

Roll. No.

Question Booklet Number

O.M.R. Serial No.

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

CHEMISTRY

(Polymers)

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. Neoprene is a polymer of a following monomers :
 - (A) Chloroprene
 - (B) Isoprene
 - (C) Isobutane
 - (D) Isopentane
2. Zeigler-Natta polymerising catalyst is:
 - (A) $(C_2H_5)_4Pb$
 - (B) $(C_2H_5)_2Hg$
 - (C) $TiCl_4-Al(C_2H_5)_3$
 - (D) $Fe(CO)_5$
3. What is an important characteristic of all condensation polymers?
 - (A) Condensation is observed on the walls of the reaction vessel
 - (B) A small molecule is lost as bonds form between the polymerizing molecules
 - (C) The polymeric product is an ester
 - (D) At least one of the polymerizing molecules contains a C=C double bond
4. What is used as initiator in a free radical polymerization ?
 - (A) Butyl lithium
 - (B) Trifluoroacetic acid
 - (C) Methyl alcohol
 - (D) Pyridine
5. Ethylene glycol reacts with dimethyl terephthalate to form :
 - (A) Nylon - 6,6
 - (B) Teflon
 - (C) Dacron
 - (D) Orlon
6. Polymers with cross linked chains are known as :
 - (A) Plasticizers
 - (B) Thermoplastic polymers
 - (C) Thermosetting polymers
 - (D) Oriented polymers
7. Which of the following is a natural polymer?
 - (A) Starch
 - (B) PVC
 - (C) Nylon
 - (D) Bakelite
8. Which of the following is a homopolymer?
 - (A) Nylon-6
 - (B) Nylon-6,6
 - (C) Saran
 - (D) Polyurethane
9. Which of the following is completely fluorinated polymers.
 - (A) PVC
 - (B) Terylene
 - (C) Nylon -6,6
 - (D) Teflon

10. Thermoplastics are :
 - (A) Linear polymers
 - (B) Highly cross-linked
 - (C) Both (A) and (B)
 - (D) Crystalline
11. Bakelite is obtained from :
 - (A) Phenol and formaldehyde
 - (B) Adipic acid and hexamethylene diamine
 - (C) Dimethyl terephthalate and ethylene glycol
 - (D) Neoprene
12. Natural rubber is a polymer of :
 - (A) Propene
 - (B) Isoprene
 - (C) Formaldehyde
 - (D) Phenol
13. A copolymer is formed when :
 - (A) Two homopolymers are allowed to react with each other
 - (B) Two or more different monomers are allowed to react
 - (C) Three identical homopolymers are allowed to react with each other
 - (D) Two identical monomers are allowed to react
14. Chloroprene is used to synthesise :
 - (A) Neoprene
 - (B) Dacron
 - (C) Nylon-6
 - (D) Orlon
15. Orlon is prepared by the polymerisation of :
 - (A) Vinyl cyanide
 - (B) Allyl alcohol
 - (C) Vinyl chloride
 - (D) Allyl chloride
16. Adipic acid reacts with hexamethylene diamine to form :
 - (A) Nylon-6,6
 - (B) Teflon
 - (C) Dacron
 - (D) Orlon
17. Low molecular weight polymers are :
 - (A) Oligomers
 - (B) Copolymers
 - (C) Monomers
 - (D) Homopolymers
18. The temperature at which transition from a glassy solid to a molten liquid occurs is called :
 - (A) T_g
 - (B) T_m
 - (C) T_f
 - (D) None of the above

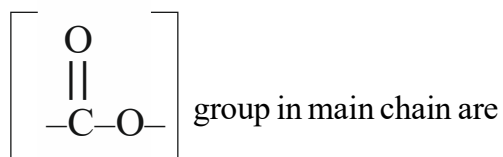
19. Which of these is/are used as inhibitor ?
- Hydraquinone
 - Nitrobenzene
 - Benothiazine
 - All of the above
20. In emulsion polymerisation, the monomer is dispersed in the aqueous phase as a uniform emulsion is stabilised by :
- Surfactants
 - Buffer solution
 - Protective colloids
 - All of the above
21. Heating of rubber with sulphur is called :
- Galvanisation
 - Sulphonation
 - Vulcanisation
 - None of the above
22. Which of the following processing technique is used to produce continuous films and sheets?
- Calendaring
 - Blow moulding
 - Coating
 - Foaming
23. Differential scanning calorimetry technique comes under the category of :
- Morphological Analysis
 - Geological Analysis
 - Thermal Analysis
 - Spectral Analysis
24. Viscosity of polymer solution :
- Decreases with increase in molecular weight
 - Decreases with increase in temperature
 - Increases with increase in temperature
 - Does not vary with temperature rise
25. The study of fractured surfaces of polymeric material is done by using :
- X-ray diffraction
 - Scanning electron microscopy
 - Atomic force microscopy
 - None of these
26. Which of the following is an inorganic polymer ?
- Bakelite
 - Silicones
 - Teflon
 - Orlon

