Roll No. .....

Question Booklet Number

O. M. R. Serial No.

M. Sc. (Fourth Semester)

(NEP) EXAMINATION, 2025-26

CHEMISTRY

(Polymers)

Paper Code							
B	0	2	1	0	0	5	T

Questions Booklet Series
B

Time : 1:30 Hours] [*Maximum 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.

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, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page) **(शेष निर्देश अन्तिम पृष्ठ पर)**

1. Spherulite in crystalline polymer are :

(A) Amorphous particles

(B) Linear crystals

(C) Molecular clusters

(D) Radially growing crystalline aggregates

2. Polymer used in drug delivery system is :

(A) Polyvinyl chloride

(B) Nylon 6

(C) Nylon 66

(D) Polylactic acid

3. The most important property of polymers used in contact lenses is :

(A) Oxygen permeability

(B) High melting point

(C) Electrical conductivity

(D) No oxygen transmission

4. Dental filling resins are mainly based on :

(A) Polyethylene

(B) Polystyrene

(C) Polypropylene

(D) Dimethyl acrylate polymers

5. Free radical polymerization is initiated :

(A) Thermally

(B) Photochemically

(C) Chemically

(D) All of the above

6. Conducting polymers are used in :

(A) Rechargeable batteries

(B) Organic solar cells

(C) Coatings on metals to prevent rusting

(D) All of the above

7. The most abundant biopolymer on earth is :

(A) Protein

(B) DNA

(C) Cellulose

(D) Collagen

8. Broad molecular weight distribution generally results in :

(A) Sharp melting point

(B) Poor processability

(C) Wider softening range

(D) Lower impact resistance

9. Curing of epoxy resin takes place by reaction with hardness of :

(A) Amines

(B) Alcohols

(C) Ketones

(D) Alkanes

10. Silicone polymer contains :

(A) Si – C bond

(B) Si – N bond

(C) Si – O bond

(D) Si – S bond

11. Which technique is primarily used to determine full molecular weight distribution ?

(A) Gel Permeation Chromatography (GPC)

(B) IR spectroscopy

(C) NMR spectroscopy

(D) UV spectroscopy

12. Which of the following is not a suitable initiator for free radical addition polymerisation reaction ?

(A) Acetyl peroxide

(B) Benzoyl peroxide

(C) tert-butyl peroxide

(D) Benzoquinone

13. In cardiovascular applications, primary polymer used for vascular graft to attach device to aorta :

(A) Polyethylene

(B) Polyurethane

(C) Polyester (Dacron)

(D) Polylactic acid

14. Polymer used in artificial skin is :

(A) Polyacrylonitrile

(B) Silicone Rubber

(C) Polyethylene

(D) None of the above

15. ..... is a biopolymer used as an anticoagulant coating in medical devices.

(A) Glycogen

(B) Cellulose

(C) Heparin

(D) Chitin

16. Monomer used for denture based resin is :

(A) Vinyl chloride

(B) Ethylene

(C) Styrene

(D) Methyl methacrylate

17. In emulsion polymerisation, polymerisation primarily occurs in :

(A) Monomer droplets

(B) Micelles

(C) Continuous aqueous phase

(D) Reactor wall

18. Phenolic resins are :

(A) Thermoplastic polymers

(B) Thermosetting polymers

(C) Elastomers

(D) Biopolymers

19. Polymerisation of dental acrylic resins generally occurs by :

(A) Free radical polymerization

(B) Step growth polymerization

(C) Condensation polymerization

(D) Coordination polymerisation

20. Artificial heart mainly replaces the function of :

(A) Blood purification

(B) Oxygen transport

(C) Blood pumping

(D) None of the above

21. Addition of plasticiser to polymer :

(A) Increases its transition temperature

(B) Decreases its transition temperature

(C) Does not change its transition temperature

(D) Convents polymer into crystalline form

22. Fibre having excellent elasticity and wrinkle resistance :

(A) Cotton

(B) Rayon

(C) Glass fibre

(D) Polyester

23. Bulk polymerisation is an example of :

(A) Heterogeneous polymerization

(B) Homogeneous polymerization

(C) Emulsion polymerization

(D) Suspension polymerization

24. Cross linking in polymers :

(A) Decreases T_g

(B) Increases T_g

(C) No effect on T_g

(D) Eliminates T_g

25. Process of converting polymer melt into fibres through small holes is called :

(A) Calendering

(B) Compounding

(C) Spinning

(D) Polymerization

26. Polymer becomes conductive after doping with iodine :

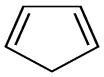
(A) Teflon

(B) Nylon

(C) Polycarbonete

(D) Polyacetylene

27. Metathesis polymerisation is given by :

(A) 

