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प्रश्नपुस्तिका क्रमांक
Question Booklet No.

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प्रश्नपुस्तिका सीरीज
Question Booklet Series
**C**

# M.Sc Industrial Chemistry (Third Semester) Examination, February/March-2022

## MSIC-303

## Sugar and Pulp Chemistry

**Time : 1:30 Hours** **Maximum Marks-100**

जब तक कहा न जाय, इस प्रश्नपुस्तिका को न खोलें

**निर्देश :** –

1. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सीरीज का विवरण यथास्थान सही– सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।
2. **इस प्रश्नपुस्तिका में 100 प्रश्न हैं, जिनमे से केवल 75 प्रश्नों के उत्तर परीक्षार्थियों द्वारा दिये जाने है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर पत्रक (O.M.R. ANSWER SHEET)में उसके अक्षर वाले वृत्त को काले या नीले बाल प्वांइट पेन से पूरा भर दें। यदि किसी परीक्षार्थी द्वारा निर्धारित प्रश्नों से अधिक प्रश्नों के उत्तर दिये जाते हैं तो उसके द्वारा हल किये गये प्रथमतः यथा निर्दिष्ट प्रश्नोत्तरों का ही मूल्यांकन किया जायेगा।**
3. प्रत्येक प्रश्न के अंक समान हैं। आप के जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
4. सभी उत्तर केवल ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर ही दिये जाने हैं। उत्तर पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
5. ओ०एम०आर० उत्तर पत्रक **(O.M.R. ANSWER SHEET)** पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाय।
6. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक–पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
7. निगेटिव मार्किंग नहीं है।

**महत्वपूर्ण :** – **प्रश्नपुस्तिका खोलने पर प्रथमतः जॉच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभॉति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्ष निरीक्षक को दिखाकर उसी सीरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**

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**Rough Work / रफ कार्य**

1. Dissolving pulp is obtained by :

   (A) Semi chemical pulping

   (B) Sulphite pulping

   (C) Kraft process

   (D) Mechanical pulping

2. Which of the following is monosaccharide with a ketone when they are in cyclic form ?

   (A) Ketoses

   (B) Hydroses

   (C) Aldoses

   (D) None of the above

3. One gram of invert sugar yields 0.6448 ml of alcohol. If molasses contain 45% fermentable sugars (or 450 kg/tonne of molasses), the theoretical recovery of alcohol should be :

   (A) 290.16 litres of alcohol

   (B) 390.16 litre of alcohol

   (C) 200.16 litre of alcohol

   (D) 216.90 litres of alcohol

4. Machine which is used for separation of sugar crystals from mother liquor by rotary motion is :

   (A) Clarifier

   (B) Centrifuge

   (C) Grader

   (D) Pug Mill

5. The wash in the fermentation tanks is pumped to the distillation column in order to :

(A) Separate alcohol from water

(B) Separate sugar from crystals

(C) Separate impurities from cane juice

(D) None of the above

6. Which of the following is disadvantage of sulphitation ?

(A) Marked improvement in colour

(B) Better elimination of phosphates and waxes

(C) Higher sulphited ash content

(D) The juice settles more rapidly

7. The process in which juice (cane) is heated up to $70℃ - 75℃$ then the pH of the raw juice is suddenly raised (9.2-9.5) only for 8-10 seconds and followed by addition of $SO_2$ to maintain pH 7.0-7.2 is known as :

(A) Pre sulphitation followed by liming

(B) Simultaneous liming and sulphitation

(C) Shock liming followed by sulphitation

(D) None of the above

8. The process in which lime is introduced just the entry of raw juice in sulphitation tank and then immediately neutralize by a gas to get pH 7.0 is known as :

(A) Pre liming

(B) Pre sulphitation followed by liming

(C) Simultaneous liming and sulphitation

(D) Shock liming followed by sulphitation

9. The carbonation process used for clarification of juice involves the introduction of:

(A) Lime and CO

(B) Lime and $CO_2$

(C) Lime and C

(D) None of the above

10. Maltose is a disaccharide of :

(A) 2 glucose molecules

(B) 2 fructose molecules

(C) 1 glucose and 1 fructose molecule

(D) 1 glucose and 1 galactose molecule

11. Sucrose content in cane sugar may be around :

(A) 65%

(B) 75%

(C) 85%

(D) 95%

12. In the first carbonation tank pH is maintained about :

(A) 7.5-7.8

(B) 8-8.5

(C) 9.5-9.6

(D) 9.8-10

13. The rate of crystallization of sugar solutions :

(A) Decrease with temperature at high degree of super saturation.

