Uka Tarsadia University(Diwaliba Polytechnic)
Diploma in Chemical Engineering
Objective Type Questions (Pulp & Paper Technology)

UNIT 1 BASICS OF PULP AND PAPER TECHNOLOGY

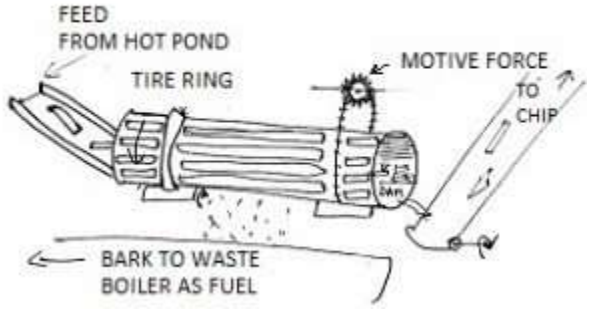
1. What is the percentage, bark comprises of in a tree stem?
   a) 10% – 20%
   b) 30% – 40%
   c) 41% – 62%
   d) 7% – 30%
2. What are some high level non-process elements which interfere in the recovery process?
   a) Carbon Dioxide and Oxygen
   b) Lead and Other Impurities
   c) Silica and Calcium
   d) Silicate and Copper
3. Whole tree ___ in the forest requires cleaning before pulping to remove dirt.
   a) Flipping
   b) Burning
   c) Cutting
   d) Chipping
4. What does the outer bark contain?
   a) Suberin
   b) Hardwood
   c) Wood Pole Conference
   d) Pith
5. What is the specific gravity of the bark in usual cases?
   a) 0.90 – 1.45
   b) 0.40 – 0.65
   c) 0.45 – 0.90
   d) 1.24 – 2.00
6. Where is Sapwood located in the structure of softwood stem?
   a) Below Inner Bark
   b) Below Outer Bark
   c) Below Wood Ray Heartwood
   d) Above Pith
7. hat type of trees are also called deciduous?
   a) Softwood
   b) Hardwood
   c) Lightwood
   d) Heavywood
8. What are openings on the radial surface known as?
   a) Pits
   b) Pith
   c) Reaction Wood
   d) Mitochondria
9. What is solid wood density, practically?
   a) Specific gravity of wood x Density of water
   b) Specific gravity of pulp x Density of water

c) Specific gravity of paper x Density of water
d) Specific gravity of impurity x Density of Liquid

10. What are some important pulping variables of wood and wood chip?
    a) Bark content
    b) Spring wood
    c) Summer wood
    d) Autumn wood
11. What caused the diminished use of Sawdust?
    a) Saw blades have become thinner with more teeth
    b) Saw blades have become thicker with no teeth
    c) Saw blades have become thinner with less teeth
    d) Saw blades have become thicker with more teeth
12. Mechanical dis-integrated wood pieces are of size _____ along the grain.
    a) 12 – 25mm
    b) 0.3 – 2.00mm
    c) 26 – 30mm
    d) 9 – 12mm
13. Bark, dirt and other materials should always be kept to a minimum of_____
    a) 3% or less
    b) 0.5% or less
    c) 0.005% or less
    d) 0.01% or less
14. Where are Silos located?
    a) Over pile of wood chips
    b) Over rotor table
    c) Under pile of wood chips
    d) Under rotor table
15. Whole tree chips undergo cleaning operation prior to the use
    a) True
    b) False
16. Which of the following is an example of residual chips?
    a) Chip silos
    b) Chips
    c) Pulp
    d) Sawdust
17. Which is the closest average fiber length for a 12mm long chip from Douglas fiber?
    a) 6mm
    b) 2mm
    c) 3mm
    d) 13.5mm
18. What is the closest percentage of wood received as chip waste from primary wood process and what percentage is chipped on site?
    a) 40% and 60%
    b) 60% and 40%
    c) 80% and 20%
    d) 20% and 80%
19. One method used for metering the wood chips into the digesters without constant supervision is with the use of chip silos of capacity _____
    a) 1 – 10 tons
    b) 10 – 50 tons

c) 11 – 100 tons
d) 50 – 300 tons

20. Fuel value of softwood is less than hardwood.
    a) True
    b) False
21. What is the purpose of barker?
    a) Remove bark from wood after chipping
    b) Remove bark from wood before chipping
    c) Add a bark like layer before chipping
    d) Add a bark like layer after chipping
22. What type of barker is this?



    a) Drum
    b) Hydraulic
    c) Rosewood
    d) Aviato
23. A dam controls log retention time in drum barker.
    a) True
    b) False
24. Which type of barker is ideal for small mills.
    a) Hydraulic
    b) Drum
    c) Rosserhead
    d) Aviato.
25. Waste water from hydraulic barker is higher in _____
    a) LRP
    b) CRP
    c) NPR
    d) BOD
26. Which are the two types of barkers in the following?
    a) Flat
    b) Slasher deck
    c) Flail
    d) Cylinder
27. Is Softwood easier to chip and generate fewer fine chips?
    a) True
    b) False
28. Arrange this in proper downward order
    a) Oversized – Over thick – Accepts – Pins – Fines
    b) Oversized – Over thick – Pins – Accepts – Fines
    c) Over thick – Oversized – Accepts – Pins – Fines
    d) Fines – Over thick – Accepts – Pins – Oversized.

29. _____ are the chip fraction of the ideal size distribution analysis perfect for pulping.
    a) Pins
    b) Accepts
    c) Rejects
    d) Fines
30. At the bottom of the pass _____ are collected?
    a) Fines
    b) Pin
    c) Accepts
    d) Silth
31. About 80% of all waste paper comes from one of three sources: corrugated boxes, newspapers and office papers.
    a) True
    b) False
32. About 10% of fiber is utilized to make paper each year worldwide is from non-wood plant fibers, which include cotton, straws and canes.
    a) True
    b) False
33. Cotton is the pure form of _____
    a) Protein
    b) Vitamins
    c) Cellulose
    d) Pulp.
34. Which of the following is a fiber mat made using synthetic fibers?
    a) Grasses
    b) Canes
    c) Reeds
    d) Nonwovens
35. What is sugar cane residue called?
    a) Grasses
    b) Kenaf
    c) Bagasse
    d) Canes
36. Pulp from bamboo is utilized in fine papers and the resulting paper is __ than paper of straw pulp.
    a) Weaker
    b) Stronger
    c) Thicker
    d) Thinner
37. _____ are utilized in products such as battery separators, glass fiber filter mats, and as reinforcement in a large variety of reinforcement materials.
    a) Glass fibers
    b) Ceramics
    c) Thermosetting tissue
    d) Pulpwood
38. Straw should not be utilized because?
    a) Agriculture's by-product
    b) Needs little refining
    c) Straws are bulky and contain silica
    d) Often cheaper than wood
39. Paper bags should be utilized because?
    a) Transportation and storage problems

b) Needs little refining
c) Straws are bulky and contain silica
d) Degrades very quickly

40. Straw should not be utilized because?
    a) Byproducts from agriculture
    b) Needs little refining
    c) Degrades very quickly
    d) Often cheaper than wood
41. consumption of paper increase per year by _____
    10.6
42. What is the requisite for cellulose raw material?
    a) Ample supply
    b) Available to pulp mill throughout the year
    c) Should not deteriorate in storage
    d) All of above
43. The paper industry in India could be classified into 3 categories according to the raw material consumed.
    a) Wood based
    b) Agro based &
    c) Waste paper based
44. The pulp and paper industry comprises manufacturing enterprises that convert cellulose fibre into a wide variety of pulps, papers and paperboards.-True
45. Raw material for pulp manufacturing
    a) Annual crops
    b) Agricultural residues
    c) Straw
    d) All of above
46. Pulp for papermaking was produced by macerating mulberry bark as early asthe 2nd century in Han dynasty.-True
47. In India, pulp and paer industry older than 100 years-True
48. Raw material for paper manufacturing
    a) Softwood
    b) Hard wood
    c) Waste paper
    d) All of above
49. Which is the requisite for cellulose raw material?
    a) Cost of conversion to paper must be low
    b) Quality of paper made must be competitive
    c) Must not have a higher priority use
    d) All of above
50. About 95% of their fibre comes from wood from forests, the balance from wastepaper and a very small quantity of linen and cotton rags.-True

