

## CHAPTER - 3

### FIBRE TO FABRIC

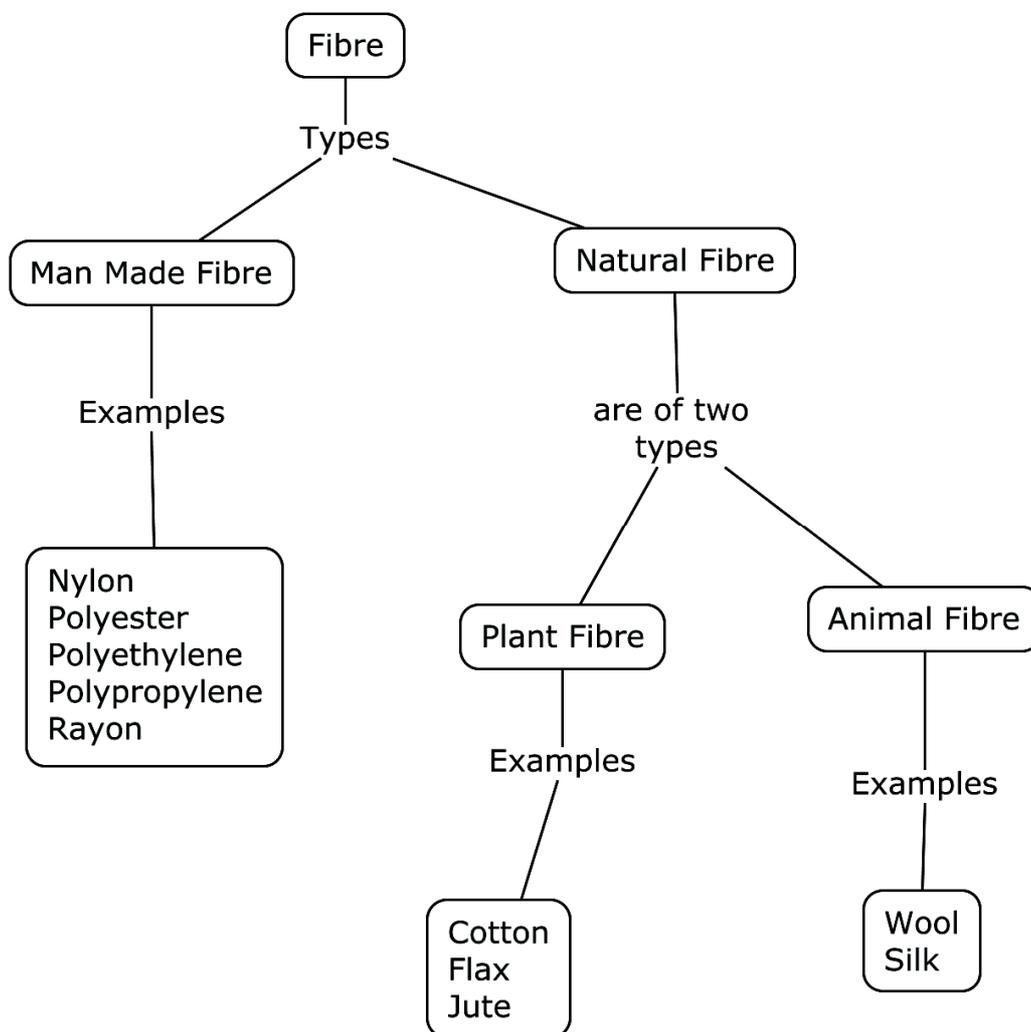
Cloth is one of our basic needs. Cloth protects us from heat, cold, rain, dust, insects, etc. Clothes also make one civilized and smart. Clothes are made of cloth. Cloth is also known as fabric. Fabric is made of fiber.

#### TYPES OF FIBRE

There are two types of fibre, viz. natural and man-made.

**Natural fibers:** Natural fibers are obtained from plants and animals; such as jute, cotton, wool, silk, etc.

**Man-made fibers:** Fibers that are synthesized in laboratory are called man-made fiber, such as terrylene, terry-cotton, acrylic, etc.



