

Roll No. ....

**B040701T**

**M. Sc. (First Semester)  
EXAMINATION, 2022-23  
(NEP)**

**BOTANY**

**(Diversity of Microbes and Fungi)**

*Time : Two Hours ] [ Maximum Marks : 75*

**Note :** This paper consists of three Sections A, B and C. Carefully read the instructions of each Section in solving the question paper. Candidates have to write their answers in the given answer-copy only. No separate answer-copy (B Copy) will be provided.

**P. T. O.**

**Section—A****(Short Answer Type Questions)**

**Note :** All questions are compulsory. Answer the following questions as short answer type questions. Each question carries 5 marks.

1. Write notes on the following :

(A) Brachymeiosis

(B) Chemotrophic Bacteria

(C) Bacteriophages

(D) Types of Mycorrhizae

(E) Mycoplasma

(F) Microbes in Biological warfare

(G) Recent criteria used for fungal classification

(H) Size and shapes of Viruses

(I) Types of microbial nucleic acid used as vectors for gene cloning.

**Section—B****(Long Answer Type Questions)**

**Note :** This section contains four questions from which *one* question is to be answered as long question. Each question carries 15 marks.

2. Give a general account of reproduction and fructifications in Lichens.

*Or*

3. Write an essay on economic importance of Bacteria.

*Or*

4. What are rhizosphere microorganisms ? What factors do affect the microbial population dynamics in soil ? How do these microbes help the growth of crop plants ?

*Or*

5. Describe the various methods of transmission of plant viruses.

**Section—C****(Long Answer Type Questions)**

**Note :** This section contains four questions from which *one* question is to be answered as long question. Each question carries 15 marks.

6. Where are fungi placed in Whittaker's system of classification ? Describe the Ainsworth's system of fungal classification giving the characters upto the level of classes.

*Or*

7. Discuss a general account of Zygomycotina using suitable examples from Mucorales and Entemophthorales.

*Or*

8. What do you understand by the terms polymorphic, macrocyclic and heteroecious ? With the help of well-labelled diagrams only, describe the life cycle of a polymorphic, macrocyclic, heteroecious obligate parasitic rust. Write a note on annual

recurrence of such fungi in the plains of Uttar Pradesh.

*Or*

9. Write short notes on any *three* of the following :

- (a) Parasexual Cycle
- (b) Degeneration of sexuality in Fungi
- (c) Fructifications produced by the members of Erysiphales
- (d) Contributions of A. H. R. Buller

Roll No. ....

**B040702T**

**M. Sc. (First Semester)**

**EXAMINATION, 2022-23**

**(NEP)**

**BOTANY**

**(Diversity of Algae and Bryophytes)**

*Time : Two Hours ] [ Maximum Marks : 75*

**Note :** This paper consists of three Sections A, B and C. Carefully read the instructions of each Section in solving the question paper. Candidates have to write their answers in the given answer-copy only. No separate answer-copy (**B Copy**) will be provided.

**P. T. O.**

**Section—A****(Short Answer Type Questions)**

**Note :** All questions are compulsory. Answer the following questions as short answer type questions. Each question carries 5 marks.

1. (A) Give a comparative account of pigments and reserve food in the class Chlorophyceae, Rhodophyceae and Phaeophyceae.
- (B) Describe the structure and function of heterocyst.
- (C) Write a note on auxospore formation in diatoms.
- (D) Write a brief account of Chrysophyta.
- (E) Describe in brief the similarities between Algae and Bryophytes.
- (F) Briefly describe the land adaptation features in bryophytes.
- (G) Point out the difference between the following :
  - (i) Rhizoids and Scales
  - (ii) Spores and Elaters
- (H) Write a short note on Peat Moss.

- (I) Describe in brief vegetative reproduction in Bryophytes.

### Section—B

#### (Long Answer Type Questions)

**Note :** This section contains four questions from which *one* question is to be answered as long question. Each question carries 15 marks.

2. Describe the range of thallus structure found in algae.

*Or*

3. Differentiate between isomorphic and heteromorphic life cycles found in Phaeophyceae.

*Or*

4. Give a detailed account of economic importance of algae.

*Or*

5. Describe in detail post-fertilization changes in Rhodophyceae with diagrams.



## Section—C

## (Long Answer Type Questions)

**Note :** This section contains four questions from which *one* question is to be answered as long question. Each question carries 15 marks.

6. Give a comparative account of the Hepaticopsida, Anthocerotopsida and Bryopsida.

*Or*

7. Describe in detail origin of Bryophytes.

*Or*

8. Explain a detailed account of the regenerative potential of bryophytes.

*Or*

9. Give a comparative account of general characters of Sphaerocarpaceales and Calobryales.

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**B040704T**

**M. Sc. (First Semester)**

**EXAMINATION, 2022-23**

**(NEP)**

**BOTANY**

**(Plant Ecology)**

*Time : Two Hours ] [ Maximum Marks : 75*

**Note :** This paper consists of three Sections A, B and C. Carefully read the instructions of each Section in solving the question paper. Candidates have to write their answers in the given answer-copy only. No separate answer-copy (**B Copy**) will be provided.

**P. T. O.**

**Section—A****(Short Answer Type Questions)**

**Note :** All questions are compulsory. Answer the following questions as short answer type questions. Each question carries 5 marks.

1. Choose the correct answer :

(A) The natural place of an organism or community is known as :

- (i) Niche
- (ii) Biome
- (iii) Habitat
- (iv) Habit

(B) According to Shelford's law of tolerance, the organism wide environmental factor tolerance limit show :

- (i) Narrow distribution with low population size
- (ii) Wide distribution with high population size
- (iii) Narrow distribution with high population size
- (iv) Wide distribution with low population size

(C) Identify the degradable pollutant from the following :

- (i) Chemicals
- (ii) Metals
- (iii) Rotten vegetable
- (iv) Plastic

(D) Mainly ozonosphere is depleted by :

- (i) CFCs
- (ii) Excess  $\text{CO}_2$
- (iii) Ozone
- (iv) Excess CO

(E) Correct descending order of relative contribution of various greenhouse gases to total global warming is :

- (i)  $\text{CO}_2$ ,  $\text{CH}_4$ , CFC, NO
- (ii)  $\text{CO}_2$ ,  $\text{CH}_4$ , NO, CFC
- (iii)  $\text{CO}_2$ , CFC, NO,  $\text{CH}_4$
- (iv)  $\text{CO}_2$ , CFC,  $\text{CH}_4$ , NO

(F) Select a non-denitrifying bacteria :

(i) *Pseudomonas aeruginosa*

(ii) *Thiobacillus*

(iii) *Thiobacillus denitrificans*

(iv) *Bacillus ramosus*

(G) Which one is a 'K' selected species ?

(i) *Aspergillus*

(ii) Human

(iii) Fungi

(iv) Grass

(H) The upper part of aquatic ecosystem contains :

(i) Nekton

(ii) Plankton

(iii) Benthos

(iv) Both (i) and (ii)

(1) The collection of individuals which belongs to the same species when living together in a region is known as :

- (i) Keystone species
- (ii) Community
- (iii) Guild
- (iv) Population

### Section—B

#### (Long Answer Type Questions)

**Note :** This section contains four questions from which *one* question is to be answered as long question. Each question carries 15 marks.

2. Define biogeochemical cycle and describe their types with suitable example.

*Or*

3. Explain the ecological perturbation and its effects on ecosystem and vegetation.

*Or*

4. Explain vegetation organisation. Give detail information of origin of intrapopulation variation with suitable examples.

*Or*

5. What is ecological succession ? Describe in detail the changes that occur in the ecosystem during ecological succession.

**Section—C**

**(Long Answer Type Questions)**

**Note :** This section contains four questions from which *one* question is to be answered as long question. Each question carries 15 marks.

6. What is biodiversity ? Explain the concept, level and role of biodiversity in ecosystem.

*Or*

7. What do you mean by sustainable development ? Explain the effect of worldwide meeting related to sustainable development and its impact on environment.

*Or*

8. / Explaining the global climate change elaborate the negative effect of greenhouse gases on earth.

*Or*

9. What is environmental pollution ? Explain its types, sources and effect on vegetation and ecosystem.



Roll No. ....

**B040703T**

**M. Sc. (First Semester)**

**EXAMINATION, 2022-23**

**(NEP)**

**BOTANY**

**(Diversity of Pteridophytes and Gymnosperms)**

*Time : Two Hours.] [ Maximum Marks : 75*

**Note :** This paper consists of three Sections A, B and C. Carefully read the instructions of each Section in solving the question paper. Candidates have to write their answers in the given answer-copy only. No separate answer-copy (B Copy) will be provided.

**P. T. O.**

## Section—A

## (Short Answer Type Questions)

Note : All questions are compulsory. Answer the following questions as short answer type questions. Each question carries 5 marks.

1. (A) Write a short note on Heterospory.
- (B) Collar in ovule of Ginkgo.
- (C) Write a note on the discovery of external morphology of *Rhynia*.
- (D) Differentiate Monoxyle and Pycnoxylic wood.
- (E) Describe the general characters of Gymnosperm.
- (F) Write a short note on polyembryony in *Pinus*.
- (G) Draw a diagram of development of embryo in *Osmunda*.
- (H) How do Pteridophytes differ from Gymnosperm ?
- (I) Write characteristic features of *Isoetes*.

**Section—B**  
**(Long Answer Type Questions)**

**Note :** This section contains four questions from which *one* question is to be answered as long question. Each question carries 15 marks.

2. Give an account of various types of stele found in Pteridophytes.

*Or*

3. Economic importance of Pteridophytes.

*Or*

4. Describe the structure and development of spore producing organ in Ophioglossum.

*Or*

5. With suitable diagram, describe the life cycle of Psilotum.

**Section—C**

**(Long Answer Type Questions)**

**Note :** This section contains four questions from which *one* question is to be answered as long question. Each question carries 15 marks.

6. Describe the classification of Gymnosperm studied by you.

*Or*

7. Describe the structure of male cone of *Taxus*.

*Or*

8. Economic importance of Gymnosperm.

*Or*

9. Describe the ovule development in Cycadales, Ginkgoales and Ephedrales.

Roll No. ....

Question Booklet Number

O. M. R. Serial No.

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313075

**M. Sc. (Second Semester) (NEP)  
EXAMINATION, 2022-23**

**BOTANY**

**(Taxonomy of Angiosperms And Biosystematics)**

**Paper Code**

B	0	4	0	8	0	1	T
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Questions Booklet  
Series

**C**

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. The label of a herbarium sheet does not carry information on :
  - (A) Local name
  - (B) Date of collection
  - (C) Height of plant
  - (D) Name of collector
2. Anthophore found in Dianthus belongs to family :
  - (A) Apocynaceae
  - (B) Fabaceae
  - (C) Caryophyllaceae
  - (D) Capparidaceae
3. When condition of stamen is which anthers one united and filament are free called :
  - (A) Syngenesious
  - (B) Adelphous
  - (C) Both (A) and (B)
  - (D) None of the above
4. The book 'Principles of Numerical Taxonomy' is compiled by :
  - (A) Sokal and Sheath
  - (B) Linnaeus
  - (C) Adanson
  - (D) Bentham and Hooker
5. Which of the following families is known as sedge family ?
  - (A) Cyperaceae
  - (B) Poaceae
  - (C) Arecaceae
  - (D) Liliaceae
6. Bentham and Hooker divided plant in their classification in :
  - (A) 202 orders
  - (B) 186 orders
  - (C) 205 orders
  - (D) 206 orders
7. The number of ICBN principles is :
  - (A) 8
  - (B) 3
  - (C) 5
  - (D) 6
8. Correct publication order of book "Fundamental Botanica, Critica Botanica, and Species Plantarum" is :
  - (A) 1736 – 1737 – 1753
  - (B) 1736 – 1737 – 1873
  - (C) 1836 – 1837 – 1573
  - (D) 1726 – 1733 – 1573

9. The highly modified tepal of Orchidaceae flower is called :

- (A) Lip or Labellum
- (B) Spur
- (C) Standard
- (D) Wings

10. The study of spore morphology of embryophytic plants and pollen morphology is termed as :

- (A) Chemotaxonomy
- (B) Palynotaxonomy
- (C)  $\alpha$ -taxonomy
- (D)  $\beta$ -taxonomy

11. Full form of APG is :

- (A) About Plant Growth
- (B) Angiosperm Phylogeny Group
- (C) Angiosperm Plant Growth
- (D) Angiosperm of Particularly Growth

