Sizing

Q. Define sizing.
Ans: The process of applying a protective adhesive coating upon the yarns surface is called sizing. This is the most important operation to attain maximum weaving efficiency especially for blended & filament yarns. Due to sizing, increases elasticity of yarn, yarn strength, weight of the yarn, smoothness, frictional resistance.

Q. Why sizing is done in weaving?
Ans: Objects of sizing:
1. To improve the weave ability of warp yarn.
2. To maintain good fabric quality by reducing hairiness, weakness and by increasing smoothness, strength of yarn.
3. To increase the tensile or breaking strength for cellulose yarn.
4. To increase the elasticity.
5. To remove the projecting fibres.
6. To reduce electrostatic formation for synthetic or blended yarn.

Q. What factors are to be considered for choosing size ingredients?
Ans:
1. The recipe should be that which gives fewest end breakage.
2. It should be that which gives the least exfoliation.
3. It should be easily washable i.e. permits easy desizing.
4. It should give good fabric characteristics.
5. It should be compatible with the machinery & associated parts.
6. It should not cause any degradation of the textile mtl.
7. It should not cause any health hazard.
8. It should be cheap.
9. Size ingredients should be neutral.
10. It should be available.

Q. Describe different types of sizing.
Ans:
1. Light sizing: This is used for dyeing and printing. 10 to 15% sizing ingredients are use on the weight of yarn.
2. Pure sizing: When sizing is done in yarn which produces unbleached fabric is called pure sizing. Size ingredients are used on the weight of yarn 15% to 25%.
3. **Medium sizing:** For increasement of strength & weight of the yarn 25 to 50%. Sizing ingredients are used on the weight of yarn.

4. **Heavy sizing:** To increase weight of the yarn its application on twisted yarn & lower count of yarn. Above 50% sizing ingredients are used on the weight of yarn.

**Q. Write down the properties of size ingredients.**

**Ans:**

1. It should be easily removed during wet processing process.
2. It should not do any harm to the fibre or yarn.
3. Adhesive substances should be more adhesive.
4. It should give good fabric characteristics.
5. It should have ability to dry instantly after sizing.
6. It should not cause any degradation of the textile mtl.
7. It should not change the colour of coloured yarn or shed.
8. It should be cheap and available.

**Q. Write down the names of size ingredients.**

**Dhaka Textile-’04,’06,’07.**

**Ans:**

**Adhesive substances:** Carbohydrate, wheat, flour, rice-flour, shagu, Barly, Tmarind seed powder, potato-starch, gum, carboxyl methyl cellulose, poly vinyl alcohol, poly vinyl chloride, maize ferina.

