**SUBJECT: LIVESTOCK PRODUCTS TECHNOLOGY.**

**CHAPTER: 12 WOOL SCIENCE AND TECHNOLOGY.**

**CHAPTER NUMBER: 12**

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**WOOL TYPES:**

**ON THE BASIS OF THE CHARACTER OF WOOL.**

1. **Fine wool:**

* Fibre is about 1.5-5 inch or 38-125 mm in length and 17µ or 0.017 mm in diameter.
* Soft to touch.
* Excellent felting ability.
* Refined in nature.
* Examples: merino, Rambouillet, Cormo, Targhee, Kashmir merino, Bharat merino.

1. **Down wool:**

* Fibres has short staple length, medium diameter and mette appearance.
* Have superb resilience and elasticity.
* Non-felting ability (washable).
* Used in making cushion effect like material like mattress, quilt, batts, pads etc.
* Examples: Clun forest, Dorset down, Shropshire, Suffolk, Hampshire, welsh-mountain.

1. **Medium wool:**

* This fibre is about 65-150 mm or 2.5-6inch long 24-34µ (0.024-0.034 mm) in diameter.
* Examples: Corriedale, finn sheep, Columbia, tunis, montadale

1. **Long wool:**

* 125-357 mm(5-15inch) in length and about 40µ (0.04 mm) in diameter.
* Example: Coopworth, Cotswold, Border Leicester, Leocester Longwool, Lincoln, Romny.
* Double coated wool:
* Produce by heritage breed.
* Have primitive fleece character.
* Have double coat

1. Outer long coat: protective coat.
2. Inner soft coat: which provides warmth.

* Examples: karakul, Icelandic, Navajo churro, Shetland, Scottish blackface.

**ON THE BASIS OF THE SHEEP FROM WHICH THE WOOL HAS BEEN SHEARED.**

1. **Class I:**

* Produce by merino sheep.
* Have a numerous crimps and maximum number of scales.
* Fibre have a 1-5inch in length

1. **Class II**

* Produce by England, Scotland, Ireland and whale sheep breeds.
* Fibre have a 2-8inch in length.

1. **Class III**

* Produce from sheep of UK.
* Smooth and more lusture.
* Wool fibre varies between 4-18inch

1. **Class IV**

* Comes from mongrel sheep, referred as a half breed.
* Length of fibre is 1-16inch.hair like character.
* Smooth and lusture.

**ON THE BASIS OF WOOL/FLEECE.**

1. **Lamb’s wool**: From lamb of 6-8 months old for the first time, tapers at end.
2. **Hogget wool:** From 12-14 months of age, have not been shorn previously, tapers at end.
3. **Wether wool**: From >14 months age. obtain after 1st shearing.
4. **Pulled wool:** Obtained from slaughter sheep skin/pelt.
5. **Dead wool:** Wool from dead sheep died due to old age or accident.
6. **Cotty wool:** When wool expose to severe weather condition, hard and brittle in texture.
7. **Tag locks:** torn, ragged and discoloured part of wool.

**IMPURITIES OF WOOL**

1. **Natural impurities:** from glandular secretion of animals.

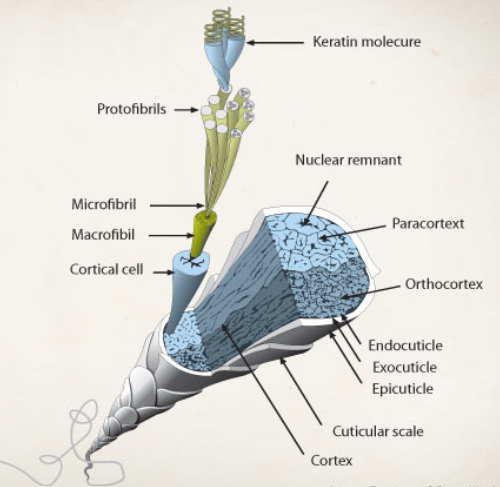
Example- suint and yolk.

1. **Acquired impurities:** get attached to the wool by accident during the grazing of the animal or they lay down on the ground.

Example- sand, dust, dirt, vegetative compound like burs, twig, straw, grass, seed etc.

* **Applied impurities** is also part of this impurities like coloured paint, coal tar, residual parts of the dips etc.

**MICROSCOPIC STRUCTURE OF WOOL FIBRE.**

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1. **Cuticle:** most outer layer of wool fibre.

Have a three major component.

1. **Epicuticle:**

* 30Å thick.
* Resistant membrane, situated most exteriorly.
* Rich in lysin.
* Hydrophobic in nature.

1. **Exocuticle:**

Mostly made up of cysteine.

1. **Endocuticle:**

* Situated most inner side of cuticle.
* Made up of debris material generated from the cytoplasm of the previously alive cuticle cells.
* Similar composition to the cellular debris presents in the nuclear remnants of cortical cells.

1. **Cortex:** constitute three type of cells.
2. Ortho-cortex: appears differently from para-cortex as the inter-macrofibrillar material covers every macrofibrils in ortho-cortex and this causes the clear outlining of the macrofibrils.
3. Para-cortex: non-keratinous material is accumulated in a few large nuclear remnants.
4. **Cell membrane complex:** Dense layer of 15 nm thickness remains between the cortex and cuticle cells.