UNIT 2 MORPHOLOGY

1. Cellulose is a material which can exist in crystalline and amorphous states
   a) True
   b) False.
2. Which is the part where lignin is highly concentrated?
   a) Outskirts of lamella
   b) Middle lamella
   c) Mitochondria
   d) Pith
3. Cellulose is a linear polymer of anhydro-D-glucose connected by beta-(1-4)-linkage?
   a) True
   b) False.
4. What are the chemical elements present in wood?
   a) C, O, H, N
   b) Co_2, O_2, N_2, H_2
   c) Co_2, O_2, N_2, H
   d) Co_2, O_2, N, H_2
5. Microfibrils occur in which section of cell wall?
   a) Primary
   b) Secondary
   c) Tertiary
   d) Quaternary
6. _____ decreases the strength of pulp yield, and are not ideal for dissolving pulp process.
   a) Terpne
   b) Hemicellulose
   c) Lignin
   d) Microfibrils
7. Which of the following is a condensed polymer?
   a) Microfibrils
   b) Arabinogalactans
   c) Hardwood hemicelluloses
   d) Hemicellulose
8. Which is the compound which is a complex polymer consisting of phenylpropane units and has an amorphous three-dimensional structure?
   a) Extractives
   b) Lignin
   c) Terpenes
   d) Hemicellulose
9. Which is the compound by definition are soluble in organic solvents, and water?
   a) Extractives
   b) Lignin
   c) Terpenes
   d) Hemicellulose.
10. Turpenes are made from _____ units in the living wood cell?
    a) Sulphated isoprene
    b) Phosphated isoprene
    c) Carbonated isoprene
    d) Hydrogenated isoprene
11. The equilibrium moisture content of wood or wood pulp depends on the temperature and relative humidity of the atmosphere surrounding the specimen.

a) True
b) False

12. What is the full form of FSP?
    a) Fiber suction point
    b) Fiber soft point
    c) Fiber saturation parcel
    d) Fiber saturation point
13. Wood shrinks and swells as a function of _____
    a) Stress
    b) Shear stress
    c) Strain
    d) Moisture content
14. At low humidities the equilibrium moisture content will be lower.
    a) True
    b) False
15. What increases the strength of the paper?
    a) Lignin
    b) Hemicellulose
    c) Fiber
    d) Lignocellulose
16. What decreases the strength of the paper?
    a) Lignin
    b) Hemicellulose
    c) Fiber
    d) Lignocellulose.
17. What could increase the fiber surface area?
    a) Decrease inter-fiber bonding
    b) Increase inter-fiber bonding
    c) Decrease intra-fiber bonding
    d) Increase inter-fiber bonding
18. Wood taken at room temperature and 99% relative humidity will have how much moisture content approaching?
    a) 90%
    b) 99%
    c) 30%
    d) 1%
19. Uneven grain orientation may cause severe warping or __ of lumber and furniture is prone to shrinkage as the wood dries.
    a) Fracture
    b) Welding
    c) Brazing
    d) Cropping
20. _____ bonding holds ligo cellulose fibers together in paper.
    a) Sulfate
    b) Hydrogen
    c) Halogen
    d) Phosphate
21. It is fundamental that the properties on paper depend on the fiber properties and the method of fiber preparation.

a) True
b) False

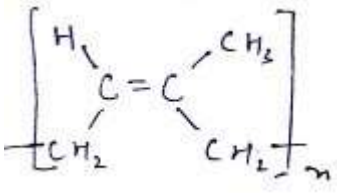
22. It is not crucial to have authentic fiber samples of contributing species on hand for comparison with unknown samples.
    a) True
    b) False
23. When attempting quantitative analysis of fiber mixtures, the number of a particular type of fiber is multiplied by its _____ since some types of fibers appear to be present in larger amounts than others.
    a) Weight factor
    b) Charge factor
    c) Lignin factor
    d) Ray cross factor
24. _____ is very utilized in the determination of isolated fibers.
    a) Spotting
    b) Pitting
    c) Gourding
    d) Lightening
25. Ray cross—field pitting shows whether ray parenchyma and or tracheids are present; it also indicates the _____
    a) Length of the rays
    b) Height of the rays
    c) Wavelength of the rays
    d) Frequency of the rays
26. Chemical stains could help with the analysis by concluding the type of pulping method utilized to generate the fiber which is crucial in _____ that might have some recycled newsprint.
    a) White paper
    b) Brown paper
    c) Non-Recyclable paper
    d) Red paper.
27. _____ is utilized to detect the presence of starch, which could be present in sapwood but not heartwood or in paper such as in the detection of forged currency.
    a) Chlorine
    b) Sodium
    c) Magnesium
    d) Iodine
28. Phloroglucinol is specific for _____ cautilizing it to turn red. It is utilized as a 2% solution in 18.5% HCl.
    a) Pulp
    b) Softwood
    c) Hardwood
    d) Lignin
29. Mechanical softwood and _____ are diffiated with the utilize of 2 percent aniline sulfate made acidic followed by 0.02 percent methylene blue after removal of the first dye by blotting
    a) Pulp
    b) Redwood
    c) Hardwood
    d) Lignin.
30. Mechanical pulp bleached with dithionite no more than a few months old is calculated by detecting traces of _____ as H_2S liberated by stannous chloride.
    a) SO_2

b) MnO_4
c) Cl_2
d) H_2

31. Fibers over _____ millimetre long are most often softwood fibers.
    a) 1
    b) 2
    c) 3
    d) 4
32. Ray cross—field pitting in softwoods is the principal means of many ray cross field pits shows if ray tracheids are present, whether they are marginal or interspersed, and might indicate the average height of the rays.
    a) True
    b) False
33. Spruce, larch, and hemlock might be able to be distinguished from each other as with true—fir and western redcedar.
    a) True
    b) False

34. Which of the following is made from Softwood fiber?
    a) Letterpress
    b) Magazine
    c) Grocery bags
    d) Novels
35. Hardwood fibers are accompanied by vessels or vessel fragments depending on the pulping process.
    a) True
    b) False
36. The source of_____ was arising from the locations outside the mills which helped to expedite the paper making process.
    a) Recycled fiber
    b) Used fiber
    c) Used latex
    d) Used lignin
37. Recycled fiber is separated from _____ which's off-specification paper produced at the mill and reused within the mill.
    a) Reel
    b) Broke
    c) Matte
    d) Emulsion
38. _____ represents the loss of material from the original feed stock to the recovered product.
    a) Binder
    b) Flocculation
    c) Shrinkage
    d) Spot.
39. One of the biggest obstacles for utilizing recycled or secondary fiber is effective _____removal.
    a) Fiber
    b) Contaminant
    c) Latex
    d) Lignin

40. Fillers include _____ which could interfere with rosin/alum sizing, clays, and TiO_2.
    a) Calcium hydroxide
    b) Calcium silicate
    c) Calcium carbonate
    d) Hydrogen silicate
41. Films and laminates include polyethylene, aluminum foil, etc.
    a) True
    b) False
42. Ink doesn't consists of pigments, such as TiO_2, to supply colour and opacity and a vehicle to carry the pigment and bind it to the paper.
    a) True
    b) False
43. What is the name of the compound?
    CH_3-(CH_2-CH_2)$_n$-CH_3
    a) Paraffin w ax
    b) Polyethylene
    c) Natural rubber
    d) Isoprene
44. What is the name of the compound?
    $CH_3(CH_2)_nCH_3$,n= 23-38
    a) Paraffin wax
    b) Polyethylene
    c) Natural rubber
    d) Isoprene
45. What is the name of the compound?



    a) Paraffin wax
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    a) True
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47. About 10% of fiber is utilized to make paper each year worldwide is from non-wood plant fibers, which include cotton, straws and canes.
    a) True
    b) False
48. Cotton is the pure form of _____
    a) Protein
    b) Vitamins
    c) Cellulose
    d) Pulp.
49. Which of the following is a fiber mat made using synthetic fibers?
    a) Grasses
    b) Canes

c) Reeds
d) Nonwovens.