**Lubricant:** Wax, Animal fat, Mineral & vegetable oil, Tallow, soap.

**Anticeptic:** Salicylic acid, zinc chloride, phenol, emulsifier, copper sulphet etc.

**Q. Write the name of ingredients used in Jute yarn sizing.**

**Noakhali Textile-’09.**

**Ans:**

**Adhesive** → Tamarind seed powder, wheat, flour, potato-starch, rice flour, maize, ferina ➢ 95-97%

**Lubricant** → Tallow, waxes, soap ➢ 2.5-3.5%

**Additive** → Zinc chloride, salicylic acid ➢ 1.5-2.5%

**Q. Write down the name of ingredients used in cotton yarn sizing.**

**Ans:**

**Adhesive** → Ferina, maize, carboxy methyl cellulose.

**Lubricant** → Tallow, soap or wax.

**Additive** → Zinc chloride, salicylic acid.

**Q. Write down the name of ingredients used in a) viscose rayon, b) Polyester sizing.**

**Ans:**

a) **Sizing for viscose rayon:**

2% gelatin, 0.5% water dispersible oil.
Continuous spun yarn need higher strength.
4% Gelatin
1% Water dispersible oil.
Sizing temperature → 40 45°C.
Cylindrical number → 1 2 3 4 5 6 7
Temperature °C → 80 85 100 100 90 80°C
b) Sizing of polyester yarn:
i) 10-12% plastisize acidic vinyl co-polymer dispersion. 6% wax emulsion.
   The dispersion is adjusted to pH 8.5 by the addition of sodium hydroxide solution before the addition of wax emulsion.
ii) 8% Water soluble salt of acidic vinyl co-polymer.
   8% Wax emulsion.
   Temperature of size box → 45-50°C.
   Cylinder number → 1 2 3 4 5 6 7
   Temperature °C → 65 70 75 80 85 80 66°C.
   Sizing mtl speed → 30-35 yds/min.

Q. Write down the names of warp sizing m/cs. Dhaka Textile-‘05.
Ans:
A) Cylinder drying → i) Two cylinder types.
   ii) Multi cylinder types.
B) Hot air drying.
C) Combined Hot air and cylinder type.

Q. Describe with sketch the slasher sizing m/cs. Dhaka Textile-‘03
Q. Dividing unit. Dhaka Textile-‘05.
Ans:
This is the mostly used sizing process. About all types of yarns can be sized by slasher sizing process. In this process the warp is passed through a size liquor bath then through a separating unit & cooling unit.
The slasher sizing m/c consists of the following seven units.
1. Back beam unit: In single end sizing yarns are taken from a creel rather than from a beam. This unit contains 7 to 12 carriers from where yarn is supplied. Indirect & direct process of yarn supply is frequently used for spun yarns. In case of indirect method beam creel is used. This beam creel can be arranged in various ways.

Here,
A = Back beam unit, M = Colour bowl
B = Guide roller, N = Wraith
C = Tensioner roller, O = Measuring roller
D = Sizing box, P = Measuring roller
E = Immersion roller, Q = Nipper roller
F = Sizing roller, R = Warp beam
G = Squeezing roller, S = Pressure roller
H = Drying cylinder, T = Floating roller
I = Cooling fan, U = Reverse box
J = Guide roller, V = Marking roller
K, L = Dividing roller, W = Steam pipe.

2. Sizing unit: In this unit a size box is used to apply size to the yarn. The warp sheet is guided through the solution means of the immersion roller & then through the squeeze roller where the yarns are pressed to maintain the req'd size to up percentage by the yarn. The size box temperature is controlled by flowing steam through pipe.

3. Drying unit: Two or more heated cylinder consists of drying unit. This unit is req'd to dry the wet sized yarn rapidly, thoroughly & uniformly. A two cylinder dryer is too slow & it is difficult to maintain by it. But a multi-cylinder dryer is a good one to main in such a way that after drying, yarn contains 6% water.

4. Cooling unit: In this unit there is cooling fan & a guide roller. The cooling fan supplies cool air which extinguish the yarn temperature & also remove the moisture.

5. Dividing unit: In order to prevent adhesion between the yarns, it is necessary to separate each sized end from the others. For this lease rod or breaker rods are used to divide the main warp sheet into single end.

6. Measuring & marketing unit: This unit consists of colouring bowl which contains easily removable colour. This colour is used for making on sized yarn. Also there is a measuring roller which measures the length of sized warp yarn.

7. Beaming unit: Finally the sized warp is wound on weavers beam.

Q. What is size take-up %?

Ans:
The amount of size mtl added on the yarn surface is called size take-up percentage.

\[
\text{Size take-up \%} = \frac{\text{wt. of sized yarn} - \text{wt. of unsized yarn}}{\text{wt. of unsized yarn}} \times 100\%
\]

Q. State the functions of size ingredients.

Ans:
1. Adhesive:
   a) To improve strength
   b) To increase smoothness.
   c) To increase elasticity & stiffness.
   d) Reduce extension percentage.
   e) Impart adhesion.
2. **Lubricant or softener:**
   a) To make the yarn soft & slippery.
   b) To smoothen the yarn.
   c) To reduce stiffness.
   d) Reduce flexibility & friction.