12. Peppermint [*Mentha piperita*] belongs to family :

- (A) Rosaceae
- (B) Asclepiadaceae
- (C) Asteraceae
- (D) Lamiaceae

13. Taxonomic key is one of the taxonomic tools in the identification and classification of plant :

- (A) Monograph
- (B) Flora
- (C) Both (A) and (B)
- (D) None of the above

14. Lint and Fuzz are characteristics of long fiber of :

- (A) Flax
- (B) Jute
- (C) Cotton
- (D) Coir

15. Identification of species based on nucleotide diversity of short DNA segments is called :
- (A) DNA Sequencing  
(B) DNA Barcoding  
(C) Gene Bank  
(D) Protein Coding
16. OTU in taxonomy stands for :
- (A) Operative Taxonomic Unit  
(B) Operational Taxonomic Unit  
(C) Only Taxonomic Unit  
(D) One Taxonomic Unit
17. *Justica* is a large broadly distributed genus of flowering plant family belong to :
- (A) Malvaceae  
(B) Asteraceae  
(C) Cucurbitaceae  
(D) Acanthaceae
18. Very hard wood *Tectona grandis* belongs to family :
- (A) Verbenaceae  
(B) Asteraceae  
(C) Orchidaceae  
(D) Solanaceae
19. Clove is a :
- (A) fruit  
(B) dry flower bud  
(C) stigma  
(D) seed
20. Groundnut oil is formed from :
- (A) *Pisum sativum*  
(B) *Arachis hypogaea*  
(C) *Glycine max*  
(D) *Cajanus cajan*
21. Multivariate statistical analysis used to group organism into separate clusters is called :
- (A) Cluster Analysis  
(B) Phenetic Analysis  
(C) Complete Linkage  
(D) Arithmetic Method



22. Feathery stigma is found in which family ?
- (A) Moraceae  
(B) Musaceae  
(C) Poaceae  
(D) Fabaceae
23. In Caryophyllaceae the placentation is :
- (A) Marginal  
(B) Axile  
(C) Free central  
(D) Basal
24. The system of classification followed by most of the herbaria of the world is that of :
- (A) Bessey  
(B) Bentham and Hooker  
(C) Hutchinson  
(D) Engler and Prandl
25. Name a marshy plant of family Acanthaceae :
- (A) Hygrophila  
(B) Sterculia  
(C) Crotalaris  
(D) Asparagus
26. The pollen grains are united in two waxy masses called pollinia found in family :
- (A) Caryophyllaceae  
(B) Asclepiadaceae  
(C) Boraginaceae  
(D) Poaceae
27. The largest petals in a Papilionaceous flower is :
- (A) Standard  
(B) Keel  
(C) Wing  
(D) None of the above
28. ICBN is :
- (A) International Code of Botanical Nomenclature  
(B) International Culture of Botanical Nomenclature  
(C) International Condition of Botanical Nomenclature  
(D) International Conversation of Botanical Nomenclature

29. The term 'taxonomy' was first proposed by :
- (A) Lamarek  
(B) Nageli  
(C) A. P. de Candolle  
(D) Carlous Linnaeus
30. The number of species classified in species Plantarum :
- (A) 5900  
(B) 6000  
(C) 4000  
(D) 3800
31. Aerial roots having velamen are found in the member of family :
- (A) Arecaceae  
(B) Amaryllidaceae  
(C) Orchidaceae  
(D) Rosaceae
32. Coconut oil found from *Cocos nucifera* belongs to family :
- (A) Arecaeae  
(B) Poaceae  
(C) Rubiaceae  
(D) Malvaceae
33. Botanical name of Sugarcane is :
- (A) *Beta vulgaris*  
(B) *Saccharum officinalis*  
(C) *Ricinus communis*  
(D) None of the above
34. Sida, a member of family Malvaceae does not show this prominent trait :
- (A) Axile placentation  
(B) Monadelphous stamens  
(C) Alternate stipulate leaves  
(D) Presence of epicalyx
35. Find out the false statement with regard to family Asteraceae :
- (A) Cypsela fruits  
(B) Capitulum inflorescence  
(C) Hypogynous flower  
(D) Syngenesious anther
36. *Lycopersicon esculantum* is common name of :
- (A) Tomato  
(B) Potato  
(C) Brinjal  
(D) Maize

37. Name a plant where gynostegium is found :
- (A) *Calotropis procera*  
 (B) *Nymphaea*  
 (C) *Dracaena*  
 (D) Both (A) and (B)
38. Which character among the angiosperms is most important taxonomically to differentiate it from gymnosperm ?
- (A) Triploid endosperm .  
 (B) Presence of vessels in xylem  
 (C) Attractive petals  
 (D) Seed enclosed in fruit
39. Adnate stipules are found in family :
- (A) Malvaceae  
 (B) Rosaceae  
 (C) Rubiaceae  
 (D) Liliaceae
40. Nodulated roots are characteristic of family :
- (A) Fabaceae  
 (B) Asteraceae  
 (C) Poaceae  
 (D) Solanaceae
41. Two important Papilionaceous timber woods are :
- (A) *Dalbergia sissoo* and *Albizia lebbek*  
 (B) *Butea monosperma* and *Xylocapa xylocapa*  
 (C) *Dalbergia sissoo* and *Intisia hookeri*  
 (D) *Dalbergia sissoo* and *Pterocarpus*
42. Basic unit of classification is :
- (A) Genus  
 (B) Class  
 (C) Species  
 (D) Order
43. The scientific name when printed should be :
- (A) In capital letter  
 (B) In small letter  
 (C) In italics  
 (D) Underlined
44. Headquarters of Botanical Survey of India (BSI) is located in :
- (A) New Delhi  
 (B) Kolkata  
 (C) Lucknow  
 (D) Dehradun

45. Champa (*Michelia champaca*) belongs to family :
- (A) Magnoliaceae  
 (B) Apocynaceae  
 (C) Asteraceae  
 (D) Orchidaceae
46. The inflorescence of Paddu is :
- (A) Racemose  
 (B) Catkin  
 (C) Panicle  
 (D) Verticillaster
47.  $\oplus \overset{\sigma}{\text{K}}_{(5)} \overset{\text{C}}{\text{C}}_{(5)} \overset{\text{A}}{\text{A}}_5 \overset{\text{G}}{\text{G}}_{(2)}$  is the floral formula of :
- (A) *Brassica*  
 (B) *Petunia*  
 (C) *Alium*  
 (D) *Sesbania*
48. Which is the correct class of Banana ?
- (A) Plantae  
 (B) Lilopsida  
 (C) Musaceae  
 (D) *Musa acuminata*
49. Pink family or "carnation" family is common name of :
- (A) Caryophyllaceae  
 (B) Amaranthaceae  
 (C) Rosaceae  
 (D) None of the above
50. *Pyrus malus* (apple) belong to family :
- (A) Rubiaceae  
 (B) Rosaceae  
 (C) Poaceae  
 (D) Solanaceae
51. Botanical name of Rubber tree plant is :
- (A) *Hevea brassilliensis*  
 (B) *Manihot esculenta*  
 (C) *Manihot glaziovii*  
 (D) *Jatropha goespifolia*
52. Takhtajan divided Angiosperm into no. of class :
- (A) Two  
 (B) Three  
 (C) Four  
 (D) Five

53. Who is the father of Botany ?

- (A) Theophrastus
- (B) B. de Jussieu
- (C) Carolus Linnaeus
- (D) John Ray

54. According to Takhtajan system of classification which order is most primitive among the following plants ?

- (A) Ericales
- (B) Magnoliales
- (C) Alismatales
- (D) Fagales

55. Epigynous gamopetalous family is :

- (A) Apiaceae
- (B) Asteraceae
- (C) Rosaceae
- (D) Myrtaceae

56. Chemotaxonomy is connected with :

- (A) Classification of chemical found in plant
- (B) Use of phytochemical data in systematic botany
- (C) Chemical analysis of plant
- (D) Statistical analysis of plant

57. The chief merit of Bentham and Hooker's classification is.....

- (A) It is natural system of classification.
- (B) Evolutionary based classification.
- (C) It also considered phylogenetic aspect.
- (D) The description of taxa are based on actual examination of specimens.

58.  $\alpha$  taxonomy deals with :

- (A) Classical Taxonomy
- (B) Chemotaxonomy
- (C) Phylogeny
- (D) Experimental taxonomy

59. Colchicine is obtained from a member of family :

- (A) Solanaceae
- (B) Liliaceae
- (C) Fabaceae
- (D) Asteraceae

60. Quinine medicine is obtained from :

- (A) *Cinchona calisoya*
- (B) *Adina cordifolia*
- (C) *Coffea robusta*
- (D) *Oldentandia corymposa*

61. Full name of Botanist Takhtajan is :
- (A) Arthur Takhtajan  
(B) Armer Takhtajan  
(C) George Takhtajan  
(D) Joseph Takhtajan
62. Code and Botanical Nomenclature divide three parts :
- (A) Principles, Rules and Recommendation  
(B) Families, Genus and Species  
(C) Both (A) and (B)  
(D) None of the above
63. The common name of *Eleusine corocana* is :
- (A) Ragi  
(B) Barley  
(C) Wheat  
(D) Oats
64. The economic product of tobacco plant is :
- (A) Flower  
(B) Leaves  
(C) Root  
(D) Stem
65. *Vinca rosea* belongs to family :
- (A) Euphorbiaceae  
(B) Malvaceae  
(C) Apocynaceae  
(D) Solanaceae
66. Taxon is defined as :
- (A) Taxonomic unit  
(B) Species  
(C) Taxonomic group of any rank  
(D) Genus
67. Cyathium is a type of :
- (A) Flower  
(B) Calyx  
(C) Inflorescence  
(D) Stamen
68. In Black gram which type of placentation is present ?
- (A) Axile  
(B) Parietal  
(C) Marginal  
(D) None of the above

69. Who among the following popularized the use of embryological characters in taxonomy ?

- (A) Carl Linnaeus
- (B) Panchanan Maheshwari
- (C) Birbal Sahni
- (D) Bentham and Hooker

70. Embryological evidence indicates that Lamnaceae family is evolved from :

- (A) Arecaceae
- (B) Fabaceae
- (C) Poaceae
- (D) Orchidaceae

71. One of the best methods for understanding general relationships of plant is :

- (A) Cytotaxonomy
- (B) Experimental Taxonomy
- (C) Numerical Taxonomy
- (D) Chemotaxonomy

72. Level of taxonomy the method refers to the analysis of interspecific variability and study of evolution is called :

- (A) alpha taxonomy
- (B) beta taxonomy
- (C) gamma taxonomy
- (D) theta taxonomy

73. The half inferior ovary is present in :

- (A) Plum
- (B) Mustard
- (C) Brinjal
- (D) Sunflower

74. Axile Placentation is found in :

- (A) Asteraceae and Brassicaceae
- (B) Malvaceae and Cucurbitaceae
- (C) Liliaceae and Malvaceae
- (D) Liliaceae and Brassicaceae

75. The quick referral system in taxonomy :

- (A) Museum
- (B) Herbarium
- (C) Botanical Garden
- (D) Zoological Parks

76. APG Group (IV) was published in year :

- (A) 2009
- (B) 2016
- (C) 1998
- (D) 1900

77. When two or more authors publish a new species or propose a new name, their names are linked using the epithet :
- (A) in  
(B) ex  
(C) et  
(D) emend
78. The newly collected specimen which is used as a substitute, when the original type material is missing in herbarium, is designated as :
- (A) Lectotype  
(B) Holotype  
(C) Neotype  
(D) Isotype
79. Highly salt tolerant fruit crop is :
- (A) Date palm  
(B) Banana  
(C) Coconut palm  
(D) Grape
80. How many species does the Orchidaceae family have ?
- (A) 26,000  
(B) 24,000  
(C) 28,000  
(D) 20,000
81. Who were the first to use orchids in traditional medicines ?
- (A) Greek  
(B) Chinese  
(C) Egyptian  
(D) Indian
82. Amaryllidaceae differ from Liliaceae in having :
- (A) Actinomorphic to slightly zygomorphic flower  
(B) Inferior ovary  
(C) Axile placentation  
(D) Number of six perianth
83. Sago (Sabudana) belong to which family ?
- (A) Aracaceae  
(B) Apocyanaceae  
(C) Asclepiadaceae  
(D) Malvaceae
84. Binomials with identical genus, name and specific epithet are called :
- (A) Homonym  
(B) Tautonym  
(C) Basionym  
(D) Synonym



85. Endosperm is absent in :

- (A) Orchidaceae
- (B) Compositae (Asteraceae)
- (C) Poaceae
- (D) Malvaceae

86.  $\oplus \overset{\sigma}{\text{P}}_{(3+3)} \overset{\text{f}}{\text{A}}_{3+3} \text{G}(3) \text{ or } (\bar{3})$  floral

formula belongs to family :