50. What is sugar cane residue called?
    a) Grasses
    b) Kenaf
    c) Bagasse
    d) Canes.
51. Pulp from bamboo is utilized in fine papers and the resulting paper is __ than paper of straw pulp.
    a) Weaker
    b) Stronger
    c) Thicker
    d) Thinner
52. _____ are utilized in products such as battery separators, glass fiber filter mats, and as reinforcement in a large variety of reinforcement materials.
    a) Glass fibers
    b) Ceramics
    c) Thermosetting tissue
    d) Pulpwood
53. Straw should not be utilized because?
    a) Agriculture's by-product
    b) Needs little refining
    c) Straws are bulky and contain silica
    d) Often cheaper than wood.
54. Paper bags should be utilized because?
    a) Transportation and storage problems
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55. Straw should not be utilized because?
    a) Byproducts from agriculture
    b) Needs little refining
    c) Degrades very quickly
    d) Often cheaper than wood
56. Bagasse is
    a) Sugar cane residue
    b) Urea residue
    c) Both above
    d) None
57. nylon 6 also known as
    a) Polycaprolactam
    b) polyhexamethylene diamide
    c) both above
    d) None
58. nylon 66 also known as
    a) Polycaprolactam
    b) polyhexamethylene diamide
    c) both above
    d) None
59. olyamide polymers with amide group –CONH is known as _____
    a) Teflon

b) Resin
c) Nylon
d) Coke

60. What is the melting point of Nylon 6?
a) 264oC
b) 223oC
c) 211oC
d) 200oC

61. Which of the following is a drawback of Nylon?
a) Moisture absorption
b) Easily Abrasive
c) Low Electric strength
d) Oil receptive

62. What is the maximum operating temperature of Nylon?
a. 100-150 F
b. 250-300 F
c. 400-500 F
d. 500-550 F

63. What is Tynex?
a. Nylon 6,6
b. Nylon 11
c. Nylon 6
d. Nylon 610

64. Nylon 6 producede from
a) Caprolactam
b) Ammonia
c) Nitric acid
d) None

65. Nylon 6 produced from
a. Ammonia
b. Nitric acid
c. Hexamethylene diamine and adipic acid
d. None

66. Polyester is a synthetic fabric that's usually derived from
a) HCl
b) Sulfuric acid
c) Petroleum
d) None

67. Length of fibers is also a basis for classifying them into
a) staple group only
b) filament Group
c) Both above
d) None

68. Staple fibers are of relatively short length fibers- True

69. filament fibers are long length fibers- - True

70. Tenacity is, directly related to the
a) length of the polymers
b) degree of polymerization
c) strength in dry and wet conditions
d) All abovce

71. Select the correct statement for Morphology.

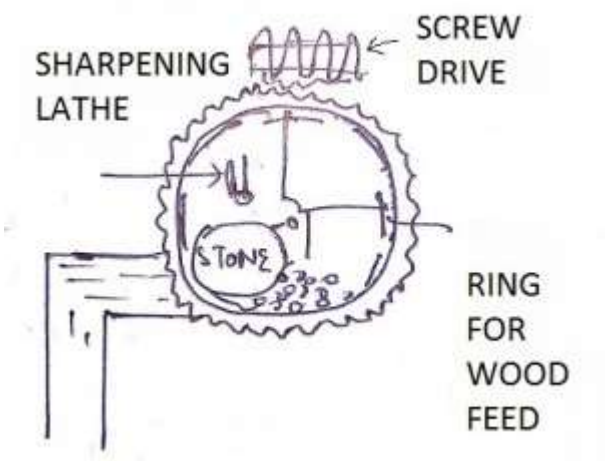
a) It is the study of physical shape and form of a fiber.
b) It includes microscopic structure like longitudinal and cross sections
c) Both above
d) None

72. Elastic recovery indicates the ability of fibers to return to their original length after being stretched.-True
73. Select the correct statement for Resiliency
    a) Resiliency refers to the ability of a fiber to come back to its original position after being creased or folded.
    b) Good elastic recovery usually indicates good resiliency
    c) Both above
    d) None
74. Most high-performance fibres have low tensile modulus and strength-False
75. Specialty fibres is
    a) Price oriented
    b) Application oriented
    c) Both above
    d) None
76. Conventional fibres is
    a) Price oriented
    b) Application oriented
    c) Both above
    d) None
77. Select the correct statement for Cellulose
    a) Cellulose is one of many polymers found in nature.
    b) Wood, paper, and cotton all contain cellulose.
    c) Cellulose is an excellent fibre.
    d) All above
78. Fibres are extracted by the process of
    a) Distillation
    b) Drying
    c) Retting
    d) None
79. Important conditions for good retting are
    a) Water should be non-saline and clear
    b) Volume of water should be enough to make fibre bundles float
    c) When bundles are immersed they should not touch the bottom.
    d) All above.
80. Select the correct statement for tenacity.
    a) The strength of textile fibers is referred to as their tenacity.
    b) It is determined by measuring the force required to rupture or break the fiber
    c) Both above
    d) d. None

UNIT 3 PULP

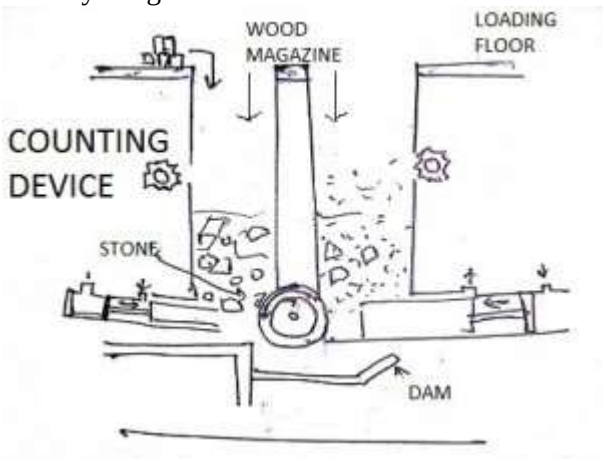
1. Pulp consists of 2 things which are, wood and the libocellulosic materials that are broken down physically and chemically.
   a) True
   b) False
2. Which are 4 broad categories of pupling processes?
   a) Chemical, semi-chemical, chemi-mechanical, and mechanical
   b) Qualitative , semi-chemical, chemi-mechanical, and mechanical
   c) Quantitative, semi-chemical, chemi-mechanical, and thermal
   d) Isentropic, semi-chemical, chemi-mechanical, and mechanical
3. Wood-free pulps contain no mechanical pulp or contains pulp subjected to a min. refining.
   a) True
   b) False
4. _____ is the process whereby the pulp is separated from large shives, knots, and etc.
   a) Shredding
   b) Cutting
   c) Picking
   d) Screening.
5. _____ are small finer bundles of fibers that have not been separated into individual fibers during the pulping process.
   a) Shives
   b) Yield
   c) Grains
   d) Pulp
6. Which process is used to treat all types of woods for pulping process?
   a) Mechanical pulping
   b) Neutral-sulfite semi-chemical(N.S.S.C.)
   c) Kraft process
   d) Chemical mechanical pulping
7. How to calculate the total yield?
   a) Screening (%) + Screened yield (%)
   b) Dry solid mass (%) + Screened yield (%)
   c) Screening (%) + Slurry mass (%)
   d) Dry product mass out (%) + Dry product mass in (%)
8. How to calculate yield %?
   a) (Dry product mass out) (Dry product mass in)$^{-1}$ x 100
   b) (Dry product mass out)$^{-1}$ (Dry product mass out) x 100
   c) (Dry product mass out) (Dry product mass out)$^{-2}$ x 100
   d) (Dry product mass out)$^{-2}$ (Dry product mass out) x 100
9. Chemical pulping yields individual fibers that are not cut and give strong papers because of _____ as it interferes with hydrogen bonding is largely removed.
   a) Pulp
   b) Hydrogen
   c) Phosphate
   d) Lignin
10. Mechanical pulp is pulp produced by using only mechanical attrition to pulp lignocellulosic materials; no chemicals are used.
    a) True
    b) False.