(B) Increases with temperature at high degree of super saturation

(C) Increases with temperature at low degree of super saturation

(D) None of the above

14. No sugar crystals can form or develop in a sugar solution unless the solution is ___

(A) Concentrated

(B) Diluted

(C) Saturated

(D) Super saturated

15. In the second carbonation the amount of CaO should be :

(A) 300-800 mg/L

(B) 600-900 mg/L

(C) 800-1200 mg/L

(D) 1000-1500 mg/L

16. Temperature of first carbonation tank should be :

(A) 45℃

(B) 55℃

(C) 65℃

(D) 75℃

17. Juice sulphitation is the process of purification of cane juice by employing :

(A) Lime and S

(B) Lime and $SO_2$

(C) Lime and $SO_3$

(D) Lime and $H_2SO_4$

18. Which enzyme is present in malted beverages :

(A) Protease

(B) Zymase

(C) Amylase

(D) Lipase

19. In middle juice carbonation :

(A) Middle juice of 40°Bx is heated with lime and $CO_2$

(B) Middle juice of 50°Bx is heated with lime and $CO_2$

(C) Middle juice of 60°Bx is heated with lime and $CO_2$

(D) None of the above

20. Substances which are used to facilitate the water resistant protection of a paper's surface are known as :

(A) Causticizing reagents

(B) Sizing agents

(C) Adsorbent

(D) Dyeing

21. The largest sugar producing country in 2019-2020 was :

(A) Pakistan

(B) Brazil

(C) USA

(D) Germany

22. Kraft pulping is :

(A) Sulphite pulping process

(B) Sulphate pulping process

(C) Cold soda semi- chemical pulping

(D) Mechanical pulping

23. Which of the following is not a source of pulp ?

(A) Recycled paper

(B) Wood

(C) Bagasse

(D) Sugarcane juice

24. Pulping process is :

(A) Extraction of cellulose from wood

(B) Mixing of cellulose and lignin

(C) Extraction of sugar from sugar beet

(D) None of the above

25. Folding Endurance is :

(A) Measure of durability of paper when repeatedly folded under constant load.

(B) Measure of strength of paper, solid board and corrugated board

(C) Measure of stiffness of paper

(D) None of the above

26. Testing property of a paper that is used as a general guide to the strength of paper, solid board and corrugated board is :

(A) Grammage

(B) Drape

(C) Bursting strength

(D) Folding Endurance

27. Continuous sulphitation means :

(A) Continuous addition of $SO_2$ and lime to the constantly flowing stream

(B) Addition of lime first (pH-8-8.5) then $SO_2$ is added.

(C) Addition of $SO_2$ first then lime is added.

(D) None of the above

28. Carbonation phosphotation was developed to :

(A) Improve keeping quality of white sugar :

(B) Get large crystals

(C) Get white sugar crystals

(D) None of the above

29. In middle juice carbonation Rare juice is :

(A) Preheated to $90 - 95℃$ and limed to pH 6.8-7.0

(B) Preheated to $100 - 102℃$ is limed to pH 7-7.2

(C) Preheated to $110 - 120℃$ and limed to pH 6.8-7.0

(D) Preheated to $90 - 95℃$ and limed to pH 7-7.2

30. Which of the following is not used as bleaching agent for juice clarification ?

(A) Lime

(B) Carbon dioxide

(C) Zeolite

(D) Sulphur dioxide

31. In Michaelis- Menten equation, the michaelis constant km is defined as :

(A) Single substrate enzyme

(B) Covalent binding between enzyme and substrate

(C) That concentration of substrate at which enzyme is working at maximum velocity

(D) None of the above

32. Which of the following is the correct line weaver Burk equation ?

(A) $V_{max} = \frac{V_o[S]}{Km+[S]}$

(B) $\frac{1}{V_{max}} = \frac{Km}{V_o[S]} + \frac{1}{V_o}$

(C) $\frac{1}{V_o} = \frac{Km}{V_{max}[S]} + \frac{1}{V_{max}}$

(D) $V_o = \frac{V_{max\ [5]}}{Km+[S]}$

33. The catalytic efficiency of two different enzymes can be compared on which of the following factor ?

(A) Product concentration

(B) $K_m$

(C) Optimum pH Value

(D) Size of the enzyme

34. The screening process is required to :

(A) Remove colour

(B) Remove sugar

(C) Floating impurities

(D) Remove mud

35. Glucose is converted in to ethyl alcohol in presence of enzyme :

(A) Invertase

(B) Zymase

(C) Maltase

(D) Diastase

36. Molasses is converted into ethyl alcohol in presence of enzymes :

(A) Zymase

(B) Invertase

(C) Both (A) and (B)