- (A) Arecaceae
- (B) Amaryllidaceae
- (C) Malvaceae
- (D) Orchidaceae

87. Number of perianth in family Moraceae is :

- (A) 2
- (B) 4
- (C) 5
- (D) 6

88. Correct floral formula of *Capparis spinosa* is :

- (A)  $\oplus \overset{\sigma}{\text{K}}_{2+2} \text{C}_4 \text{A}_a \text{G} \underline{2-6}$
- (B)  $\oplus \overset{\sigma}{\text{K}}_{2+2} \text{C}_4 \text{A}_6 \text{G} \underline{2}$
- (C)  $\oplus \overset{\sigma}{\text{K}}_5 \text{C}_5 \text{A}_a \underline{\text{G}_a}$
- (D)  $\oplus \overset{\sigma}{\text{K}}_5 \text{C}_5 \text{A}_5 \text{G} \underline{(3)}$

89. Gynobasic style from the base of ovary is a characteristic of family :

- (A) Lamiaceae
- (B) Solanaceae
- (C) Asteraceae
- (D) Poaceae

90. Floral formula does not deal about :

- (A) Ovary position
- (B) Whorls of floral part
- (C) Number of floral part
- (D) Placentation and Aestivation

91. Gymnosperm has been placed in between dicot and monocot in plant classification by :

- (A) Charles and Bessey
- (B) Bentham and Hooker
- (C) John Hutchinson
- (D) Engler and Prantdtl

92. In family Asclepiadaceae the stamens are modified and known as :

- (A) Syngenesious
- (B) Sinuous
- (C) Translator
- (D) Androphore

93. Correct statement applicable to family Myrtaceae :
- Zygomorphic flower
  - Hypogynous flower
  - Limited stamens
  - Inferior ovary
94. The starting family in Bentham and Hooker's classification :
- Ranunculaceae
  - Poaceae
  - Liliaceae
  - Magnoliaceae
95. The gynoecium with fused carpel is called :
- Syncarpous
  - Apocarpous
  - Syngenesious
  - Synandrous
96. Bicarpellary Gynoecium with obliquely placed septum is seen in :
- Banana
  - Brinjal
  - Pisum
  - Mustard
97. International size of Herbarium sheet is :
- 49 cm × 22 cm
  - 41.5 cm × 29 cm
  - 22.5 cm × 49 cm
  - 29 cm × 42 cm
98. Where is the British Museum of Royal Botanical Garden located ?
- Paris
  - Kew
  - Kolkata
  - Dehradun
99. Give the name of persistent and accrescent sepals :
- Brinjal
  - Tomato
  - Both (A) and (B)
  - None of the above
100. Name the type of inflorescence found in Banyan :
- Hypanthodium
  - Verticillaster
  - Capitulum
  - None of the above

Roll No. ....

O. M. R. Serial No.

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Question Booklet Number

315982

**M. Sc. (Second Semester) (NEP)  
EXAMINATION, 2022-23**

**BOTANY**

**(Morphology, Anatomy and Embryology of Angiosperms)**

Paper Code							
B	0	4	0	8	0	2	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. In leaf, elongated cylindrical cells are seen in :
  - (A) Upper epidermis
  - (B) Lower epidermis
  - (C) Palisade parenchyma
  - (D) Spongy parenchyma
  
2. The skeleton of the leaf is :
  - (A) Tracheids
  - (B) Vessels
  - (C) Companion cells
  - (D) Veins
  
3. Air spaces in leaf are found in :
  - (A) Palisade parenchyma
  - (B) Spongy parenchyma
  - (C) Vascular bundle
  - (D) Pericycle
  
4. Formation of abscission layer is caused due to :
  - (A) Increased gibberellin concentration
  - (B) Decreased gibberellin concentration
  - (C) Increased auxin concentration
  - (D) Decreased auxin concentration
  
5. Androgynophore is the internode between :
  - (A) Corolla and Androecium
  - (B) Androecium and Gynoecium
  - (C) Calyx and Corolla
  - (D) Corolla and Androecium, and Androecium and Gynoecium
  
6. Vascular cambium produces :
  - (A) Primary xylum and primary phloem
  - (B) Secondary xylum and secondary phloem
  - (C) Primary xylum and secondary phloem
  - (D) Secondary xylum and primary phloem
  
7. The part of the hypocotyl where change takes place from one type of vascular structure to the other is known as :
  - (A) Intercalary zone
  - (B) Transition region
  - (C) Quiescent centre
  - (D) None of the above
  
8. The cells of *Quiescent* centre are characterized by :
  - (A) having dense cytoplasm and prominent nucleoli
  - (B) having light cytoplasm and small nuclei
  - (C) divide regularly
  - (D) None of the above

9. A vascular strand that extends between the vascular cylinder of stem and the base of leaf is called :
- Leaf trace
  - Leaf gap
  - Both (A) and (B)
  - None of the above
10. Multiple epidermis is found in :
- Grass leaf
  - Nerium leaf
  - Tulsi leaf
  - Grass stem
11. Name the stomata which are surrounded by a limited number of epidermal cells, which are indistinguishable from other epidermal cells :
- Paracytic type
  - Anisocytic type
  - Anomocytic type
  - Diacytic type
12. Interxylary phloem is formed due to :
- formation of accessory strip of cambium
  - abnormal behaviour of normal cambium
  - anomalous behaviour of abnormal cambium
  - anomalous position of cambium
13. The anomalous secondary growth in *Boerhaavia* is due to the formation of :
- accessory cambial ring
  - abnormal behaviour of abnormal cambium
  - abnormal behaviour of normal cambium
  - None of the above
14. In which of the following plants anomalous secondary growth occurs due to abnormal behaviour of normal cambium :
- Bignonia*
  - Bougainvillea*
  - Boerhaavia*
  - All of the above
15. In a cross-section of old trunk of a tree, we observed the outer region of secondary wood lighter in colour. This region of wood is known as :
- Spring wood
  - Sap wood
  - Heart wood
  - Autumn wood
16. In old trees, most part of secondary wood impregnated with extractive is called :
- Sap wood
  - Soft wood
  - Heart wood
  - Hard wood

17. Which of the following families, each microspore mother cell forms only a single microspore ?
- (A) Rutaceae
  - (B) Cyperaceae
  - (C) Poaceae
  - (D) None of the above
18. Select the correct statement from the following :
- (i) Endosperm is generally triploid in Angiosperms
  - (ii) All angiosperms have monosporic and endosporic embryo sac
  - (iii) Angiosperms are characterized by double fertilization
  - (iv) All angiosperms show indirect pollination and siphonogamy
- (A) i, ii and iii
  - (B) i, iii and iv
  - (C) i, ii and iv
  - (D) None of the above
19. Typical embryo sac of angiosperm is :
- (A) Tetranucleate and seven celled
  - (B) Only tetranucleated
  - (C) Eight nucleated and seven celled
  - (D) Tetranucleated and tetracelled
20. In angiosperms, the functional megaspore develops into :
- (A) Ovule
  - (B) Embryo sac
  - (C) Pollen tube
  - (A) Endosperm
21. In double fertilization total number of male nuclei and total number of female nuclei involved is :
- (A) 3, 2 respectively
  - (B) 2, 3 respectively
  - (C) 2, 2 respectively
  - (D) 3, 3 respectively
22. A central cell in embryo sac, after triple fusion becomes :
- (A) Zygote
  - (B) Embryo
  - (C) Endosperm
  - (D) Primary endosperm cell
23. Coconut water of a tender coconut is :
- (A) Immature embryo
  - (B) Free nuclear endosperm
  - (C) Innermost layer of the seed coat
  - (D) Degenerated nucellus

24. Which of the following fruits is parthenocarpic ?
- (A) Brinjal  
(B) Apple  
(C) Banana  
(D) Jackfruit
25. Receptacle of the flower resemble ontogenetically to :
- (A) Vegetative apex  
(B) Reproductive apex  
(C) Pedicel  
(D) None of the above
26. The two nuclei at the end of pollen tube are called :
- (A) Sperm and ovum  
(B) Generative nucleus only  
(C) Tube nucleus and generative nucleus  
(D) Tube nucleus and sperm
27. Male gametophyte in Angiosperm produces :
- (A) 3 sperms  
(B) single sperm and 2 vegetative cells  
(C) single sperm and vegetative cell  
(D) 2 sperms and a vegetative cell
28. An organic substance that can withstand environmental extremes and cannot be degenerated by any enzyme is :
- (A) Cuticle  
(B) Lignin  
(C) Sporopollenin  
(D) Cellulose
29. Match the following :
- (A) Male gametophyte (i) Embryo sac  
(B) Female gametophyte (ii) Ovule  
(C) Megasporangium (iii) Pollengrain  
(D) Microsporangium (iv) Pollen sac
- (A) A-iii, B-i, C-ii, D-iv  
(B) A-i, B-ii, C-iii, D-iv  
(C) A-iv, B-iii, C-ii, D-i  
(D) A-iii, B-ii, C-i, D-iv
30. Male gametophyte with least number of cells are present in :
- (A) Funaria  
(B) Pteris  
(C) Pinus  
(D) Lillium

31. Nucellar polyembryony is reported in species of :
- (A) Gossypium
  - (B) Triticum
  - (C) Brassica
  - (D) Citrus
32. Of the two cells of zygote, the cell near the micropyle is termed as :
- (A) Terminal cell
  - (B) Basal cell
  - (C) Embryo cell
  - (D) Zygote cell
33. When pollen tube enters through the funiculus or integument it is termed as :
- (A) Porogamy
  - (B) Chalazogamy
  - (C) Mesogamy
  - (D) Isogamy
34. Ovule converts into which of the following after fertilization ?
- (A) Fruit
  - (B) Embryo
  - (C) Seed
  - (D) Both (A) and (B)
35. Longest pollen tube occurs in :
- (A) Grass
  - (B) Maize
  - (C) Cucurbita
  - (D) Dahlia
36. What is another name of vegetative fertilization ?
- (A) Double fertilization
  - (B) Triple fusion
  - (C) Somatogamy
  - (D) Syngamy
37. Which of the following contains the filiform apparatus ?
- (A) Zygote
  - (B) Synergids
  - (C) Generative cell
  - (D) Egg cell
38. Embryo from an unfertilized egg is :
- (A) Apogamy
  - (B) Allogamy
  - (C) Parthenogenesis
  - (D) Parthenocarpy



39. Apomixis is the type of reproduction that results in the development of :
- Embryo from endosperm
  - Embryo from nucellus
  - New organism without fusion of gametes
  - None of the above
40. Which of the following statements regarding post-fertilization development in flowering plant is incorrect ?
- Ovules develop into fruit
  - Ovary develops into fruit
  - Central cell develops into endosperm
  - Zygote develops into an embryo
41. Which is the largest cell of the embryo sac ?
- Chalazal cells
  - Micropylar cells
  - Synergids
  - Central cell
42. The process by which fruits are developed without fertilization is called :
- Parthenocarpy
  - Parthenogenesis
  - Apomixis
  - All of the above
43. Which of these plants will lose their economic value if its fruits are as a result of induced parthenocarpy ?
- Banana
  - Grape
  - Orange
  - Pomegranate
44. In adventive embryony, a type of apomixis, the embryo develops directly from the :
- Zygote
  - Integuments or nucellus
  - Accessory embryo sacs in the ovule
  - Antipodals or synergids in an embryo sac
45. Apospory is :
- Development of gametophyte from any cell of sporophyte other than spores
  - Development of sporophyte without fusion of male and female gametes
  - Both (A) and (B)
  - None of the above

46. Diplospory is the development of embryo sac from :
- Megaspore mother cell
  - Nucellus
  - Integument
  - Megaspore
47. Endosperm development precedes embryo development because :
- It provides nutrition to developing embryo
  - It is product of triple fusion
  - It is larger than embryo
  - Its development mostly occurs by free nuclear division
48. Match the following and choose the correct option :
- | Group A                  | Group B                    |
|--------------------------|----------------------------|
| (A) Aleurone layer       | (i) Without fertilization  |
| (B) Parthenocarpic fruit | (ii) Nutrition             |
| (C) Ovule                | (iii) Double fertilization |
| (D) Endosperm            | (iv) Seed                  |
- A-ii, B-i, C-iv, D-iii
  - A-i, B-ii, C-iii, D-iv
  - A-iv, B-ii, C-i, D-iii
  - A-ii, B-iv, C-i, D-iii
49. Ruminant endosperm is :
- Smooth
  - Rough
  - Diploid
  - Triploid
50. If the number of chromosomes in the root cells of a plant is 24, what would be their number of chromosomes in its endosperm ?
- 12
  - 24
  - 36
  - 48
51. Monosporic 4 nucleate type of embryo sac which does not have any antipodals is :
- Oenothera type
  - Polygonum type
  - Allium types
  - Pepromia type
52. Ubisch bodies are associated with the development of :
- Embryo
  - Embryo sac
  - Pollengrains
  - Endosperm

