

Roll. No.

Question Booklet Number

O.M.R. Serial No.

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M.Sc. (SEM.-IV) (NEP) (SUPPLE.) EXAMINATION, 2024-25

CHEMISTRY

(Industrial Chemistry)

Paper Code

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**Question Booklet
Series**

A

Time : 1 : 30 Hours

Max. Marks : 75

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.
4. Four alternative answers are mentioned for each question as - A, B, C & D in the booklet. The candidate has to choose the correct / answer and mark the same in the OMR Answer-Sheet as per the direction :

(Remaining instructions on last page)

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, उसे तुरन्त बदल लें।
4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर- A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छानना है। उत्तर को OMR उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

(शेष निर्देश अन्तिम पृष्ठ पर)

1. The major constituent of cement responsible for strength development is :
 (A) C_3S
 (B) C_2S
 (C) C_3A
 (D) C_4AF
2. Gypsum is added during cement manufacture to :
 (A) Increase setting speed
 (B) Reduce cost
 (C) Control flash setting
 (D) Increase color
3. The oxide that acts as a flux material in cement is:
 (A) CaO
 (B) Al_2O_3
 (C) Fe_2O_3
 (D) SiO_2
4. The compound responsible for long-term strength in cement is :
 (A) C_3A
 (B) C_3S
 (C) C_2S
 (D) C_4AF
5. The final setting time of cement should not exceed :
 (A) 3 hours
 (B) 5 hours
 (C) 10 hours
 (D) 12 hours
6. The raw materials used to produce cement clinker are mainly :
 (A) Lime and gypsum
 (B) Lime and silica
 (C) Lime and clay
 (D) Lime and alumina
7. The heat of hydration in cement is mainly contributed by :
 (A) C_2S
 (B) C_4AF
 (C) C_3S and C_3A
 (D) SiO_2
8. Ordinary glass is produced mainly from :
 (A) Quartz and feldspar
 (B) Silica, soda, and lime
 (C) Lime, gypsum, and alumina
 (D) Boron, silica, and lead oxide
9. Soda-lime glass has the basic composition of:
 (A) $Na_2O-CaO-SiO_2$
 (B) $PbO-SiO_2$
 (C) $Al_2O_3-SiO_2$
 (D) K_2O-SiO_2
10. Transparency of glass is due to its :
 (A) Crystalline structure
 (B) Metallic bonds
 (C) Amorphous structure
 (D) Hexagonal structure

11. The addition of lead oxide in glass mainly improves :
 - (A) Hardness and toughness
 - (B) Refractive index and brilliance
 - (C) Thermal stability
 - (D) Chemical resistance
12. Pyrex glass can withstand :
 - (A) High voltage
 - (B) High temperature changes
 - (C) High compressive loads
 - (D) High impact stress
13. Colored glasses are generally produced by adding :
 - (A) Metallic oxides
 - (B) Sodium carbonate
 - (C) Boron
 - (D) Silica gel
14. Borosilicate glass is made of :
 - (A) $\text{SiO}_2 + \text{B}_2\text{O}_3$
 - (B) $\text{SiO}_2 + \text{Na}_2\text{O}$
 - (C) $\text{SiO}_2 + \text{PbO}$
 - (D) $\text{SiO}_2 + \text{Al}_2\text{O}_3$
15. Ceramics are generally :
 - (A) Ductile and tough
 - (B) Brittle and insulating
 - (C) Highly conductive
 - (D) Soft and malleable
16. The bonding present in ceramics is :
 - (A) Metallic only
 - (B) Ionic and covalent
 - (C) Covalent only
 - (D) Metallic and ionic
17. Whiteware ceramics are usually made from:
 - (A) Kaolin, feldspar, quartz
 - (B) Sand, lime, gypsum
 - (C) Magnesite, silica, alumina
 - (D) Clay, iron oxide, feldspar
18. Refractoriness of ceramics is due to :
 - (A) Na_2O and K_2O
 - (B) CaO and MgO
 - (C) SiO_2 and Al_2O_3
 - (D) Fe_2O_3 and Al_2O_3
19. Advanced ceramics find use in :
 - (A) Construction of walls
 - (B) Bearings and cutting tools
 - (C) Road pavements
 - (D) Cement mortar
20. Ceramic materials generally fail by :
 - (A) Plastic deformation
 - (B) Brittle fracture
 - (C) Ductile fracture
 - (D) Yielding