3. **Antiseptic or anti-mildew agent:**
   a) To prevent mildew formation.
   b) To preserve size mtl for a long time.
   c) To help to store the sized yarn.
   d) To protect yarn from bacteria or fungus.

Q. Describe the changes in yarn due to sizing.

**Ans:**

**Properties of yarn after sizing or sized yarn properties:**
Due to sizing, there is a change in different properties of yarn as –

1. **Elasticity of yarn:** Higher.
2. **Yarn strength:** Higher.
3. **Frictional resistance:** Increase.
4. **Hairiness:** Lower.
5. **Flexibility:** Lower.
6. **Smoothness:** Higher.
7. **Absorbency:** Lower.
8. **Weakness:** Lower.
9. **Yarn diameter:** Higher.
10. **Wt. of the yarn:** Higher.
11. **Static electricity:** Lower.

Q. Describe the technological changes of yarn due to sizing.

**Ans:**

1. **Increase in breaking strength:** During sizing, adhesive mtl creates bonds betw fibres to fibre which increase the strength of yarn. It increases 20 to 40% breaking strength of the fibre.
2. **Increase abrasion resistance:** After sizing the gap betw fibres are filled with size & coating on the outer surface of the yarn takes place.
3. **Increase in stiffness:** After sizing, flexibility or pliability of yarn is decrease & stiffness is increased.
4. **Increase in elasticity:** As extensibility of the sized yarn decreases, more force has to be applied to extent the yarn. Hence elasticity increases.
5. **Increase frictional resistances:** Application of size mtl makes outer surface of the yarn smooth & hence occurs less friction.
6. **Increase yarn diameter:** Sizing means coating adhesive on their outer surface of the yarn. Hence, sizing causes increases of diameter of yarn,
7. **Decrease in extension:** After sizing, the gap betw the fibres are filled with size mtl's. So, the slippage betw the fibres does not occur easily. So, the extension decreased.
8. **Decrease in electrostatic charge:** Electrostatic charge is formed due to the friction between yarns & roller. Size mts contain moisture which reduces static friction.

9. **Subpress hairiness:** During sizing protruding hairs of yarn fix with yarn end so yarn hairiness subpressed.

**Q. State the function of wetting agent.**

**Ans:**
Wetting agent is used for –
1. To increase the wt. of yarn during finishing.
2. To impart fullness & feel to the fabric.
3. To prevent opening of cloth.

**Q. State the uses of Antifoaming agent.**

**Ans:**
To prevent foam formation, antifoaming agent is used.

**Q. List the different sizing faults & state the causes of these faults.**

**Ans:**
1. **Size spot:** Size mtl should be added gradually to the mixing tank for good mixing. If it is added at once, spot are appeared on the yarn.
2. **Repeating warp streaks:** This defect is due to uneven tension in the pre-beam.
3. **Shinnery:** this defect due to the friction between the yarn & drying cylinder.
4. **Sandy warp:** Due to not crushed or grind the size mtl properly.
5. **Ridge Beam:** This fault occurs due to uneven distribution of yarn in wraith.
6. **Hard sizing:** If the size mts are applied too much, the size becomes hard which causes hard sizing.
7. **Improper drying:**
   - Under drying → Bacteria form → yarn breakage.
   - Over drying → Hard sizing.
8. **Sizing dropping:** This defect due to not optimum the viscosity of the size solution.
9. **Size stitching:** Due to improper drying after sizing.
10. **Uneven sizing:**
    - Due to over or under sizing.
    - Due to over or under concentration of size liquor.

**Q. State different techniques of sizing.**

**Ans:**
1. Hot melt sizing.
2. Solvent sizing. (organic sizing)
3. Foam sizing.
4. High pressure sizing.
5. Electrostatic sizing.
7. Combined sizing (dyeing + sizing.)
8. Conventional slasher sizing.