* Helps in binding and surrounding the cortical cells together, acting as a cementing material. Structural integrity of fibre provided by this material.
* It can be digested by proteolytic enzymes called “retting process” which separate the cortical cells.

1. **Macro-fibril:** These are the long filaments present inside the cortical cells of wool fibre.

* Fine filaments of microfibrils in bundles are the constituents of the macro-fibrils microfibrils covers by a matrix region when remains in the bundles.

1. **Matrix:** Responsible for absorption capacity, fire-resistance, and anti-static character.

* Water absorption capacity is due to presence of sulphure-proteins, which attracts water molecules and allow wool to absorb upto 30% of water of its weight.

1. **Microfibril:** provide strength of flexibility to wool fibre.

* Major constituents of the microfibrils are the pairs of twisted molecular chain.

1. **Twisted molecular chain and helical coil:** act like spring.

* Provides flexibility, elasticity and resilience.

1. **Medulla:** central hollow core along with fibre length.

Have 3 category 1. Hetero 2. Hairy 3.Kempy.

**FILL UP TYPE QUESTION**

1. burrs, seeds, twigs, leaves and straw have removed by \_\_\_\_\_ (process) from the raw wool.
2. \_\_\_\_\_ in the wool is a result of the morphological arrangement of ortho- and para-cortex cells in the wool fibre.
3. \_\_\_\_\_ is a technique used for removal of less required or undesirable parts of the wool.
4. \_\_\_\_\_ is a weight-loss in raw wool when it is scoured, expressed as a percentage of original weight.
5. The process of removing grease, soil, and suint, usually by washing in hot water and detergent called \_\_\_\_\_.
6. The process of removal of wool fibre from sheep skin through use of chemical application (sodium sulphite) or administration (10-14 mg of thallium) for artificial moult in sheep called \_\_\_\_\_.
7. \_\_\_\_\_ is the non-wool portion of grease wool, including grease, vegetable matter, dirt, suint, paints, insects, etc.
8. \_\_\_\_\_ is a length of wool without disturbing the natural waviness of the lock which is a measure of wool quality.
9. \_\_\_\_\_ is a length of stretched wool.
10. \_\_\_\_\_ is the skin of sheep, including the wool.
11. Wool from the hindquarter of sheep, usually the coarsest wool in the fleece is \_\_\_\_\_.
12. Wool remove from the are around the dock and/or udder of sheep called \_\_\_\_\_.
13. \_\_\_\_\_ is a commercial name of crude wool grease.
14. \_\_\_\_\_ is the all the wool shorn from one sheep at a time.
15. \_\_\_\_\_ is a property of a wool of entangling closely and interlocking to form compact mass.
16. Felting property of wool is due to \_\_\_\_\_
17. 1 hank =\_\_\_\_\_ meter.
18. \_\_\_\_\_ hank can be made from 50’S wool weighing one pound.
19. Number of the hank that can be made from one pound of wool is called \_\_\_\_\_.
20. Temperature of the scouring water is maintained at \_\_\_\_\_ this temperature is enough to melt wool grease.
21. \_\_\_\_\_ is a proteinous fibre structure of animal which is non-inflammable & non-liable to melt.
22. \_\_\_\_\_ is obtain from Karakul species.
23. Grease and suint content of fine wool is \_\_\_\_\_.
24. Cashmere goat produces \_\_\_\_\_ fibres.
25. \_\_\_\_\_ is length of 1 lock of wool without disturbing the natural waviness.
26. Under the microscope medulla appears \_\_\_\_\_ (colour) and it may be \_\_\_\_\_ or \_\_\_\_\_.
27. The dye is usually absorbed by \_\_\_\_\_.
28. In Jammu, Govt. wool testing lab is located in\_\_\_\_\_.
29. Abnormal yellow colour of some fleece is due to \_\_\_\_\_.
30. Moisture content in raw wool is \_\_\_\_\_

**MATCH UP TYPE QUESTION**

|  |  |
| --- | --- |
| 1. Fine wool | 1. Due to severe weather condition |
| 1. Worsted yarn | 1. Least fuzz |
| 1. Tag locks | 1. Removal of unwanted wool |
| 1. Skirting | 1. Torn, ragged, and discoloured wool |
| 1. Cotty wool | 1. 17 µ |

1. Match the columns and choose the correct option.
2. (1-b) (2-e) (3-a) (4-c) (5-a)
3. (1-e) (2-d) (3-b) (4-a) (5-c)
4. (1-e) (2-b) (3-d) (4-c) (5-a)
5. (1-e) (2-d) (3-b) (4-c) (5-a)

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| --- | --- |
| 1. Angora | 1. Downy coat of rabbit |
| 1. Mohair | 1. Hypoallergic in nature |
| 1. Cashmere | 1. Very much durable |
| 1. Lamb’s wool | 1. Felting ability |
| 1. Fine wool | 1. Combing |

1. Match the columns and choose the correct option.
2. (1-b) (2-e) (3-a) (4-c) (5-a)
3. (1-e) (2-d) (3-b) (4-a) (5-c)
4. (1-a) (2-b) (3-c) (4-e) (5-d)
5. (1-a) (2-c) (3-e) (4-b) (5-d)