21. Macroscopic composites are recognized by :
- (A) Visible distinction of phases
 - (B) Atomic arrangement
 - (C) Molecular bonds
 - (D) Crystallographic analysis
22. The term dispersion in composites usually refers to:
- (A) Distribution of reinforcement within the matrix
 - (B) Distribution of heat in the matrix
 - (C) Spread of cracks during fracture
 - (D) Mixing of two polymers
23. Dispersion strengthening is effective when:
- (A) Large particles are used
 - (B) Coarse aggregates are present
 - (C) Fine, uniformly distributed particles are used
 - (D) Fibers are very long
24. In dispersion-strengthened composites, the reinforcing phase is :
- (A) Coarse fibers
 - (B) Fine particles
 - (C) Thin sheets
 - (D) Matrix-rich zones
25. The strength of composites generally depends on:
- (A) Only the matrix properties
 - (B) Only the reinforcement properties
 - (C) Both matrix and reinforcement properties + interface bonding
 - (D) Only on dispersion of reinforcement
26. Particle-reinforced composites usually provide :
- (A) High stiffness and strength
 - (B) Ductility and toughness
 - (C) Improved conductivity
 - (D) Greater plasticity
27. In particle-reinforced composites, particles are generally :
- (A) Ductile
 - (B) Hard and brittle
 - (C) Elastic
 - (D) Magnetic
28. Fiber-reinforced composites are mainly used because of:
- (A) High compressive strength
 - (B) High tensile strength-to-weight ratio
 - (C) High ductility
 - (D) High electrical resistance

29. The critical fiber length in fiberreinforced composites depends on:
- (A) Diameter of fiber and bond strength with matrix
 - (B) Matrix density only
 - (C) Volume fraction only
 - (D) Temperature conditions only
30. Short fiber composites are also called :
- (A) Continuous composites
 - (B) Discontinuous composites
 - (C) Dispersion composites
 - (D) Particulate composites
31. Long, continuous fiber composites show:
- (A) Isotropic properties
 - (B) Anisotropic properties
 - (C) Homogeneous properties
 - (D) No reinforcement effect
32. The interface in composites plays a role in:
- (A) Crack propagation only
 - (B) Load transfer between matrix and reinforcement
 - (C) Increasing density
 - (D) Reducing wettability
33. Fiber-reinforced polymer composites are widely used in:
- (A) Aerospace and automotive industries
 - (B) Thermal insulation only
 - (C) Ordinary household items
 - (D) Food packaging
34. The main limitation of fiber-reinforced composites is:
- (A) High cost and difficulty in processing
 - (B) Low strength
 - (C) Poor stiffness
 - (D) High density
35. Which of the following is a natural composite?
- (A) Concrete
 - (B) Bone
 - (C) Fiberglass
 - (D) Carbon-carbon composite
36. Carbon-fiber reinforced composites are valued for :
- (A) High density
 - (B) High stiffness and low weight
 - (C) Low strength
 - (D) Corrosion susceptibility

37. Metal-matrix composites are preferred when:
- (A) High-temperature strength is required
 - (B) Low strength is acceptable
 - (C) Transparency is desired
 - (D) Electrical insulation is required
38. Ceramic-matrix composites are mainly used to :
- (A) Increase ductility of ceramics
 - (B) Reduce thermal stability
 - (C) Reduce stiffness
 - (D) Increase porosity
39. Polymer-matrix composites are popular because they are :
- (A) Brittle and heavy
 - (B) Lightweight and easy to process
 - (C) Expensive and rare
 - (D) Hard to shape
40. The load-carrying capacity of a composite is primarily improved by :
- (A) Reinforcement phase
 - (B) Matrix only
 - (C) Porosity in the material
 - (D) Crystallinity of matrix
41. The main nitrogenous fertilizer produced from Haber's process is:
- (A) Ammonium nitrate
 - (B) Ammonia
 - (C) Urea
 - (D) Nitric acid
42. Urea contains nitrogen by weight approximately :
- (A) 20%
 - (B) 26%
 - (C) 46%
 - (D) 60%
43. Ammonium nitrate contains nitrogen in :
- (A) Only nitrate form
 - (B) Only ammonium form
 - (C) Both ammonium and nitrate form
 - (D) Organic form
44. The fertilizer that is hygroscopic and prone to caking is:
- (A) Urea
 - (B) Ammonium nitrate
 - (C) Ammonia
 - (D) Potassium nitrate
45. Anhydrous ammonia is stored under :
- (A) Normal atmospheric pressure
 - (B) Refrigerated tanks at low temperature
 - (C) High pressure or low temperature conditions
 - (D) Dry powdered form