#### Types of Natural fiber:

Natural fibers can be classified into two types – Plant fiber and Animal fiber.

**Plant Fiber:** Fiber obtained from plants is called plant fiber. For example – cotton, jute, flex, etc.

**Animal Fiber:** Fiber obtained from animals is called animal fiber. For example: wool and silk.

## WOOL

There are many animals that bear a thick coat of hair on their body. Such animals generally live in cold climates. Thick coat of hair over the body of such animals traps lot of air and keeps them warm as air is a bad conductor of heat. It prevents the warmth of the body from escaping and also prevents the coldness of the surroundings from entering. Thus, thick layer of hair over their body protects them from harsh cold. For example: Sheep, Goat, Camel, Yak, etc.



(a) Sheep



(b) Goat



(c) Yak



(d) Camel



(e) Llama



(f) Alpaca

The animals which provide us wool.

Fleece and Wool bearing animals; like sheep, goat, camel, yak, etc. bear two types of hair – coarse hair and fine-soft under hair. Fine soft hair is found close to the skin in such animals. The fine soft under hair is called fleece. Fiber for wool is obtained from the fleece (hair) of such animals and hence such animals are called wool bearing animals.

Sheep are reared in many parts of our country for wool. The below Table gives the names of some breeds of sheep reared in our country for producing wool. The quality and texture of the fibres obtained from them is also indicated in the table.

**Table Some Indian breeds of sheep**

S.No.	Name of breed	Quality of wool	State where found
1.	Lohi	Good quality wool	Rajasthan, Punjab
2.	Rampur bushair	Brown fleece	Uttar Pradesh.Himachal Pradesh
3.	Nali	Carpet wool	Rajasthan, Haryana, Punjab
4.	Bakharwal	For woollen shawls	Jammu and Kashmir
5.	Marwari	Coarse wool	Gujarat
6.	Patanwadi	For hosiery	Gujarat

Angora wool is obtained from Angora Goats. Angora Goats are found in hilly regions, such as Jammu and Kashmir. Pashmina wool is obtained from Pashmina Goats. Yak wool is obtained commonly in Tibet and Laddakh. Alpaca and Llama are other animals that give wool.

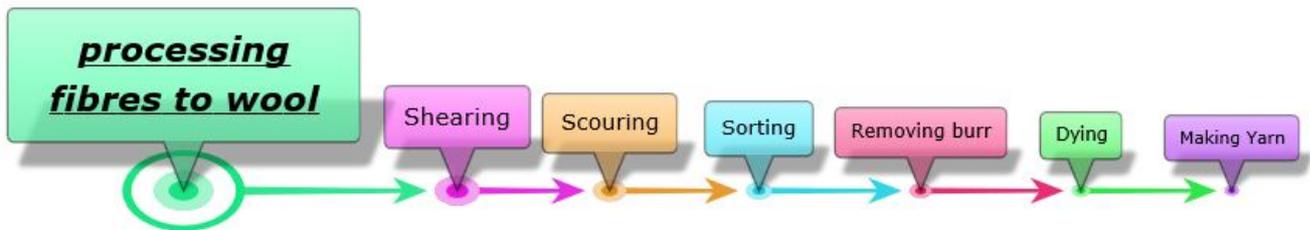
**Selective breeding and rearing of sheep:** Some breeds of sheep bear only a coat of fine hair. Such animals are reared by selective breeding. Selective breeding is the process to obtain animals or plants having special characteristics.

In India, sheep are reared generally in the states of Jammu and Kashmir, Himachal Pradesh, Uttaranchal, Arunachal Pradesh and Sikkim, or the plains of Haryana, Punjab, Rajasthan and Gujarat.

**Food of sheep:** Sheep are herbivores and feed generally on grass and leaves. Apart from grass and leaves they also feed on corn and oil cakes. Oil cakes are materials left after obtaining of oil from oil seeds.