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| --- | --- |
| 1. Fine wool | 1. Leicester longwool |
| 1. Down wool | 1. 24-34 µ in diameter |
| 1. Double coated wool | 1. Superb resilient and elasticity |
| 1. Medium wool | 1. karakul |
| 1. Long wool | 1. Merino |

1. Match the columns and choose the correct option.
2. (1-e) (2-c) (3-d) (4-b) (5-a)
3. (1-e) (2-d) (3-c) (4-b) (5-a)
4. (1-e) (2-c) (3-d) (4-a) (5-b)
5. (1-e) (2-c) (3-b) (4-d) (5-a)

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| --- | --- |
| 1. Lamb’s wool | 1. wool from sheep of >14month old |
| 1. Wether | 1. Angora |
| 1. Hogget wool | 1. First clip |
| 1. cashmere | 1. wool from sheep of 12-14month old |
| 1. Mohair | 1. Kashmir goat |

1. Match the columns and choose the correct option.
2. (1-c) (2-a) (3-d) (4-e) (5-b)
3. (1-c) (2-a) (3-d) (4-b) (5-e)
4. (1-c) (2-d) (3-a) (4-e) (5-b)
5. (1-c) (2-d) (3-a) (4-b) (5-e)

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| --- | --- |
| 1. CWDB | 1. Less twisted |
| 1. IWDP | 1. For development in pashmina production |
| 1. PWDB | 1. Price stabilization of wool |
| 1. Woollen yarn | 1. Improve quality of woollen products & provide skill development. |
| 1. Worsted yarn | 1. Tightly twisted |

1. Match the columns and choose the correct option.
2. (1-d) (2-c) (3-b) (4-a) (5-e)
3. (1-c) (2-d) (3-b) (4-a) (5-e)
4. (1-d) (2-c) (3-b) (4-a) (5-e)
5. (1-c) (2-d) (3-b) (4-e) (5-a)

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| --- | --- |
| 1. Fleece rot | 1. Wool lost crimp |
| 1. Break | 1. Due to prolong wetting and bacterial action. |
| 1. Tender wool | 1. Due to copper deficiency |
| 1. Steely wool | 1. Wool is abnormally weak throughout the entire length of the fibre |
| 1. Doggy wool | 1. When lock is stretched & all the fibres break squarely across the same point |

1. Match the columns and choose the correct option.
2. (1-b) (2-e) (3-d) (4-c) (5-a)
3. (1-b) (2-d) (3-e) (4-c) (5-a)
4. (1-b) (2-c) (3-d) (4-c) (5-a)
5. (1-b) (2-c) (3-d) (4-a) (5-a)

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| 1. Odour of burnt wool | 1. Non-medullated |
| 1. Kempy wool | 1. Medullated |
| 1. Hairy wool | 1. Medulla comprise <75 % Of the fibre diameter. |
| 1. Fine wool | 1. Burning hair |
| 1. coarse wool | 1. Medulla comprise >75 % Of the fibre diameter. |

1. Match the columns and choose the correct option.
2. (1-d) (2-e) (3-c) (4-b) (5-a)
3. (1-d) (2-c) (3-e) (4-a) (5-b)
4. (1-d) (2-e) (3-c) (4-b) (5-a)
5. (1-d) (2-e) (3-c) (4-a) (5-b)

|  |  |
| --- | --- |
| 1. Resiliency of fine wool | 1. Number per inch |
| 1. Crimp | 1. µ |
| 1. Fibre diameter | 1. Bad |
| 1. Abrasion resistance | 1. Excellent |
| 1. Dimentional stability of fine wool | 1. Good |

(8) Match the columns and choose the correct option.

1. (1-d) (2-e) (3-c) (4-b) (5-a)
2. (1-d) (2-c) (3-e) (4-a) (5-b)
3. (1-d) (2-e) (3-c) (4-b) (5-a)
4. (1-d) (2-a) (3-b) (4-e) (5-c)

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| --- | --- |
| 1. CSWRI | 1. Malpura |
| 1. Wool from shoulder and side | 1. Gilling, combing, drafting |
| 1. Sheep | 1. Rugs |
| 1. Worsted processing | 1. Nellore |
| 1. Wool from lower legs | 1. Clothing |

1. Match the columns and choose the correct option.
2. (1-a) (2-b) (3-d) (4-e) (5-c)
3. (1-a) (2-e) (3-d) (4-c) (5-b)
4. (1-a) (2-e) (3-d) (4-b) (5-c)
5. (1-b) (2-c) (3-d) (4-e) (5-a)

|  |  |
| --- | --- |
| 1. March-april clip | 1. Best quality yield, white in colour ,largest clip |
| 1. July-august clip | 1. Yellow coloured and fetch lower prize |
| 1. September-october clip | 1. Pale yellow |
| 1. Rajastham | 1. Three shearing/year practiced |
| 1. Hilly region | 1. Two shearing/year practiced |

1. Match the columns and choose the correct option.
2. (1-a) (2-c) (3-a) (4-e) (5-d)
3. (1-b) (2-c) (3-e) (4-a) (5-d)
4. (1-c) (2-b) (3-a) (4-e) (5-d)
5. (1-a) (2-b) (3-c) (4-d) (5-e)

|  |  |
| --- | --- |
| 1. Mohair | 1. 7% sulphuric acid |
| 1. Cashmere | 1. Single coat |
| 1. Fellmongering | 1. Double coat |
| 1. Scouring | 1. Water ,alkali |
| 1. Carbonizing | 1. Sulphide |

