Roll. No. .....

O.M.R. Serial No. | | | | | | | | |

Question Booklet Number

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

CHEMISTRY

(Chemistry of Natural Products)

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

(शेष निर्देश अन्तिम पृष्ठ पर)

1. Terpenoids are made up of :
   (A) Isoprene units
   (B) Amino acids
   (C) Nucleic acids
   (D) None of the above

2. Number of isoprene units in sesquiterpenes :
   (A) 2
   (B) 3
   (C) 4
   (D) 5

3. Which one of the following terpenoid is an acyclic in nature?
   (A) a-terpineol
   (B) Menthol
   (C) Geraniol
   (D) All of the above

4. a-terpineol when heated with canc H_2SO_4 gives :
   (A) p-cymene
   (B) Terpin
   (C) Terpinolene
   (D) Limonene

5. Abietic acid is present in :
   (A) Rose oil
   (B) Ginger oil
   (C) Rosin
   (D) Citral oil

6. Rubber is a type of :
   (A) Monoterpenoid
   (B) Sesquiterpenoid
   (C) Tetraterpenoid
   (D) Polyterpenoid

7. Which terpenoid is used in medicine as an anthelmentic?
   (A) Santonin
   (B) Fornesol
   (C) Citral
   (D) Menthol

8. The molecular formula of β-carotene is :
   (A) $C_{38}H_{56}$
   (B) $C_{40}H_{56}$
   (C) $C_{40}H_{58}$
   (D) $C_{45}H_{56}$

9. On dehydrogenation of abietic acid with selenium gives :
   (A) Retene
   (B) Biphenyl
   (C) Tetrahydroabietic acid
   (D) Phenanthre

10. Menthol has :
   (A) One chiral carbon
   (B) Two chiral carbon
   (C) Three chiral carbon
   (D) More than three chiral carbon

11. Menthol on oxidation with CrO_3/AcOH gives :

(A) Menthone

(B) Menthanone

(C) Piperitone

(D) Pulegone

12. Alkaloids may be defined as :

(A) Basic N containing compounds

(B) Heterocyclic compounds

(C) Basic N containing natural products, optically active, and possessing nitrogen heterocycles and have a pronounced physiological action

(D) None of the above

13. Which test is used for the detection of alkaloids in plants?

(A) Mayer's test

(B) Wagner's test

(C) Hager's test

(D) All of the above

14. Dibromaticonine $C_{10}H_8O_2N_2Br_2$ on treatment with $Ba(OH)_2$, breakdown into $C_{10}H_8N_2Br_2 \xrightarrow{Ba(OH)_2}$

$A + B + CH_3NH_2$ A and B are :

(A) Nicotinic acid + Maleic acid

(B) Nicotinic acid + Fumaric acid

(C) Nicotinic acid + Malonic acid

(D) Maleic acid + Fumaric acid

15. On oxidation of atropic acid gives :

(A) Benzoic acid

(B) Tropic acid

(C) Toluic acid

(D) Tropine

16. On Zn-dust distillation coniine gives :

(A) Conyrine

(B) Pyridine-2-carboxylic acid

(C) 3-methyl pyridine

(D) All of the above

17. Nicotine methiodide on oxidation gives :

(A) Hygrinic acid

(B) Nicotinic acid

(C) Pyridine-2-carboxylic acid

(D) Adipic acid

18. Hemlock alkaloid is :

(A) Nicotine

(B) Coniine

(C) Ephedrine

(D) Atropine

19. Oxidation of quinine with chromic acid gives :

(A) Quininic acid and quinone

(B) Quinone and meroquinene

(C) Quininic acid and benzoic acid

(D) Quininic acid and meroquinene

20. Quinine is extracted from :

(A) Citral plants

(B) Pine tree

(C) Opium

(D) Cinchona bark

21. Phenanthrene nucleus is present in :

(A) Nicotine

(B) Morphine

(C) Quinine

(D) Reserpine

22. Number of methoxy groups is determined by :

(A) Ziesel's method

(B) Herzig Meyer method

(C) Both (A) and (B)

(D) None of these

23. A pigenin is :

(A) Terpenoids

(B) Alkaloids

(C) Plant pigments

(D) Steroids

24. Chlorophyll reflects green light, giving plants their green colour. What element is located at the centre of the porphyrin ring in chlorophyll?

