# Model answer of midterm exam of Synthetic fibers 13-Nov 2017

## Question 1 (5 marks, 0.5 mark for each)

**Give the name(s) of only ten of the fiber(s), which confirm with the following**

1. Five natural fibers composed mainly from cellulose.
2. Four artificial fibers produced from cellulose.
3. Natural fiber, which chains stabilize by four types of bonds.
4. The natural fiber which give +ve N **only** in element test.
5. The artificial fiber, which can be prepared by three different methods.
6. Fiber, which is used in manufacture of canvas.
7. The fiber, which is used in prestige items.
8. Fiber, which is produced from flax.
9. Fiber used for production burlap.
10. Fiber used in industrial applications
11. Fiber produced from some proteins
12. The fiber, which melt on burning.

Answer

1. Cotton, flax, hemp, ramie and jute.
2. Cellulose acetate, cellulose ether, rayon and cellophane
3. Wool
4. Silk
5. Rayon
6. Hemp
7. Linen or flax
8. Linen
9. Jute
10. Ramie
11. Azlon
12. Silk

## Question 2 (2.5 marks, 0.5 mark for each)

**Give the name of the process of the following**

1. Process make the fiber have more ability of dyestuff
2. Conversion of cellulose into cellulose triacetate
3. Removal of undesirable material from fiber
4. Conversion of silk into more heavy and opaque fiber
5. Processes for making rayon fiber

Answer

1. Mercization
2. Acetylation

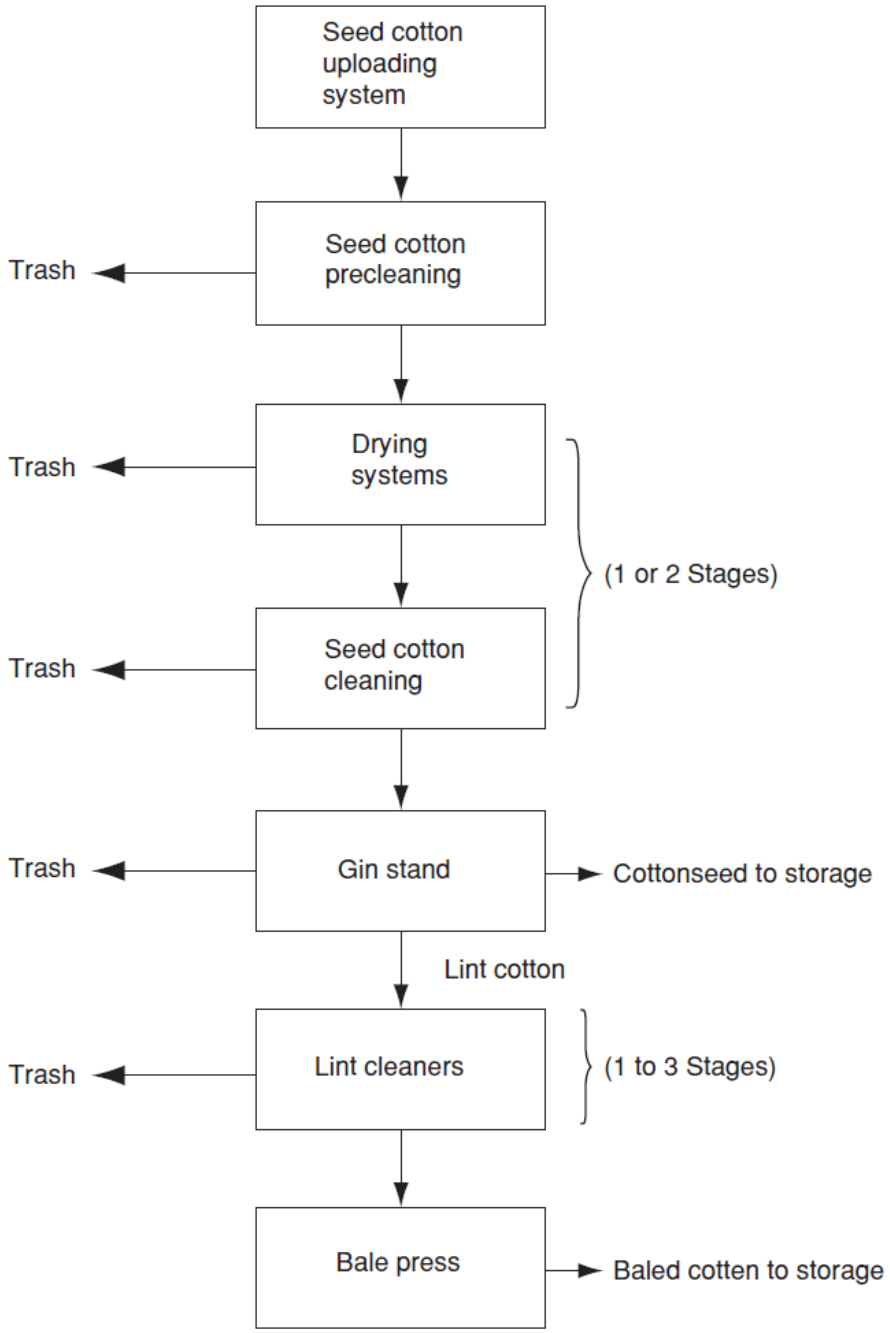
3. Scouring
4. Weighting of silk
5. Viscose rayons, cuprammonium rayon, and saponified cellulose acetate