(B) $CH_2 = CH - CH = CH_2$

(C) $CH_2 = CH_2$

(D) $CH_2 = CHCl$

28. Which one of the following gives vinyl polymerisation ?

(A) $CH_2 = CHCl$

(B) $CH_2 = CH - O - COCH_3$

(C) $C_6H_5 - CH = CH_2$

(D) All of the above

29. The factor controlling the degradation rate of bio-degradable biomedical polymer is :

(A) Colour of polymer

(B) Polymer transparency

(C) Electrical conductivity

(D) Degree of crystallinity

30. ..... is not a conducting polymer.

(A) Polyethylene

(B) Polyaniline

(C) Polythiophene

(D) Polypyrrole

31. If an a-functional monomer reacts with a *b*-functional monomer, the functionality of the product molecule :

(A) $a + b$

(B) $a + b + 2$

(C) $a + b - 2$

(D) $a + b/2$

32. End group analysis directly gives :

(A) M_w

(B) M_n

(C) M_z

(D) PDI

33. Polymer used in rotational moulding is :

(A) Nylon

(B) Polyethylene

(C) Epoxy resin

(D) Phenolic resin

34. Spinning technique used for thermoplastic polymers like nylon and polyester is :

(A) Dry spinning

(B) Melt spinning

(C) Wet spinning

(D) Solution spinning

35. For a polymer sample, M_n = 60,000 g/mol and M_w = 90,000 g/mol. If the repeating unit molecular weight is 120 g/mol, degree of polymerization is :