1. Match the columns and choose the correct option.
2. (1-b) (2-c) (3-d) (4-a) (5-e)
3. (1-b) (2-c) (3-e) (4-d) (5-a)
4. (1-c) (2-b) (3-e) (4-d) (5-a)
5. (1-c) (2-b) (3-d) (4-a) (5-e)

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| --- | --- |
| 1. Feeling test | 1. Self-extinguishing |
| 1. Burning test | 1. Skilled perception is required |
| 1. Fibre diameter | 1. Velvet board of size 50 cm2 in a colour contrast with that of wool |
| 1. Staple length | 1. Microscope, CCD camera and image processing software |
| 1. Core sampling technique | 1. A tube with a sharpen tip |

1. Match the columns and choose the correct option.
2. (1-b) (2-a) (3-e) (4-c) (5-d)
3. (1-b) (2-a) (3-d) (4-c) (5-e)
4. (1-b) (2-a) (3-c) (4-d) (5-e)
5. (1-b) (2-c) (3-a) (4-d) (5-e)

|  |  |
| --- | --- |
| 1. American or blood system of grading | 1. Mean fibre diameter |
| 1. English or spinning count system | 1. Merino sheep from Spain |
| 1. Micron grading | 1. Hank |
| 1. Ortho-cortex | 1. Non-keratinous material is accumulate in a few large nuclear remanant. |
| 1. Para-cortex | 1. Intermacrofibrillar material covers every microfibril in this part of cortex which cause clear outlining |

1. Match the columns and choose the correct option.
2. (1-b) (2-c) (3-a) (4-d) (5-e)
3. (1-b) (2-c) (3-a) (4-e) (5-d)
4. (1-b) (2-c) (3-a) (4-d) (5-e)
5. (1-b) (2-a) (3-c) (4-e) (5-d)

|  |  |
| --- | --- |
| 1. Matrix | 1. Fire resistance, absorption capacity and anti-static character |
| 1. Cuticle | 1. Resistant membrane and act as a barrier |
| 1. Twisted molecular chain and helical coil | 1. Provides flexibilit, elasticity, resilience |
| 1. Microfibril | 1. Provide strength and flexibility |
| 1. Cortex | 1. Creation of crimp |

1. Match the columns and choose the correct option.
2. (1-a) (2-c) (3-d) (4-b) (5-e)
3. (1-a) (2-b) (3-c) (4-e) (5-d)
4. (1-a) (2-b) (3-c) (4-d) (5-e)
5. (1-b) (2-a) (3-c) (4-d) (5-e)

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| --- | --- |
| 1. Boiling in 5% alkaline solution like NaOH | 1. Wool fibre get dissolve |
| 1. Concentrated acid | 1. Wool fibre become weak and lost its elasticity |
| 1. Bleached wool | 1. Damage wool fibre by breaking salt bridge |
| 1. UV rays | 1. Yellowing or dull colouration of wool |
| 1. dyes | 1. Take up bye matrix (amorphous area ) of wool |

1. Match the columns and choose the correct option.
2. (1-a) (2-c) (3-b) (4-d) (5-e)
3. (1-a) (2-b) (3-c) (4-d) (5-e)
4. (1-a) (2-c) (3-d) (4-b) (5-e)
5. (1-d) (2-b) (3-c) (4-e) (5-a)

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| --- | --- |
| 1. Follicle initiation is completed (but not all produce emergent fibre yet) | 1. 50 day of gestation period of sheep |
| 1. Initiation of development of 1” follicle | 1. 150 days of gestation period of sheep |
| 1. Initiation of development of tri group + 1”follicle | 1. 70 days of gestation period of sheep |
| 1. Initiation of development of 2” follicle | 1. 85 days of gestation period of sheep |
| 1. Initiation of development of 2”derived follicle | 1. 105 days of gestation period of sheep |

1. Match the columns and choose the correct option.
2. (1-b) (2-a) (3-c) (4-d) (5-b)
3. (1-b) (2-a) (3-d) (4-c) (5-b)
4. (1-b) (2-d) (3-c) (4-a) (5-b)
5. (1-b) (2-d) (3-a) (4-c) (5-e)

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| 1. Tufting | 1. Production of fabric by interlacing yarn loops with loops of the same or other yarn |
| 1. Gilling | 1. Process of carpet manufacturing by using woollen yarn |
| 1. Knitting | 1. Process in worsted processing system |
| 1. Pelt | 1. Carpet |
| 1. Namda | 1. Karakul |

1. Match the columns and choose the correct option.
2. (1-b) (2-c) (3-a) (4-e) (5-d)
3. (1-b) (2-a) (3-c) (4-d) (5-e)
4. (1-b) (2-a) (3-c) (4-e) (5-d)
5. (1-d) (2-b) (3-e) (4-c) (5-a)

|  |  |
| --- | --- |
| 1. Carding | 1. Vegetable matter, Neps and noils are removed |
| 1. Spinning | 1. Division of tufts into individual fibre,orientation in same direction |
| 1. Combing | 1. Last stage of yarn production |
| 1. Lanolin | 1. Step before spinning |
| 1. Roving | 1. Wool by-product |

