

Roll. No.

Question Booklet Number

O.M.R. Serial No.

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

BOTANY

(Advanced Plant Physiology and Biochemistry)

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 α and β forms of D-Glucose are known as :
 - (A) Anomer
 - (B) Epimer
 - (C) Racemic mixture
 - (D) Ene diol
2. In the model plant *Arabidopsis thaliana*, methionine is a precursor amino acid in the biosynthesis of
 - (A) Alkaloids
 - (B) Glucosinolates
 - (C) Phenolics
 - (D) Terpenoids
3. Disaccharide consists of two monosaccharide units held together by a ____ bond.
 - (A) Hydrogen
 - (B) Glycosidic
 - (C) Phosphodiester
 - (D) Ionic
4. ____ are molecular complexes of lipids with proteins?
 - (A) Lipoprotein
 - (B) Glycolipids
 - (C) Phospholipid
 - (D) Steroids
5. Amylopectin and cellulose Both of these polysaccharides are
 - (A) Have extended linear shapes.
 - (B) Function as structural component
 - (C) Contain α -glycosidic bonds.
 - (D) Contain 1-4-glycosidic bonds.
6. Which statement about enzymes is true?
 - (A) Enzymes enable a greater total amount of product to form
 - (B) Enzymes alter the rate of reaction
 - (C) Enzymes increase the activation energy required for a reaction to take place
 - (D) Enzymes alter the position of the reaction equilibrium
7. What is the tertiary structure of a protein?
 - (A) The overall three-dimensional shape
 - (B) The sequence of amino acids
 - (C) The arrangement of subunits
 - (D) The sequence of nucleotides
8. Aromatic amino acids include
 - (A) Phenylalanine, tyrosine and tryptophan
 - (B) Phenylalanine, serine and tryptophan
 - (C) Threonine, tyrosine and tryptophan
 - (D) Asparagine, tyrosine and tryptophan

9. Which of the following statements is/are true regarding primary structure of proteins?
 - (A) Primary structure denotes the number of amino acids in a protein
 - (B) Primary structure denotes the sequence of amino acids in a protein
 - (C) Primary structure determines the biological activity of a protein
 - (D) all of these
10. An enzyme responsible for the reduction of molecular nitrogen to the level of ammonia in leguminous plants.
 - (A) Nitrate reductase
 - (B) Nitrogenase
 - (C) Carboxylase
 - (D) Nitrite reductase
11. Which type of bonding is responsible for stabilizing the secondary structure of proteins?
 - (A) Disulphide bridges between cysteine residues
 - (B) Disulphide bridges between cysteine residues.
 - (C) Peptide bonds between amino acids.
 - (D) Salt bridges between charged side chains of amino acids.
12. Which of the following amino acid chiefly accumulate in cells of water stressed and salt stressed plants to maintain osmotic relations of the cells?
 - (A) Glycine
 - (B) Proline
 - (C) Leucine
 - (D) None of the above
13. Bacterial genes that function in nodulation are termed as nod genes and their expression is induced.
 - (A) Flavonoid
 - (B) Leghaemoglobin
 - (C) Nodulin gene
 - (D) Cytokinin
14. Concentration of which of the following hormone is increased in water stressed plants that results in stomatal closure?
 - (A) ABA
 - (B) IAA
 - (C) Gibberellin
 - (D) All of the above
15. Which of the following is more susceptible to heat stress?
 - (A) Rubisco
 - (B) Photosystem II
 - (C) Respiration
 - (D) None of the above

16. Which of the following substance acts as volatile air borne SAR inducing signal?
- Salicylic acid
 - Methyl salicylate
 - Jasmonate
 - All of these
17. Free-living nitrogen fixing anaerobic bacteria is
- Anabaena
 - Nostoc
 - Clostridium
 - Azotobacter
18. Nitrogenase requires a very high input of energy to produce ammonia. How many ATP molecules are required by nitrogenase to produce one ammonia?
- 6
 - 2
 - 16
 - 11
19. What is the role of secondary messengers in cell signalling?
- Receive the primary signal
 - Transmit the signal inside the cell
 - Act as the primary signal
 - Produce the primary signal
20. Which of the following is a common secondary messenger?
- ATP
 - cAMP
 - Glucose
 - Amino Acid
21. Sesquiterpene contains:
- 10 carbons
 - 15 carbons
 - 20 carbons
 - None of the above
22. A Holoenzyme is:
- Functional unit
 - Apo enzyme
 - Coenzyme
 - All of the above
23. Effect of water stress (drought) on the plant:
- Reduce the plant cell's water potential
 - Accumulation of abscisic acid (ABA)
 - Overproduction of Reactive Oxygen Species (ROS)
 - All of the above