53. Heterofertilization is :
- (A) Fusion of two male gametes with different structures
  - (B) Fusion of egg with secondary nucleus
  - (C) When the egg cell and central cell are fertilized by sperm cells from different pollen grains
  - (D) All of the above
54. What is common between vegetative reproduction and apomixis ?
- (A) Both are applicable to only dicot plants
  - (B) Both produce progeny identical to the parent
  - (C) Both bypass flowering phase
  - (D) None of the above
55. Cotyledon in embryo is formed from :
- (A) Basal cell
  - (B) Terminal cell
  - (C) Both (A) and (B)
  - (D) None of the above
56. In flowering plants meiosis occurs at the time of :
- (A) formation of buds
  - (B) germination of seed
  - (C) formation of pollen grains
  - (D) formation of root primordia
57. After fertilization petals :
- (A) develop into fruits
  - (B) develop into seeds
  - (C) develop into ovaries
  - (D) fall off
58. Formation of embryo sac from a single megaspore nuclei is termed as :
- (A) Bisporic development
  - (B) Monosporic development
  - (C) Tetrasporic
  - (D) Polysporic
59. Which one of the following is resistant to enzyme action ?
- (A) Xylum fibre
  - (B) Pollen exine
  - (C) Wood fibre
  - (D) None of the above

60. Generative nucleus divides forming :
- 3 male nuclei
  - 2 male nuclei
  - 2 female nuclei
  - 3 female nuclei
61. What is the function of filiform apparatus ?
- Produce nector
  - Stimulate division of generative cell
  - Guide the entry of pollen tube
  - Recognise the suitable pollen at the stigma
62. Which of the following statements is correct ?
- Microspores are produced by endothecium
  - sporogenous tissue is haploid
  - Tapetum nourishes the developing pollen
  - The hard outer layer of pollen is called intine
63. In the vascular cylinder just above the point of departure of leaf trace, a small parenchymatous patch occurs. This parenchymatous region between the main vascular cylinder and leaf trace is called :
- Leaf trace
  - Leaf gap
  - Stem trace
  - Stem gap
64. Bulliform cells :
- are found in dorsiventral leaves and help in photosynthesis
  - are found in dorsiventral leaves and help in minimizing water loss
  - are found in isobilateral leaves and help in minimizing water loss
  - are found in isobilateral leaves and help in photosynthesis
65. Pseudo-embryo sac is a substitute for :
- Embryo
  - Endosperm
  - Ovule
  - None of the above
66. In angiosperms, microsporogenesis and megasporogenesis :
- occur in ovule
  - occur in anther
  - form gametes without further divisions
  - involve meiosis
67. The concept of four distinct zones of tissue builders on the root apex is called as :
- Dermatogen theory
  - Meristem theory
  - Tunica Corpus theory
  - Histogen theory

68. The position of root apical meristem is :

- (A) Terminal
- (B) Subterminal
- (C) Lateral
- (D) Intercalary

69. The tip of the root apical meristem is capped by the histogen known as :

- (A) Periblem
- (B) Dermatogen
- (C) Plerome
- (D) Calyptragen

70. Quiescent centre is present in :

- (A) Shoot tip
- (B) Root tip
- (C) Meristematic tissue
- (D) Both (A) and (B)

71. Which of the following statements is correct about Tunica Corpus theory ?

- (i) Cells of Tunica show anticlinal division
- (ii) Cells of Corpus are larger than Tunica cells
- (iii) Cells of Tunica divide in all plains
- (iv) Cells of Tunica are larger than Corpus cells

Codes :

- (A) A and B
- (B) A, B and D
- (C) A, B and C
- (D) A, B, C and D

72. The stomata remain surrounded by a pair of subsidiary cells whose common wall is at right angles to the guard cells occur in :

- (A) Diacytic or caryophyllaceous type of stomata
- (B) Actinocytic type of stomata
- (C) Paracytic or Rubiaceous type of stomata
- (D) Graminaceous type of stomata

73. Stamen is equivalent to :

- (A) Microsporangium
- (B) Microsporophyll
- (C) Megasporophyll
- (D) Megasporangium

74. Xenia and metaxenia can be best illustrated in :

- (A) Wheat
- (B) Maize
- (C) Myristica
- (D) Strawberry

75. Tunica Corpus theory is connected with :
- Root apex
  - Root cap
  - Secondary growth
  - Shoot apex
76. Which meristem helps in increasing girth ?
- Apical meristem
  - Primary meristem
  - Lateral meristem
  - Intercalary meristem
77. Pith and cortex do not differentiate in :
- Dicot stem
  - Monocot stem
  - Monocot root
  - Dicot root
78. Cork cambium and vascular cambium are :
- Lateral meristem
  - Parts of pericycle
  - Part of secondary xylum and phloem
  - Apical meristem
79. Bordered pits are found in :
- Vessel wall
  - Sieve cells
  - Companion cells
  - Sieve tube wall
80. Stomatal guard cells are :
- a type of ground tissue
  - a type of epidermal tissue
  - a type of vascular tissue
  - None of the above
81. Part of the promeristem that develops into cortex of stem and root is :
- Plerome
  - Periblem
  - Dermatogen
  - None of the above
82. Sunken stomata are characteristic features of :
- Hydrophytes
  - Mesophytes
  - Xerophytes
  - All of the above
83. Consider the following statements and make the correct option(s) :
- The long and slender stalk of a stamen is called anther
  - The terminal bilobed structure of the anther is called the filament
  - Both (A) and (B)
  - Neither (A) nor (B)

84. Diadelphous stamens are found in :
- Citrus
  - China rose
  - Pea
  - None of the above
85. Which give rise to the cork tissue ?
- Periblem
  - Phellogen
  - Phellogen
  - Periderm
86. Abnormal secondary growth is found in :
- Dracaena
  - Triticum
  - Helianthus
  - Cucurbita
87. Root cap is formed by :
- Dermatogen
  - Vascular cambium
  - Calyptragen
  - Wood cambium
88. When cambium is present, the vascular bundle is called :
- Close
  - Open
  - Radial
  - Conjoint
89. Which statement is correct about primary meristem ?
- Epidermis derived from protoderm
  - Primary vascular tissues derived from the procambium
  - Cortex and pith derived from the ground meristem
  - All of the above
90. When a shoot tip transforms into flower :
- It is always solitary
  - It is never solitary
  - The flower is always short-lived
  - The flower is always long-lived
91. An inferior ovary :
- is positioned below the sites of attachment for perianth and androecium
  - is situated on the receptacle above the perianth and androecium
  - Both (A) and (B)
  - None of the above
92. According to classical concept, the folding of carpellary margin is :
- Peltate
  - Involute
  - Conduplicate
  - Acarpic

93. Which of the following is uppermost part of flower that encloses ovules ?
- (A) Sepals  
(B) Petals  
(C) Stamens  
(D) Carpel
94. Which of the following is true about primitive type of carpel ?
- (A) It is simple elongate structure, usually without distinction in ovary, style and stigma  
(B) Pollen is received on a longitudinal stigmatic crest  
(C) It occurs in woody Magnoliales  
(D) All of the above
95. Epigynous flower is :
- (A) inferior ovary  
(B) superior ovary  
(C) half inferior ovary  
(D) half superior ovary
96. The sterile stamen is called as :
- (A) Staminate  
(B) Staminode  
(C) Internode  
(D) Pistillate
97. Abscission layer is made up of :
- (A) Cork cells  
(B) Collenchymatous cells  
(C) Sclerenchymatous cells  
(D) Parenchymatous cells
98. In monocot leaf :
- (A) Stomata is present on both surface of epidermis  
(B) Mesophyll is not differentiated into palisade and spongy parenchyma  
(C) Both (A) and (B)  
(D) None of the above
99. Match the following :
- |                     |       |                      |
|---------------------|-------|----------------------|
| (A) Cuticle         | (i)   | Guard cells          |
| (B) Bulliform cells | (ii)  | Single layer         |
| (C) Stomata         | (iii) | Waxy layer           |
| (D) Epidermis       | (iv)  | Empty colorless cell |
- (A) A-iii B-iv, C-i, D-ii  
(B) A-i, B-ii, C-iii, D-iv  
(C) A-iii, B-ii, C-iv, D-i  
(D) A-iii, B-ii, C-i, D-iv
100. The stomata are equally distributed on both the surface of epidermis in :
- (A) Dorsiventral leaf  
(B) Isobilateral leaf  
(C) Both (A) and (B)  
(D) None of the above



Roll No. ....

Question Booklet Number

317215

O. M. R. Serial No.

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**M. Sc. (Second Semester) (NEP)  
EXAMINATION, 2022-23**

**BOTANY**

**(Cytogenetics & Basic Molecular Biology)**

**Paper Code**

B	0	4	0	8	0	3	T
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Questions Booklet  
Series

**C**

*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. Which of the following organisms have overlapping genes ?
  - (A) Virus
  - (B) Bacteria
  - (C) Fungi
  - (D) Yeast
2. Type of gene mutation which involves the replacement of purine with pyrimidine or vice versa or the substitution of one type of base with another type of base is :
  - (A) Transition
  - (B) Transduction
  - (C) Translation
  - (D) Transversion
3. The haploid set of the chromosome is called as :
  - (A) Proteome
  - (B) Genomics
  - (C) Genome
  - (D) Genes
4. The mRNA of which eukaryotic protein lacks introns ?
  - (A) Haemoglobin
  - (B) Myoglobin
  - (C) Histone
  - (D) Polymerase
5. The phenomenon of incomplete dominance was observed by :
  - (A) de Vries
  - (B) Correns
  - (C) Tschermak
  - (D) None of the above
6. A mutation that changes a codon specifying one amino acid to a termination codon is called :
  - (A) Mis-sense mutation
  - (B) Transition mutation
  - (C) Non-sense mutation
  - (D) Frame-shift mutation
7. Frame-shift mutation could result from :
  - (A) A base deletion only
  - (B) A base insertion only
  - (C) Either an insertion or a deletion of a base
  - (D) Deletion of three consecutive bases
8. Who coined the term 'chromatin' to describe the thread-like material of the nucleus ?
  - (A) Boveri
  - (B) W. Roux
  - (C) E. Strasburger
  - (D) W. Fleming

9. Conditions of a karyotype  $2n + 1$ ,  $2n - 1$  and  $2n + 2$ ,  $2n - 2$  are called :
- Aneuploidy
  - Polyploidy
  - Allopolyploidy
  - Monosomy
10. Which of the following statements are true regarding law of segregation ?
- Alleles separate with each other during gametogenesis.
  - The segregation of factors is due to the segregation of chromosomes during meiosis.
  - Law of segregation is called law of purity of gametes.
  - All of the above
11. Nucleolar organiser (NOR) contains repeated sequence of DNA bases and codes for :
- sRNA
  - tRNA
  - mRNA
  - rRNA
12. Which is the longest phase of meiosis ?
- Prophase-I
  - Prophase-II
  - Metaphase
  - Anaphase
13. Differential staining in chromosome as a result of differences in thickening is known as :
- Puffing
  - Heterosis
  - Heteropycnosis
  - Differential staining
14. Isochromosome refers to :
- Chromosome which has got isolated from rest of the chromosome set.
  - Translocated chromosome having identical arms.
  - Lagging chromosome which has not moved to the pole from the equator.
  - Chromosome that reaches the equator earliest.
15. Cell growth results in disturbing the ratio between :
- Cytoplasm-chromosome ratio
  - Nucleus-chromosome ratio
  - Cytoplasm-spindle fibre ratio
  - Nucleus-cytoplasm ratio
16. The exchange of segments of non-sister chromatids between chromosomes of homologous pair is termed as :
- Transformation
  - Translocation
  - Crossing over
  - Chromosomal aberration