1. Match the columns and choose the correct option.
2. (1-b) (2-c) (3-a) (4-d) (5-e)
3. (1-b) (2-c) (3-a) (4-e) (5-d)
4. (1-c) (2-b) (3-a) (4-e) (5-d)
5. (1-b) (2-c) (3-e) (4-a) (5-d)

|  |  |
| --- | --- |
| 1. Suri & Huacaya fibre | 1. Golden-brown ,Shed naturally |
| 1. Shahtoosh | 1. No lanolin |
| 1. Camel fibre | 1. King of fine wools |
| 1. Angora | 1. Odour resistant |
| 1. Yak fibre | 1. They moult every four month |

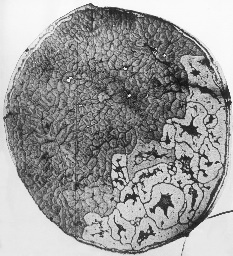
1. Match the columns and choose the correct option.
2. (1-b) (2-c) (3-a) (4-e) (5-d)
3. (1-d) (2-b) (3-c) (4-e) (5-a)
4. (1-c) (2-b) (3-a) (4-e) (5-d)
5. (1-b) (2-c) (3-e) (4-a) (5-d)

|  |  |
| --- | --- |
| 1. Light burr wool | 1. <3% |
| 1. Medium burr wool | 1. >6% |
| 1. Heavy burr wool | 1. 3-6% |
| 1. Corriedale | 1. 5% |
| 1. Apperal wool | 1. Dual purpose |

1. Match the columns and choose the correct option.
2. (1-a) (2-c) (3-b) (4-e) (5-d)
3. (1-d) (2-b) (3-c) (4-e) (5-a)
4. (1-c) (2-b) (3-a) (4-e) (5-d)
5. (1-b) (2-c) (3-e) (4-a) (5-d)