11. The total yield under the supervision of mechanical pulp is around?
    a) 50-55%
    b) 90-98%
    c) 20-50%
    d) 100%
12. The use of mechanical pulps' confined mainly to only non-permanent papers like newsprint and catalog paper.
    a) True
    b) False
13. What is the full form of PGW?
    a) Pressure Group Window
    b) Produced Ground Wood
    c) Pre-recycled Ground Wood
    d) Pressure Ground Wood.
14. What is the full form of RMP?
    a) Refiner Mechanical Pulp
    b) Refined Microscopic Pulp
    c) Radiated Microscopic Process
    d) Refiner Mechanical Process.
15. Identify the grinder?



    a) Hydraulic magazine grinder
    b) Roberst's ring grinder
    c) Great northern grinder
    d) Three pocket grinder.

16. Identify the grinder?



    a) Hydraulic magazine grinder
    b) Roberst's ring grinder
    c) Great northern grinder
    d) Three pocket grinder
17. Which of this is an important pulping variable?
    a) Speed of the refiner plates
    b) Fiber fragments
    c) Pulp hydrogen grains
    d) Coarse screens

18. What is the full form of T.M.P?
    a) Thermo mechanical pulp
    b) Tri membrane process
    c) Tribunal molecular pump
    d) Thermochemical pulp
19. Chemi-mechanical processes were originally named chemi-groundwood processes.
    a) True
    b) False
20. What is the full form of ESPRA?
    a) Empire state paper research association
    b) Entropy state pulp research association
    c) Enthalpy state paper research academy
    d) Empire state pound research association
21. The most common chemi-mechanical process is?
    a) SGW
    b) PGW
    c) RPM
    d) CTMP
22. In hot sulfite process pressurized hot sulfite liquor is used to treat __ prior to fibration.
    a) Crackers
    b) Cards
    c) Plates
    d) Chips.
23. The cold soda process was first investigated by U.S. in?
    a) 2000
    b) 1950

c) 1860
d) 1974

24. What is the full form of C.T.M.P?
    a) Chemi-thermomechanical pulp
    b) Chemi-mechanical pulp
    c) Chemi-thermomechanical protein
    d) Chemi-catalyst protein

25. What is the name of the process where chips are impregnated with cooking liquor, the free liquor is drained or otherwise removed.
    a) Vapor-phase pulping
    b) Liquid-phase pulping
    c) Saturated-phase pulping
    d) Differential-phase pulping.
26. What is the name of the process which involves steps like mild chemical treatment and followed by moderate mechanical refining.
    a) Semi-chemical process
    b) Vapor-chemical process
    c) Differential-chemical process
    d) Saturated-chemical process.
27. What is the range of yield in the Semi-chemical process?
    a) 70-95%
    b) 60-80%
    c) 30-40%
    d) 55-65%.
28. High yield chemical pulling is the other name of semi-chemical process.
    a) True
    b) False
29. Natural Sulfite Semi-Chemical is the full form of N.S.S.C. process. This is the most common method.
    a) True
    b) False.
30. What does NSSC cooking liquor contain?
    a) CTMP+BOD
    b) CTMP+APMP
    c) APMP+BOD
    d) $Na_2So3+Na_2Co_3$
31. The _____ liquor semi-chemical pulping process for corrugating medium uses green liquor as the pulping liquor.
    a) Green
    b) Distilled
    c) Pure
    d) Indigo.
32. _____ is the use of waste liquor of a semi-chemical mill as the make-up chemical in the kraft recovery plant.
    a) Diagonal recovery
    b) Cross recovery
    c) Multi recovery
    d) Instant recovery.
33. The low _____ removal makes chemical recovery difficult in the semi-chemical process.
    a) Lignin

b) Pulp
c) Hardwood
d) Softwood

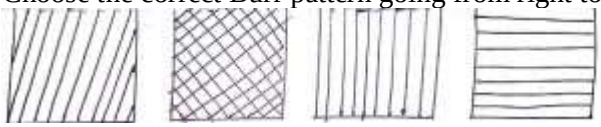
34. Kraft pulping is a full chemical pulping method using sodium hydroxide and sodium sulfide at pH above 12.
    a) True
    b) False
35. Wood species is an important variable during Kraft cooking process.
    a) True
    b) False.
36. The degree of Kraft cook for bleachable grades of pulp, have a lignin content of 3 – 5.2% for softwood and 1.8 – 2.4% for hardwood.
    a) Soft
    b) Medium
    c) Hard
    d) Ultra.
37. _____ is a fresh pulping liquor for the Kraft process, consisting of the active pulping species NaOH and Na_2S, small amounts of Na_2CO_3.
    a) Black liquor
    b) White liquor
    c) Red liquor
    d) Green liquor
38. _____ is the waste liquor from the Kraft pulping process after pulping is completed.
    a) Black liquor
    b) White liquor
    c) Red liquor
    d) Green liquor
39. _____ is the partially recovered form of Kraft liquor. It is obtained after burning of the black liquor in the recovery boiler.
    a) Black liquor
    b) White liquor
    c) Red liquor
    d) Green liquor
40. Fill in the blank.
    _____ $=(Na_2S)/(NaOH + Na_2S)X\ 100\%$
    a) Sulfifdity
    b) Causticity
    c) Effective alkali
    d) Active alkali
41. Fill in the blank.
    _____ $=(NaOH)/(NaOH + Na_2S)X\ 100\%$
    a) Sulfifdity
    b) Causticity
    c) Effective alkali
    d) Active alkali
42. Fill in the blank.
    _____ $=(Na_2S)/(Na_2SO_4 + Na_2S)X\ 100\%$
    a) Reduction efficiency
    b) Causticity
    c) Effective alkali
    d) Active alkali.

43. Bleaching is the treatment of wood (and other lignocellulosic) pulps with chemical agents to decrease their brightness.
    a) True
    b) False
44. Bleaching of chemical pulps is achieved by lignin addition.
    a) True
    b) False
45. _____ pulps are not susceptible to colour reversion.
    a) Chemical
    b) Mechanical
    c) Dithionite
    d) Hydrousulfite.
46. _____ removal in chemical pulps leads to higher fiber-fiber bonding strength in paper, but the strong chemical pulps decrement in the length of cellulose molecules, resulting in weaker fibers.
    a) Softwood
    b) Hardwood
    c) Lignin
    d) Pulp
47. Bleaching of mechanical pulps is called _____ to distinguish it from bleaching of chemical pulps.
    a) Brightening
    b) Bloating
    c) Blackening
    d) Branding
48. The purpose of the recovery boiler is to recover the inorganic chemicals as smelt, burn the organic chemicals so they are not discharge from the mill as pollutants, and recover the heat of combustion in the form of heat.
    a) True
    b) False.
49. There are three zones in recovery boilers; which are as follows in top to bottom order?
    a) Oxidation, drying and reducing zone
    b) Reducing, drying and oxidation zone
    c) Drying, oxidation and reducing zone
    d) Drying, reducing and oxidation zone

50. Which of the following is the chemical react. in the recovery boiler in addition to combustion?
    a) $2NaOH + CO_2U \rightarrow Na_2CO_2+H_2O$ and $Na_2SO_2 +4C \leftrightarrow 6Na_2S + 4CO$
    b) $2NaOH + CO_2 \rightarrow Na_2CO_2$ and $Na_2SO_2+4C \leftrightarrow 4CO$
    c) $2NaOH + CO_2 \rightarrow Na_2CO_2+H_2O_2$ and $Na_2SO_2+4C \leftrightarrow Na_2S +4CO_2$
    d) $2NaOH + CO_2 \rightarrow Na_2CO_2+H_2O$ and $Na_2SO_2+4C \leftrightarrow Na_2S +4CO$
51. A type of paper pulp derived from cotton or linen is known as
    a) RAG pulp
    b) Dissolving Pulp
    c) Bleached pulp
    d) Kraft pulp
52. When a wood pulp contain cellulose more than _____is known as Dissolving pulp.
    a) 90%
    b) 80%
    c) 50%