27. Hydrogels are widely used in bio-medical applications due to their ability to :
- (A) Conduct electricity
 - (B) Absorb and retain water
 - (C) Increase the density of medical implants
 - (D) Prevent drug absorption
28. Which of the following is not a mechanical test for polymers?
- (A) Tensile test
 - (B) Impact test
 - (C) Hardness test
 - (D) NMR test
29. What is the primary goal of fibre spinning in polymer processing?
- (A) To create their, continuous polymer fibre
 - (B) To improve polymer solubility
 - (C) To make polymer powders
 - (D) To increase the density of polymer
30. Which of the following polymeric substance give very broad and diffused x-ray diffraction patterns?
- (A) Crystalline substance
 - (B) Glassy substance
 - (C) Rubbery substance
 - (D) Amorphous substance
31. Process by which a liquid pre-polymer is converted into solid object of a desired shape is called :
- (A) Calendering
 - (B) Compounding
 - (C) Die casting
 - (D) None of the above
32. In emulsion polymerisation the emulsifier is :
- (A) Sodium dodecyl sulphate
 - (B) Cetyl trimethyl amino bromide
 - (C) Sodium stearate
 - (D) All of the above
33. Which is a natural biopolymer formed as a result of polymerisation of amino acids?
- (A) Starch
 - (B) Cellulose
 - (C) Protein
 - (D) Nucleic acid
34. Weakest interparticle force of attraction is present in :
- (A) Thermosetting polymer
 - (B) Fibres
 - (C) Thermoplastic polymer
 - (D) Elastomers

35. Polydispersity index is defined as ____ where M_w and M_n are the wt average and no average molecular masses respectively.
- $M_w \times M_n$
 - M_w / M_n
 - M_n / M_w
 - $M_w - M_n$
36. Which catalyst is commonly used in co-ordination chain polymerisation?
- Nickel
 - Ziegler-Natta catalyst
 - Zeolite
 - Platinum
37. The impact resistance of a polymer is commonly measured using the :
- Izod Test
 - Charpy test
 - Both (A) and (B)
 - None of the above
38. Most of the hollow objects such as bottles and containers are produced by:
- Comprassion moulding
 - Blow moulding
 - Injection moulding
 - Transfer moulding
39. What is the primary purpose of adding stabilizers in polyvinyl chloride?
- To reduce density
 - To improve heat and light stability
 - To enhance solubility
 - To increase flexibility
40. Technique of fabrication of polymer into useful article of shape is called :
- Polymerisation
 - Osmometry
 - Polymer processing
 - Calendering
41. Which of the following is not an application of conducting polymers?
- Rechargable batteries
 - Analytical sensors
 - Electronic
 - Adhesives
42. SARAN is a :
- Copolymer of phenol and HCHO
 - Copolymer of vinylidene chloride (85%) and vinyl chloride (15%)
 - Copolymer of vinyl chloride (85%) and vinylidene chloride (15%)
 - Copolyer of phenol and adipic acid

43. Perspex is made up of :
- (A) Polypropylene
 - (B) Polyester
 - (C) Polymethyl-methacrylate
 - (D) Polystyrene
44. Which polymer additives are added to improve flexibility?
- (A) Lubricant
 - (B) Plasticizer
 - (C) Stabilizer
 - (D) Reinforcement
45. Which of the following polymers is known for its high flame resistance?
- (A) Polyethylene
 - (B) Polypropylene
 - (C) Polyvinyl chloride
 - (D) Polytetrafluoroethylene
46. Which is an addition polymer?
- (A) Nylon
 - (B) DNA
 - (C) Polythene
 - (D) Bakelite
47. Which of the following consideration distinguish die casting from the permanent mould casting?
- (A) Moulding Material
 - (B) Way of pouring molten metal
 - (C) Casting on mould
 - (D) Size of coating
48. Methods used to determine molecular weight of polymers are :
- (A) End group analysis
 - (B) High Scattering
 - (C) Viscometry
 - (D) All of the above
49. The no of repeating units in a polymer is known as :
- (A) Monomer
 - (B) Molecules
 - (C) Degree of polymerisation
 - (D) Carbon chain
50. Polymer used to make contact lenses for eye :
- (A) Poly-methyl methacrylate
 - (B) Poly-amino acid
 - (C) Poly carbonate
 - (D) Polyvinyl-chloride
51. Polymer unit of cotton is :
- (A) Rayon
 - (B) Glucose
 - (C) Cellulose
 - (D) Fructose