Q. Write a note on – ‘Size cooking equipments’.  
Ans:
In the figure A is a motor, B is a agitator getting direct motion from motor. C is a mixing tank. Size ingredients are mixed with the help of agitator in mixing tank. Size ingredients are added in mixing tank by the help of inclined lid (H) & steam supply from steam pipe. After mixing size-ingredients passed through the valve (D) & then pumped by pump (E) into cooking & storing tank (G). In the storing tank, steam is passed to maintain viscosity of size. Viscosities of size depend upon concentration & temp. of cooking tank (G). Temp. of storage tank is 90°C.

Q. Describe ordinary size mixing or conventional method of mixing or cooking. 
Ans:
Procedure:
1. Add req’d amount of water into the mixing tank making an allowance for evaporation & condensation.
2. Stirring start & continue until the end of the process.
3. Add antiseptic & stir for 10 mins.
4. Gradually add starch mts & stir for 30-45 mins.
5. Pass steam & bring temp. to boil.
6. Add softener & boil for 15-20 mins.
7. Continue steaming the correct viscosity is obtained.
8. Test & adjust pH 6 to 8 by adding soda ash, alkali or acid.
9. Total time of cooking is 120-150 mins.
10. Transfer the size mts to storage tank.
11. Finally maintain temp. at 60°C.

Q. What are the drying systems used in sizing? Describe briefly.
Ans:

Q. Cylinder drying
Ans:
1. **Cylinder drying:** In this type of m/c, drying is done by passing over hot cylinders.
   a) **Two cylinder drying:**
   - In this drying process, two copper cylinder are used in which one cylinder is large diameter & other is small comparatively.
   - Firstly warp sheet is passed below the small cylinder & then over the bigger one.
   - The yarn is dried while traveling through the circumstances of the cylinder.

   ![Diagram of two cylinder drying](image1)

   **Advantages:**
   1. Simple process & cheap.
   2. Less risky.
   3. Temp. uniform.
   4. Almost uniform drying.

   **Disadvantages:**
   1. Slow process.
   2. Drying efficiency is low.
   3. Irregular drying.
   4. Due to sticky property of cylinder uneven drying.

   (b) **Multi cylinder drying:**
   - In this type of m/c, the drying unit consists of 5 to 7 or 11 cylinders having same diameter are used.
   - All cylinders may be steel cylinders or first two cylinders are teflon coated & rest of are steel cylinder.
   - The cylinders are heated by passing steam.
   - Heat in initial cylinder is low & gradually increases when moved towards final cylinder.
   - If large amount of heat is given to the initial, the sized may be backed.
   - If finer yarn is used, then no need to use excess cylinder.

   ![Diagram of multi cylinder drying](image2)

   **Advantages:**
   1. High speed process.
   2. Uniform drying.
   3. Non-sticky so smooth drying.
   4. Drying efficiency high.
5. Less time required.

**Disadvantages:**
1. For high viscosity, stick properly may observed.
2. For friction, yarn hairiness.
3. Shinning effect.
4. Yarn shape may hamper.
5. Possibility of yarn flaten.

2. **Hot air drying:**
   - In this m/c, the drying unit is a closed chamber containing a number of guide rollers through warp yarn.
   - Hot air blown into the chamber causing the moisture in the yarn to evaporate.
   - Exhaustion should be used to throw away the moisture.
   - If moisture remains inside the chamber it may condense & again fall on the yarn.
   - Hot air should be continuously passed through the chamber, so the process becomes somewhat costly.

**Advantages:**
1. Regular drying.
2. Not shinning effect.
3. Non-sticky property.

**Disadvantages:**
1. Costly process.
2. For closed chamber, reqd more time.
3. Less suitable for fine yarn.
4. Difficult to maintain temperature.