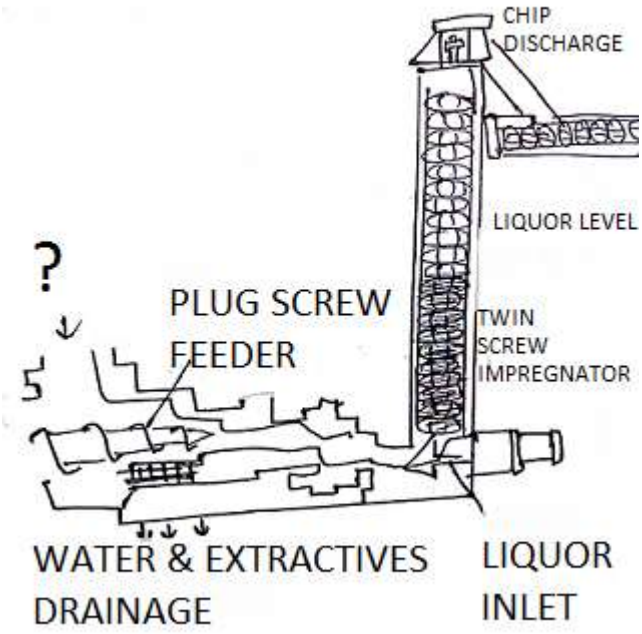
d) 60%

53. Brightness is a term used to describe the _____ of pulp or paper, on a scale from 0 to 100.
    a) Whiteness distribution
    b) Whitness obstructivness
    c) Coquettes
    d) Bleach
54. _____ is the yellowness of pulps on exposure to air, light, heat, and fungi due to modification of residual lignin forming chromophores.
    a) Colour reversion
    b) Colour addition
    c) Oxidation
    d) Exposure
55. _____ pulps are susceptible to colour reversion.
    a) Chemical
    b) Mechanical
    c) Dithionite
    d) Hydrousulfite
56. Bleaching stages are carried out consistencies for pulp bleaching are from _____%.
    a) 8-10
    b) 3-20
    c) 3-10
    d) 4-15
57. Quality of mechanical pulp is better than chemical pulp.-False
58. Yield of chemical pulp is less than mechanical pulp- True
59. Higher bleaching stages are carried out in consisitencies of range_____
    a) 8-10
    b) 10-20
    c) 15-20
    d) 3-10
60. Choose the correct Burr pattern going from right to left.



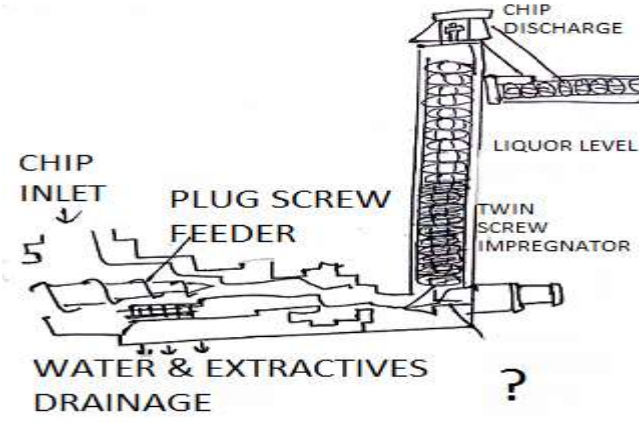
    a) Thread, diamond, spiral and straight
    b) Spiral, diamond, thread and straight
    c) Spiral, thread, diamond and straight
    d) Straight, diamond, thread and spiral

61. What is the name of the process at the question mark area?



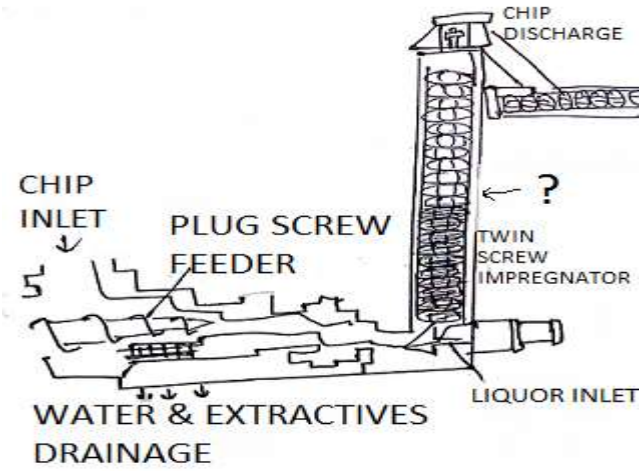
a) Chip inlet
b) CTMP
c) Liquor level
d) Liquor inlet

62. What is the name of the process at the question mark area?



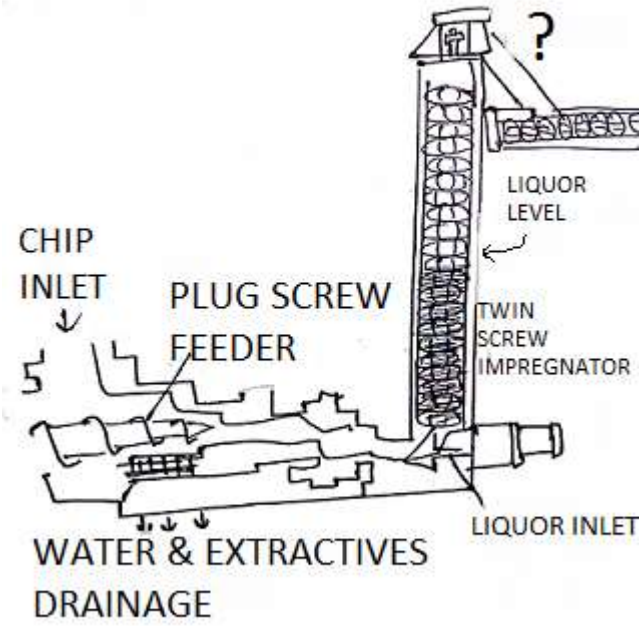
a) Chip inlet
b) CTMP
c) Liquor level
d) Liquor inlet

63. What is the name of the process at the question mark area?



a) Chip inlet
b) CTMP
c) Liquor level
d) Liquor inlet

64. What is the name of the process at the question mark area?



a) Chip inlet
b) Chip discharge
c) Liquor level
d) Liquor inlet

65. What is the correct definition of H – factor?
    a) It is a pulping variable that combines ignition temperature and time into a single variable
    b) It is a pulping variable that combines cooking temperature and time into a single variable
    c) It is a pulping variable that combines sublimation temperature and time into a single variable
    d) It is a pulping variable that combines vaporization temperature and time into a single variable.
66. The de-fiberator is also known as?
    a) Cold stock refiner
    b) Hot stock refiner
    c) Neutral stock refiner
    d) Maximum stock refiner