17. On which of the following chromosomal disorders are based ?
- Mutant allele and their defective products
  - Imbalance in chromosome number and chromosome arrangement
  - Mutant allele and chromosome arrangement
  - Mutant allele and imbalance in chromosome number
18. When a gene hides the effect of other, it is called :
- Epistasis
  - Complementary gene
  - Incomplete dominance
  - Codominance
19. Who has introduced X-ray mutations in barley and maize ?
- Stadler
  - Muller
  - Morgan
  - All of the above
20. Amino acids are joined together into protein chain by which of the following ?
- Transfer RNA
  - DNA polymerase
  - Hydrogen bonds
  - Messenger RNA
21. A protein is made up of how many amino acids ?
- 20
  - 22
  - 25
  - 30
22. If a mutation occurs in a gamete, it would influence :
- Only a single individual
  - Sterility in the progeny
  - All successive generation of the parent
  - Only the particular
23. The major reason for the success of Mendelian experiments was :
- Garden pea was cross breeding
  - Garden pea was true breeding
  - Garden pea was heterozygous
  - Garden pea was easily available
24. "The alleles of a gene do not show any blending and both the characters are recovered as such in the  $F_2$  generation." This statement is of :
- Law of dominance
  - Law of segregation
  - Law of independent assortment
  - Law of natural selection
25. A mutant rice is :
- Allopolyploid
  - Autopolyploid
  - Autoallopolyploid
  - Segmental polyploid

26. Inheritable mutations can be studied by :
- Pureline breeding
  - Punnett square
  - Using chemical mutagens
  - Generating a pedigree of family
27. Which of the following organisms have monocistronics ?
- Virus
  - Bacteria
  - Yeast
  - Fungi
28. Association of DNA and histone is mediated by :
- Covalent bonding
  - Hydrogen bonding
  - Hydrophobic bonding
  - van der Waals interactions
29. A single gene mutation affecting more than one phenotype is called :
- Azotropic
  - Pleiotropic
  - Auxotropic
  - None of the above
30. In Mendel's experiments, the dihybrid phenotypic ratio was :
- 9 (Round, Green) : 3 (Round, Yellow) : 3 (Wrinkled, Yellow) : 1 (Wrinkled, Green)
  - 9 (Round, Yellow) : 3 (Round, Green) : 3 (Wrinkled, Yellow) : 1 (Wrinkled, Green)
  - 9 (Wrinkled, Yellow) : 3 (Round, Green) : 3 (Round, Yellow) : 1 (Wrinkled, Green)
  - 9 (Wrinkled, Green) : 3 (Round, Yellow) : 3 (Wrinkled, Yellow) : 1 (Round, Green)
31. SAT chromosomes means :
- Satellite chromosome
  - Sine Acid Thymo Nucleinico chromosome
  - Nucleolus organiser
  - None of the above
32. The term 'nucleosome' was given by Outdet. Who among the following called it 'nu' bodies ?
- Hewish
  - Rajnekar
  - Olius and Olius
  - None of the above

33. Which phase is called an invisible phase ?
- S-phase
  - G<sub>0</sub> phase
  - G<sub>1</sub> phase
  - G<sub>2</sub> phase
34. The stage in cell division that consider of G<sub>1</sub> phase, S phase, G<sub>2</sub> phase is :
- Metaphase
  - Prophase
  - Anaphase
  - Interphase
35. Chromosomes are made up of nucleosomes which consists of :
- DNA
  - Histones wrapped over octomeric core of nucleic acid
  - Histones
  - DNA wrapped over octomeric core of histones
36. Microtubule depolymerizing drug such as colchicine is expected to :
- Inhibit spindle formation during mitosis
  - Allow mitosis beyond metaphase
  - Inhibit cytokinesis
  - Induce formation of multiple contractile
37. Tendency of one crossover to enhance the chance of another crossover in its adjacent region is referred to as :
- Positive interference
  - Negative interference
  - Coincidence
  - Coupling
38. A DNA segment contains 100 adenine and 100 cytosine. How many nucleotides are present in the segment ?
- 100
  - 200
  - 400
  - 50
39. Wheat plant is  $6n = 42$ . What will be the number of chromosomes in its monosomics, haploid and monoploid ?
- 43, 21, 7
  - 15, 7, 7
  - 41, 21, 7
  - 14, 7, 7

40. In transposition the segment duplication on :
- Same chromosome
  - Non-homologous chromosome
  - Homologous chromosome
  - It does not duplicate
41. If both genotype and phenotype shows the same ratio of 1 : 2 : 1 in the F<sub>2</sub> generation it shows :
- Incomplete dominance in monohybrid cross
  - Complete dominance in monohybrid cross
  - Dihybrid cross
  - Co-dominance
42. Peptide bond formation between amino acids of growing polypeptide chain is catalysed by :
- Peptidyl transferase
  - Amino acyl-tRNA polymerase
  - Peptide polymerase
  - Peptidyl synthetase
43. Test cross determines :
- Whether two traits are linked or not
  - The genotype of F<sub>2</sub> plant
  - Whether the two species will breed successfully
  - Number of alleles in a gene
44. Considering the concept of multiple alleles, one organism can have :
- One allele
  - Two alleles
  - Three alleles
  - Four alleles
45. Which of Mendel's law will be violated by linkage ?
- Panspermia
  - Dominance
  - Segregation
  - Independent assortment
46. Somaclones are produced by :
- Micropropagation
  - Mutation
  - Polyploidy
  - Hybridization
47. The genes for seven characters chosen by Mendel are located on :
- Four chromosomes
  - Five chromosomes
  - Six chromosomes
  - Seven chromosomes

48. Genotype of dominant plant can be determined by :
- Pedigree analysis
  - Back cross
  - Test cross
  - Dihybrid cross
49. Which of the following is not a requirement for protein synthesis ?
- Ribosomes
  - Peptidyl transferase
  - Spliceosome
  - Amino-acyl-tRNA
50. Who suggested that ageing is due to low level of mutation ?
- Kelner
  - Burnet
  - Setto
  - Flanders
51. Test cross is a :
- cross between two recessive homozygotes
  - cross between dominant homozygote and heterozygote
  - cross between two  $F_1$  hybrids
  - cross between  $F_1$  hybrids and recessive homozygotes
52. During gamete formation, the enzyme recombinase participates during :
- Zygotene
  - Diplotene
  - Pachytene
  - Diakinesis
53. Histone proteins have large amount of :
- Glycine and Glutamic acid
  - Protein and Phenylalanine
  - Lysine and Arginine
  - Methionine and Arginine
54. Chromosomal puffs are :
- Rich in mRNA and DNA
  - Rich in DNA
  - Rich in mRNA
  - Rich in neither mRNA nor DNA
55. In which of the following banding technique is best known and absent in plant chromosome ?
- Q-Banding
  - G-Banding
  - C-Banding
  - R-Banding



56. Genetic balance theory of sex determination was given by :
- (A) Morgan  
(B) Bridges  
(C) Darwin  
(D) Mendel
57. The site of the gene, at which the mutations occur with usually high frequency are :
- (A) Recons  
(B) Hot spots  
(C) Mutons  
(D) Palindromes
58. If the DNA codons are ATG ATG ATG and a cytosine base is inserted at the beginning, which of the following will result ?
- (A) CA TGA TGA TG  
(B) CATG ATG ATG  
(C) CAT GAT GATG  
(D) A nonsense mutation
59. How many types of histone molecules are found in nature ?
- (A) 3  
(B) 4  
(C) 5  
(D) 6
60. The phenotype of an individual may be affected if the modified allele produces :
- (1) The normal enzyme  
(2) A non-functional enzyme  
(2) No enzyme at all
- Codes :**
- (A) Only 1 is correct.  
(B) 1 and 2 are correct.  
(C) Only 2 is correct.  
(D) 2 and 3 are correct.
61. For experimental induction of mutations in *Drosophila* by X-rays, the Nobel Prize was awarded to :
- (A) T. H. Morgan (1910)  
(B) H. J. Muller (1927)  
(C) Stadler (1928)  
(D) de Vries (1900)
62. During cell division chromosomes move towards different poles due to :
- (A) Centriole  
(B) Mitochondria  
(C) Cytokinesis  
(D) Microtubules

63. The mechanism of distributing centriole pairs to the daughter cells is called :
- (A) Equational division  
 (B) Haplontic division  
 (C) Astral division  
 (D) Reduction division
64. A plant of genotype AA Bb CC is selfed. Phenotypic ratio of F<sub>2</sub> generation would be :
- (A) 9 : 3 : 4  
 (B) 3 : 1  
 (C) 9 : 3 : 3 : 1  
 (D) 27 : 9 : 9 : 3 : 9 : 3 : 3 : 1
65. Which of the following is the correct statement about the genome ?
- (A) The genome does not contain alleles.  
 (B) Sexual germ cells contain only one set of chromosomes.  
 (C) Chromosomes are only present in somatic cells.  
 (D) Non-homologous chromosomes are not present in the genome.
66. Which of the following statements is incorrect ?
- (A) Chromosome number is constant within different species in an ecosystem.  
 (B) Chromosome number is constant within different somatic cells of an ecosystem.  
 (C) Chromosome number is constant within individuals in a species in an ecosystem.  
 (D) All of the above
67. The production of gametes by the parents, formation of zygotes, the F<sub>1</sub> and F<sub>2</sub> plants, can be understood from a diagram called :
- (A) Met square  
 (B) Bullet square  
 (C) Punch square  
 (D) Punnett square
68. In meiosis 4 daughter cells are produced by two successive divisions in which :
- (A) First division is equational, second is reductional.  
 (B) First division is reductional, second division is equational.  
 (C) Both divisions are reductional.  
 (D) Both divisions are equational.

69. Which of the following chromosomes are typically banded ?
- Allosomes
  - Supernumerary chromosome
  - Lampbrush chromosome
  - Polytene chromosome
70. Liquid endosperm in coconut is resulted due to :
- Karyokinesis followed by cytokinesis
  - Failure of karyokinesis followed by cytokinesis
  - Karyokinesis twice followed by single cytokinesis
  - Karyokinesis is not followed by cytokinesis
71. Which site of the tRNA molecule binds to the mRNA molecule ?
- Anti-codon
  - Codon
  - Amino acid
  - 5 prime end
72. Translocation in protein synthesis begin with the :
- Movement of dipeptidyl tRNA from A-site to P-site
  - Movement of tRNA from A-site to R-site
  - Movement of tRNA from P-site to E-site
  - Movement of tRNA, P-site to A-site
73. In the regions of Balbiani ring DNA strand is uncoiled. It helps in :
- More synthesis of particular RNA
  - Multiple transcription of RNA for rapid protein synthesis
  - Both (A) and (B)
  - None of the above
74. In cell cycle S phase follows the :
- G<sub>1</sub> phase
  - G<sub>2</sub> phase
  - M phase
  - Prophase
75. Haemoglobin and collagen are examples of ..... respectively.
- Fibrous protein and chromoprotein
  - Chromoprotein and fibrous protein
  - Nucleoprotein and cell sap protein
  - Chromosomal protein and cytoplasmic protein

76. A segment of the DNA has a base sequence AAG GAG GAC CAA CCA, which of the following sequence represents a frameshift mutation ?
- (A) AGG AGG ACC AAC CA  
 (B) AAG GCA GAC CCA AC  
 (C) ACG GAC GAC CAG CCA  
 (D) AAG GAG GAC CAA CCA.
77. A polysome could be best described as :
- (A) An active site of DNA  
 (B) An active site of protein synthesis  
 (C) An active site of lipid synthesis  
 (D) All of the above
78. Exchange of segments between non-homologous chromosome is called :
- (A) Crossing over  
 (B) Inversion  
 (C) Duplication  
 (D) Translocation
79. Which of the following is not true about the Notch genes in *Drosophila* ?
- (A) Notch is lethal in homozygous form.  
 (B) Notch is recessive to facet.  
 (C) It causes a special indentation of the wing margins.  
 (D) It is expressed in heterozygous form.
80. Hereditary variations in plants have been produced by use of :
- (A) DDT  
 (B) Auxin  
 (C) X-rays  
 (D) Gibberellic acid
81. XY sex chromosomes were discovered by :
- (A) Mendel  
 (B) R. Brown  
 (C) Nettie Stevens  
 (D) M.J.D. White
82. Which of the following is imino acid ?
- (A) Proline  
 (B) Hydroxyproline  
 (C) Phenylalanine  
 (D) Both (A) and (B)
83. Three-dimensional structure of protein is stabilized by :
- (A) Ionic bonds  
 (B) Covalent disulphide bond  
 (C) Hydrogen bond  
 (D) All of the above