46. Phosphoric acid is obtained by reaction of phosphate rock with :
- Sulfuric acid
 - Nitric acid
 - Hydrochloric acid
 - Ammonia
47. Single superphosphate (SSP) contains available P.O. around:
- 8.10%
 - 14.16%
 - 26.28%
 - 45.46%
48. Triple superphosphate (TSP) is manufactured using:
- HCl
 - H₂SO₄
 - HNO₃
 - H₃PO₄
49. Diammonium phosphate (DAP) is represented chemically as :
- (NH₄)₂SO₄
 - (NH₄)₂HPO₄
 - NH₄NO₃
 - (NH₂)₂CO
50. DAP contains nitrogen and P₂O₅ approximately:
- 18% N and 46% P₂O₅
 - 20% N and 40% P₂O₅
 - 46% N and 18% P₂O₅
 - 50% N and 25% P₂O₅
51. The main potassic fertilizer used in India is:
- Potassium nitrate
 - Muriate of potash (KCl)
 - Potassium carbonate
 - Potassium sulfate
52. Muriate of potash chemically is :
- K₂SO₄
 - KNO₃
 - KCl
 - K₂CO₃
53. Potassium nitrate contains potassium and nitrogen in percentage approx.:
- 46% K, 13% N
 - 60% K, 20% N
 - 30% K, 46% N
 - 13% K, 46% N

54. Which fertilizer is called a straight fertilizer?
- (A) DAP
(B) NPK complex
(C) Urea
(D) Superphosphate mixture
55. The fertilizer that is neutral in reaction and leaves no residual acidity or alkalinity is:
- (A) Ammonium sulfate
(B) Urea
(C) Ammonium chloride
(D) Potassium nitrate
56. Which of the following fertilizers is explosive in nature and needs careful handling?
- (A) Urea
(B) Ammonium nitrate
(C) SSP
(D) TSP
57. Excessive use of urea may lead to :
- (A) Soil salinity
(B) Soil acidity
(C) Soil alkalinity
(D) Soil erosion
58. Rock phosphate has to be converted into soluble form because :
- (A) It contains free acid
(B) It is insoluble in water
(C) It is highly alkaline
(D) It evaporates easily
59. The fertilizer with the highest nitrogen content is :
- (A) Urea
(B) Ammonium sulfate
(C) Ammonium nitrate
(D) Calcium ammonium nitrate
60. Balanced application of N, P, K is important to prevent :
- (A) Soil sterilization
(B) Soil nutrient imbalance and crop deficiency
(C) Waterlogging
(D) Plant diseases
61. Petroleum is primarily composed of :
- (A) Carbohydrates
(B) Hydrocarbons
(C) Proteins
(D) Alcohols
62. Natural gas is mainly composed of :
- (A) Ethane
(B) Methane
(C) Propane
(D) Butane

63. The process of breaking down heavier hydrocarbons into lighter ones is called:
- (A) Polymerization
 - (B) Hydrogenation
 - (C) Cracking
 - (D) Distillation
64. Thermal cracking is carried out in the temperature range of:
- (A) 100–200 °C
 - (B) 200–400 °C
 - (C) 450–750 °C
 - (D) Above 1000 °C
65. The process of separating different fractions of petroleum is called :
- (A) Hydrogenation
 - (B) Refining
 - (C) Distillation
 - (D) Polymerization
66. The octane rating of petrol indicates :
- (A) Tendency to corrode
 - (B) Resistance to knocking
 - (C) Calorific value
 - (D) Viscosity
67. Higher octane number of a fuel indicates :
- (A) Lower ignition quality
 - (B) Better anti-knocking property
 - (C) Poor burning efficiency
 - (D) Lower flash point
68. Cetane number is used to express quality of:
- (A) Petrol
 - (B) Diesel
 - (C) Kerosene
 - (D) LPG
69. Higher cetane number in diesel means :
- (A) Delayed ignition
 - (B) Lower ignition quality
 - (C) Better ignition quality and smooth running
 - (D) Higher calorific value
70. The flash point of a liquid fuel is defined as:
- (A) Lowest temperature at which it ignites spontaneously
 - (B) Lowest temperature at which it gives enough vapors to ignite momentarily
 - (C) Highest temperature of ignition
 - (D) Point of complete burning

71. Fire point of a fuel is :
- (A) Higher than flash point
 - (B) Lower than flash point
 - (C) Same as flash point
 - (D) Unrelated to flash point
72. Lubricating oils are obtained from which fraction of crude oil?
- (A) Gasoline
 - (B) Middle distillates
 - (C) Heavy distillates/residues
 - (D) Naphtha
73. Additives are mixed with lubricating oils to improve :
- (A) Calorific value
 - (B) Performance and durability
 - (C) Density
 - (D) Viscosity only
74. Naphtha crackers are mainly used for production of :
- (A) Gasoline
 - (B) Olefins like ethylene, propylene, butadiene
 - (C) Lubricating oil
 - (D) Paraffin wax
75. The major product obtained from steam cracking of naphtha is :
- (A) Methane
 - (B) Ethylene
 - (C) Acetylene
 - (D) Butane
76. Synthetic oils are mainly prepared from:
- (A) Natural gas or coal through chemical synthesis
 - (B) Simple distillation of petroleum
 - (C) Fermentation of alcohols
 - (D) Mechanical refining of crude
77. Synthetic lubricants compared to mineral oils generally show :
- (A) Poor oxidation resistance
 - (B) Better viscosity stability and thermal resistance
 - (C) Lower flash point
 - (D) Higher corrosiveness
78. Blended oils are produced by :
- (A) Mixing lubricating oils with vegetable oils
 - (B) Mixing different mineral oils and additives to achieve desired properties
 - (C) Mixing petrol and diesel
 - (D) Blending with water for stability