UNIT 4 CELLULOSE AND LIGNIN CHEMICALS

1. Cellulose is a material which can exist in crystalline and amorphous states.
   a) True
   b) False.
2. Which is the part where lignin is highly concentrated?
   a) Outskirts of lamella
   b) Middle lamella
   c) Mitochondria
   d) Pith
3. Cellulose is a linear polymer of anhydro-D-glucose connected by beta-(1-4)-linkage.
   a) True
   b) False.
4. What are the chemical elements present in wood?
   a) C, O, H, N
   b) Co_2, O_2, N_2, H_2
   c) Co_2, O_2, N_2, H
   d) Co_2, O_2, N, H_2
5. Microfibrils occur in which section of cell wall?
   a) Primary
   b) Secondary
   c) Tertiary
   d) Quaternary
6. _____ decreases the strength of pulp yield, and are not ideal for dissolving pulp process.
   a) Terpne
   b) Hemicellulose
   c) Lignin
   d) Microfibrils
7. Which of the following is a condensed polymer?
   a) Microfibrils
   b) Arabinogalactans
   c) Hardwood hemicelluloses
   d) Hemicellulose
8. Which is the compound which is a complex polymer consisting of phenylpropane units and has an amorphous three-dimensional structure?
   a) Extractives
   b) Lignin
   c) Terpenes
   d) Hemicellulose.
9. The equilibrium moisture content of wood or wood pulp depends on the temperature and relative humidity of the atmosphere surrounding the specimen.
   a) True
   b) False
10. What is the full form of FSP?
    a) Fiber suction point
    b) Fiber soft point
    c) Fiber saturation parcel
    d) Fiber saturation point
11. Wood shrinks and swells as a function of _____

a) Stress
b) Shear stress
c) Strain
d) Moisture content

12. At low humidities the equilibrium moisture content will be lower.
    a) True
    b) False
13. What increases the strength of the paper?
    a) Lignin
    b) Hemicellulose
    c) Fiber
    d) Lignocellulose
14. What decreases the strength of the paper?
    a) Lignin
    b) Hemicellulose
    c) Fiber
    d) Lignocellulose
15. What could increase the fiber surface area?
    a) Decrease inter-fiber bonding
    b) Increase inter-fiber bonding
    c) Decrease intra-fiber bonding
    d) Increase inter-fiber bonding
16. Wood taken at room temperature and 99% relative humidity will have how much moisture content approaching?
    a) 90%
    b) 99%
    c) 30%
    d) 1%
17. Uneven grain orientation may cause severe warping or __ of lumber and furniture is prone to shrinkage as the wood dries.
    a) Fracture
    b) Welding
    c) Brazing
    d) Cropping
18. _____ bonding holds ligo cellulose fibers together in paper.
    a) Sulfate
    b) Hydrogen
    c) Halogen
    d) Phosphate

19. Lignin is a class of complex organic polymers that form key structural materials in the support tissues of vascular plants and some algae.-True
20. Lignins are particularly important in the formation of cell walls, especially in wood and bark.-True
21. Lignin is insoluble in water.
    True
22. Lignin is soluble in alcohol.
    False
23. Lignin is soluble in weak alkaline solutions.
    True
24. Lignin constitutes 30% of non-fossil organic carbon and 20 to 35% of the dry mass of wood.

True

25. Lignin is an impediment to papermaking as it is colored, it yellows in air,
    True
26. Presence of lignin improve the strength of the paper.
    False
27. In sulfite pulping, lignin is removed from wood pulp as lignosulfonates.
    True
28. Formula of Cellulose is
    a) $(C_6H_{10}O_5)_n$
    b) $(C_5H_{10}O_5)_n$
    c) $(C_8H_{12}O_6)_n$
    d) $(C_6H_{10}O_5)$
29. Cellulose is an important structural component of the primary cell wall of green plants.
    True
30. Cellulose is insoluble in water and most organic solvents.
    True
31. Cellulose is a polysaccharide.
    True
32. Cellulose is soluble in acid and base.
    True
33. Cellulose is used in
    a) Paper products
    b) Fibers
    c) Electrical insulation paper
    d) All of above
34. Cellulose ethers include
    a) Alkyl
    b) Hydroxyalkyl
    c) Carboxyalkyl
    d) All of above
35. Type of cellulose ether of Alkyl include
    a) Methylcellulose
    b) Ethylcellulose
    c) Ethyl methyl cellulose
    d) All of above

36. Cellulose is the major constituent of paper, paperboard, and card stock.
    True
37. Lignin chemical is
    a) Di-methyl sulphides
    b) Di- methyl sulfoxide
    c) Both of above
    d) None of above
38. Di-methyl sulphides is soluble in water
    False
39. Di- methyl sulfoxide is soluble in organic solvent.
    True
40. Di- methyl sulfoxide is insoluble in water
    True
41. Di-methyl sulphides and Di- methyl sulfoxide are manufactured from wood liquor.
    True

42. Raw material for manufacturing of Di-methyl sulphides and Di- methyl sulfoxide
    a) Black liquor
    b) NaOH
    c) Sulfur
    d) All of above
43. Chemical formula of Di- methyl sulfoxide
    a) C_2H_6OS
    b) C_2H_6S
    c) C_3H_6OS
    d) $C_4H_{10}OS$
44. Methylcellulose is cold water-soluble-True
45. Ethylcellulose is soluble in water-False
46. Methyl cellulose is used in
    a) paper coating
    b) Thickening agent
    c) Cosmetic product
    d) All of above
47. Hydroxyethyl cellulose is used in Gelling and thickening agent.-True
48. Lignin fills the spaces in the cell wall between cellulose, hemicellulose, and pectin components True
49. Lignin is present in all vascular plants, but not in bryophytes.-True
50. Di-methyl sulphides is used as a food flavoring component.-True

UNIT 5 PAPER

1. _____ are made primarily of bleached chemical softwood pulps and which could have bleached softwood sawdust or hardwood pulps to impart smoothness.
   a) Tissues
   b) Fiber
   c) Paper
   d) Uncoated groundwood
2. Newsprint accounts for about 80% of this grade. What is the type we are talking about?
   a) Coated groundwood
   b) Tissue
   c) Uncoated groundwood
   d) Uncoated wood-free paper
3. This grate's used for magazines, catalogues, and letterpress. What's the type we are talking about here?
   a) Coated groundwood
   b) Tissue
   c) Uncoated groundwood
   d) Uncoated wood-free paper
4. _____ is mainly made from kraft or sulfite softwood pulps and may contain limited amounts of mechanical pulp or recycled fiber.
   a) Coated groundwood
   b) Tissue
   c) Uncoated groundwood
   d) Uncoated wood-free paper
5. The base sheet of coated, wood-free paper is manufactured from kraft or sulfite softwood pulps. Which type of paper is this?
   a) Coated wood-free paper
   b) Uncoated wood-free paper
   c) Coated groundwood
   d) Uncoated groundwood
6. _____ are manufactured from bleached or un-bleached kraft softwood pulp of southern pine. They are manufactured in various weights from 50 to 134 g/m^2.
   a) Coated wood-free paper
   b) Uncoated wood-free paper
   c) Wrapping papers
   d) Specialty papers
7. Cast-coated paper is a very _____ paper made by allowing the coating on the paper to dry on a large, chrome plated dryer along with a polished surface.
   a) Low gloss
   b) High gloss
   c) Bleaked
   d) Black texture
8. . _____ are made for specific uses which include capacitor, cigarette, and greaseproof papers.
   a) Kraft wrapping
   b) Bag
   c) Speciality paper
   d) Kraft paperboards

9. _____ is a thick paper of low density and quality used for making solid fiber boxes and is of papers that requires very low strength.
   a) Kraft paperboard
   b) Chipboard
   c) Bag
   d) Kraft wrapping
10. Pulps which are produced by the mills which don't have paper machines and this pulp's sold to the open market as wet lap or dry lap. What's its name?
   a) Residue pulp
   b) Chipboard
   c) Market pulp
   d) Kraft paperboards
11. It's very important to obtain a sufficient number of representative samples by using a sampling procedure.
   a) Bond paper
   b) Linerboard
   c) Fine papers
   d) Newsprint.
12. _____ is a vast category of high quality printing or writing papers. They are made from bleached chemical pulps and cotton fibers and could be watermarked.
   a) Bond paper
   b) Linerboard
   c) Fine paper
   d) Newsprint
13. _____ are made with a min. of 25%t rag fiber from cotton. They are high quality, long lasting, expensive papers.
   a) Newsprint
   b) Rag bond
   c) Linear board
   d) Fine papers
14. _____ are made for writing, typing, and printing purposes. They may be white or colored, are manufactred from bleached kraft or sulfite softwood pulps.
   a) Fine papers
   b) Tissue
   c) Greaseproof paper
   d) Bond paper
15. Wrapping tissues are manufactured from bleached sulfite or kraft pulps and are soft and absorbent.
   a) True
   b) False
16. Sanitary tissues are used for wrapping clothes, flowers, etc. and are made of bleached kraft or sulfite softwood pulps that impart very high strength.
   a) True
   b) False
17. _____ is a dense, transparent grade of paper that's used for tracing.
   a) Sanitary tissue
   b) Wrapping tissue
   c) Glassine tissue
   d) Wrapping tissue
18. _____ are manufactured from highly refined chemical pulps, resulting in a very dense, translucent sheet.
   a) Liner board