52. Polymer containing recurring



called :

- (A) Polyamide
- (B) Polythene
- (C) Polyester
- (D) None of the above

53. Which one is a thermosetting plastic?

- (A) Polythene
- (B) PVC
- (C) PET
- (D) Melamine

54. Which of the following is a free radical initiator?

- (A) Azo compounds
- (B) Peroxides
- (C) Both (A) and (B)
- (D) None of the above

55. PVC is used in :

- (A) Water pipes
- (B) Fire retarding substance
- (C) Leather Industry
- (D) All of these

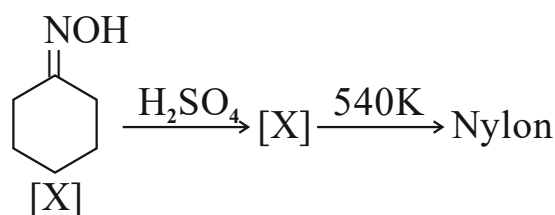
56. To obtain alternating copolymer which of the following condition of reactivities is necessary?

- (A) $r_1 = r_2 = 1$
- (B) $r_1 = r_2 = 0$
- (C) $r_1 / r_2 = 1$
- (D) $r_1 - r_2 = 1$

57. In which of the following methods, the polymer obtained is of high purity?

- (A) Suspension method
- (B) Solution method
- (C) Bulk method
- (D) Emulsion method

58. In the reaction sequence



is :

- (A) Cyclohexanone
- (B) Caprolactone
- (C) $\text{HO}(\text{CH}_2)_6\text{NH}_2^-$
- (D) Hexamethylene diisocyanate

59. Which one of the following pairs is not correctly matched ?
- (A) Light scattering method – weight average molecular mass
 - (B) Osmotic pressure method – Weight average molecular mass
 - (C) Gel permeation chromatography – Number average molecular mass
 - (D) Sedimentation equilibrium method – Weight average molecular mass
60. Ziegler-Natta polymerization is an example of :
- (A) Condensation polymerisation
 - (B) Addition polymerisation
 - (C) Condensation as well as addition polymerization
 - (D) Free radical addition polymerisation
61. The neighbouring polymeric chains in thermoplaste are held together by :
- (A) Hydrogen bond
 - (B) Covalent bond
 - (C) Vander Waal's force
 - (D) Electrovalent bonds
62. The advantage of using conducting polymers in place of metal is their :
- (A) Light weight
 - (B) Thermal conductivity
 - (C) Solubility
 - (D) Cost
63. Polymers used for fabrication of heat pumps :
- (A) Teflon
 - (B) Decron
 - (C) Polyurethane
 - (D) All of the above
64. Which of the following is not true for intrinsically conducting polymers?
- (A) Poor mechanical strength
 - (B) Low conductivities
 - (C) Good storage stability
 - (D) Improcessability
65. The elasticity of elastomeric material is because of :
- (A) Its weak intermolecular forces between polymeric chains
 - (B) Its strong intermolecular forces between polymeric chain
 - (C) High molecular weight
 - (D) None of these
66. Which of the following is a chain growth polymer?
- (A) Nucleic acid
 - (B) Protein
 - (C) Starch
 - (D) Polystyrene
67. The abrasion resistance of the plastic is :
- (A) Low
 - (B) High
 - (C) Very high
 - (D) Very low

68. Polymers which can be calendered into sheets are :
- PVC
 - Polyethylene
 - Acrylonitrile butadiene copolymer
 - All of the above
69. Which of the following polymerization is also called as pearl polymerization?
- Solution polymerization
 - Bulk polymerization
 - Suspension polymerization
 - Emulsion polymerization
70. Which of the following is used for making rechargeable batteries?
- Polypyrrole
 - Polyester
 - Polyaniline
 - Polyacrylonitrile
71. Which of the following polymer fiber spinning processes is used for heat sensitive polymers?
- Melt spinning
 - Wet spinning
 - Compression molding
 - Injection molding
72. What is the main purpose of reinforcing polymers?
- To reduce molecular weight
 - To increase mechanical strength and stiffness
 - To improve polymer solubility
 - To decrease processing temperature
73. Which polymer is used for making lightweight foams?
- Polyvinyl chloride
 - Polystyrene
 - Nylon-6
 - Polycarbonate
74. The process of heat softening, moulding and cooling to rigidity can be repeated for which plastic?
- Thermoplastics
 - Thermosetting plastics
 - Both (A) and (B)
 - Neither (A) nor (B)
75. The Mark-Houwink equation is the relation between :
- Viscosity and viscosity average molecular weight
 - Intrinsic viscosity and viscosity average molecular weight
 - Intrinsic molecular weight and intrinsic viscosity
 - None of these