(A) Manganese

(B) Potassium

(C) Magnesium

(D) Calcium

25. Which pigment is responsible for the blue, red and purple colours in flowers and fruits?

(A) Chlorophyll

(B) Xanthophyll

(C) Carotenoids

(D) Anthocyanins

26. Which of the following is not a heme protein?

(A) Tryptophan pyrrolase

(B) Tyrosinase

(C) Myoglobin

(D) Cytochrome P_{450}

27. What is the prosthetic group in hemoglobin?

(A) Globin

(B) Heme

(C) Phosphoric acid

(D) Lipoprotein

28. What happens to hemoglobin when iron is oxidized from Fe^{2+} to Fe^{3+}?

(A) Carbon monoxide poisoning

(B) Methemoglobinemia

(C) Cystic Fibrosis

(D) Sickle cell anemia

29. Which enzyme catalyzes the rate determining step in hemebiosynthesis?

(A) PBG synthase

(B) ALA synthase

(C) Heme oxygenase

(D) Billirubin synthase

30. The molecular formula of Haemin is :

(A) $C_{34}H_{32}O_4N_4FeCl$

(B) $C_{32}H_{34}O_4N_4FeCl$

(C) $C_{34}H_{32}O_4N_4FeBr$

(D) $C_{34}H_{30}O_4N_2FeBr$

31. The basic structure of flavanols is based on which skeleton?

(A) C_6-C_3-C_6

(B) C_5-C_5

(C) C_6-C_1

(D) C_{20}

32. Which reaction is commonly used to test the presence of flavanols?

(A) Shinoda test (Mg/HCl reduction)

(B) Molisch test

(C) Biuret test

(D) Benedict's test

33. Oxidation of anthocyanidin usually leads to :

(A) Formation of chalcones

(B) Breakdown into phenolic acids

(C) Conversion into carotenoids

(D) Formation of alkaloids

34. Hydrolysis of anthocyanins with dilute acids gives :

(A) Anthocyanidins + Sugars

(B) Flavones + Ketones

(C) Cholcones + Aldehydes

(D) Phenols + Terpenes

35. The colour change of anthocyanins in acidic vs. basic medium is due to :

(A) Oxidation

(B) Keto-enol tautomerism

(C) Structural changes in flavylium ion

(D) Reduction

36. Flavonols undergo alkalins hydrolysis to yield :

(A) Coumarins

(B) Chalcones

(C) Hydroxybenzoic and hydroxycinnamic acids

(D) Quinones

37. Reduction of flavonols (Zn/HCl) generally convert them into :

(A) Flavanones

(B) Chalcones

(C) Coumarins

(D) Isoflavones

38. Anthocyanidins react with $FeCl_3$ to give :

(A) Blue-green coloration (phenolic OH test)

(B) Brick-red precipitate

(C) No reaction

(D) Yellow colour

39. Enzymatic oxidation of anthocyanins in plants (by polyphenol oxidase) causes :

(A) Colour fading (browning)