**<u>Question 3 (7.5 marks, 2.5 mark for each)</u>**

1. ***Diagram*** Simplified flow chart of ginning systems.
2. ***Mention*** the advantages and disadvantages of synthetic fiber compared with natural fibers
3. ***Explain*** how synthetic fibers and fabrics are made

Answer

1.




2. **<u>Advantages of synthetic fibers than natural fibers</u>**

a) More durable
b) Cheep
c) more water resistant and stain resistant
d) can be produced in large amounts compared with natural fibers

## Disadvantages of synthetic fibers than natural fibers

a) Synthetic fibers burn more readily than natural.
b) More damage by hot washing
c) More electrostatic charge is generated by rubbing.
d) Not skin friendly, so uncomfortable for long wearing.
e) Allergenic to some people.
f) Do not absorb sweat during summers.

3. Most synthetic fibers go through a similar production process which includes four steps.

1. A **chemical process**
   a. Monomers are converted to solid polymers by polymerization process
   b. The solid polymer must be converted to a liquid state to be extruded into fibers either by dissolving , or melting.

2. A **spinning process** produces the fiber by passing the thick liquid through a spinneret. The liquid is forced through the spinneret holes and comes out a string liquid filament.
3. A **twisting process** twists the filament fiber into a yarn. The filament falls vertically from the spinneret and is caught in a large vacuum nozzle and it is wound around a bobbin.
4. The twisted yarn is **packaged** and sent to a textile mill

## Question 4 (5 marks)

If two kilometers of fiber weighs 11.2 gram. Determine the value of measurements the fibers in the following units **Denier, Worsted count, cotton count, woolen and yield**

**[1 Ib = 453.592 g, 1 yard = 0.9144 m, 1 cotton hank = 770 m and 1 hank wool = 1600 yard]**

**Answer**

- **Since Denier Is** weight of 9000 m fiber in gram so

**If 2000 m weighs 11.2 g**

**9000 m weighs ?**

**Denier = 9000(11.2)/2000 = 50.4**

**Since Worsted count is** number of 560-yard length of that a pound of wool yields

- Since 1 Ib = **453.592 g**

**If 2000 m weighs 11.2 g**

**X m weighs 453.592 g**

**Number of meters = 80998.57 m = 80998.57/0.9144 = 88581.11 yard**

**Since Worsted count is** number of 560-yard length of that a pound of wool yields

So Worsted count **= 88581.11/560 = 158.18**

- Since cotton count is number of cotton hanks that weight **1 Ib**

**From the above conversion, 1 Ib has 80998.57 m**

**So cotton count = 80998.57 m/770 = 105.2**

- **Since Wolen** Number of wool hanks (1600 Y) of skein material that weigh **1 Ib**

**From the above conversion, 1 Ib has 80998.57 m = 80998.57/0.9144 = 88581.11 yard**

**Woolen = 88581.11/ 1600 = 55.36**

- **Since yield is** number of yards that weight **1 Ib**

| | | |
|---|---|---|
| 2000m | 1y | 453.592 |
| 11.2 g | 0.9144m | Ib |

**Yield = 88581.1**

***With my best wishes***

***Associate Professor Dr: Khaled Samir Mohammed***