helping conservation of forests.' Comment.

Ans. In the manufacturing of synthetic fibres we use no material from natural sources thus in turn we conserve forests which may otherwise been destroyed. When we use articles made of plastics we also save thousands of trees which otherwise have to be cut if we used articles made of wood or natural fibres.

15. Describe an activity to show that thermoplastic is a poor conductor of electricity.

Ans. A thermoplastic (or plastic) is poor conductor of electricity. It can be shown by using a plastic wire as a connecting wire in a circuit. In this condition the bulb will not glow.