### PROCESS TO OBTAIN WOOL FROM SHEEP

Steps given below are followed to obtain wool from sheep or other wool bearing animals:



**Step 1: Shearing:** The fleece (hair) of sheep is shaved off along with a thin layer of skin. In olden days this was done using pair of metal blades. But now-a-days machine is used to cut off the fleece. This is similar to shaving of beards or hair. This process is called shearing.



Shearing a sheep (cutting the hair of sheep alongwith a thin layer of skin in 'one piece')

Shearing is generally done in summer so that sheep could get new hair by winter to get protection against cold.

**Step 2: Scouring:** Fleece, after shearing, is washed properly to remove dirt and grease. The washing of fleece; after shearing; is called scouring.



Scouring(washing cut hair of sheep or 'fleece' with soap in a tank)

**Step 3: Sorting:** After scouring, fleece is sorted according to texture. This process is called sorting.

**Step 4: Removing burr:** After sorting, fluffy fibers; called burr; are picked out from hair. Burr is the fiber that gives wool.

**Step 5: Dyeing:** After sorting and picking out of burrs, these are dyed in desired colors.

**Step 6: Making yarn:** The fibers are then straightened, combed and rolled into yarns.

Wool yarn is used in knitting sweaters and woolen cloths, i.e. fabric.

## SILK

Silk is another important animal fiber. Silk worm spins silk. Silkworm is reared to obtain silk.

### History of Silk:

Silk was discovered in China; around 3500 BC. Silk became a prized possession because of its fine quality and luster. Originally, it was used by emperors only. It was through trade that silk spread to other parts of the world over a period of time. Silk was a staple item of trade during ancient times. Due to this, the ancient trade routes which linked China to other parts of the world are called 'Silk Route'.

As per historians, silk was produced in India also. Proof of use of silk during the Indus Valley Civilization has also been found.

**Types of Silk:** Different types of silk worm produce different types of silk; in terms of luster and texture. For example; tassar silk, mooga silk, kosa silk, etc. are produced by different types of silk moth. Mulberry silk is the most common silk moth.

**Rearing of silkworm:** Rearing of silkworm is known as SERICULTURE. Silkworms are reared on mulberry leaves as they feed on mulberry leaves.

## LIFE CYCLE OF SILKWORM:

There are four stages in the development of silk moth

1. Egg
2. larva
3. pupa
4. adult

### Stage 1:-

In the beginning female silk moth **lays eggs** on mulberry leaves.

### Stage 2:-

The eggs are hatched into very small **larvae within** a week. These larvae then feed on mulberry leaves. The larvae looks like a worm and are also called **caterpillars or silkworms**.

### Stage 3:-

They then grow in size (over three inches) and then the caterpillar is ready to enter the next stage of his life called **pupa**. An adult silkworm first weaves a net to hold itself. Then it swings its head from side to side in the form of figure 8. During these movements the head of the caterpillar secretes fibre made of a protein which hardens on exposure to air and becomes **silk fibre**. Soon the caterpillar covers itself completely by silk fibre. This covering is known as a **cocoon**. The cocoon is made by caterpillar to protect its development as pupa. The silkworm continues to develop inside the cocoon to form silk moth. **Pupa is the stage in the life history of silk moth when the caterpillar becomes encased in the hard shell of silk fibre(cocoon).**

### Stage 4:-

In this stage pupa which is encased in the cocoon, develops fully to form an adult silk moth. After the complete development the cocoon splits up and beautiful silk moth comes out of it. This completes the life history of a silk moth.

Egg → Larva (or Caterpillar) → Pupa → Silk moth  
(Silkworm)



(a) Eggs of silk moth on mulberry leaves



(b) Larva (or Caterpillar) (Silkworm)



Cocoon



(c) Pupa



(d) Adult silk moth

Diagrams to show the life history of silk moth.

## PRODUCTION OF SILK FROM SILK MOTH

To obtain silk, silk moths are reared and their cocoons are collected to get silk threads or fabric. We will now learn more about the process. For this mulberry trees are grown.