b) Bond paper
c) Rag bonds
d) Grease proof paper

19. _____ is an un-bleached Kraft softwood sheet of southern pine or Douglas-fir, made in various weights.
    a) Linerboard
    b) Bond paper
    c) Grease proof paper
    d) Fine papers
20. _____ is manufactured from unbleached, semi-chemical pulp, especially N.S.S.C hardwood pulp, and recycled fiber from corrugated boxes.
    a) Concurrent medium
    b) Corrugated medium
    c) Fluted medium
    d) Calliper medium
21. Fibers must be properly mixed with additives. The slurry must be treated to remove contaminants.
    a) True
    b) False
22. Paper does not consists of a web of pulp fibers, generally formed from an aqueous slurry on a screen, and held together by H bonding.
    a) True
    b) False
23. The _____ is a device for continuously forming, pressing, and drying a web of paper fibers.
    a) Paper machine
    b) Pulp extractor
    c) Lignin formation
    d) Jack machine
24. Machines that use 2 wires to form and drain water from the dilute, pulp slurry are named _____ These have become popular since the late 1960s for printing and lightweight papers.
    a) Twin wire formers
    b) Twin extractors
    c) Twin connectors
    d) Twin drinages
25. The key to good paper making with long fabric life, good retention, and minimized sheet two-sidedness' control of the process. Sheet sealing occurs at around _____% consistency unless precautions are taken.
    a) 0.2-1.20
    b) 0.8-1.14
    c) 0.1-0.10
    d) 0.1-0.20
26. _____ is utilized for applying the pulp slurry to a screen.
    a) Draining
    b) Pressuring
    c) Drying
    d) Forming
27. _____ is for allowing water to drain by means of a force such as gravity or a pressure difference developed by a water column.
    a) Drying
    b) Pressuring
    c) Forming
    d) Draining

28. _____ is for further de-watering by squeezing water from the sheet.
    a) Draining
    b) Drying
    c) Pressuring
    d) Forming
29. _____ is for air drying or drying of the sheet over a hot surface.
    a) Draining
    b) Drying
    c) Pressuring
    d) Forming
30. _____ pulp slurries at 3 percent consistency don't even flow well. Therefore, the entire purpose of the paper machine is to remove all of this water that one is forced to use to give paper that's uniform.
    a) Softwood
    b) Groundwood
    c) Hardwood
    d) Beetewood
31. _____are steam filled drums designed to heat the web by direct contact and remove water by evaporation.
    a) Winder
    b) Dryer
    c) Converters
    d) Reel
32. The _____ is designed to keep hot, dry air over the free paper surface, and the pockets b/w dryer drums where H_2O quickly evaporates.
    a) Reel
    b) Winder
    c) Dryer
    d) Ventilation system
33. _____ keeps the paper web against the drums to enhance heat transfer b/w the drum and web and absorb a portion of the H_2O evaporated from the web.
    a) Reels
    b) Calendar
    c) Dryer hood
    d) Dryer felts
34. The first step in controlling the heating of _____ is to remove the steam condensate from the drum.
    a) Pocket ventilation
    b) Reverse press
    c) Press felt
    d) Dryer drums
35. The _____ is an enclosure around the dryer section and is used to enhance drying efficiency.
    a) Dryer hood
    b) Reel
    c) Calendar
    d) Ventilation system
36. The use of a long press nip with one roll at 175-400°Celcius to remove water from the web's called as _____
    a) Yankee drying
    b) Reel

c) Dryer hood
d) Impulse drying

37. The _____ is located b/w dryer sections and consists of a pair of squeeze rolls mounted horizontally, vertically, or at a 45 degrees angle.
    a) Ventilation point
    b) Size press
    c) Dryer hood
    d) Calendar stack
38. Surface size uses _____ materials, commonly starch, but sometimes starch reacted with ethylene oxide are applied as a solution to the surface of the web at the size press, followed by drying.
    a) Polymeric
    b) Radioisotopic
    c) Metallic
    d) Non metallic
39. Sizing efficacy may by measured by the _____
    a) Kennedy porosity
    b) Gurley porosity
    c) Sizing porosity
    d) John porosity
40. The source of_____ was arising from the locations outside the mills which helped to expedite the paper making process.
    a) Recycled fiber
    b) Used fiber
    c) Used latex
    d) Used lignin
41. Recycled fiber is separated from _____ which's off-specification paper produced at the mill and reused within the mill.
    a) Reel
    b) Broke
    c) Matte
    d) Emulsion
42. _____ represents the loss of material from the original feed stock to the recovered product.
    a) Binder
    b) Flocculation
    c) Shrinkage
    d) Spot
43. One of the biggest obstacles for utilizing recycled or secondary fiber is effective _____removal.
    a) Fiber
    b) Contaminant
    c) Latex
    d) Lignin
44. Fillers include _____ which could interfere with rosin/alum sizing, clays, and TiO_2.
    a) Calcium hydroxide
    b) Calcium silicate
    c) Calcium carbonate
    d) Hydrogen silicate
45. Films and laminates include polyethylene, aluminum foil, etc.
    a) True
    b) False

46. Ink doesn't consists of pigments, such as TiO_2, to supply colour and opacity and a vehicle to carry the pigment and bind it to the paper.
    a) True
    b) False
47. What is the name of the compound?
    CH_3-(CH_2-CH_2)$_n$-CH_3
    a) Paraffin wax
    b) Polyethylene
    c) Natural rubber
    d) Isoprene
48. Recycling fiber is the process of separating useful fiber from the contaminants of waste paper.
    a) True
    b) False
49. Recycled fiber recovery does not begins at the pulper, which is nothing more than a large blender to disperse pulp into an aqueous slurry.
    a) True
    b) False
50. The primary screen rejects could be as high as 50 percent, the primary screen rejects are often sent to a secondary screen to recover usable _____
    a) Lignin
    b) Pulp
    c) Fiber
    d) Ink
51. _____ involves removal by washing it from the fiber using NaOH, sodium silicate, and hydrogen peroxide with a suitable dispersant in the pulper.
    a) Ink flotation
    b) Froth flotation
    c) Ink washing
    d) Froth washing
52. _____ process is carried out using NaOH, sodium silicate, and H_2O_2 with a collector system consisting of a surfactant. What is the name of the process?
    a) Ink washing
    b) Gyroclean
    c) Deinking chemistry
    d) Reverse cleaners
53. After de-inking and cleaning, the dilute pulp slurry must be concentrated for processing further and storage. What is the term used here?
    a) Bleaching of secondary fiber
    b) Slurry concentration
    c) Deinking process
    d) Flocculation
54. _____ or so called wood-containing pulp are bleached with peroxide about 1 percent on pulp, with 4 percent sodium silicate, 50°C.
    a) Chemical pulps
    b) Softwood pulps
    c) Hardwood pulps
    d) Mechanical pulps
55. Recycling fiber is the process of separating useful fiber from the contaminants of waste paper. A series of processes can be used to accomplish this task.
    a) True
    b) False

.