79. The test used for determining flash and fire points of petroleum products is :
- (A) Abel-Pensky or Pensky-Martens apparatus
 - (B) Redwood viscometer
 - (C) Saybolt apparatus
 - (D) Bomb calorimeter
80. Petroleum refining in India is mostly carried out by :
- (A) Destructive distillation
 - (B) Fractional distillation and secondary conversion processes
 - (C) Chemical leaching
 - (D) Simple condensation
81. Paints are generally composed of:
- (A) Pigment + Vehicle + Additives
 - (B) Only pigments
 - (C) Only oils and solvents
 - (D) Pigment + Water only
82. The main function of paint is to:
- (A) Improve mechanical strength
 - (B) Provide protection and decorative finish
 - (C) Reduce cost of construction
 - (D) Act as cementing material
83. The vehicle in paint is:
- (A) Pigment carrier that forms film on drying
 - (B) A coloring substance
 - (C) A volatile solvent
 - (D) An additive for shine
84. Solvents in paints are added to:
- (A) Improve color
 - (B) Reduce viscosity and assist application
 - (C) Improve durability
 - (D) Reduce cost only
85. Thinners are generally :
- (A) Non-volatile liquids
 - (B) Volatile organic liquids used to dilute paints
 - (C) Solid fillers
 - (D) Resins
86. Pigments are added in paint formulation to:
- (A) Increase viscosity only
 - (B) Provide color and opacity
 - (C) Increase fluidity
 - (D) Act as preservative

87. Fillers (extenders) in paints are used to :
- (A) Increase gloss
 - (B) Reduce cost and control consistency
 - (C) Provide drying action
 - (D) Act as solvent
88. Dyes differ from pigments because dyes are:
- (A) Insoluble in medium
 - (B) Soluble in medium and impart transparent color
 - (C) Used only for white paints
 - (D) Only inorganic
89. Resins in paints function as :
- (A) Binders providing adhesion and hardness
 - (B) Solvents to reduce viscosity
 - (C) Driers to accelerate oxidation
 - (D) Pigments to impart color
90. Driers in paints mainly consist of :
- (A) Metallic soaps (cobalt, manganese, lead salts)
 - (B) Organic solvents
 - (C) Plasticizers
 - (D) Extenders
91. Insecticides in paints are added to:
- (A) Prevent corrosion
 - (B) Prevent fungal and insect attack on surfaces
 - (C) Improve shine
 - (D) Reduce drying time
92. Additives in paints are used for :
- (A) Adjusting gloss, flow, stability, and durability
 - (B) Increasing density only
 - (C) Decreasing adhesion
 - (D) Neutralizing color
93. Enamel paints are characterized by :
- (A) Matt finish only
 - (B) Smooth, glossy finish and durability
 - (C) Water solubility
 - (D) Quick chalking
94. Emulsion paints are :
- (A) Solvent-based
 - (B) Water-based with polymer binders
 - (C) Powder-based
 - (D) Oil-based only

95. Water-based paints are advantageous because:
- (A) Require strong thinners
 - (B) Emit less odor and are eco-friendly
 - (C) Are highly flammable
 - (D) Have high VOC emissions
96. Paints are classified based on :
- (A) Composition and application
 - (B) Color only
 - (C) Solvent only
 - (D) Viscosity only
97. The manufacture of paints generally involves:
- (A) Grinding pigments, mixing with vehicle, adding additives
 - (B) Simple distillation
 - (C) Evaporation and condensation
 - (D) Electrolysis of raw materials
98. Latex paints are an example of:
- (A) Enamel paints
 - (B) Emulsion paints
 - (C) Oil-based paints
 - (D) Powder paints
99. A desirable property of a good paint is :
- (A) High porosity
 - (B) Quick drying, durability, good coverage
 - (C) Low adhesion
 - (D) Easy solubility in water always
100. The ingredient in paints responsible for preventing settling of pigments is:
- (A) Solvent
 - (B) Filler
 - (C) Additive (suspending agent)
 - (D) Dye

ROUGH WORK

Example :

Question :

Q.1 (A) ● (C) (D)

Q.2 (A) (B) ● (D)

Q.3 (A) ● (C) (D)

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination, candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager & cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)

प्रश्न 2 (A) (B) ● (D)

प्रश्न 3 (A) ● (C) (D)

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैल्कुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण: प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरिज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।