### (1) Rearing of silk worms to obtain cocoon:-

Female silk moth lays hundreds of eggs at a time. These eggs are stored carefully on paper or cloth strips and are sold to silk worm farmers. The farmers keep eggs under hygienic conditions and under suitable conditions of temperature and humidity.

The eggs are then warmed to suitable temperature for hatching. When eggs hatch silkworms or caterpillars come out. Silkworms are then fed on mulberry leaves day and night. They then increase enormously in size.

The larvae are kept in clean bamboo trays along with young and freshly chopped mulberry leaves. After 25 to 30 days, silkworms stop eating and start spinning the cocoon.



(a) Female silk moth lays eggs



(b) Silkworms hatched from eggs feed on mulberry leaves



(c) Cocoons of silk fibres spun by silkworms

#### Production of silk

#### (2) Processing cocoons to obtain silk fibre:-

The cocoons are collected and boiled in water to kill the pupa inside them. Hot water makes the silk fibres of cocoon to separate out. This resulting fibre is called raw silk.

The process of taking out silk fibre from cocoons for use as silk is called reeling. Reeling is done in special machines which unwind the fibres of silk from cocoons.

#### (3) Converting silk fibre into silk cloth:-

Silk fibres obtained from cocoons are spun to form silk yarn which is then woven in looms by weavers to make silk cloth.

#### Different Varieties of Silk

There is a variety of silk moths which look very different from one another. The silk produced by the silkworms of different varieties of silk moths is different in texture (coarse, smooth, shiny, etc.). Some of the varieties of silk are: Mulberry silk; Tassar silk; Mooga silk; Kosa silk; and Eri silk. These silks are obtained from cocoons spun by the silkworms of different types of silk moths. The most common silk moth is the mulberry silk moth. The silk obtained from the cocoons of mulberry silk moth is called mulberry silk. Mulberry silk is soft, lustrous (shiny) and elastic, and can be dyed in beautiful colours. Thus, the most common variety of silk is mulberry silk.

### NCERT EXERCISE QUESTIONS AND ANSWERS

1. You must be familiar with the following nursery rhymes

- (i) 'Baa baa black sheep have you any wool'.
- (ii) 'Mary had a little lamb. whose fleece was white as snow'.

Answer the following question.

(a) Which parts of the black sheep have wool?

**Answer:** The skin of black sheep has wool.

(b) What is meant by the fleece of the lamb?

**Answer:** Fleece means hair of the lamb.

2. The silkworm is (a) caterpillar (b) a larva; choose the correct option.

- (i) a (ii) b (iii) both 'a' and 'b' (iv) neither 'a' nor 'b'

**Answer:** (iii) both 'a' and 'b'

3. Which of the following does not yield wool?

- (i) Yak
- (ii) Camel
- (iii) Goat
- (iv) Woolly dog

**Answer:** (iv) Woolly dog

4. What is meant by the following terms?

- (i) Rearing
- (ii) Shearing
- (iii) Sericulture

**Answer:**

(i) Rearing: Taking care of animals including feeding, grazing, breeding, etc. for meat, and other useful products.

(ii) Shearing: The removal of wool from the sheep is called shearing.

(iii) Sericulture - The rearing of silkworm for obtaining silk is known as sericulture.

5. Give below is sequence of steps in the processing of wool. Which are the missing steps? Add them.

Shearing \_\_\_\_\_ Sorting \_\_\_\_\_.

**Answer:** Shearing Scouring Sorting Colouring Spinning

6. Make sketches of the two stages in the life history of the silk moth which are directly related to the production of silk.