3. **Infrared drying:**
   - In this machine, the heating chamber consists of a plate which is constantly heated by gas flame.
   - The warp sheet is passed over the plate & dried in the process.
   - When gas flames are not used, then electronic plate may be used.
   - Arrangement should be made to through out the moisture removed from the yarn. This m/c is not used singally.

**Advantages:**
1. No shining effect.
2. Drying efficiency high.

**Disadvantages:**
1. Yarn may burn.
2. Higher cost.
3. Difficult to maintain uniform heating.
4. Risk of accident.

4. **Combined drying:**
   - In this type of m/c, preheating is done as cylinder drying method.
• And final drying is done by hot air drying method or infrared drying method.

Advantages:
1. Regular drying.
2. Drying efficiency high.
3. Speedy process.

**Disadvantages:**
1. Shinning effect.
2. High cost.

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**Q. Explain the mechanism of cylinder drying.**

**Ans:**
- The cylinder is heated by passing steam in it.
- When the yarn passes over the cylinder, the moisture in the yarn is removed from it & it moves upward but some amount of steam remains below the yarn & forms a layer called steam cohesion.
- The evaporated moisture remains above the yarn unless it finds some outlet. This layer is called stagnant vapour.
- If the stagnant steam remains for a larger timer time, it may condense & fall back on the yarn.

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**Q. What are the factors are to be considered while drying?**

**Ans:**
1. **EPI:** If EPI is more, warp sheet density increase & drying time req’d.
2. **Count of warp yarn:**
   Higher count, drying quickly (low temp)
   If yarn is coarser, more time req’d to dry. (high temp)
3. **Characteristics of warp yarn:**
   Water retaining
   - Cotton (low) → Drying ↓
   - Polyester (high) → Drying ↑
4. **Twist of warp yarn:**
   Higher twist, lower dry ability.
5. **Concentration of liquor:** Higher concentration, lower dry ability.
6. **Size pick-up percentage:** Higher pick up%, dry ability lower.
7. **Speedy of running:** More speed, lower ability, because of cylinder & yarn contact for the time.
8. **System of drying:**
   Hot air drying < Cylinder drying.
   Two cylinder < Multi cylinder drying.
9. **Environmental condition:** Higher R.H.%, lower dry ability (high temp)
10. **Total ends:** Higher ends, lower dry ability (high temp)

**Q. What are the factor that influences size take up percentage?**

Dhaka Textile-`04,’05,’07.

**Ans:**

1. Fibre characteristics: Immature fibre-s.t.p. (↑)
2. Yarn characteristics, Hairiness (↑) – s.t.p. (↑)
3. Wet ability, higher, s.t.p. (↑) due to absorption.
4. Linear density or yarn count: coarser yarn – s.t.p. (↑)
5. EPI: EPI (↑) – s.t.p. (↑) due to density of yarn in warp sheet.
6. Uniformity of warp yarn: Uniform yarn – s.t.p. (↓)
7. Warp tension: Tension (↑) – s.t.p. (↓)
8. Roller wt.: Squeezing roller wt. (↑) → s.t.p. (↑)
9. Roller diameter, (↑) – s.t.p. (↑)
11. Contact length in size: yarn contact in size, s.t.p. (↑)
12. Running speed (↑) – s.t.p. (↓) due to short time of penetration of yarn.
13. Size concentration (↑) – s.t.p. (↑)
14. Total ends.
15. Environmental condition.
16. Ingredients: Adhesive power of starch is greater than flour.
17. Preparation condition: Shape of sizing mts should be finer.
18. Temperature: 60°C.

**Q. Discuss the ‘sizing- weaving curve’ or ‘size take up%’ & weaving efficiency.’**

Noakhali Textile-’03,’04.

**Ans:**

1. From AB, Breakage rate ∝ \( \frac{1}{\text{size} \%} \).
2. From BC, Breakage rate const. to a certain limit.
3. From CD, Breakage rate ∝ size%.