24. The halophytes, which can resist a wide range of salt concentrations, are called as:
- (A) Glycophytes
 - (B) Stenohaline
 - (C) Euryhaline
 - (D) None of the above
25. Which of the following pigments is involved in red - far red light interconversion?
- (A) Cytochrome
 - (B) Lycopene
 - (C) Phytochrome
 - (D) Xanthophyll
26. Zwitter ions carries
- (A) Positive charge
 - (B) Negative charge
 - (C) Both (A) and (B)
 - (D) None of the above
27. Arginine is:
- (A) Acidic amino acid
 - (B) Heterocyclic amino acid
 - (C) Aromatic amino acid
 - (D) Basic amino acid
28. Maltose is a disaccharide of
- (A) Fructose and lactose
 - (B) Glucose and glucose
 - (C) Glucose and galactose
 - (D) Glucose and lactose
29. Which of the following is vitamin-K?
- (A) Ascorbic acid
 - (B) Tocopherol
 - (C) Phytonadione
 - (D) Pantothenic acid
30. Which of the following a water-soluble vitamin?
- (A) Vitamin B1
 - (B) Vitamin C
 - (C) Vitamin B2
 - (D) All of the above
31. How are flavonoids synthesized in plants?
- (A) Shikimic acid pathway
 - (B) Malonic acid pathway
 - (C) Mevalonic acid pathway
 - (D) Both (B) and (C)
32. Haemoglobin is
- (A) Glycoprotein
 - (B) Phosphoprotein
 - (C) Chromoprotein
 - (D) Lipoprotein
33. Most abundant protein on earth is
- (A) Keratin
 - (B) Rubisco
 - (C) Fibrogen
 - (D) Catalase

34. Which of the following is an iron porphyrin coenzyme?
- NAD
 - FAD
 - NADP
 - Cytochrome
35. Which of the following amino acid are exception to the Ramchandran's plots?
- Proline and Valine
 - Alanine and Proline
 - Valine and Glycine
 - Glycine and Proline
36. Which of the following has a major role in regulating chloroplast movement?
- Phototropin
 - Photoperiodism
 - Cryptochrome
 - Calcium
37. Which of the following steroids has primary function in plants?
- Cholesterol
 - Sitosterol
 - Ponasterone-A
 - None of the above
38. The general structure of an amino acid includes:
- A carboxyl group, an amino group, and a side chain
 - A phosphate group, a sugar group, and a base
 - A hydroxyl group, a carbonyl group, and a side chain
 - A sulfhydryl group, an amino group, and a side chain
39. In aldose sugars, the aldehyde group or the reducing centre always lies at:
- C-1
 - C-2
 - C-3
 - None of the above
40. Which amino acid contains sulphur?
- Serine
 - Valine
 - Alanine
 - Cysteine
41. Leghaemoglobin creates :
- Anaerobic condition for optimum activity of Nitrogenase
 - Aerobic condition for optimum activity of Nitrogenase
 - Required oxygen concentration for optimum activity of Nitrogenase
 - Suitable environment for nodule formation

42. In cells of water stress plant, the compatible solutes,
- (A) Lower the water potential of cells
 - (B) Lower the osmotic potential of cells
 - (C) Do not interfere with enzyme function
 - (D) All of the above
43. Which of the following methods are adopted by plants to cope with salt stress
- (A) Avoiding salinity
 - (B) Evading salinity
 - (C) Tolerating salinity
 - (D) All of the above
44. Nitrifying bacteria:
- (A) Oxidize ammonia to nitrates
 - (B) Converts free nitrogen to nitrogen compounds
 - (C) Converts protein into ammonia
 - (D) Reduce nitrate to free nitrogen
45. Food storage polysaccharides is/are:
- (A) Amylopectin
 - (B) Inulin
 - (C) Chitin
 - (D) Both (A) and (B)
46. Which of the following is a cell surface receptor?
- (A) Enzyme-linked receptors
 - (B) G-protein linked receptors
 - (C) Ion-channel linked receptors
 - (D) All of the above
47. Plants acquire thermo-tolerance due to simultaneous synthesis of
- (A) Heat shock proteins when decrease in temperature
 - (B) Anti-freeze protein with increase in temperature
 - (C) Chilling proteins with decrease in temperature
 - (D) Heat shock proteins with increase in temperature
48. Vesicular arbuscular mycorrhiza (VAM) represents a beneficial association between plant roots and fungus, where fungus assists plants in obtaining..... From the soil
- (A) Iron
 - (B) Zinc
 - (C) Sulphate
 - (D) Phosphate
49. Glucose contains:
- (A) Six-OH groups
 - (B) One-CHO groups
 - (C) One C=O group
 - (D) All are correct