**Answer:**

stages of life cycle of silk moth

7. Out of the following which are the two terms related to silk production?

- a. Sericulture
- b. Floriculture
- c. Morigulture
- d. Apiculture and
- e. Silviculture

**Answer:** (a) Sericulture and (b) Morigulture are related to silk production.

8. Match the following

Column I

- (1) Scouring
- (2) Mulberry leaves
- (3) Yak
- (4) Cocoon

Column II

- (a) Yields silk fibres
- (b) Wool yielding animal
- (c) Food of silkworm
- (d) Reeling
- (e) Cleaning sheared skin

**Answer:** 1 – (e), 2 – (c), 3 – (b), 4 – (a)

## QUESTION BANK (SET 01)

### MULTIPLE CHOICE QUESTIONS (MCQS)

1. Which of the following does not yield wool ?  
(a) yak (b) camel (c) goat (d) woolly dog
2. The silkworm is :  
(a) a caterpillar  
(b) a larva  
(c) a caterpillar as well as larva  
(d) neither caterpillar nor larva
3. The wool of sheep is removed only once a year before the beginning of :  
(a) spring season (b) summer season (c) winter season (d) rainy season
4. Rampur bushair and Bakharwal are the breeds of:  
(a) goat (b) yak (c) sheep (d) camel
5. Pattanwadi is an Indian breed of sheep found in :  
(a) Gujarat (b) Punjab (c) Haryana (d) Rajasthan
6. The cut off 'wool coat' of a sheep alongwith a thin layer of skin is called :  
(a) grease (b) fleece (c) fleet (d) skeet
7. Sorter's disease is caused by :  
(a) bacteria (b) virus (c) protozoa (d) fungus
8. The process of cleaning the fleece by using soap (or detergent) and a lot of water so as to remove dust, dirt, and grease, etc., is called :  
(a) sorting (b) shearing (c) scouring (d) washing
9. Which of the following fibres are made of proteins ?  
(a) silk and cotton (b) natural silk and artificial silk  
(c) rayon and wool (d) wool and silk
10. The rearing of silkworms for obtaining silk is called :  
(a) agriculture (b) sericulture (c) silviculture (d) pisciculture
11. Which of the following produces silk ?  
(a) pupa (b) larva (c) baby silk moth (d) adult silk moth
12. Silk production involves the cultivation of :  
(a) blackberry trees (b) mulberry trees  
(c) gooseberry trees (d) strawberry trees
13. The process of taking out silk fibres from the cocoons for use as silk is called :  
(a) reeling (b) shearing (c) combing (d) sorting
14. The most common variety of silk is :  
(a) Tassar silk (b) Mooga silk (c) Mulberry silk (d) Kosa silk

**15. Fill in the following blanks with suitable words :**

- (a) The process of selecting parents for obtaining special characteristics in their offsprings is called selective \_\_\_\_\_
- (b) Angora wool is obtained from Angora \_\_\_\_\_
- (c) Llama and alpaca also yield \_\_\_\_\_
- (d) Sheep are \_\_\_\_\_ and prefer grass and leaves.
- (e) Lohi and nali are breeds of \_\_\_\_\_
- (f) Silk is obtained from the \_\_\_\_\_ of a silk moth.
- (g) Silk fibres are made of a \_\_\_\_\_
- (h) Silkworms are \_\_\_\_\_ of silk moth.
- (i) Silkworms Spin \_\_\_\_\_ of silk fibres.
- (j) The process of taking out threads from the cocoons for use as silk is called \_\_\_\_\_ the silk.

**16. Write True for the correct statement and False for the incorrect statement.**

- (a) Tasar silk is a non-mulberry silk product. \_\_\_\_\_
- (b) Shearing is done annually in winter months. \_\_\_\_\_
- (c) Wool, on burning, produces characteristic odour of burning plastic. \_\_\_\_\_
- (d) Scouring is done during extraction of wool in order to remove dust, dirt etc. \_\_\_\_\_

**ANSWER THE FOLLOWING QUESTIONS**

- 17. Name two fibres obtained from animals.
- 18. Which type of wool is common in Tibet and Ladakh ?
- 19. Where are Angora goats found in our country ?
- 20. Which animal produces wool for making fine Pashmina shawls ?
- 21. Where are the wool-yielding animals called llama and alpaca found ?
- 22. Name any two breeds of sheep found in India.
- 23. State whether sheep are herbivores or carnivores.
- 24. What terms are used for the following processes ?
- 25. (a) Removing hair of sheep alongwith a thin layer of skin.
- 26. (b) Washing of sheep's fleece to remove dust, dirt and grease.
- 27. (c) Separating sheep's fleece into fibres of different qualities.
- 28. What causes sorter's disease ?
- 29. Which step comes first in the production of woollen yarn from sheep : scouring or shearing ?