**Q. State the disadvantages of sizing.**

**Ans:**

1. Capital investment.
2. Labour.
3. Cost of size ingredients.
4. Cost of power, water or solvent.
5. Long preparatory process.
7. Less yarn or inch due to increased diameter.
8. Rough surface of warp due to uneven size solg, sometime increase co-efficient of friction.
9. Reduce yarn extension%.
10. Increase yarn stiffness.
12. More robust loom.
13. More power to drive loom.
14. Less length of yarn on warp loom.
15. Difficulties of size removed.
16. Variation in dye takes up.
17. Cost of desizing.
18. Need information of size ingredients about size ingredients for desizing.
19. Increase pollution.
20. Fading of colour intensity.
21. Possibility if some changes in the fibre structure.

Q. Why warp breakage occurred in sizing?  
   Noakhali Textile-’05.

Ans:
1. **Faulty warp:** Faulty warp may be different types & in different causes.
2. **Examples:** Uneven, immature, nepped, slubby, hairiness.
3. **Weak warp yarn:** For less twist of yarn or broken fibres in yarn.
5. **Repeating warp streaks:** Less squeezing.
6. **Size spots:** Faulty mixing of size ingredients.
7. Shimmers of fibre.
8. **Sandy size:** Large size adhesive particles.
9. **Hard sizing:** Excessive concentration.
   - Uneven sizing.
   - Improper drying.
   - Size dropping.
   - Size sticking.
10. **Crossing of warp ends:** During sizing, the yarns overlap each other in any case.
11. **Uneven & improper tension:** If tension of beam is not const. rate, warp yarn breakage.
12. **Defective m/c parts:**
    - The surface of cylinder faulty.
    - Yarn supply of back beam is not proper tension.
13. **Faulty adjustment:** Not proper adjustment of comb, separating rod & other parts.
14. **Excessive m/c speed:** If weak yarn, yarns will breakage due to high speed.
15. **Insufficient care of m/c:** If m/c parts are inert.
16. **Unsuitable humidity:** With humidity, the quality of yarn changes.
17. Workers or Tenter faults.

Q. Describe shirley automatic size box with neat sketch.
Ans:
The ordinary size box cannot maintain uniform concentration. So, shirley Automatic size Box has be introduced.

**Purpose:** The main purpose of shirley Automatic size Box is to maintain uniform level of size solⁿ in the size box & also maintain uniform concentration per volume.

![Diagram](image.png)

**Construction:**
1. This is mainly a box which is remaining size liquor.
2. There is a sizing roller, which makes coating on yarn.
3. There is a immersion roller to immerse warp yarn into liquor & a squeezing roller to control size take up%.
4. There are two separate pipe named a water pipe which control size liquor volume in Box & a size solⁿ pipe which control concentration.

**Basic principle**
1. The necessary quantity of water through a water pipe & size liquor solution through a feed pipe are added in a size box.
2. The main principle is that when concentration of size solution becomes more, water comes automatically from water pipe to maintain its concentration
3. When concentration becomes less, size is automatically supplied size ingredient pipe & maintain its concentration & volume.
4. Yarn sheet is feed to the immersion roller via guide roller & finally comes out from in bet³ the squeezing & sizing roller.
5. Yarn sheet is feed to the immersion roller via guide roller & finally comes out form in between the squeezing & sizing roller.
Mathematical problem

Rules:
1. Total wt. of size on warp = wt. of sized warp – wt. of unsized warp.
2. The wt. of size to be put on warp = wt. of unsized warp × % of size req'd to be put on warp.
3. The wt. of unsized warp = \( \frac{\text{length of warp in yds}}{840 \times \text{count}} \times \text{no. of ends} + \text{wt. of size} \).
4. Wt. of sized warp = \( \frac{\text{wt. of size}}{\text{wt. of unsized warp}} \times 100\% \).
5. % of size on warp = \( \frac{\text{wt. of size}}{\text{wt. of unsized warp}} \times 100\% \).
6. Count of sized yarn = \( \frac{\text{length of warp in yds}}{840 \times \text{wt. of sized warp} \text{ (in lbs)}} \times \text{no. of ends} \).
7. Count of sized yarn = count of unsized yarn \( \times \frac{100}{100 + \% \text{ of size}} \).