(B) Enhanced red colour

(C) Conversion into carotenoids

(D) Increased fluorescence

40. On heating strongly anthocyanins undergo :

(A) Decarboxylation $\rightarrow$ Stillenes

(B) Hydrolysis $\rightarrow$ Anthocyanidins + Sugars

(C) Oxidative cleavage $\rightarrow$ Phenolic acids

(D) Isomerization into flavones

41. Which of the following statement about anthocyanin reaction with pH is correct?

(A) Stable in all pH ranges

(B) Red in acidic medium, blue in basic medium

(C) Yellow in acidic medium, green in basic medium

(D) Colourless in acidic medium

42. Prostaglandins are derived from which class of compounds?

(A) Steroids

(B) Fatty acids

(C) Amino acids

(D) Terpenes

43. The immediate precursor of prostaglandins in the body is :

(A) Arachidonic acid

(B) Cholesterol

(C) Tyrosine

(D) Mevalonate

44. Prostaglandins are synthesized via which pathway?

(A) Mevalonate pathway

(B) Cyclooxygenase (COX) pathway

(C) Shikimic acid pathway

(D) Polyketide pathway

45. Which enzyme catalyzes the first committed step in prostaglandin biosynthesis?

(A) Lipooxygenase

(B) Cyclooxygenase

(C) Dehydrogenase

(D) Isomerase

46. The term "Prostaglandin" was first coined because they were thought to originate from :

(A) Brain tissue

(B) Prostate gland

(C) Kidney

(D) Placenta

47. Prostaglandins contain how many carbon atoms in their skeleton?

(A) 18

(B) 20

(C) 21

(D) 27

48. In prostaglandin nomenclature, the letter (A,B,D,E,F) refers to :

(A) Source of isolation

(B) Nature of substituents and ring structure

(C) Type of enzyme involved

(D) Function of the molecule

49. Which of the following prostaglandins causes strong uterine contractions?

(A) PGF2 α

(B) PGE2

(C) PGA1

(D) PGD2

50. PGE2 differs from PGF2α in :

(A) Presence of hydroxyl vs. Keto group

(B) Ring size

(C) Carbon skeleton

(D) Precursor fatty acid

51. The classification of prostaglandins is based on :

(A) Functional groups and ring structure

(B) Number of double bonds

(C) Type of fatty acid precursor

(D) Source of tissue

52. Which prostaglandin is a potent mediator of fever and inflammation?

(A) PGD2

(B) PGE2

(C) PGF2α

(D) PGI2

53. Prostacyclin (PGI2) is mainly involved in :

(A) Promoting platelet aggregation and vasodilation

(B) Inhibiting platelet aggregation and vasodilation

(C) Inducing fever

(D) Uterine contraction

54. Which drug inhibits prostaglandin synthesis by blocking cyclooxygenase?

(A) Penicillin

(B) Aspirin

(C) Quinine

(D) Morphine

55. The natural occurrence of prostaglandins is in :

(A) All mammalian tissues

(B) Only prostate gland

(C) Only liver

(D) Only brain

56. Which of the following prostaglandins is most abundant in semen?

(A) PGD2

(B) PGE1 and PGE2

(C) PFF2α

(D) PGI2

57. The cyclic structure in prostaglandins is formed by :

(A) Intramolecular oxidation

(B) Cyclization of arachidonic acid via COX

(C) Esterification

(D) Diels-Alder reaction

58. Prostaglandins are chemically classified as :

(A) Steroidal harmones

(B) Non-steroidal lipids

(C) Glycoproteins

(D) Peptides

59. Cholesterol contains how many carbon atoms?

(A) 19

(B) 21

(C) 27

(D) 30

60. The steroid harm one oldosterone is primarily involved in :

(A) Glucose metabolism

(B) Regulation of salt and water balance

(C) Protein synthesis

(D) Reproductive functions

61. Aldosterone belongs to which class of steroid hormones?

(A) Glucocorticoids

(B) Mineralocarticoids

(C) Androgens

(D) Estrogens

62. Progesterone is mainly secreted by :

(A) Testis

(B) Ovaries and corpus luteum

(C) Adrenal cortex

(D) Only placenta

63. The main biological role of progesterone is :

(A) Inducing male secondary sexual characters

(B) Maintaining pregnancy and preparing uterus

(C) Stimulating bile acid formation

(D) Controlling salt metabolism

64. Bile acids are biosynthesized from :

(A) Testosterone

(B) Cholesterol

(C) Progesterone

(D) Andosterone

65. Which functional group is characteristic of bile acids?

(A) Aldehyde group

(B) Carboxyl group

(C) Amine group

(D) Ketone group

66. Androsterone is classified as :

(A) Estrogen

(B) Androgen

(C) Mineralocorticoid

(D) Progestogen

67. The major male sex hormone is :
(A) Testosterone
(B) Estrone
(C) Progesterone
(D) Cortisol

68. Oestrone belongs to which class of hormones?
(A) Estrogens
(B) Androgens
(C) Glucocorticoids
(D) Progestogens

69. Which steroid hormone regulates glucose metabolism and stress response?
(A) Aldosterone
(B) Cortisol
(C) Estrone
(D) Progesterone

70. Which of the following is not derived from cholesterol?
(A) Vitamin D
(B) Bile acids
(C) Steroid hormones
(D) Alkaloids

71. The Diels hydrocarbon used as a model for steroid skeleton has :
(A) 4 fused rings (C,D,E,F)
(B) 4 fused rings (A,B,C,D)
(C) 3 benzene rings
(D) 5 fused rings

72. Which of the following is a C21 steroid hormone?
(A) Testosterone
(B) Estrone
(C) Progesterone
(D) Andosterone

73. High levels of aldosterone in the body lead to :
(A) Hypoglycemia
(B) Increased sodium retention and hypertension
(C) Reduced pregnancy maintenance
(D) Anemia

74. Progesterone is chemically characterized by the presence of :
(A) Aldehyde group
(B) 20-keto group and 3-keto-4-ene structure
(C) Phenolic hydroxyl group
(D) Aromatic ring with hydroxyl

75. Deficiency of aldosterone can cause :
(A) Addison's disease
(B) Cushing's syndrome
(C) Diabetes mellitus
(D) Goiter

76. Pyrethrins are naturally obtained from which plant?
(A) Papaver somniferum
(B) Chrysanthemum cinerifolium
(C) Rauwolfia serpentina
(D) Taxus brevifolia