30. Name a natural fibre obtained from insects.
31. Name the tree whose leaves provide food for the silkworms.
32. What are the natural colours of the fleece of sheep and goats ?
33. Which stage comes earlier in the life history of a silk moth—pupa or larva ?
34. Which of the following terms is related to silk production ?  
Floriculture, Tissue culture, Silviculture, Apiculture, Sericulture
35. Name two fibres which are made of proteins.
36. State whether artificial silk is an animal fibre or a plant fibre.
37. What type of feed (or food) is given to sheep ?
38. What is meant by the 'rearing' and 'breeding' of sheep ?
39. Name the various steps involved in the production of wool from sheep.
40. Why do woi—yielding animals (like sheep) have a thick coat of hair on their body ?
41. Explain why, a Woollen garment keeps us very warm in winter.
42. What is an occupational hazard ? Name one occupational hazard.
43. What is meant by the term 'sericulture' ?
44. Name the most common silk moth. What are the characteristics of silk fibres obtained from the cocoons of this silk moth ?
45. How will you distinguish between natural silk and artificial silk ?
46. What is meant by the term 'reeling the silk' ? How is it done?
47. Name any five animals which yield wool. Which is the most common type of wool available in the market ?
48. Name any four types of silk. State whether silk is an animal fibre or a plant fibre.
49. What is a cocoon ? Name the fibre of which a cocoon is made.
50. Arrange the following steps in the correct order in which they are carried out during the production of woollen yarn from the sheep :  
Combing, Shearing, Dyeing, Scouring, Spinning, Sorting
51. Describe briefly, how wool is obtained from sheep and processed to make woollen yarn.
52. What is meant by the following terms ?  
(a) Shearing (b) Scouring (c) Sorting
53. Describe the life history of silk moth briefly. Make sketches of the two stages in the life history of silk moth which are directly related to the production of silk.
54. Describe briefly how silk is produced.
55. In what type of weather shearing of sheep is done ? Why ? Why does shearing not hurt the sheep ?
- .....

**MULTIPLE CHOICE QUESTIONS**

1. The rearing of silkworms for obtaining silk is called
  - (a) cocoon
  - (b) silk
  - (c) sericulture
  - (d) silviculture
  
2. Which of the following is not a type of silk?
  - (a) Mulberry silk
  - (b) Tassar silk
  - (c) Mooga silk
  - (d) Moth silk
  
3. Paheli wanted to buy a gift made of animal fibre obtained without killing the animal. Which of the following would be the right gift for her to buy?
  - (a) Woollen shawl
  - (b) Silk scarf
  - (c) Animal fur cap
  - (d) Leather jacket
  
4. Silk fibre is obtained from
  - (a) fleece of sheep
  - (b) cotton ball
  - (c) cocoon
  - (d) shiny jute stalk
  
5. Wool fibre cannot be obtained from which of the following?
  - (a) Goat
  - (b) Llama
  - (c) Alpaca
  - (d) Moth
  
6. Selective breeding is a process of
  - (a) selecting the offsprings with desired properties.
  - (b) selecting the parents with desired properties.
  - (c) selecting an area for breeding.
  - (d) selecting fine hair for good quality wool.
  
7. The general process that takes place at a sheep shearing shed is
  - (a) removal of fleece.
  - (b) separating hair of different textures.
  - (c) washing of sheep fibre to remove grease.
  - (d) rolling of sheep fibre into yarn.
  
8. The term sericulture is used for
  - (a) culture of bacteria.
  - (b) rearing of silkworm.
  - (c) making silk fabric from silk yarn.
  - (d) production of sarees.