**MULTIPLE CHOICE TYPE QUESTIONS**

1. which of the following statement are correct?
2. Out of the total production of in India ,5% is of apperal grade, 85% is of carpet grade and 10% is of coarse grade.
3. North-western arid and semi-arid region having a carpet wool type sheep breed like Chokla, Nali, Marwari, Magra, pattanwadi.
4. North temperate region have a medium wool type sheep breed viz. Gaddi, Rampur bushair, Bhakharwal, Changthangi, Poonchi.
5. Changthangi breed of Ladakh which is hardy and yields good carpet/medium apperal wool has relatively longer staple length than other breeds of this region.
6. (i) and (ii) and (iii) are correct.
7. (ii) and (iv) are correct.
8. (i) and (iv) are correct.
9. All are correct.
10. which of the following statement are correct?
11. Kendrapada sheep is identified as another prolific sheep breed of India after Garole of west Bengal.
12. Fine wool fibres composed of 2 layers of cells, namely the cuticle and cortex.
13. The fine wool fibres contain medulla where empty space filled with air & or remnants of modified /destroyed cortical cells are present.
14. The cuticle cells grouped, as scales comprise about 10% of the mass of the whole fibre.
15. (i) and (ii) and (iv) are correct.
16. (iii) and (iv) are correct.
17. (iii) and (iv) are correct.
18. All is correct
19. which of the following statement are correct?
20. Cuticle overlap each other with the exposed edges pointing towards the base of the fibre.
21. The cortex represents 80% of the mass of the wool fibre and it has major influences on the mechanical properties of the wool.
22. Paracortical cells have closed package of microfibrils with a little inter-macro-fibrillar material whereas ortho-cortical cells have sufficient material between them, which enables each macro-fibril to be identified.
23. The cortical cells are made of microfibril, which are packed together in bundles called macro-fibrils.
24. (i) and (ii) and (iv) are correct.
25. (iii) and (i) are correct.
26. (ii), (iii) and (iv) are correct.
27. All are correct.
28. which of the following statement are incorrect?
29. Treatment with enzymes or formic acid break down the CMC and significantly impair the mechanical properties of fibre and fabrics.
30. Each cortical cell surrounded by CMC (cell membrane complex), which is continuous phase that extends throughout the fibre.
31. In fine merino wool, the ortho-cortical cells usually account for over 10% of the cross-section.
32. CSIRO developed instrument known as ATLAS (automated testing of length and strength) is used to measure staple properties.
33. (i) and (ii) and (iv) are incorrect.
34. (iii) and (i) are incorrect.
35. Only (iii) is incorrect.
36. All are incorrect.
37. which of the following statement are incorrect?
38. Wool fibre is very hygroscopic in nature and it can absorb about 80% of moisture of its own weight without feeling wet.
39. Vegetable matter in wool proportional to processing yield.
40. Spinning system is the most accurate measure for determining the grade of wool.
41. Wool is grouped according to fineness and the process is called grading.
42. (i) and (ii) and (iii) are incorrect.
43. (iii) and (iv) are incorrect.
44. Only (iii) is incorrect.
45. All are incorrect.
46. which of the following statement are incorrect?
47. CSWRI has developed standard specification of blanket in collaboration with BIS, New Delhi.
48. Crimp in the wool is a result of the morphological arrangement of ortho- and meso-cortex cells in the wool fibre.
49. The wool also contains glands producing grease or oil as well as glands producing sweat/salt just above the root portion.
50. Patanwadi is also called desi, kutchi, vadhiyari and charotari.
51. (i) and (ii) and (iv) are incorrect.
52. (iii) and (i) are incorrect.
53. Only (ii) is incorrect.
54. All are incorrect.
55. which of the following statement are incorrect?
56. Natural impurities of wool result from the glandular secretions from the skin of the animals.
57. Major natural impurities are suint and yolk.
58. Cholesterol is a major ingredient of yolk along with other components.
59. Suint is a water-soluble impurity material in wool.
60. (i) and (ii) and (iv) are incorrect.
61. (iii) and (i) are incorrect.
62. Only (ii) is incorrect.
63. None
64. which of the following statement are incorrect?
65. Sand, dust, dirt are the natural impurities in wool.
66. Applied impurities is the part of acquired impurities which includes coloured paints, coal tars, residual parts of dips and spray.
67. Major use of lanolin is manufacturing soaps, and other medical preparation like cream which is water-in-oil type of emulsion.
68. Removal of vegetative impurities from raw wool is called scouring.
69. (i) and (iv) are incorrect.
70. (iii) and (i) are incorrect.
71. Only (ii) is incorrect.
72. (i) and (ii) are incorrect.
73. which of the following statement are correct?
74. Sheep are normally shorn twice or thrice a year.
75. wool related characters are highly heritable and therefore a significant improvement can be made by selection of animals with desired characteristics.
76. Heritability of wool related character ranges between 0.3 to 0.6.
77. Pituitary, thyroid stimulating hormone, adreno-cortico-trophic hormone and growth hormone influence the growth of wool.
78. (i) and (iv) are correct.
79. (iii) and (i) are correct.
80. (i), (ii), (iv) is correct.
81. All are correct.
82. which of the following statement are correct?
83. The fibre from Huacaya llama is used for woollen processing as they have a spongy fibre but Suri fibre suitable for woven goods as they don’t have a crimp.
84. Cashmere hair fibres are 10% weaker than finest wool and 40% weaker than mohair fibre.
85. Cloth made from wool provides comfort in hot and cold weather because of its moisture vapour absorption capacity.
86. The wool fibre prevents the penetration of dirt inside because of scales on its surface.
87. (i) and (iv) are correct.
88. (iii) and (i) are correct.
89. Only (ii) is correct.
90. All are correct.
91. which of the following statement are incorrect?
92. Wool fibre is irregular and roughly cylindrical, tapered at the end, and multicellular in structure.
93. Third type, meso-cortex, is sometimes present in between the ortho-cortex and para-cortex.
94. Meso-cortex usually accounts for less than 10% of the fibre.
95. Wool contains a small amount (0.8-1.0 by mass) lipid material concentrated in the intercellular region of the fibre.
96. (i) and (ii) and (iv) are incorrect.
97. (iii) and (i) are incorrect.
98. Only (iii) is incorrect.
99. None
100. which of the following statement are incorrect?
101. The staple length in fine wool is 1.2 to 1.3fold of fibre length because of crimp while Indian wool fibres have almost similar fibre length to staple length because of very little crimp in the fibre.
102. Staple length increases with fibre diameter.
103. Fine merino wool fibres have 20 to 30 crimps per inch.
104. Coarse wool particularly Indian wool has very poor crimp and less than two crimps per cm.
105. (i) and (ii) and (iv) are incorrect.
106. (iii) and (i) are incorrect.
107. Only (i) is incorrect.
108. None
109. Which of the following question is correct regarding chemical composition the wool?
110. Carbon-50%, Oxygen-10%, Nitrogen-25%, Hydrogen-12%, Sulphure-3%.
111. Carbon-50%, Oxygen-10%, Nitrogen-40%, Hydrogen-12%, Sulphure-3%.
112. Carbon-50%, Oxygen-10%, Nitrogen-25%, Hydrogen-12%, Sulphure-30%.
113. Carbon-60%, Oxygen-10%, Nitrogen-25%, Hydrogen-12%, Sulphure-3%.
114. Identify label A, B in the following figure.



AA

BA

1. A =Ortho-cortex, B =para-cortex.
2. A =para-cortex, B =Ortho-cortex.
3. A =Cuticle, B =Ortho-cortex.
4. A =Cortex, B =Medulla.

1. which of the following statement are incorrect?
2. Crimps gives more cohesiveness between fibres, which helps to improves the spinning performance by imparting more twist in the fibre assembly.
3. Long stapled fine wool also known as a delaine wool.
4. Cysteine is a major sulphur containing amino acid in wool.
5. Cross-section of the fine wool have a elliptical shape.
6. (i) and (ii) and (iv) are incorrect.
7. (iii) and (i) are incorrect.
8. Only (i) is incorrect.
9. None
10. which of the following statement are incorrect?
11. As per ISI standard heavy burr containing wool have >10% burr content.
12. Average pashmina production from Chegu and Changthangi goat is around 100-150 g/year.
13. Strength of the wool fibre increase in wet condition.
14. Braid type wool have a 40’S to 36’S spinning count.
15. (i) and (ii) and (iv) are incorrect.
16. (iii) and (i) are incorrect.
17. Only (i) is incorrect.
18. None
19. which of the following statement are incorrect?
20. Wool have a continuous growth, if not sheared unlike hair.
21. Cuticle present in wool are irregular unlike hair.
22. Removal of excess wool from neck and from belly particularly at the penis is referred as a ringing.
23. Removal of excess wool to prevent wool blindness around eyes is referred as crutching.
    1. (i) and (ii) and (iv) are incorrect.
    2. (iii) and (i) are incorrect.
    3. Only (iv) is incorrect.
    4. None
24. Arrange the steps which present in conventional carbonization of wool.
25. Scouring
26. Acidizing
27. Drying
28. Baking
29. Burr crushing
30. De-dusting
31. Neutralizing
32. 1-2-3-4-5-6-7.
33. 1-3-4-2-7-6-5.
34. 1-3-2-4-5-6-7.
35. 1-2-3-4-5-7-6.
36. which of the following statement are incorrect regarding carding of wool.
37. To further open the wool as a whole.
38. To straighten the individual fibre as far as possible/required.
39. To remove the natural impurities.
40. Further smoothening of the wool fibres.
    1. (i) and (ii) and (iv) are incorrect.
    2. (iii) and (i) are incorrect.
    3. Only (iv) is incorrect.
    4. None