50. Sulphate assimilation takes place chiefly in:
- Leaves in chloroplast
 - Roots
 - Fruits
 - None of the above
51. Lignin is an example of:
- Phenolic compounds
 - Terpenes
 - Nitrogen containing compounds
 - None of the above
52. Beta-sheets allowed region is present in which of the following:
- First quadrant
 - Third quadrant
 - Fourth quadrant
 - Second quadrant
53. Which vitamin forms coenzymes FAD and FMN?
- Riboflavin (B_2)
 - Nicotinamide (B_2)
 - Cobalamin (B_{12})
 - Ascorbic Acid (Vit.C)
54. Left bound alpha bond allowed region is present in which of the following quadrants of Ramchandran plot?
- Fourth quadrant
 - Third quadrant
 - Second quadrant
 - First quadrant
55. There is a limitation to the rotation of bonds on either side of the peptide bond, due to which of the following phenomenon?
- Hydrophobicity
 - Resonance
 - Electronegativity
 - Steric hindrance
56. The peptide bond observes which of the following characters?
- Single bond
 - Triple bond
 - Complete double bond
 - Partial double bond
57. How many types of proteins can be formed from 100 amino acids?
- 20^{100}
 - 100^{20}
 - 100^{100}
 - 2000
58. Glycogen is a polymer of:
- Starch
 - Sucrose
 - Glucose
 - Galactose
59. Oxidative stress leads to changes in the plant are :
- Membrane damage
 - Electrolyte leakage
 - Loss of organ function
 - All of the above

60. Jasmonate is biosynthesised from Linolenic acid that is completed in:
- (A) Chloroplast and peroxisome
 - (B) Mitochondria
 - (C) Chloroplast and mitochondria
 - (D) All of the above
61. Which amino acid is essential for synthesizing glutathione, a major antioxidant?
- (A) Cysteine
 - (B) Methionine
 - (C) Serine
 - (D) Threonine
62. What is the primary source of sulphur for plants?
- (A) Sulphate (SO_4^{2-})
 - (B) Sulphide (S^{2-})
 - (C) Elemental sulphur (S)
 - (D) Sulphur dioxide (SO_2)
63. Which of the following polysaccharides is probably the most abundant organic substances of Earth?
- (A) Chitin
 - (B) Cellulose
 - (C) Starch
 - (D) Inulin
64. In β -oxidation of fatty acids, which of the following are utilized as co-enzymes?
- (A) NAD^+ and NADP^+
 - (B) FADH_2 and NADH_2
 - (C) FAD and FMN
 - (D) FAD^+ and NAD^+
65. In branching of molecules of starch, which glycosidic bond occurs?
- (A) α 1-4
 - (B) β 1-4
 - (C) β 1-6
 - (D) α 1-6
66. The peptide linkage is:
- (A) $-\text{CO}-\text{NH}_2$
 - (B) $-\text{CO}-\text{NH}$
 - (C) $-\text{COO}-\text{NH}_2$
 - (D) $-\text{CH}-\text{CH}$
67. Leguminous plants are able to fix atmospheric nitrogen through the process of symbiotic nitrogen fixation. Which one of the following statements is not correct during this process of nitrogen fixation?
- (A) Nitrogenase is insensitive to oxygen
 - (B) The enzymes nitrogenase catalyses the conversion of atmospheric N_2 to NH_3
 - (C) Nodules act as sites for nitrogen fixation
 - (D) Leghaemoglobin scavengers' oxygen and is pinkish in colour

68. By the reaction of α -ketoglutaric acid with ammonia, through which of the process glutamic acid is formed?
- Oxidative amination
 - Reductive amination
 - Ammonification
 - Transamination
69. Which of the following groups is present invariably at the two terminals of protein?
- Methyl and ethyl
 - Aldehyde and Ketone
 - Amino and Carboxylic
 - Acid and Alcohol
70. A fibrous polysaccharide is:
- Glycogen
 - Starch
 - Cellulose
 - Collagen
71. Which second messenger signals the release of Ca_2^+ from endoplasmic reticulum?
- IP3
 - 1, 2 diacyl glycerol
 - cAMP
 - cGMP
72. Beta-carotene, a plant pigment falls under which of the following classes of terpenes
- Triterpenes
 - Tetraterpenes
 - Diterpenes
 - Polyterpenes
73. Which of the following enzyme plays an important role in the antioxidative defence system?
- Catalase
 - Ascorbate peroxidase
 - Superoxide dismutase
 - All of the above
74. What is common between NAD and FAD?
- Both act as oxygen carriers
 - Both are derived from proteins
 - Both are co-enzymes
 - All of the above
75. The protein on hydrolysis yields:
- α -amino acids
 - β -amino acids
 - Nucleosides
 - Histones