(A) 500

(B) 600

(C) 750

(D) 900

36. The process by which the solvent in solution film casting is removed is :

(A) Condensation

(B) Compression

(C) Crystallisation

(D) Evaporation

37. Polyvinyl chloride is a/an :

(A) Elastomer

(B) Fibre

(C) Thermoplastic

(D) Thermosetting plastic

38. The Mark – Houwink equation is $[\eta] = kM^{\alpha}$, where M corresponds to :

(A) M_n

(B) M_w

(C) Mv

(D) M_z

39. Living polymer is an example of :

(A) Catronic polymer

(B) Free radical

(C) Anionic polymer

(D) Condensation polymer

40. Which of the following is not a classification of polymers ?

(A) Based on source

(B) Based on structure

(C) Based on density

(D) Based on polymerization

41. In living polymerization, the PDI ideally approaches :

(A) 0

(B) 1

(C) 2

(D) 3

42. Branching phenomenon in propagation step cannot be possible in :

(A) Free radical polymerisation

(B) Anionic polymerisation

(C) Cationic polymerisation

(D) All of the above

43. A well known intrinsically conducting polymer is :

(A) Polyaniline

(B) Polystyrene

(C) Polyethylene

(D) PVC

44. Which of the following statements is true ?

(A) Radical polymerization always gives narrow molecular weight distribution

(B) Anionic polymerization always give PDI = 2

(C) Co-ordination polymerization can control tacticity

(D) Cationic polymerization is insensitive to impurities

45. Polymer used as dialysis membrane is :

(A) Cellulose acetate

(B) Cellulose nitrate

(C) Polysulfone

(D) All of the above

46. Hardness of polymers refers to their resistance to :

(A) Stretching

(B) Compression

(C) Electrical conduction

(D) Scratching

47. Electrical conductivity in conducting polymers is due to :

(A) Van der Waals forces

(B) Hydrogen bonding

(C) Delocalised π electrons

(D) Ionic bonding

48. Instrument used to measure the hardness of polymers :

(A) Tensile tester

(B) Durometer

(C) Viscometer

(D) Spectrophotometer

49. Polymers used in artificial heart valves :

(A) Polyurethanes

(B) Polytetra fluoroethylene

(C) Silicone rubber

(D) All of the above

50. ABS is best classified as :

(A) Homopolymer

(B) Alternating co-polymer

(C) Graft co-polymer

(D) Linear co-polymer

51. Which of these is a copolymer ?

(A) PVC

(B) Bakelite

(C) Polythene

(D) Polyacrylonitrile

52. Which is not an elastomer ?

(A) Buna-S

(B) Buna-N

(C) PVC

(D) Neoprene

53. Polymerisation of vinyl cyanide with peroxide catalysts forms :

(A) PVC

(B) PET

(C) HDP

(D) PAN

54. Ion-exchange resins are example of :

(A) Structural polymers

(B) Functional polymers

(C) Elastomers

(D) Thermoplastic polymers

55. Which polymer is naturally more flame resistant ?

(A) Polypropylene

(B) Polystyrene

(C) Polyethylene

(D) Polyvinyl chloride

56. Reinforcing materials are added to polymers to :

(A) Reduce molecular weight

(B) Increase solubility

(C) Improve mechanical strength

(D) Increase polymerisation rate

57. Catisonic polymerisation typically requires :

(A) Strong nucleopliles

(B) Lewis acids

(C) Peroxides

(D) Oxygen

58. Polymer used for blood-contacting diaphragms and flexible components in total artificial heart is :

(A) Polystyrene

(B) Polyurethane

(C) Polyvinyl chloride

(D) Polycaprolactone

59. Which order kinetics does the rate of polymer formation in free radical polymerisation follow corresponding to monomer concentration ?

(A) 0

(B) 1

(C) 2

(D) 3

60. Based on intermolecular forces, polymers having strong hydrogen bonding and high tensile strength are classified as :

(A) Thermoset

(B) Thermoplastics

(C) Elastomers

(D) Fibres

61. ..... is an example of branched polymers.

(A) Nylon 6, 6

(B) PVC

(C) LDPE

(D) Kevlar

62. Process of introducing cross link in Rubber is :

(A) Polymerisation

(B) Esterification

(C) Plasticization

(D) Vulcanisation

63. As degree of polymerisation increases, the mechanical strength of polymer generally :

(A) Decreases

(B) Increases

(C) Remains constant

(D) Becomes zero

64. Functional polymers are useful in biomedical applications due to which property ?

(A) High density

(B) Low molecular weight

(C) Presence of reactive functional groups

(D) High crystallinity

65. Which polymer shows highest chemical resistance to weathering and oxidation ?

(A) Polyamide

(B) Phenolic resin

(C) Polystyrene

(D) Silicone polymer

66. Anionic polymerisation is favoured by monomers containing :

(A) Electron-donating groups

(B) Electron-withdrawing groups

(C) Bulking substituents

(D) No substituents

67. Density of foamed polymer as compared to a solid polymer is :

(A) Higher

(B) Lower

(C) Equal

(D) Unchanged

68. Bakelite is prepared by the reaction between :

(A) Urea and formaldehyde

(B) Ethylene glycol and formaldehyde

(C) Phenol and formaldehyde

(D) Terephthalic acid and ethylene glycol

69. Crystalline regions in polymers are organised into structures known as :

(A) Micelles

(B) Lamellae

(C) Globules

(D) Particles

70. Glyptal is a :

(A) Viscose Rayon

(B) Nylon

(C) Polystyrene

(D) Alkyd Resin

71. Who proposed the folded chain model for the structure of polymer crystal ?

(A) Keller

(B) Staudinger

(C) Flory

(D) Zieglar

72. Catalyst system used in co-ordination polymerization of ethylene is :

(A) Benzoyl peroxide

(B) $AlCl_3$

(C) NaOH

(D) Ziegler-Natta catalyst

73. Increase in T_g is observed with :

(A) Flexible polymer backbone

(B) Platicized polymer

(C) Low molecular weight polymer

(D) High molecular weight polymer

74. Arrangement of atoms in a polymer chain that cannot be changed without breaking bonds is called :

(A) Conformation

(B) Configuration

(C) Orientation

(D) Morphology

75. In radical polymerisation, if initiator concentration is increased four times, the rate of polymerisation (R_P) changes by a factor of :