Q. Calculate the production of a slasher sizing m/c from the following particulars:
   Circumference of drawing roller = 29.25”
   PPM of drawing roller = 36
   Efficiency = 80%
   Production/8hrs = ?

Ans:
Production
\[
\text{circumference of drawing roller} \times \text{rpm of drawing roller} \times 60 \text{min} \times hr \times \text{efficiency} \times 100 \\
36 \times 100
\]
\[
= \frac{29.25 \times 36 \times 60 \times 8 \times 80}{36 \times 100} \text{ yds}
\]
\[
\therefore \text{production/8hrs} = 11232 \text{ yds (Ans)}
\]

Q. Calculate the production in lb of a slasher sizing m/c from the following particulars;
   Circumference of drawing roller = 29.25inch.
PPM of drawing roller = 36
No. of warp ends = 2100
Yarn count = 32
Efficiency = 80%
Production/8hrs = ?

Ans:
Production
\[
\pi \times \text{Dia of drawing roller} \times \text{rpm of drawing roller} \times 60 \times \text{hr} \times \text{eff.} \times \text{no. of warp ends} \\
= \frac{29.25 \times 36 \times 60 \times 8 \times 80 \times 2100}{36 \times 840 \times 32 \times 100} \text{lb} = 877.5 \text{ lb (Ans.)}
\]
= 877.5 kg
= \frac{2.204}{2.204}
= 398.14 kg. (Ans.)

Q. Calculate the no. of loom are neede from the following particulars:
Production/hr of a slasher sizing m/c = 1354 yds.
Production/hr of a loom = 4 yds
warp regain or crimp = 6%
wastage = 0.5%
no. of looms = ?

Ans
No. of looms
\[
= \frac{\text{production/hr of a slasher sizing m/c}}{\text{production/hr of a loom} \times \left( \frac{100 + \text{crimp\%}}{100} \right) \times \left( \frac{100 \times \text{w\%}}{100} \right)}
\]
= \frac{1334}{4 \times \frac{100 + 6}{100} \times \frac{100 + 0.5}{100}}
= \frac{1334}{4 \times 106 \times 100.5}
= \frac{1334}{100}
= 313 \text{ (Ans.)}

Q. A warp containing 2800 ends is required to be sized to 25%. The length of the sized warp on the beam is required to be 1080 yds. If the counts of the yarn 40s. Find-
i) The wt. of the size to be put on the warp of the given length.
ii) The wt. of sized warp
iii) The count (Ne) of sized warp. Dhaka Textile-’05. Noakhali Textile-’08.

Ans:  
i) The wt. of the size to be put on the warp
\[
\text{wt. of unsized warp} \times \% \text{ of size} \\
\frac{840 \times \text{count}}{840 \times 40} \times 25\% \\
= \frac{2800 \times 1080}{840 \times 40} \times 25\% \\
= 22.5 \text{ lbs. (Ans)}
\]

ii) wt. of sized warp = wt. of unsized warp + wt. of size on it
\[
= 90 + 22.5 \\
= 112.5 \text{ lbs (Ans.)}
\]

iii) The count of the sized warp
\[
\frac{\text{length of warp in yds}}{\text{840 \times \% of size warp in lbs}} \times \text{no. of ends} \\
\frac{2800 \times 1080}{840 \times 112.5} \\
= 32^5 \text{ (Ans.)}
\]

Q. The calculated production of a high speed slasher is 100 yds per min. If the efficiency of the m/c is 75%, calculate the followings-

a. The actual production per day of 8 hrs.
b. Total length of yarn if the total ends is 3520.
c. The total wt. of sized warp, if it is sized to 10% & the count of unsized are 40.