(D) Azebobacter

37. Starch is a polymer of :

(A) Fructose

(B) Glucose

(C) Galactose

(D) None of the above

38. Sucrose when heated to 200°C, looses water and forms a brown colour compound known as :

(A) Invert sugar

(B) Molasses

(C) Caramel

(D) Jaggery

39. The change of yeast suspension prepared for inoculation in to the wort contained in the fermentation tank is :

(A) Wash

(B) Pitch or Bub

(C) Sludge

(D) Wort

40. Which of the following is not the important technical efficiency for judging the efficiency of a distillery?

(A) Fermentation efficiency

(B) Distillation efficiency

(C) Steam consumption of rectified spirit

(D) Alcohol recovery

41. Absolute alcohols is :

(A) Rectified spirit

(B) Anhydrous alcohol

(C) 10-15% alcohol

(D) 40-50% alcohol

42. In the distillation column, the first distillate is known as :

(A) Fore shots

(B) Heads product

(C) Last runs

(D) Tailings

43. Fermentation requires an optimum pH of :

(A) 8-10

(B) 6.5-8

(C) 4.5-6

(D) 2-4

44. Baker's yeast is a strain of :

(A) Saccharomyces cerevisiae

(B) Cryptococcus albidus

(C) Candida albidus

(D) Aureobasidium pullulans

45. Invertase enzyme converts :

(A) Monosaccharide into alcohol and $CO_2$

(B) Disaccharide in to monosaccharide

(C) Maltose in to glucose

(D) None of the above

46. The residual liquid left over after alcohol is distilled out of the fermented wash is known as :

(A) Rectified spirit

(B) Proof spirit

(C) Wort

(D) Spent liquors

47. 'Pol' is :

(A) The quantity of sugar contained in any sugar product

(B) The percentage of dissolved solids

(C) The purity of any sugar house product

(D) None of the above

48. Sugars which can be converted in to ethyl alcohol by fermentation are :

(A) Invert sugar

(B) Fermentable sugar

(C) Reducing sugar

(D) None of the above

49. Proof spirit is :

(A) The residual liquid left over after distillation

(B) A unit of alcohol strength

(C) The condensed vapours returned to the distillation column

(D) 95% pure spirit

50. Which of the following are used as rare material for the production of ethyl alcohol by fermentation :

(A) Sacchari ferrous materials

(B) Amylaceous material

(C) Cellulose

(D) All of the above

51. Ethyl alcohol is not used as rare material for the manufacture of :

(A) Ethyl Acrylate

(B) Glycol Ethers

(C) Ethyl Acetate

(D) Glucose

52. Ethyl alcohol is used :

(A) For industrial purposes

(B) As a fuel

(C) For potable purposes

(D) All of the above

53. High test molasses is :

(A) Beet molasses

(B) Palm molasses

(C) Inverted cane syrup

(D) None of the above

54. The final mother liquor obtained during the manufacture of rare sugar from sugarcane is known as :

(A) Cane molasses

(B) Black strap molasses

(C) Refinery molasses

(D) Beet molasses

55. Auto hydrolysis of bagasse is a :

(A) Physicochemical process, which leads to an increase in the mutation value of sugarcane bagasse.

(B) Simple process which leads to a decrease in the mineral content of sugarcane bagasse.

(C) Chemical process which leads to remove colour of bagasse.

(D) None of the above

56. Pulp is not used as major component for the manufacture of :

(A) Paper

(B) Paper board

(C) Printable sheet

(D) Ply board

57. Which of the following is not the basic requirement of news print paper ?

(A) News print must have good opacity

(B) News print must have high ink absorption property

(C) The news print must have smooth printing surface

(D) News print should be hard, and should easily under go deformation

58. Cylinder machine, FOURDRINER Machines are example of :

(A) Evaporator

(B) Centrifuge

(C) Paper machine

(D) None of the above

59. Consistency of the pulp is expressed in the terms :

(A) $C = \frac{F}{W} \times 100$

(B) $C = F \times W \times 100$

(C) $C = \frac{W}{F} \times 100$

(D) $C = \frac{W \times F}{100}$

Where F = Weight of fibrous material in sample

W = Total weight of sample.

60. In Paper industry during 'CAUSTICIZING' :

(A) Green liquor is converted to an active material (NaOH) to produce white liquor.