76. Which of the following is not a co-polymer?
- (A) Block polymers
(B) Cross-linking polymers
(C) Random polymers
(D) Alternate polymers
77. In certain copolymers a more ordered sequence of repeating unit is seen. These copolymer are termed as :
- (A) Alternating copolymers
(B) Block copolymer
(C) Graft copolymer
(D) All of the above
78. The relation which may realistically reflect the thermal behaviour is :
- (A) $\frac{1}{2} < \frac{T_g}{T_m} < \frac{2}{3}$
(B) $\frac{1}{2} < \frac{T_m}{T_g} < \frac{2}{3}$
(C) $\frac{2}{3} < \frac{T_g}{T_m} < \frac{1}{2}$
(D) $\frac{2}{3} < \frac{T_m}{T_g} < \frac{1}{2}$
79. Which of the following initiators is used in anionic polymerization?
- (A) Metal amide
(B) Alkali metal
(C) Alkyl metal alkyls
(D) All of these
80. Equal number of molecules with $M_1 = 10,000$ and $M_2 = 1,00,000$ are mixed. Calculate M_N :
- (A) 55,000
(B) 45,000
(C) 50,000
(D) 52,000
81. Correct relation between degree of polymerization (D_p) and Molecular weight (M) of the polymer is :
- (A) $D_p = M \cdot m$
(B) $M = D_p \cdot m$
(C) $m = D_p \cdot M$
(D) $M = D_p / m$
82. Polymethyl methacrylate is commonly known as :
- (A) Acrylic plastic
(B) Polyamide plastic
(C) Artificial skin
(D) Spherulites
83. What is the general structure of silicon polymers?
- (A) Linear chain
(B) Cross-linked network
(C) Branched chain
(D) Random chain

84. Which of the following statements is correct for smart polymers?
- They are stimuli - responsive polymers
 - They are sensitive to temperature, humidity, pH
 - Under the influence of light, electric and magnetic field they react in various ways
 - All of these
85. Which property makes silicon polymers different from organic polymers?
- High flexibility
 - Low thermal stability
 - Resist to high temperature
 - High conductivity
86. Double or triple bond is present in which type of polymerization ?
- Addition
 - Free radical
 - Condensation
 - All of these
87. The backbone chain in silicon rubber is :
- Si-O bond
 - C - C bond
 - C - O - C bond
 - C - Si - C bond
88. Which of the following technique is used to measure the number of conjugation within the molecule?
- UV - Visible Spectroscopy
 - Differential scanning calorimetry
 - Fourier Transform Infrared Spectroscopy
 - Thermogravimetric analysis
89. Which of the following is not used in making of unbreakable cups ?
- Novolac
 - Polystyrene
 - Bakelite
 - Urea formaldehyde
90. Which of the following methods is used to determine the molecular weight of the polymers ?
- Ultracentrifugation
 - Viscometry
 - Osmometry
 - All of these
91. Which of the following statements is not true for silicon rubber?
- They are dimethyl silicon linear polymers
 - They remain flexible even at very low temperature
 - They are highly water soluble
 - Mostly used as additives in manufacturing of rubbers

92. Which of the following polymer is known for its high resistance towards chemicals high strength , toughness making for pipes and fitting ?
 (A) PET (B) PE
 (C) PVC (D) PP
93. Latex of the rubber tree consisting of isoprene unit joined in :
 (A) Trans-1,2 fusion
 (B) Cis-1,2 fusion
 (C) Trans-1,4 fusion
 (D) Cis-1, 4 fusion
94. Free radicals polymerisation is initiated :
 (A) Thermally
 (B) Photochemically
 (C) Chemically
 (D) All of the above
95. In the automotive industry, polymers are mainly used to :
 (A) Replace metallic components to reduce weight
 (B) Increase vehicle emissions
 (C) Reduce fuel efficiency
 (D) Decrease the recyclability of vehicles
96. Which of the following is not a common application of polymers?
 (A) Packaging materials
 (B) Biomedical implants
 (C) Textile fibres
 (D) Structural steel components
97. In TGA, the mass of a polymer sample is monitored as a function of :
 (A) Temperatue
 (B) Humidity
 (C) Viscosity
 (D) Pressure
98. Which of the following is suitable for identifying functional groups in a polymers?
 (A) Infrared spectroscopy
 (B) X-ray diffraction
 (C) Differential scanning calorimetry
 (D) Osmometry
99. Which of the following is a homopolymers?
 (A) Teflon
 (B) Terylene
 (C) Nylon
 (D) Novoloc
100. How many types of average molecular weights of polymers are there?
 (A) One (B) Two
 (C) Three (D) Four

Rough Work / रफ कार्य

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।