Ans:

a. Calculated production per day of 8 hrs = 100 \times 60 \times 8 \text{ yds.}
\[
= 48000 \text{ yds.}
\]

The actual prod^n per day of 8hrs = \[
48000 \times \frac{75}{100} \text{ yds}
\]
\[
= 36000 \text{ yds. (Ans)}
\]

b. The total length of yarn sized = Total length of warp \times \text{no. of ends.}
\[
= 36000 \times 3250 \text{ yds.}
\]
\[
= 117000000 \text{ yds. (Ans)}
\]
c. Total wt. of sized warp = \( \frac{\text{Total length of warps}}{840 \times \text{count}} + 10\% \)
\[
= \frac{117000000}{840 \times \text{count}} + 10\%
= 3482 + 10\%
= 3830 \text{ lbs} \text{ (Ans)}
\]

Q. A warp containing 2800 ends, is required to be sized to 25%. The length of the sized warp on the beam is required to be 1080 yds. If the counts of the yarn is 40s. Find out –

a. The wt. of the size to be put on the warp of the given length.
b. The wt. of sized warp.
c. The count of the sized warp.

**Ans:**
a. The wt. of the size to be put on the warp,
\[
= \text{wt. of unsized warp} \times \% \text{ of size reqd to be put}.
= \frac{1080 \times 2800}{840 \times 40} \times 25\% = 22.5 \text{ lbs. (Ans)}
\]
b. Wt. of sized warp = wt. of unsized warp + wt. of size
\[
\text{wt. of unsized warp} = \frac{\text{length of warp in yds}}{840 \times \text{count}} \times \text{no. of ends}.
= \frac{1080 \times 2800}{840 \times 40} \text{ lbs.}
= 90 \text{ lbs}
\]
wt. of sized warp = 90 + 22.5 = 112.5 lbs.
c. Count of sized warp = count of unsized \times \frac{100}{100 + \text{size}\%}
\[
= 40 \times \frac{100}{100 + 25}
= 32\text{s} \text{ (Ans.)}
\]

Q. A warp containing 2400 ends of 44s sized to 10%. If the sized warp wt. lbs. Calculate the length of the sized warp & total length of sized yarn.

**Ans:**
\[
\text{Count of the sized warp} = \text{count of unsized} \times \frac{100}{100 + \% \text{size}}
= 44 \times \frac{100}{100 + 10}
= 40\text{s}.
\]
Total length of sized warp = 120 \times \text{count} = 120 \times 40 = 4800 \text{ hanks. (Ans)}
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Total length of yarn sized = \( \frac{\text{Total length of warp}}{\text{no. of ends}} \)
= \( \frac{4800}{2400} \) = 2hanks (Ans.)

Q. The wt. of sized yarn on a beam was found to be 82.5 lbs. The beam contains 1050 yds of warp whose count before sizing was 50s. If the no. of ends in warp is 3000. Calculate –

a. The wt. of size on the yarn.
b. The % of size put on the yarn
c. Count of the sized yarn.

Ans:

a) The wt. of size on the yarn = wt. of sized warp – wt. of unsized warp

Wt. of unsized warp = \( \frac{\text{length of warp in yds}}{840 \times \text{count}} \times \text{no. of ends} \)
= \( \frac{1050 \times 3000}{840 \times 50} \)
= 75 lbs.

Wt. of size = 82.5 – 75 = 7.5 lbs (Ans)

b) percentage of size put on the yarn = \( \frac{\text{wt. of size} \times 100}{\text{wt. of unsized warp}} \)
= \( \frac{7.5 \times 100}{75} \)
= 10% (Ans.)

c) Count of sized warp = count of unsized \( \times \frac{100}{100 + \% \text{size}} \)
= \( 50 \times \frac{100}{100 + 10} \)
= 45.45s (Ans.)