84. Teminism is :
- Reverse Transcription
  - DNA Replication
  - RNA Replication
  - None of the above
85. Who explained the Wobble hypothesis ?
- Watson and Crick
  - Nirenberg
  - Darwin
  - Samuel B. Weiss
86. Which of the following biomolecules has self-repair mechanisms ?
- DNA, RNA and Protein
  - DNA and RNA
  - DNA only
  - DNA and Protein
87.  $\alpha$ -helix and  $\beta$ -pleated sheates are pattern of :
- Primary structure of protein
  - Secondary structure of protein
  - Tertiary structure of protein
  - Quaternary structure of protein
88. Extranuclear chromosome is :
- Circular and with protein coat
  - Circular and without protein coat
  - Linear and without protein coat
  - Linear and with protein coat
89. Petite mutants of yeast are due to :
- Genome
  - Chondriogene
  - Plastogene
  - Kinetogene
90. DNA repair mechanism is absent in :
- Nuclear genome
  - Mitochondrial genome
  - Chloroplast genome
  - Both (B) and (C)
91. Non-chromosomal genes in *Chlamydomonas* is studied by :
- Correns
  - Sagar
  - Strutvent
  - Morgan
92. In *Lathyrus odoratus*, cross between two purple flowered plants give a pink/white progeny, it is due to :
- Incomplete dominance
  - Codominance
  - Epistasis
  - Segregation

93. The result of  $F_2$  generation in recessive epistasis is :
- (A) 9 : 3 : 3 : 1  
 (B) 9 : 3 : 4  
 (C) 15 : 1  
 (D) 12 : 3 : 1
94. In which stage of mitotic cell division chromosomes lose their identity ?
- (A) Prophase  
 (B) Metaphase  
 (C) Anaphase  
 (D) Telophase
95. Various phases of cell cycle are controlled by proteins :
- (A) Hormones and CDKs  
 (B) Cytokines and Cyclins  
 (C) Cyclins and CDKs  
 (D) Hormones and Cyclins
96. An acentric chromosome at metaphase will be :
- (A) Condensed and lie at equator  
 (B) Condensed and lie near the equator  
 (C) Coiled and get attached to spindle  
 (D) Irregularly shaped and lie at one of the pole
97. Euchromatin is :
- (A) Generally active chromatin with genes  
 (B) Stains lightly  
 (C) Partially condensed  
 (D) All of the above
98. The diagrammatic representation of karyotype of a species is called :
- (A) Idiogram  
 (B) Cladogram  
 (C) Ecogram  
 (D) Chromogram
99. The cross made between two inbreds by reversing the order of male and female parent is called :
- (A) Test cross  
 (B) Back cross  
 (C) Reciprocal cross  
 (D) None of the above
100. An allele is dominant, when it is expressed in :
- (A) Both homozygous and heterozygous individuals  
 (B) Second generation  
 (C) Heterozygous combination only  
 (D) Homozygous combination only

Roll No. ....

Question Booklet Number

O. M. R. Serial No.

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319102

**M. Sc. (Second Semester) (NEP)  
EXAMINATION, 2022-23  
BOTANY  
(Paleobotany) (Elective)**

Paper Code

B	0	4	0	8	0	4	T
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Questions Booklet  
Series

B

Time : 1:30 Hours ]

[ Maximum Marks : 75

**Instructions to the Examinee :**

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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. Animal burrows, dens and nests are the sources of :
- (A) Trace fossils
  - (B) Index fossils
  - (C) Microfossils
  - (D) Macrofossils
2. Coacervates were experimentally produced by :
- (A) Oparin and Sidney Fox
  - (B) Darwin
  - (C) Aristotle
  - (D) Louis Pasteur
3. Calorific value of coal is :
- (A) 25-35 MJ/kg
  - (B) 50-70 MJ/kg
  - (C) 75-105 MJ/kg
  - (D) 100-140 MJ/kg
4. Coacervates were formed by :
- (A) D. N. A.
  - (B) Polymerisation
  - (C) Radiation
  - (D) Polymerisation and aggregation
5. Fossil fuels are derived from which of the following sources ?
- (A) Organic matter trapped in sedimentary rocks
  - (B) Non-organic matter trapped in metamorphic rocks
  - (C) Organic matter trapped in igneous rocks
  - (D) Organic matter trapped on the crust surface
6. Pollen grain plays a role of bio-indicator for monitoring :
- (A) SO<sub>2</sub> pollution
  - (B) CO<sub>2</sub> pollution
  - (C) N<sub>2</sub>O pollution
  - (D) CH<sub>4</sub> pollution
7. Primitive atmosphere of earth was :
- (A) Reducing
  - (B) Oxidizing
  - (C) Neutral
  - (D) Normal



8. Flowering herbaceous plants dominated the earth during :
- (A) Holocene
  - (B) Pliocene
  - (C) Miocene
  - (D) Eocene
9. Which of the following principles applicable in the process of fossilization ?
- (A) Replacement theory
  - (B) Infiltration theory
  - (C) Both (A) and (B)
  - (D) None of the above
10. Which is the best site in India to study fossil flora ?
- (A) Aravalli Hills
  - (B) Shivalik Hills
  - (C) Vindhya Hills
  - (D) Rajmahal Hills
11. In which of the following rocks, the earliest vascular plants have been discovered ?
- (A) Early Cambrian
  - (B) Early Devonian
  - (C) Mid Cretaceous
  - (D) Silurian
12. The branch that deals with the plant life of the geological past is called :
- (A) Pteridology
  - (B) Palaeobotany
  - (C) Neurology
  - (D) Archaeology
13. Fossilization is also known by the name :
- (A) Acclimatization
  - (B) Pasteurization
  - (C) Preservation
  - (D) Tyndallization
14. Petrification, impression and compression are types of :
- (A) Fossils
  - (B) Bacteria
  - (C) Spores
  - (D) Virus
15. Father of Indian palaeobotany is :
- (A) Birbal Sahni
  - (B) P. Maheshwari
  - (C) K. C. Mehta
  - (D) S. R. Kashyap
16. Convection currents, which move the tectonic plates, are found in which layer of the earth ?
- (A) Crust
  - (B) Mantle
  - (C) Outer core
  - (D) Inner core

17. Laurasia and Gondwana land were separated by :

- (A) Black sea
- (B) Red sea
- (C) Tethys sea
- (D) Pacific ocean

18. Who is credited with developing the principle of faunal succession ?

- (A) Charles Lyell
- (B) Charles Darwin
- (C) William "Strata" Smith
- (D) John C. Butler

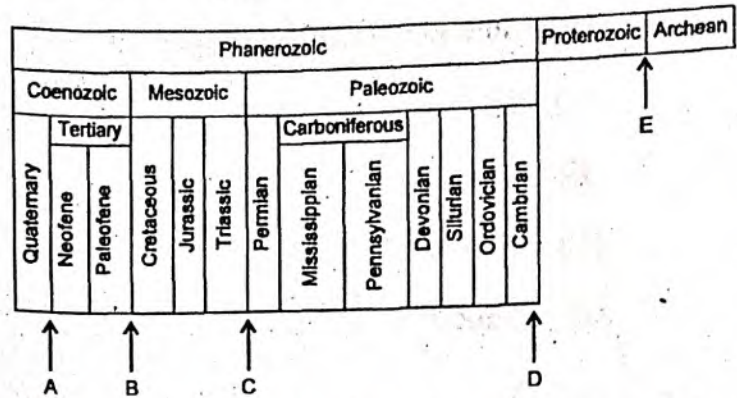
19. A stratigraphic sequence is a vertical set of strata :

- (A) used as chronological record of the geologic history of region
- (B) that is unique to a specific area
- (C) that represents a repeating set of events such as recurring floods, debris flows etc.
- (D) bounded above and below by igneous and / or metamorphic rocks

20. Radiometric dating is least useful for which rocks ?

- (A) Granitic
- (B) Basaltic
- (C) Metamorphic
- (D) Sedimentary

Diagram of Q. No. 21 to 25 :



21. The age estimate for point A in the diagram above in million years :

- (A) 0.16
- (B) 1.6
- (C) 16
- (D) 160

22. The age estimate for point B in the diagram above is million years :

- (A) 35
- (B) 65
- (C) 245
- (D) 570

23. The age estimate for point C in the diagram above in million years :

- (A) 35
- (B) 65
- (C) 245
- (D) 570

24. The age estimate for point D in the diagram above is million years :
- (A) 65  
(B) 245  
(C) 570  
(D) 2500
25. The age estimate for point E in the diagram above is million years :
- (A) 570  
(B) 2500  
(C) 3000  
(D) 4500
26. Most periods in the geologic time scale are named for :
- (A) geographic localities  
(B) fossils  
(C) catastrophic events  
(D) paleontologists
27. What scientific avenue of investigation gave scientists the best estimates of the age of earth ?
- (A) Dating fossils  
(B) Archaeological dating  
(C) Radiometric dating  
(D) Carbon dating
28. Fossil fuels are rich in carbon and :
- (A) Nitrogen  
(B) Hydrogen  
(C) Methane  
(D) Oxygen
29. Why is coal called gold ?
- (A) Due to its commercial value  
(B) Due to its occurrence in mines  
(C) Due to carbon content present in it  
(D) Due to its black colour
30. Aperture are distributed all over the surface of pollen, condition is known as :
- (A) Pantotreme  
(B) Zonotreme  
(C) Calatreme  
(D) Anatreme
31. Natural gas is composed mainly of which type of gas ?
- (A) Propane  
(B) Methane  
(C) Butane  
(D) Ethane

32. Select the continent where coal is not found :
- (A) Africa
  - (B) North America
  - (C) Australia
  - (D) Antarctica
33. What is one difference between a common organic fuel such as wood and a fossil fuel ?
- (A) Wood burns more slowly
  - (B) Fossil fuels burn faster
  - (C) Fossil fuels make more efficient fuels
  - (D) Wood is in higher demand
34. What is fellow coal ?
- (A) Bituminous
  - (B) Anthracite
  - (C) Lignite
  - (D) Peat
35. Maceral is a :
- (A) Non-crystalline organic substance
  - (B) Crystalline inorganic substance
  - (C) Non-crystalline inorganic substance
  - (D) Crystalline organic substance
36. Formula of coal is :
- (A)  $C_{201} H_{142} O_{26} N_2$
  - (B)  $C_{221} H_{148} O_{28} N_2$
  - (C)  $C_{100} H_{82} O_{22} N_2$
  - (D)  $C_{160} H_{72} O_{20} N_2$
37. Tectonic plates are constantly moving at a few ..... each year.
- (A) metres
  - (B) centimetres
  - (C) millimetres
  - (D) kilometers
38. Stony piece of fossils found in Animal's stomach :
- (A) Gastrolith
  - (B) Coprolites
  - (C) Otoliths
  - (D) Ammonites
39. Which state is rich in coal ?
- (A) Jharkhand
  - (B) U. P.
  - (C) Maharashtra
  - (D) Gujarat

40. How much CO<sub>2</sub> is in coal ?
- (A) 2.07 pound
  - (B) 1.07 pound
  - (C) 2.04 pound
  - (D) 2.02 pound
41. Which one is not a macerol ?
- (A) Internite
  - (B) Bauxite
  - (C) Vitrinite
  - (D) Liptinite
42. A dangerous activity which results in many deaths due to gas explosion, caves in or flooding is :
- (A) coal mining
  - (B) climbing mountain
  - (C) extracting oil
  - (D) hydropower generation
43. Why do fossil fuels generate more power than wood use in machines ?
- (A) Fossil fuel have a higher conc. of C and H
  - (B) Fossil fuels are drier
  - (C) Fossil fuel are easier to light
  - (D) Fossil fuel are easier to transport
44. Pollen without aperture are called :
- (A) Anatreme
  - (B) Atreme
  - (C) Operculate
  - (D) Inoperculate
45. Pollen grains with spine on exile :
- (A) Echinate
  - (B) Verrucate
  - (C) Psilate
  - (D) Baculate
46. Burning of fossil fuels is leading environment towards :
- (A) Pollution
  - (B) Global warming
  - (C) Climate change
  - (D) All of the above
47. The Era in which Appalachian Revolutions occur is :
- (A) Proterozoic Era
  - (B) Paleozoic Era
  - (C) Mesozoic Era
  - (D) Coenozoic Era

48. Which is the best method of "Dating fossils" ?
- (A) ESR method
  - (B) Radio-Carbon method
  - (C) Lead method
  - (D) K-Argon method
49. In human body first fossilization occurs of :
- (A) Teeth
  - (B) Bones
  - (C) Jaws
  - (D) Skull
50. Which was the first horse old word ?
- (A) Merychippus
  - (B) Equips
  - (C) Eohippus
  - (D) Mesohippus
51. Ammonites become extinct in :
- (A) Cambrian period
  - (B) Carboniferous period
  - (C) Cretaceous period
  - (D) Permian period
52. A heliotype is :
- (A) a single physical example of an organism known to have been used when the species was described
  - (B) a term used to describe the special type of bones found exclusively in birds
  - (C) a recently formed fossil specimen
  - (D) None of the above
53. The process of continents moving over millions of year is called :
- (A) continental drift
  - (B) plate boundary
  - (C) heat
  - (D) radioactive rocks
54. Metamorphic rocks are ..... that have been changed.
- (A) by pressure
  - (B) thousands of years
  - (C) existing rocks
  - (D) limestone