9. Reeling of silk is
- (a) a process of making silk reels.
  - (b) spinning of silk fibres.
  - (c) weaving of silk cloth.
  - (d) the process of taking silk threads from cocoon.
10. Silkworms secrete fibre made of
- (a) fat
  - (b) cellulose
  - (c) protein
  - (d) nylon
11. Natural fibres obtained from plant source like cotton and jute are \_\_\_\_\_ based.
- (a) protein
  - (b) starch
  - (c) fleece
  - (d) fat
12. Pashmina shawls are made from the fine, soft hair of \_\_\_\_\_ goat.
- (a) Angora
  - (b) Kashmiri
  - (c) Cashmere
  - (d) Turkey
13. Bulk of the wool production worldwide comes from \_\_\_\_\_.
- (a) goat
  - (b) camel
  - (c) sheep
  - (d) rabbit
14. The process of unwinding the silk filament from cocoon is known as \_\_\_\_\_.
- (a) softening
  - (b) reeling
  - (c) sorting
  - (d) burning
15. Which of the following is not an animal fibre ?
- (a) Silk
  - (b) Wool
  - (c) Polyester
  - (d) Pashmina
16. \_\_\_\_\_ is the part of the body of sheep that yields wool.
- (a) Skin
  - (b) Fibre
  - (c) Fleece
  - (d) None of these
17. Which of the following options is best suited for the production of superior wool quality ?
- (a) Rearing
  - (b) Shearing
  - (c) Breeding
  - (d) Feeding

18. Silk is made of a \_\_\_\_\_ protein fibre.
- (a) Sericin
  - (b) Chitin
  - (c) Pectin
  - (d) Fibroin
19. Silkworm is reared through
- (a) Apiculture
  - (b) Sericulture
  - (c) Agriculture
  - (d) None of these
20. Silk fibre is
- (a) A good conductor of heat
  - (b) A synthetic fibre
  - (c) Obtained from silk moth
  - (d) None of these
21. The processes involved in making silk strands are
- (a) Reeling, softening, sorting, baling
  - (b) Sorting, baling, reeling, softening
  - (c) Sorting, softening, reeling, baling
  - (d) Sorting, baling, softening, reeling
22. A non-mulberry silk product is
- (a) Muga silk
  - (b) Eri silk
  - (c) Tasar silk
  - (d) All of these
23. The workers of silk industry face risks of disease related to
- (a) Lungs
  - (b) Heart
  - (c) Skin
  - (d) Both (a) and (c)
24. Fill in the blanks in the following statements.
- (a) \_\_\_\_\_ and \_\_\_\_\_ fibres are obtained from animals.
  - (b) Silk fibres come from \_\_\_\_\_ of silk \_\_\_\_\_.
  - (c) Wool yielding animals bear \_\_\_\_\_ on their body.
  - (d) Hair trap a lot of \_\_\_\_\_, which is a poor \_\_\_\_\_ of heat.
25. Fill in the blanks.
- (a) Silkworm undergoes moulting \_\_\_\_\_ times before forming the pupa or cocoon.
  - (b) \_\_\_\_\_ of camel family produce wool in more than 22 different colours.
  - (c) \_\_\_\_\_ infection is caused due to bacterium anthracis.
  - (d) The cocoons are graded according to colour, size, \_\_\_\_\_ and texture.

- (e) Silk and wool are \_\_\_\_\_ products.
  - (f) Pashmina shawls are woven from \_\_\_\_\_ wool.
  - (g) The world's finest wool is extracted from \_\_\_\_\_ sheep.
  - (h) Selective breeding of sheep involves the cross between an indigenous and an \_\_\_\_\_ breed.
  - (i) The scientific name of silkworm is \_\_\_\_\_ .
  - (j) The life cycle of silkworm consists of egg, larva, \_\_\_\_\_ and silk moth.
  - (k) The \_\_\_\_\_ effect of silk thread gives it a natural shine.
  - (l) \_\_\_\_\_ is caused by Bacterium anthracis.
- .....