(A) 2

(B) 4

(C) 8

(D) 16

76. Chain topology in polymers refer to :

(A) Chemical corporation of polymers

(B) Molecular weight distribution

(C) Crystallinity of polymers

(D) Arrangement and connectivity of polymer chain

77. Polymer configuration in which substituent groups are arranged alternatively on opposite side of chain is :

(A) Isotactic

(B) Syndiotactic

(C) Atactic

(D) All of the above

78. Which technique is commonly used for end group determination ?

(A) NMR spectroscopy

(B) X-Ray-diffraction

(C) SEM

(D) DSC

79. Polymer used for manufacturing hemodialysis membranes (artificial kidneys) to separate waste from blood is :

(A) Polysulfone

(B) Polyurethane

(C) Natural rubber

(D) Nylon

80. What is the expression for rate of termination reaction of free radical polymerization ?

(A) $k_t[M^\bullet]^2$

(B) $2k_t[M^\bullet]^2$

(C) $2fk_t[M^\bullet]$

(D) $fk_t[M^\bullet]$

81. Syndiotactic polypropylene is best produced by :

(A) Free radical polymerization

(B) Cationic polymerization

(C) Anionic polymerization

(D) Coordination polymerization

82. Glass Transition Temperature (T_g) of a polymer refers to :

(A) the temperature at which it starts to burn

(B) the temperature at which it melts

(C) the temperature at which it becomes crystalline

(D) the temperature at which it transitions from glassy to rubbery state

83. Tensile test of polymers measures :

(A) Electrical conductivity

(B) Strength and elongation under stretching

(C) Chemical composition

(D) Molecular weight

84. Rayon is classified as :

(A) Synthetic fibre

(B) Semi-synthetic fibre

(C) Natural fibre

(D) Inorganic fibre

85. Polymer processing method best suited for continuous production is :

(A) Injection molding

(B) Blow molding

(C) Compression molding

(D) Extrusion molding

86. Thermoforming is used to process :

(A) Thermosetting polymers

(B) Thermoplastic polymers

(C) Elastomers

(D) Cross link polymers

87. Fire-Retardant additives for polymers are :

(A) Chlorine

(B) Phosphorus

(C) Bromine

(D) All of the above

88. The term BUR in extrusion and calendering of thermoplastics refers to :

(A) Blow Up Ratio

(B) Bauxime Up Ratio

(C) Bottom Upper Ratio

(D) Bottom Up Ratio

89. Thermogravimetric Analysis (TGA) measures :

(A) Heat flow in polymers

(B) Change in weight of polymer with temperature

(C) Electrical conductivity

(D) Molecular weight distribution

90. Thermogravimetric Analysis (TGA) primarly measures :

(A) Heat flow

(B) Heat capacity

(C) Mechanical modulus

(D) Weight change with temperature

91. Test used to determine flexibility and bending strength of polymers :

(A) Impact test

(B) Flexural test

(C) Hardness test

(D) Thermal test

92. Tear resistance is especially important in :

(A) Optical lenses
(B) Rubber sheets and films
(C) Electrical wires
(D) Polymer powders

93. In which polymer configuration substituent groups arranged alternately ?

(A) Isolactic
(B) Syndiotactic
(C) Atactic
(D) All of the above

94. Fatigue in polymer refers to :

(A) Thermal degradation
(B) Chemical reaction with oxygen
(C) Melting of polymer
(D) Fracture of polymer due to cyclic strain

95. Impact resistance is the ability of polymer to :

(A) Resist corrosion
(B) Conduct electricity
(C) Resist heat
(D) Absorb energy during sudden shock

96. Termination step is absent in :

(A) Free radical polymerization
(B) Cationic polymerization
(C) Co-ordination polymerization
(D) Anionic polymerization (ideal case)

97. Impact strength of polymer increases with :

(A) Increasing density
(B) Increasing crystallinity
(C) Increasing toughness and ductility
(D) Increasing brittleness

98. Polymer well known for strain induced crystallisation :

(A) Polystyrene
(B) Natural rubber
(C) Polyvinyl chloride
(D) Polymethyl methacrylic acid

99. Polydispersity index (PDI) of a polymer sample is defined as :

(A) M_n/M_w
(B) M_w/M_n
(C) M_z/M_w
(D) $M_w \times M_n$

100. Which of the following is an example of polymer configuration ?

(A) Gauche conformation
(B) Bond rotation
(C) Isotactic arrangement
(D) Random coil structure

(Only for Rough Work)

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 :

Example :

Question :

Q. 1 (A) ● (C) (D)
Q. 2 (A) (B) ● (D)
Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

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 and 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.

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 छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)
प्रश्न 2 (A) (B) ● (D)
प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. 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. ओ. एम. आर. 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 के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, 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 प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।