55. "Impression of past found in rocks is called fossils." This definition was given by :
- (A) Charles Lyell  
 (B) Charles Darwin  
 (C) Thomas Malthus  
 (D) A. R. Wallace
56. Which of the following can be inferred from studying the fossilized skeletons of animals ?
- (A) Pathologies  
 (B) Life expectancy  
 (C) Growth pattern  
 (D) All of the above
57. Organic theory of petroleum origin by Engler was proposed in :
- (A) 1900  
 (B) 1645  
 (C) 2001  
 (D) 1800
58. The earth is supposed to be originated before :
- (A) 4.6 billion years ago  
 (B) 3.4 billion years ago  
 (C) 4.6 million years ago  
 (D) None of the above
59. The quality of coal, called its rank, is a measure of which of the following characters ?
- (A) Amount of carbon in coal  
 (B) Amount of oxygen in coal  
 (C) How much black it is  
 (D) How hard it is
60. Birbal Sahni Institute of Palaeobotany is situated at :
- (A) New Delhi  
 (B) Lucknow  
 (C) Hyderabad  
 (D) Dehradun
61. Which of the following periods is "Age of Fishes" ?
- (A) Devonian  
 (B) Silurian  
 (C) Ordovician  
 (D) Cambrian
62. The scientific study of the structure of bones, skeletal elements and micro bone morphology are called :
- (A) Osteology  
 (B) Herpetology  
 (C) Entomology  
 (D) None of the above

63. Phytoliths data are used as a mean of Palaeoclimatic reconstruction because :
- (A) they do not decay
  - (B) they decay easily
  - (C) they are pseudofossils
  - (D) they are trace fossils
64. Professor Birbal Sahni and H. S. Rao have described a petrified fossil of water fern *Azolla intertrappa* from early Tertiary in India :
- (A) 1989
  - (B) 2000
  - (C) 1943
  - (D) None of the above
65. 'Geological Time Scale' first introduced by :
- (A) Arthur Holmes
  - (B) Lamarck
  - (C) Charles Darwin
  - (D) Packard
66. First cell produced on earth was :
- (A) Probiot
  - (B) Protozoa
  - (C) Metazoa
  - (D) None of the above
67. The origin of Angiosperms occurs in :
- (A) Jurassic
  - (B) Cretaceous
  - (C) Triassic
  - (D) Permean
68. First amphibian group appeared in Devonian period :
- (A) stegocephalia
  - (B) cotylasaures
  - (C) sphenodon
  - (D) plesiosauria
69. Number of Eras in Geological time scale is :
- (A) three
  - (B) four
  - (C) five
  - (D) six



70. Coal swamp of gymnosperms developed in :
- (A) Permian
  - (B) Devonian
  - (C) Mississippian
  - (D) Pennsylvanian
71. The large pieces of the crust and upper part of the mantle are called :
- (A) Tectonics plates
  - (B) Flow
  - (C) Centimetres
  - (D) Mountains
72. Cenozoic Era is known as :
- (A) Era of flowering plants
  - (B) Era of gymnosperms
  - (C) Era of pteridophytes
  - (D) Era of algae
73. Which Era is called "Era of Ancient Life" ?
- (A) Proterozoic Era
  - (B) Paleozoic Era
  - (C) Mesozoic Era
  - (D) Cenozoic Era
74. Which is character of good fossil ?
- (A) Must be short lived
  - (B) Wide geological range
  - (C) Cannot easily decompose
  - (D) All of the above
75. Who is the founder of "Modern Paleontology" ?
- (A) George Cuvier
  - (B) Leonardo da Vinci
  - (C) Birbal Sahni
  - (D) Charles Lyell
76. Hypothesis of continental drift was written in :
- (A) 1895
  - (B) 1900
  - (C) 1905
  - (D) 1910

77. To which one of the following the genus *Williamsonia* belongs ?
- (A) Cycadales  
(B) Coniferales  
(C) Gnetales  
(D) Bennettiales
78. The pollen-bearing organs of *Lyginopteris* belong to :
- (A) Cycadeoidea  
(B) *Crosstheca*  
(C) *Calymmatotheca*  
(D) *Williamsonia*
79. Jurassic period is about :
- (A) 265 million years back  
(B) 165 million years back  
(C) 65 million years back  
(D) 365 million years back
80. Fossil beehives is the name associated with fossil :
- (A) Cycadales  
(B) Coniferales  
(C) Pteridophytes  
(D) Ginkgoales
81. The leaves of *Zygopteridaceae* belong to the genus :
- (A) *Callixylon*  
(B) *Etapteris*  
(C) *Selaginella*  
(D) *Ptilophyllum*
82. *Nipaniophyllum* belongs to :
- (A) Bennettiales  
(B) Filicales  
(C) Cordaitales  
(D) Pentoxylales
83. *Baragwanathia* a fossil pteridophyte was discovered from :
- (A) Rhynie Chert bed of Scotland  
(B) Raj Mahal hills of Bihar  
(C) Silurian beds of Victoria, Australia  
(D) Mudstones near Giloba, New York
84. The diatomaceous earth of tertiary deposits found in California is :
- (A) 300 feet thick  
(B) 500 feet thick  
(C) over 1000 feet thick  
(D) over 1000 feet and below 200 feet thick

85. Zosterophyllum is :
- (A) Fossil algae
  - (B) Fossil bryophyta
  - (C) Fossil pteridophyta
  - (D) Fossil gymnosperm
86. Which is known as fossil bryophyte ?
- (A) Marchantia palmata
  - (B) Riccia fluitans
  - (C) Naiadita lanceolata
  - (D) Marchantia polymorpha
87. What is the study of ancient plants called ?
- (A) Paleontology
  - (B) Palynology
  - (C) Palaeobotany
  - (D) Plaeobiology
88. Which of the following is not a type of fossilized plant ?
- (A) Petrified wood
  - (B) Coal
  - (C) Dinosaur bones
  - (D) Leaf impressions
89. What type of plant fossil is a cast of a plant stem or leaf found in rock ?
- (A) Mold
  - (B) Cast
  - (C) Carbon film
  - (D) Compression
90. Which of the following is not a characteristic of the Devonian period ?
- (A) Land plants first appeared
  - (B) Fish with jaws evolved
  - (C) Dinosaurs first appeared
  - (D) Wingless insects evolved
91. What is the study of fossil pollen and spores called ?
- (A) Palaeobotany
  - (B) Histology
  - (C) Palynology
  - (D) Paleontology
92. What is the name of the first seed bearing plants ?
- (A) Gymnosperms
  - (B) Angiosperms
  - (C) Pteridophytes
  - (D) None of the above

93. Life originated in the era :
- (A) Precambrian
  - (B) Proterozoic
  - (C) Mesozoic
  - (D) Cenozoic
94. Which of the following was described by Kidston and Lang from the Devonian period ?
- (A) Rhynia
  - (B) Lepidodendron
  - (C) Lepidocarpon
  - (D) None of the above
95. The first seed plant appeared during :
- (A) Silurian period
  - (B) Devonian period
  - (C) Carboniferous period
  - (D) Cretaceous period
96. To what period prokaryotic microbes belong ?
- (A) Precambrian
  - (B) Proterozoic
  - (C) Azoic
  - (D) Palaeozoic
97. What type of plant fossils are formed when a plant is buried in sediment and the organic material is replaced by mineral matter ?
- (A) Pelerification
  - (B) Canonization
  - (C) Mummification
  - (D) None of the above
98. Ozone layer is formed in :
- (A) Thermosphere
  - (B) Stratosphere
  - (C) Mesosphere
  - (D) Lithosphere
99. Which is the source of micro-botanical evidence ?
- (A) Starch grains of some plants
  - (B) Diatoms
  - (C) Phytoliths
  - (D) All of the above
100. Which is not considered as a Pseudo fossil ?
- (A) Dendrites
  - (B) Concretions
  - (C) Nodules
  - (D) Diatoms

Roll No. ....

Question Booklet Number

321195

O. M. R. Serial No.

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**M. Sc. (Second Semester) (NEP)  
EXAMINATION, 2022-23**

**BOTANY**

**(Plant Breeding and Elementary Biostatistics) (Elective)**

Paper Code

B 0 4 0 8 0 5 T

Questions Booklet  
Series

C

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. The Pearson correlation coefficient is appropriate when :
  - (A) both variables are categorical
  - (B) one variable is continuous and other is categorical
  - (C) both variables are continuous and have a linear relationship
  - (D) None of the above
2. Regression analysis is used to :
  - (A) determine causation between two variables
  - (B) predict future outcomes based on historical data
  - (C) measure the strength of association between two variables
  - (D) identify statistical outliers in a data set
3. In simple linear regression, the relationship between the dependent variable and independent variable is assumed to be :
  - (A) non-linear
  - (B) curvilinear
  - (C) linear
  - (D) exponential
4. A t-test is used to determine :
  - (A) the correlation between two variables'
  - (B) the difference between two sample means
  - (C) Both (A) and (B)
  - (D) None of the above
5. The null hypothesis for a t-test states that :
  - (A) there is no difference between the sample means
  - (B) there is a significant difference between the sample means
  - (C) Both (A) and (B)
  - (D) None of the above
6. The Chi-square test is calculated by comparing :
  - (A) observed frequencies to expected frequencies
  - (B) correlation coefficients
  - (C) Both (A) and (B)
  - (D) None of the above
7. The degrees of freedom in a dihybrid cross is :
  - (A) 3
  - (B) 4
  - (C) 1
  - (D) 2

8. The degrees of freedom in a Chi-square test are calculated as :
- (A) number of phenotypes - 1
  - (B) number of phenotypes + 1
  - (C) number of phenotypes - 2
  - (D) None of the above
9. The mean is calculated by :
- (A) summing all values in a dataset and dividing by the total count
  - (B) identifying the middle value in a data set
  - (C) Both (A) and (B)
  - (D) None of the above
10. The mean is a measure of :
- (A) variability in a data set
  - (B) central tendency in a data set
  - (C) correlation between two variables
  - (D) None of the above
11. If a data set has two modes it is called :
- (A) bimodal
  - (B) unimodal
  - (C) multimodal
  - (D) No mode
12. The mode represents :
- (A) the middle value in a data set
  - (B) the average value in a data set
  - (C) the most frequent occurring value(s) in a data set
  - (D) None of the above
13. The median is calculated by :
- (A) ranking the values in ascending order and selecting the value in the middle
  - (B) identifying middle value in a data set
  - (C) determining the most frequent value
  - (D) None of the above
14. Biostatistics is the application of statistical methods to :
- (A) analyze data from biological experiments
  - (B) design clinical trials and studies
  - (C) understand health related phenomena
  - (D) All of the above

15. The development and release of new crop varieties in India are regulated by :

- (A) ICAR
- (B) Ministry of agriculture and farmers welfare
- (C) NBPGR
- (D) Plant variety protection and farmer's rights authority (PPV and FRA)

16. The breeding of genetically modified (GM) crops involves :

- (A) hybridization
- (B) introduction of foreign genes into a plant's genome
- (C) cloning through tissue culture
- (D) None of the above

17. Genomic selection in plant breeding involves :

- (A) selecting plants on their physical traits
- (B) using statistical models to predict breeding values based on genomic data
- (C) Both (A) and (B)
- (D) None of the above

18. The organization responsible for Potato research in India is :

- (A) ICAR
- (B) CPRI
- (C) NBPGR
- (D) None of the above

19. New potato varieties are developed to :

- (A) improve yield and disease resistance
- (B) enhance culinary qualities and flavor
- (C) extend shelf life and storage potential
- (D) All of the above

20. The oilseed research and development institute in India is :

- (A) IARI
- (B) ICAR
- (C) CIOR
- (D) None of the above

21. In plant breeding probability is used to :

- (A) predict the exact outcome of a breeding program
- (B) assess the likelihood of obtaining traits in offspring
- (C) Both (A) and (B)
- (D) None of the above



22. The probability of obtaining a homozygous recessive genotype from a cross between ( $Aa \times Aa$ ) is :
- (A)  $1/4$   
 (B)  $1/2$   
 (C)  $3/4$   
 (D) 1
23. When two plants are crossed, the probability of obtaining a specific trait in the offspring depends on :
- (A) the genetic makeup of the parents  
 (B) the size of the breeding population  
 (C) Both (A) and (B)  
 (D) None of the above
24. What is a contingency table ?
- (A) a table that shows the distribution of one categorical variable  
 (B) a table that shows the relationship between two categorical variables  
 (C) Both (A) and (B)  
 (D) None of the above
25. How many variables are represented in a contingency table ?
- (A) 1  
 (B) 2  
 (C) 3  
 (D) 4
26. What statistical test is commonly used to analyse contingency tables ?
- (A)  $t$ -test  
 (B) chi-square test  
 (C) ANOVA (analysis of variances)  
 (D) None of the above
27. Simple random sampling is a sampling method in which :
- (A) every individual in the population has an equal chance of being selected  
 (B) the population is divided into clusters and clusters are randomly selected  
 (C) Both (A) and (B)  
 (D) None of the above
28. Stratified random sampling is used when :
- (A) population is small, homogenous  
 (B) population is large, heterogeneous  
 (C) population is divided into strata based on specific characteristics  
 (D) None of the above