76. Alkaloids are diverse group of secondary metabolites are primarily synthesized from which amino acids?
- Glutamine, asparagine and histidine
 - Lysine, tyrosine and tryptophan
 - Alanine, serine and threonine
 - Methionine, cysteine and proline
77. Which of the following catalyses the cutting of P_1 , P_2 into 2 molecules of IP^3 and diacylglycerol in cell signalling?
- Phosphokinase
 - Phospholipase C
 - Lipo kinase
 - Phosphodiesterase C
78. Gossypol, which is found in cotton plants and provides resistance to insects, fungal and bacterial pathogens is a
- Monoterpene
 - Sesquiterpene
 - Diterpene
 - Sesquiterpene dimer
79. In plants, alkaloids usually accumulate in,
- Young actively growing parts
 - Epidermal and hypodermal cells
 - Bundle sheaths cells and latex vessels
 - All of the above
80. The fundamental 5-C units of terpenoids (isoprene) has
- Branched carbon skeletons
 - Unbranched carbon skeleton
 - Ring carbon skeleton
 - None of the above
81. Which of the following is a category of nitrogen containing secondary plants products?
- Alkaloids
 - Cyanogenic glycosides and glucosinolates
 - Non- protein amino acids
 - All of the above
82. Which of the following is building block of lignins?
- Coniferyl alcohol
 - Sinapyl alcohol
 - P-coumaroyl alcohol
 - All of the above
83. The colours of tomato fruits are due to the presence of
- Anthocyanins
 - Flavonoids and flavanone
 - Carotenoids
 - None of the above

84. Mustard oil glycosides are also known as:
- (A) Glucosinolates
 - (B) Cyanogenic glycosides
 - (C) Steroid glycosides
 - (D) None of the above
85. Which of the following are the basic categories of chemical signalling found in multicellular organisms ?
- (A) Paracrine signalling
 - (B) Autocrine signalling
 - (C) Endocrine signalling
 - (D) All of the above
86. Phytochrome is a photosensitive pigment involved in
- (A) Geotropism
 - (B) Phototropism
 - (C) Photoperiodism
 - (D) Photorespiration
87. Chilling sensitive plants have membrane with high proportion of
- (A) Unsaturated fatty acids
 - (B) Heat shock protein
 - (C) Saturated fatty acids
 - (D) None of the above
88. The enzymatic function of a protein is due to
- (A) Primary structure
 - (B) Tertiary structure
 - (C) Secondary structure
 - (D) Helix structure
89. Acid-base properties of amino acids be studies using :
- (A) Titration curve
 - (B) Sigmoid curve
 - (C) J shape curve
 - (D) None is correct
90. Which out of the following amino acids is a precursor for mediator of allergies and inflammation?
- (A) Histidine
 - (B) Tyrosine
 - (C) Phenyl alanine
 - (D) Tryptophan
91. Which of the following organic compounds play an important role in detoxify the toxicity of heavy metal?
- (A) Citrate
 - (B) Phytochelatins
 - (C) Metallothionines
 - (D) All of the above
92. In which among the followings are the mucopolysaccharides:
- (A) Heparin
 - (B) Keratan sulphate
 - (C) Hyaluronic acid
 - (D) All of the above

93. Pyrimidine have a
- (A) Six membered heterocyclic ring compounds
 - (B) Six membered ring structure fused to imidazole ring
 - (C) Five membered imidazole rings
 - (D) None of these
94. Chain termination codons or stop codons are:
- (A) UAA, UAG, UGA
 - (B) AAA, AAG, AGA
 - (C) GAA, GAG, GGA
 - (D) None of the above
95. Which of the following crop plants are high salt tolerant?
- (A) Maize and beans
 - (B) Sugarbeet and datepalm
 - (C) Cotton and barley
 - (D) All of the above
96. External symptom of chilling injury to plants
- (A) Reduced growth
 - (B) Chlorosis and lesions on leave
 - (C) Appearance of foliose as if soaked in water for long
 - (D) All of the above
97. Which of the following compounds is an 18-C unsaturated fatty acid with three double bonds
- (A) Jasmonate
 - (B) Linolenic acid
 - (C) Oleic acid
 - (D) None of the above
98. Phytoalexins which have antimicrobial activity are:
- (A) Secondary metabolite
 - (B) Synthetic compounds
 - (C) Plant hormones
 - (D) None of the above
99. Which of the following is the non-radical type of ROS?
- (A) Superoxide
 - (B) Hydroxyl
 - (C) Peroxyl
 - (D) Hydrogen peroxide
100. Protein kinase A is
- (A) Completely inhibited by cyclic AMP
 - (B) Allosterically activated cyclic AMP
 - (C) Affected by cyclic AMP only under unusual circumstances
 - (D) Activated by covalent binding of cyclic AMP

Rough Page

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।