**MULTIPLE STATEMENT TYPE QUESTION.**

* + 1. Given below are two statement.

Statement I: Wool growers who produce large quantity of wool generally get better price of their produce compare to small producers.

Statement II: Wool growers are taking their produce directly to the “mandi”, they are unable to fetch the true value of their produce as compare to middleman due to their unfamiliarity with the traders.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Fine wool fibres composed of 2 layers of cells, namely the cuticle and cortex.

Statement II: The fine wool fibres contain medulla where empty space filled with air & or remnants of modified /destroyed cortical cells are present.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Llama hair produces high fibre yield about 90-93% after processing.

Statement II: Llama does not produce lanolin.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Indian sheep produce average 600-800 gm wool/annum.

Statement II: In India apparel wool sheep breeds are Hissardale, Nilgiri, Kashmir merino and Bharat merino.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: The Hissardale was evolved at the government livestock farm, Meeruth, through crossbreeding Australian merino rams with Bikaneri (magra) ewes and stabilizing the exotic inheritance at about 75%.

Statement II: The scales of merino wool fibre are basically rectangular and 20 µ x30 µ x0.5 µ in size.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: The cuticle is responsible for the surface properties of the fibres and also acts as the barrier for the diffusion of chemical reagents into the cortex of the fibres.

Statement II: The CMC contributes 10% part of the wool fibre.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Fibre length is one of the important characteristics of wool fibre, which governs the wool quality.

Statement II: Fibre length along with fibre diameter influence the spinning limit of wool.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: The hygroscopic nature of the wool is due to the polarity of peptide group, the salt linkage and amorphous nature of the wool fibre.

Statement II: Indian wool absorbs more moisture at the given humidity than merino wool.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: The chlorination, reduction, scouring and oxidation all improves the wettability of the wool.

Statement II: Wool oiling is done to minimize the fibre breakage during opening process as well as reduce fly waste and static electricity during carding.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: The resilience of the wool increase with coarseness of the fibre, as the coarse fibres have higher Young’s Modulus and high torsion rigidity.

Statement II: During the shearing season, sometimes the yarn manufacturer hires the middlemen for purchase of wool directly from farmers on commission basis. This way he bypasses the various taxes on the commodity, which reduce the purchase cost of wool.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Indian wool fibres are not superior in term of resilience than any other wool because they contain hetero- and hairy- type of medullated fibres.

Statement II: The resilience of fibre depends on stiffness, elastic recovery, medullation and crimp in the fibre

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Competition among buyers leads to better prices, whereas combination among the buyers, with consequent lack of competition, leads to lower prices of the wool.

Statement II: Drying and baking are important process of scouring.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: High concentration (7-7.5 %) of sulphuric acid is used in carbonization process.

Statement II: Woollen processing utilizes longer, finer wool fibres to produce strong, fine, smooth, compact, uniform yarns for weaving or knitting into high quality fabrics.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Central wool development board (CWDB) established in 1987 and its headquarter situated at Jodhpur.

Statement II: Indian sheep found to produce average 0.9 kg of wool/sheep/annum as compared to 2.4 kg/sheep/annum in the world.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: India is a 9th largest wool producing country.

Statement II: Fine wool is about 1.5-5.0 inch in length and average width is about 0.017 mm.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Cashmere fibre is collected by shearing.

Statement II: Lamb’s wool is a fleece obtain from lamb of six to eight months old for the first time.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Ratio of secondary to primary follicle for coure wool sheep like English down sheep is 25:1 and for fine wool breed like superfine saxon merino is 5:1.

Statement II: Follicle group is the unit of wool production, which includes trio group and follicles mainly secondary follicles.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: The wool fibre is produced with the average density of 1.31 g/cc over the skin of sheep.

Statement II: 2 hank = 1120 yard.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Spinning count is the number of hanks made by yarn that can be spun from 1.5 pound of clean wool by using the spinning machine.

Statement II: The wool produced in India is graded by Wool grading and marketing rules, 1975.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Finest fibre in the world obtain from Vicuna.

Statement II: Different grade system used to indicate the characteristic and quality of wool of specified trade descriptions are those set out in Column 1 of schedules I to VI- A.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: China is a Largest wool producing country in the world.