29. Clonal selection technique is used in :
- animal breeding
  - plant breeding
  - microbial fermentation
  - None of the above
30. Which of the following techniques is often used in Clonal selection ?
- Micropropagation
  - Genetic transformation
  - Both (A) and (B)
  - None of the above
31. Which plant breeding system is commonly used to develop  $F_1$  hybrid varieties ?
- Self pollination
  - Gross pollination
  - Inbreeding
  - None of the above
32. Chi-square formula :
- $\chi^2 = \sum \left( \frac{(\text{Observed frequency} - \text{Expected frequency})^2}{\text{Expected frequency}} \right)$
  - $\chi^2 = \sum \left( \frac{(\text{Observed frequency} + \text{Expected frequency})^2}{\text{Expected frequency}} \right)$
  - $\chi^2 = \sum \left( \frac{(\text{Observed frequency} - \text{Expected frequency})}{\text{Expected frequency}} \right)$
  - None of the above
33. Widely cultivated sugarcane variety known for its high sugar content is :
- Co O 238
  - SP80 - 3280
  - Q117
  - None of the above
34. Sugarcane breeding institute is located in :
- Lucknow
  - Pune
  - Coimbatore
  - None of the above
35. Distant hybridization involves crossing two plant species that are :
- genetically identical
  - genetically different
  - Both (A) and (B)
  - None of the above
36. Which international organization has played a key role in promoting mutation breeding ?
- IAEA
  - WHO
  - UNESCO
  - FAO

37. What is the potential drawback of mutation breeding ?
- (A) Environmental contamination by genetically modified organisms
  - (B) Inefficient process
  - (C) Time consuming process
  - (D) Unpredictable and unintended effects on plant characteristics
38. Which techniques is commonly used to identify desirable mutations in plants after mutagenesis ?
- (A) DNA sequencing
  - (B) Polymerase chain reaction
  - (C) Phenotypic screening
  - (D) Genomic mapping
39. Culture of isolated plant cells without a cell wall in a nutrient medium :
- (A) Organogenesis
  - (B) Callus culture
  - (C) Suspension culture
  - (D) Protoplast culture
40. Which of the following is an example of heteroploidy ?
- (A) Triploidy
  - (B) Tetraploidy
  - (C) Aneuploidy
  - (D) All of the above
41. Heteroploidy can be induced artificially through :
- (A) Chemical mutagens
  - (B) Radiation
  - (C) Cross breeding different species
  - (D) All of the above
42. Ti plasmid is used in :
- (A) gene cloning
  - (B) PCR
  - (C) DNA sequencing
  - (D) Southern blotting
43. Which bacterium harbors the Ti plasmid ?
- (A) *Agrobacterium tumefaciens*
  - (B) *Escherichia coli*
  - (C) *Bacillus subtilis*
  - (D) None of the above

44. The Ti plasmid can transfer DNA to :
- Prokaryotic cells
  - Animal cells
  - Fungal cells
  - Plant cells
45. Which factor is critical for successful cryopreservation ?
- Slow cooling rate
  - High temperature fluctuations during storage
  - Absence of cryoprotectants
  - Prolonged exposure to room temperature
46. Application of cryopreservation is :
- preservation of endangered species
  - production of modified organisms
  - cloning of animals
  - DNA sequencing
47. RFLP is a technique used to study :
- protein-protein interaction
  - DNA methylation patterns
  - Genetic variations in DNA sequences
  - None of the above
48. Transgenic plants are :
- plants that have undergone natural genetic modifications
  - plants that have been genetically engineered to contain foreign genes
  - Both (A) and (B)
  - None of the above
49. Somatic embryogenesis is used in :
- animal cloning
  - tissue cultures
  - gene editing
  - hybridization
50. Which hormones are commonly used to induce somatic embryogenesis in plants ?
- Gibberellins
  - Ethylene
  - Auxins and Cytokinins
  - None of the above
51. Anther culture is :
- a technique used to culture plant shoots
  - a technique used to culture anthers to obtain haploid plants
  - Both (A) and (B)
  - None of the above

52. Who is considered the father of modern plant breeding ?
- (A) Gregor Mendel  
 (B) Luther Burbank  
 (C) Norman Borlaug  
 (D) Robert Bakewell
53. The process of crossing two different plant varieties to produce offspring with desirable traits is known as :
- (A) self-pollination  
 (B) outbreeding  
 (C) hybridization  
 (D) mutation breeding
54. The green revolution focused on improving which crop ?
- (A) Wheat  
 (B) Rice  
 (C) Maize  
 (D) Soybeans
55. What was the main goal of 'pure line theory' ?
- (A) Development of genetically modified organisms  
 (B) Creation of hybrid crops  
 (C) Isolation and stabilization of uniform plant lines  
 (D) Preservation of wild plant species
56. Plant breeder known for his pioneering work in developing disease resistant wheat varieties :
- (A) Luther Burbank  
 (B) Norman Borlaug  
 (C) Both (A) and (B)  
 (D) None of the above
57. Green revolution aimed to :
- (A) reducing pollution  
 (B) increasing agricultural productivity and food production  
 (C) renewable energy sources  
 (D) None of the above
58. The domestication of plants is :
- (A) grown in labs  
 (B) adapted to survive in harsh climates  
 (C) cultivated and bred for human use  
 (D) conservation of plants

59. The concept of 'centres of origin' refers to :
- (A) advanced farming techniques
  - (B) first agriculture
  - (C) wild plant species with high genetic diversity
  - (D) None of the above
60. Who proposed the concept of 'centres of origin' ?
- (A) Nicolai Vavilov
  - (B) M. S. Swaminathan
  - (C) Both (A) and (B)
  - (D) None of the above
61. Vavilovian centres are :
- (A) highest biodiversity of animals
  - (B) medicinal plants are found
  - (C) new plant species discovered
  - (D) regions with high plant diversity and origins
62. The term 'Heterosis' was coined by :
- (A) G. Mendel
  - (B) C. Darwin
  - (C) N. Vavilov
  - (D) G. H. Shull
63. Hybrid seed production requires :
- (A) Hand-pollination techniques
  - (B) Genetic modification
  - (C) Water management
  - (D) None of the above
64. Hybrid vigor refers to :
- (A) hybrid plants exhibit improved traits compared to their parents
  - (B) disease resistance
  - (C) genetic mutations
  - (D) None of the above
65. Most widely adopted genetically engineered crop is :
- (A) golden rice
  - (B) blue berries
  - (C) Both (A) and (B)
  - (D) None of the above
66. Potential benefit of genetic engineering in crop improvement is :
- (A) increased biodiversity
  - (B) decreased pesticide use
  - (C) enhanced soil fertility
  - (D) None of the above

67. The first genetically engineered crop to be commercially released was :
- corn (maize)
  - rice
  - soybeans
  - wheat
68. Genetically engineered crops are :
- organic crops
  - hybrid crops
  - transgenic crops
  - None of the above
69. The process of tissue culture involves :
- growing plants in controlled environment
  - cloning plants through asexual reproduction
  - Both (A) and (B)
  - None of the above
70. Traditional plant breeding methods involve the process of :
- genetic modification
  - cloning
  - cross-pollination
  - tissue culture
71. Plant breeding goal is :
- reduce crop yield
  - decrease genetic diversity
  - improving desirable traits in plants
  - None of the above
72. Cleistogamous flowers are :
- insect pollinated
  - remained closed during pollination and self fertilize
  - wind pollinated
  - None of the above
73. Apomixis is a form of reproduction in plants that involves :
- self-pollination and self-fertilization
  - vegetative propagation
  - asexual reproduction without fertilization
  - cross pollination and hybridization
74. Emasculation is :
- the removal of male reproductive organs
  - the removal of female reproductive organs
  - Both (A) and (B)
  - None of the above
75. Emasculation is commonly performed in plants for :
- self-pollination
  - cross-pollination
  - Both (A) and (B)
  - None of the above

76. Which of the following organizations is responsible for wheat and maize improvement in India ?

- (A) ICAR
- (B) NSC
- (C) FCI
- (D) None of the above

77. The green revolution in India was initiated in the :

- (A) 1950s
- (B) 1960s
- (C) 1970s
- (D) 1980s

78. The development of high yielding wheat varieties in India was led by :

- (A) Dr. M. S. Swaminathan
- (B) Dr. Norman Borlaug
- (C) Dr. V. Kurian
- (D) None of the above

79. In India, major maize producer state is :

- (A) Madhya Pradesh
- (B) Karnataka
- (C) Gujarat
- (D) Bihar

80. Wheat bowl of India is :

- (A) Punjab
- (B) Uttar Pradesh
- (C) Rajasthan
- (D) Maharashtra

81. The cultivation of paddy requires :

- (A) dry conditions
- (B) well-drained soil
- (C) saline soil
- (D) wet and waterlogged conditions

82. Popular variety of aromatic rice in India is :

- (A) Basmati
- (B) Jasmine
- (C) Sushirice
- (D) None of the above

83. Major sugarcane producing state is :

- (A) Uttar Pradesh
- (B) Bihar
- (C) Both (A) and (B)
- (D) None of the above

84. Which method is commonly used for sugarcane propagation ?

- (A) Seed sowing
- (B) Grafting
- (C) Tissue culture
- (D) Stem cuttings

85. High yielding variety of potato commonly grown in India is :

- (A) Kufri Jyoti
- (B) Pusa Kranti
- (C) Coimbatore potato-1
- (D) Lal Aloo



86. The process of producing new potato varieties through controlled pollination and selection is known as :
- (A) tissue culture
  - (B) mutation breeding
  - (C) hybridization
  - (D) clonal propagation
87. Bt cotton is a genetically modified cotton variety that produces a toxin to protect against :
- (A) fungal diseases
  - (B) bacterial diseases
  - (C) insect pests
  - (D) weeds
88. High yielding variety of pulses in India is :
- (A) Pusa Basmati
  - (B) Rajma Chitra
  - (C) Moong Dhuli
  - (D) Arhar Dal
89. High yielding pulse varieties are selected for their :
- (A) nutritional value
  - (B) disease resistance
  - (C) seed yield
  - (D) All of the above
90. In India commonly grown high yielding variety of oil seeds is :
- (A) Mustard Pusa Bold
  - (B) Groundnut JL-24
  - (C) Sunflower Modern
  - (D) Soybean Co1
91. The process of improving oil seed crops by altering their genetic makeup using recombinant DNA technology is called :
- (A) selection
  - (B) mutation breeding
  - (C) genetic engineering
  - (D) None of the above
92. Polyploidy can result sterility in plants due to :
- (A) incompatibility between chromosomes
  - (B) absence of flowering
  - (C) chromosomal breakage
  - (D) lack of seed development
93. Polyploidy crops are :
- (A) wheat and cotton
  - (B) rice and maize
  - (C) tomato and potato
  - (D) soybean and canola

94. Polyploidy is advantageous in plant breeding :
- (A) enhances crop adaptability to different environments
  - (B) increases the expression of desirable traits
  - (C) facilitates the production of seedless fruits
  - (D) All of the above
95. The process of inducing polyploidy artificially in plants is known as :
- (A) hybridization
  - (B) tissue culture
  - (C) mutagenesis
  - (D) cloning
96. Which statistical software is known for its extensive library support and versatile data analysis capabilities ?
- (A) R
  - (B) SPSS
  - (C) SAS
  - (D) MATLAB
97. Which software is primarily used for numerical computing and offers statistical functions and tool boxes ?
- (A) MATLAB
  - (B) SPSS.
  - (C) Excel
  - (D) None of the above
98. ANOVA is used to analyze the differences between :
- (A) two independent samples
  - (B) two dependent samples
  - (C) multiple independent samples
  - (D) multiple dependent samples
99. In a one way ANOVA, how many groups are compared ?
- (A) 1
  - (B) 2
  - (C) 3
  - (D) any number greater than 1
100. The correlation coefficient ranges between :
- (A) -1 and 0
  - (B) 0 and 1
  - (C)  $-\infty$  and  $\infty$
  - (D) 0 and  $\infty$