77. The synthetic analogues of pyrethrins are called :

(A) Rotenoids

(B) Pyrethroids

(C) Alkaloids

(D) Flavonoids

78. Which of the following is a major component of natural pyrethrins?

(A) Rotenones

(B) Pyrethrin 1

(C) Artemisinin

(D) Quassin

79. Rotenone is primarily used as :

(A) Antimalarial

(B) Insecticide and fish poison

(C) Cardiac glycoside

(D) Antibiotic

80. Pheromones are defined as :

(A) Hormones secreted inside the body

(B) Chemical signals released to affect members of the same species

(C) Antibiotics against pathogens

(D) Plant defense compounds

81. Pyrethroids act mainly on :

(A) DNA polymerase

(B) Sodium ion channels in nerves

(C) Protein kinases

(D) Cell membrane

82. The main limitation of natural pyrethrins is :

(A) Toxicity to humans

(B) Photoinstability

(C) Lack of volatility

(D) High cost of synthesis

83. Rotenone inhibits which part of the electron transport chain?

(A) Complex I (NADH dehydrogenase)

(B) Complex II

(C) Complex III

(D) Complex IV

84. Which is a commonly synthesized pyrethroid?

(A) Permethrin

(B) Artemisinin

(C) Digitoxin

(D) Quinine

85. Pheromones can be used in agriculture as :

(A) Growth promoters

(B) Insect traps and mating disruption agents

(C) Fertilizers

(D) Herbicides

86. Lignans are derived biosynthetically from :

(A) Shikimic acid pathway

(B) Terpenoid pathway

(C) Polyketide pathway

(D) Mevalonate pathway

87. The dimerization of which type of units gives rise to lignans?

(A) Monoterpenes

(B) Cinnamic acid derivatives (C_6-C_3 units)

(C) Purine bases

(D) Alkaloids

88. Sesamin is an example of :

(A) Rotenoid

(B) Lignan

(C) Alkaloid

(D) Flavonoid

89. Which class of compound is structurally related to lignans but formed by polymerization?

(A) Tannins

(B) Lignin

(C) Alkaloid

(D) Steroids

90. Pyrethrins and pyrothroids are mainly used as :

(A) Antibiotics

(B) Insecticides

(C) Herbicides

(D) Fungicides

91. The main advantage of synthetic pyrathroids over natural pyrethrins is :

(A) Better taste

(B) Enhanced photostability and potency

(C) Lower cost

(D) Higher volatility

92. Rotenone is obtained from the roots of :

(A) Chrysanthemum species

(B) Derris and Lonchocarpus species

(C) Papaver somniferum

(D) Cinchona species

93. Which of the following is not a function of pheromones?

(A) Alarm signaling

(B) Sexual attraction

(C) Territorial marking

(D) Photosynthesis

94. β-carotene

$\xrightarrow{[0]}$ A $\xrightarrow[(ii)\ Zn-H_2O]{(i)\ O_3}$ B A and B are :

(A) β-ionone, Geranaldehyde

(B) β-ionone, p-cymene

(C) β-ionone, Geronic acid

(D) β-ionone, Camphoric acid

95. Catalytic hydrogenation of thymol gives :

(A) α-pinene

(B) Camphor

(C) ± menthol

(D) Nerol

96. When Zinziberene is ozonolysed, it yields the products :

(A) Acetone + Cadalene + Succinic acid

(B) Acetone + Levulinic acid + Succinic acid

(C) Acetone + Succinic acid

(D) Acetone + Palmitic acid

97. Diels-Alder adduct of isoprene and methyl vinylketone when treated with methyl magnesium halide followed by acid hydrolysis gives :

(A) Citral

(B) Menthol

(C) α-terpineol

(D) Dihydrocarveol

98. Tropinic acid, on Hofmann exhaustive methylation followed by catalytic hydrogenation forms :

(A) Tropinone

(B) Pimelic acid

(C) Maleic acid

(D) Tropinone

99. Which alkaloid is found in tobacco?

(A) Cocaine

(B) Caffeine

(C) Nicotine

(D) Morphine

100. Which one is a tropane alkaloid?

(A) Piperine

(B) Nicotine

(C) Atropine

(D) Quinine

Rough Work

Example :

Question :

Q.1 Ⓐ ● Ⓒ Ⓓ

Q.2 Ⓐ Ⓑ ● Ⓓ

Q.3 Ⓐ ● Ⓒ Ⓓ

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 Ⓐ ● Ⓒ Ⓓ

प्रश्न 2 Ⓐ Ⓑ ● Ⓓ

प्रश्न 3 Ⓐ ● Ⓒ Ⓓ

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।

महत्वपूर्णः 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 सिरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।