Statement II: Lanolin is the fractionated and refined form of wool grease.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Suint is the dried up sweat that originates from sweat glands of sheep is mixed with amino acids, short-chain fatty acids, salt of potassium, and very small amount of urea, lactic acid, succinic acid, hippuric acid, etc.

Statement II: Fleece rot develops due to the prolonged wetting of the fleece, resulting in moist skin and Pseudomonas aeruginosa is responsible for this condition.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: IWDP stands for Integrated wool development project.

Statement II: The characteristic odour of burned wool is due to Sulphur in it.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Clun forest belongs to class down wool sheep breed.

Statement II: Targhee is one of the sheep-breeds which belongs to fine wool sheep breed.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Most of the angora hair produces in china.

Statement II: Angora fibres are soft, fluffy, can retain heat properly and has the best moisture absorption quality.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Cashmere fibres are less durable than wool from sheep.

Statement II: CMC is the dense layer of 15 nm thickness remains in between the cortex and cuticle cells.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: The main reason behind the water absorption is presence of high sulphur protein, which attaches water molecules and allow wool to absorb upto 30% of water of its weight.

Statement II: The UV radiation of sunlight causes yellowing or dull coloration of wool fabric.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: The polymer present on the surface of the wool fibre get damaged by the ultra-violet radiation of sunlight.

Statement II: Wool is healthy as it can insulate against hot and cold temperature, this helps in protecting against changes of temperature.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: If wool catches fire accidently, it flares up or support the flame.

Statement II: Hand spinners always prefers short wool fibres.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Integrated wool development programme has been launched with the aims of harmonization of the wool supply chain, to creat link between the wool industry & the producers and to provide a marketing platform to the smaller wool product manufacturers in country.

Statement II: Wool processing scheme, pashmina wool development scheme, wool marketing scheme are parts of the IWDP.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: fleece that are rejected for normal processing due to severe faults such as cotted, tender, black, kempy, or excessively stained fleeces known as a “Rejects”.

Statement II: Length of wool fibre after removing crimpiness is staple length.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: WWEPC promotes export of all types of wool, woollen and acrylic-blended products from India.

Statement II: Cloth made from wool provides comfort in hot and cold weather because of its moisture vapour absorption capacity.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Willowing is process of combing and arranging of fibres to make it parallel before spinning.

Statement II: Under microscope medulla appears white.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Smoothness of handle and luster of wool products is influenced by cortex and mechanical properties influence by cuticle.

Statement II: Sheep should not be fed just before shearing.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Out of the total production of in India ,10% is of apperal grade.

Statement II: Deccani sheep breed have a black colour wool.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Bonpala sheep breed is native to southern Sikkim.

Statement II: Dolly became the most famous sheep in history when her birth was announced by the Roslin institute in Scotland in 1997.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Felting property of wool is due to cortex.

Statement II: Moisture absorbing capacity of wool is due to scales.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Speciality fibre obtain from alpaca, llama, vicuna, camel and sheep.

Statement II: yak fibre has a long staple length.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: Temperature of the scouring water is maintained at 90 C this temperature is enough to melt wool grease.

Statement II: Wool is the part of speciality fibre.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true.
   * 1. Given below are two statement.

Statement I: 80 Hank can be made from 80’S wool weighing one pound.

Statement II: Number of the hank that can be made from one pound of wool is called blood count.

1. Both Statement I and Statement II are true.
2. Both Statement I and Statement II are false.
3. Statement I is true and Statement II is false.
4. Statement I is false and Statement II is true

**ANSWERS**

* **FILL UP.**

1-Carbonization.

2-Crimp.

3-Skirting.

4-Shrinkage.

5-Scouring.

6-Fellomengering.

7-Shrink.

8-Staple length.

9-Fibre length.

10-Pelt.

11-Britch/Breech wool.

12-Crutching.

13-Dgras.

14-Fleece.

15-Felting.

16-Scales in cuticles.

17-512 meter.

18-50.

19-Spinning count.

20-60-65 0C

21-Wool.

22-Pelt.

23-Wool yolk.

24-Cashmere fibres.

25-Staple length.

26-Black, Hairy, Campy

27-Cortical cells.

28-Kartholi.

29- Lanaurin.

30-15%

* **MATCH-UPS TYPE QUESTINS.**

(1-C) (2-D) (3-A) (4-A) (5-B) (6-A) (7-D) (8-D) (9-C) (10-D) (11-B) (12-B) (13-B) (14-C)

(15-A) (16-A) (17-A) (18-B) (19-A) (20-A).

* **MULTIPLE CHOICE TYPE QUESTIONS.**

(1-D) (2-A) (3-C) (4-C) (5-A) (6-C) (7-D) (8-A) (9-C) (10-D) (11-C) (12-C) (13-A) (14-A)

(15-D) (16-C) (17-C) (18-A) (19-C).

* **STATEMENT TYPE QUESTIONS.**

(1-A) (2-C) (3-A) (4-A) (5-D) (6-C) (7-A) (8-C) (9-A) (10-A) (11-D) (12-C) (13-C) (14-A)

(15-A) (16-D) (17-D) (18-A) (19-D) (20-A) (21-A) (22-A) (23-D) (24-A) (25-A) (26-A) (27-A) (28-A) (29-B) (30-A) (31-C) (32-A) (33-C) (34-D) (35-D) (36-A) (37-B) (38-D) (39-B) (40-C).