(B) Green liquor is converted to sodium sulphite to produce black liquor.

(C) Green liquorar is converted to sodium sulphite to produce black liquor.

(D) None of the above

61. What is sugar cane residue called ?

(A) Canes

(B) Kenaf

(C) Bagasse

(D) Grass

62. Which process is used to heat all types of pulping process ?

(A) Mechanical pulping

(B) Neutral-sulfite semi-chemical

(C) Kraft process

(D) Chemical mechanical pulping

63. Which of the following is not a pulping process ?

(A) Chemical

(B) Semi chemical

(C) Mechanical

(D) Thermal

64. The process in which all the ingredients are combined and the reaction is proceed without any further input ?

(A) Batch Fermentation

(B) Fed batch fermentation

(C) Continuous batch fermentation

(D) Open batch fermentation

65. The fermenter which holds the cell mass constant is :

(A) Chemo stats

(B) Plug flow reactors

(C) Turbidostats

(D) Open batch process

66. In fed batch fermentation :

(A) All the ingredients are combined and the reaction proceed without any further input

(B) Some of the ingredients are added during the fermentation

(C) Substrates are added and final products removed continuously

(D) None of the above

67. Composition of Bio-gas is :

(A) $CH_4 + CO_2 + H_2$ gas

(B) $CO_2 + CO + H_2$ gas

(C) $C_2H_2 + CO_2 + N_2$gas

(D) $CO_2 + CO + H_2S$gas

68. Molasses is :

(A) Mother liquor separated form sugar crystals contained in massecuite

(B) Concentrated clear juice from evaporator

(C) Dissolved solids in sugar bearing liquid

(D) None of the above

69. Massecuit is :

(A) Mass of sugar crystals surrounded by sugar containing liquor, obtained in vacuum Pans.

(B) Mass of fine sugar suspended in syrupy liquid boiled in vacuum Pans.

(C) Mother liquor separated from sugar crystals.

(D) Sugar conveyor with shaking motion

70. Seed is :

(A) Mass of sugar crystals surrounded by sugar containing liquor, obtained in vacuum pans.

(B) Mass of fine sugar suspended in syrupy liquid boiled in vacuum pans.

(C) Mother liquor separate from sugar crystals

(D) Sugar conveyor with shaking motion

71. The molecule which acts directly on an enzyme to lower its catalytic rate is :

(A) Promotor

(B) Modulator

(C) Inhibitor

(D) Regulator

72. To make bagasse useful as cattle food which of the following process is used ?

(A) Auto hydrolysis

(B) Fermentation

(C) Reduction

(D) Oxidation

73. The science of fermentation is known as :

(A) Entomology

(B) Zymology

(C) Biology

(D) Phytology

74. Which buffer is used in GS-9 method of colour estimation of sugar solution ?

(A) NaOH

(B) MOPS

(C) TEA / HCL

(D) None of the above

75. Juice sulphitation is the process of :

(A) Purification of cane juice

(B) Crystallization of sugar

(C) Digestion of juice

(D) None of the above

76. In the production of furfural, rare material is digested at a temperature :

(A) 110-120℃

(B) 120-135℃

(C) 145-180℃

(D) 200-220℃

77. Wort is :

(A) Change of yeast suspension

(B) Product of distillation

(C) Solution of molasses in water used for fermentation in to alcohol

(D) Residue of yeast

78. Rectified spirit is :

(A) 88% alcohol

(B) 95% alcohol

(C) 92% alcohol

(D) 90% alcohol

79. Furfural is an____ of furan.

(A) Acid

(B) Aldehyde

(C) Ketone

(D) None of the above

80. Which of the following is not a source of furfural production ?

(A) Bagasse

(B) Rice hull

(C) Oat hull

(D) Potato

81. Calorific value of Air dreed bagasse's is :

(A) Equal to wet bagasse

(B) Higher than wet bagasse

(C) Lower than wet bagasse

(D) None of the above

82. Fermented Wort is known as :

(A) Wash

(B) Spirit

(C) Seed

(D) None of the above

83. Molecular separation on the basis of their sedimentation is called :

(A) Filtration

(B) Concentration

(C) Centrifugation

(D) Extraction

84. The property of paper which measures the value of hydrostatic pressure which is crucial at an particular rate but required to rupture a piece of paper :