56. Recycled fiber recovery does not begins at the pulper, which is nothing more than a large blender to disperse pulp into an aqueous slurry.
    a) True
    b) False
57. A _____ is a long tube with an overhead grapple that's utilised to manually remove waste that accumulates at the bottom of the tower.
    a) Woodward
    b) Junk tower
    c) Contaminants
    d) Surfactants.
58. A _____ is an enclosed bucket conveyer utilized to automatically remove heavy and floating waste on a continuous basis.
    a) Sludge
    b) Centrifugal cleaner
    c) Continuous junk removal
    d) Ink washing
59. The primary screen rejects could be as high as 50 percent, the primary screen rejects are often sent to a secondary screen to recover usable _____
    a) Lignin
    b) Pulp
    c) Fiber
    d) Ink
60. _____ involves removal by washing it from the fiber using NaOH, sodium silicate, and hydrogen peroxide with a suitable dispersant in the pulper.
    a) Ink flotation
    b) Froth flotation
    c) Ink washing
    d) Froth washing
61. _____ process is carried out using NaOH, sodium silicate, and H2O2 with a collector system consisting of a surfactant. What is the name of the process?
    a) Ink washing
    b) Gyroclean
    c) Deinking chemistry
    d) Reverse cleaners.
62. After de-inking and cleaning, the dilute pulp slurry must be concentrated for processing further and storage. What is the term used here?
    a) Bleaching of secondary fiber
    b) Slurry concentration
    c) Deinking process
    d) Flocculation
63. _____ or so called wood-containing pulp are bleached with peroxide about 1 percent on pulp, with 4 percent sodium silicate, 50°C.
    a) Chemical pulps
    b) Softwood pulps
    c) Hardwood pulps
    d) Mechanical pulps

UNIT 6 WASTE DISPOSAL TECHNIQUES

1. In Pulp and paper industry, the production process consists two main steps: pulping and bleaching where large quantity of water is used. -True
2. Water consumption is more in pulping process than in paper making-True
3. Water consumption changes depending on the production process and it can get as high as 60 m^3/ton paper produced in spite of the most modern-True
4. The wastewaters generated from production processes of this industry include high concentration of chemicals such as
   a. Sodium hydroxide,
   b. Sodium carbonate,
   c. Sodium sulfide,
   d. All of above
5. The major problems of the wastewaters are
   a. high organic content (20-110 kg COD/air dried ton paper),
   b. dark brown coloration,
   c. adsorbable organic halide (AOX) and toxic pollutants.
   d. All of above
6. Type of waste generated from pulp and paper industry
   a. Waster water
   b. Solid waste
   c. Gas emission
   d. All of above
7. Solid wastes from pulp and paper industry contain
   a. lime mud,
   b. lime slaker grits,
   c. boiler and furnace ash,
   d. all of above
8. Wastewater treatment sludges are generated from different mills contain large amount of solid waste.-True
9. During the pulp processing, approximately_____ of the lignin comes from the raw materials cannot be removed
   a. 5-10%
   b. 10-20%
   c. 25- 30 %
   d. None of above
10. _____is responsible for the dark colour of the end product.
    a. Lignin
    b. Cellulose
    c. Sulfite
    d. NaOH
11. Wastewaters generated from pulping stage include mostly
    a. Wood debris,
    b. Soluble wood materials, and also
    c. Some chemicals from chemical pulping process
    d. All of above
12. Bleaching process wastewater are not higher strength than pulping process wastewater, however they include toxic components.-True
13. The wastewaters generated from pulping process consist various wooden compounds such as lignin, carbohydrate and extractives.-True
14. Treatment of wastewaters generated from pulping process by biologically is difficult.-True

15. Caustic process generate type of waste
    a. Dregs
    b. Muds
    c. Both of above
    d. None of above
16. Power boiler produce type of waste
    a. Muds
    b. Ash
    c. Sludge
    d. Dregs
17. Paper mill produce type of waste
    a. Sludge
    b. Colour waste
    c. Lignin
    d. All of above
18. Air pollutants generated from pulp and paper industry
    a. Water vapours
    b. Nitrogen oxide
    c. Volatile organic compounds
    d. Sulfur oxides
    e. All of above
19. Modern waste minimization approach is
    a. Chemical recovery and Recycling
    b. Minimize waste production
    c. Both of above
    d. None of above
20. Hazardous waste generation can be reduced by waste management methods including,
    a. Production, planning and sequencing
    b. Process adjustment and/or modification
    c. Raw material replacement
    d. All of above
21. The industries can not develope and apply new technologies instead of conventional pulping and bleaching processes for waste minimization.-False
22. Organic Solvent Pulping use the solvent like ethanol, methanol.
    True
23. Organic Solvent Pulping process is more energy consumer than conventional ones.
    True
24. In Acid Pulping, Acetic acid under the high pressure is used for treating of wood chips.
    True
25. Microorganism or microbial enzymes and their combination are used in the pulping process to improve the properties of pulp is know as_____.
    a. Acid Pulping
    b. Organic Solvent Pulping
    c. Biopulping
    d. Sulfite pulping
26. Bio pulping is preferred because:
    a. To reduce the chemical and energy utilization
    b. To reduce the pollutants
    c. To increase the yield and strength properties of pulp
    d. All of above
27. New technologies for pulping

a. Biopulping
b. Organic acid pulping
c. Acid pulping
d. All of above

28. Elemental chlorine can be used for bleaching of pulp instead of
    a. Chlorine Dioxide And Hypochlorite
    b. Chlorine Troxide And Hypochlorite
    c. Chlorine Dioxide And Hydrochlorite
    d. NaOH
29. In Bio bleachingFungal cells and or their enzymes are used for pretreatment of pulp.
    True
30. Application of white rod fungi reduces the chemical dosage of bleaching and enhances the brightness of paper.
    True
31. Lignin can be removed before bleaching step by extended delignification.
    True
32. Extended Delignification may be achieved by extended cooking, oxygenation, ozonation, and addition of chemical catalysts.
    True
33. Extended delignification positively affect on the bleach effluent quality parameters
    a. COS,
    b. BOD,
    c. Color
    d. All of above
34. Secondary treatment of waste water is used to is to remove suspended solid such as bark particles, fiber, fiber debris, filler and coating materials and consequently organic materials.-False
35. Biological treatment of waste water for pulp and paper mills
    a. Sedimentation
    b. Anaerobic treatment
    c. Filtration
    d. None of above
36. Advanced oxidation methods are used to achieve the destruction of chromophoric and nonchromophoric pollutants in pulp and paper mills-True
37. Photocatalytic reaction is not used to remove COD from waste water.-Flase
38. Membrane filtration is a potential method to remove colour, COD, AOX, salts, heavy metals, and total dissolved solids from pulp and paper mills.-True
39. By Membrane filtration COD and BOD can be removed
    a. 80-90%
    b. 70%
    c. 50%
    d. 30%
40. Advanced oxidation methods include
    a. Photocatalysis,
    b. Photo-oxidation,
    c. Wet oxidation
    d. All of above
41. Wet-oxidation are increased the biodegradability of the pulp and paper mill effluent from 30% to 70%.-True
42. Solid waste management of pulp and paper mills are done through
    a. Anaerobic digestion,
    b. Composting,

c. Thermal processes
d. All of above

43. Thermal processes include
    a. Incineration/combustion,
    b. Pyrolysis,
    c. Steam reforming, and wet oxidation
    d. All of above
44. Industrial wastes, which have high organic content like paper sludge and wastewater treatment plant sludge are disposed by
    a. Incineration
    b. anaerobic digestion
    c. wet oxidation
    d. Pyrolysis
45. Method is suitable for the wastes and sludge, especially paper fibres and organic materials.
    a. Composting
    b. wet oxidation
    c. Pyrolysis
    d. Steam reforming
46. Organic wastes are converted to gaseous and liquid phase under high temperature and in the absence of oxygen by,
    a. wet oxidation
    b. Pyrolysis
    c. Steam reforming
    d. Incineration
47. During wet oxidation, waste pulped with water is carbonized and its fuel value increases to the equivalent of medium-grade coal.-True
48. Technology is not sufficient for pulp and paper mill waste.
    a. wet oxidation
    b. Pyrolysis
    c. Steam reforming
    d. Incineration
49. Land fill method has been preferred disposal method, especially for the acidic soil due to $CaCO_3$ content of sludge.-True
50. In wet oxidation process, organic compound as solid or liquid form is firstly transferred to water where it contacts with an oxidant under high temperature and pressure.-True