(A) Fold endurance

(B) Tear resistance

(C) Burst strength

(D) Abrasion factor

85. The main purpose of washing the pulp is :

(A) To separate sugar from bagasse

(B) To separate minerals from spent liquor

(C) To separate colour from cane juice

(D) To separate fibre from the spent cooking liquor

86. Pulp and papers are produced from :

(A) Plant fibre

(B) Plant sugar

(C) Lignin

(D) All of the above

87. The process of separation of cellulosic fibre from lignin is called as :

(A) Refining

(B) Clarification

(C) Pulping

(D) Bleaching

88. In Neutral Sulphite semi chemical pulping, the chips of fibrous cane materials are treated with :

(A) Cold Sodium Hydroxide

(B) Sodium Sulphite and Sodium Bicarbonate

(C) Sodium Sulphite and Carbon dioxide

(D) Sodium Hydroxide and Sodium Sulphite

89. In grain spirit production process, mash is made by mixing____ to give an initial temperature.

(A) Cold water

(B) Hot water

(C) Normal water

(D) All of the above

90. Which of the following is not component of bagasse ?

(A) Cellulose

(B) Lignin

(C) Pentosans

(D) Lipid

91. Sugarcane is superior to sugar beet because :

(A) Sugarcane is grown under a wide range of climatic condition.

(B) Sugarcane is best synthesizer of solar energy into biomass.

(C) Sugarcane plant carries its own fuel in the shape of fibre to process its juice in to sugar.

(D) All of the above

92. Grain spirit is produced by :

(A) Conversion of starch in to fermentable sugar

(B) Conversion of protein in to fermentable sugar

(C) Conversion of cellulose in to fermentable sugar

(D) Fermentation of fruit juice

93. The series of 'purifying' distillation is known as :

(A) Crystallization

(B) Condensation

(C) Rectification

(D) None of the above

94. Grain spirit is type of spirit drink produced by :

(A) Distillation of fermented mash of cereals

(B) Distilling fermented sugarcane juice, syrup or molasses

(C) Fermentation of fruits

(D) Any fermentable material

95. A set of bodies in which cane juice is concentrated with maximum use of vapours generated by boiling of juice is called as :

(A) Vapour cell

(B) Pre-evaporator

(C) Multiple effect evaporator

(D) Clarifier

96. Molasses conditioning is :

(A) Dilution of Molasses from massecuite to about 70° Bx followed by heating to 70°C

(B) Concentration of molasses from massecuite to about 80°Bx followed by heating at 80°C

(C) Dilution of molasses from massecuite to about 40° Bx followed by heating to 70°C

(D) None of the above

97. Concentrated clear juice obtained from evaporator is called as :

(A) Syrup

(B) Brix

(C) Molasses

(D) Condensate

98. Mother liquor obtained by centrifugal separation of sugar crystals from massecuite with little or no use of water is :

(A) Light molasses

(B) Heavy molasses

(C) Seed

(D) Syrup

99. In the production of grain spirit maize or wheat are cooked in batch or continuous cookers at :

(A) Atmospheric or elevated pressure at moderate temperature

(B) Atmospheric or elevated pressure at high temperature

(C) Atmospheric or elevated pressure at low temperature

(D) None of the above

100. Brix is :

(A) The insoluble material from treated juice retained on screen

(B) Concentrated clean juice

(C) Dissolved solids in sugar bearing liquid

(D) Deposit consisting of inorganic salts

******

**DO NOT OPEN THE QUESTION BOOKLET UNTIL ASKED TO DO SO**

1. Examinee should enter his / her roll number, subject and Question Booklet Series correctly in the O.M.R. sheet, the examinee will be responsible for the error he / she has made.
2. **This Question Booklet contains 100 questions, out of which only 75 Question are to be Answered by the examinee. Every question has 4 options and only one of them is correct. The answer which seems correct to you, darken that option number in your Answer Booklet (O.M.R ANSWER SHEET) completely with black or blue ball point pen. If any examinee will mark more than one answer of a particular question, then the first most option will be considered valid.**
3. Every question has same marks. Every question you attempt correctly, marks will be given according to that.
4. Every answer should be marked only on Answer Booklet **(O.M.R ANSWER SHEET).**Answer marked anywhere else other than the determined place will not be considered valid.
5. Please read all the instructions carefully before attempting anything on Answer Booklet**(O.M.R ANSWER SHEET).**
6. After completion of examination please hand over the Answer Booklet **(O.M.R ANSWER SHEET)** to the Examiner before leaving the examination room.
7. There is no negative marking.

**Note:** On opening the question booklet, first check that all the pages of the question booklet are printed properly in case there is an issue please ask the examiner to change the booklet of same series and get another one.