**Roll. No. .....**

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

**Question Booklet Number**

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

## BOTANY

## ( Advanced Phycology )

| Paper Code | | | | | | | |
|---|---|---|---|---|---|---|---|
| B | 0 | 4 | 1 | 0 | 0 | 3 | T |

**Question Booklet Series**

**A**

**Time : 1 : 30 Hours** **Max. Marks : 75**

**Instructions to the Examinee :**

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. All questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.
4. Four alternative answers are mentioned for each question as - A, B, C & D in the booklet. The candidate has to choose the correct / answer and mark the same in the OMR Answer-Sheet as per the direction :

***(Remaining instructions on last page)***

**परीक्षार्थियों के लिए निर्देश :**

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, उसे तुरन्त बदल लें।
4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर- A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से सही उत्तर छाँटना है। उत्तर को OMR उत्तर-पत्रक में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

*(शेष निर्देश अन्तिम पृष्ठ पर)*

1. What is the primary factor influencing the distribution of marine algae in Indian coastal waters?

(A) Temperature

(B) Salinity

(C) Light intensity

(D) All of the above

2. Which of the following marine algal forms is commonly found in the intertidal zone of Indian coasts?

(A) Phytoplankton

(B) Seaweeds

(C) Seagrasses

(D) Microphytobenthos

3. Marine algae in Indian coastal waters play a crucial role in:

(A) Primary production

(B) Fodder production

(C) Food production

(D) Reclamation

4. Which type of marine algae is commonly used as a source of agar in India?

(A) Red algae (Rhodophyceae)

(B) Green algae (Chlorophyceae)

(C) Brown algae (Phaeophyceae)

(D) Diatoms

5. What is the name of the marine algal bloom that can be harmful to marine life in Indian coastal waters?

(A) Red tide

(B) Green tide

(C) Brown tide

(D) All of the above

6. Which of the following Indian coastal regions is known for its rich marine algal diversity?

(A) Gulf of Mannar

(B) Gulf of Kutch

(C) Lakshadweep Islands

(D) All of the above

7. What is the importance of studying the distribution pattern of marine algae in Indian coastal waters?

(A) To understand the impact of climate change

(B) To conserve marine biodiversity

(C) To promote sustainable harvesting of seaweeds

(D) All of the above

8. What is the role of marine algae in the marine food chain?

(A) Primary producers

(B) Primary consumers

(C) Secondary consumers

(D) Decomposers

9. Which of the following is a characteristic of marine algae found in the subtidal zone?
   (A) Low light tolerance
   (B) High light tolerance
   (C) Ability to withstand desiccation
   (D) Ability to withstand strong wave action

10. What is the impact of pollution on marine algal communities in Indian coastal waters?
   (A) Increased biodiversity
   (B) Decreased biodiversity
   (C) No impact
   (D) Increased growth rate

11. Which type of marine algae is commonly used as a fertilizer in India?
   (A) Red algae (Rhodophyceae)
   (B) Green algae (Chlorophyceae)
   (C) Brown algae (Phaeophyceae)
   (D) Cyanophyceae

12. What is the primary method used for isolating algae from mixed cultures?
   (A) Centrifugation
   (B) Filtration
   (C) Streak plate method
   (D) Spreading method

13. Which of the following is a common medium used for culturing algae?
   (A) Nutrient agar
   (B) LB broth
   (C) BG-11 medium
   (D) Potato dextrose agar

14. What is the purpose of purification in algal culture?
   (A) To increase growth rate
   (B) To enhance pigment production
   (C) To obtain axenic cultures
   (D) To reduce contamination

15. Which technique is used to separate algae based on their density?
   (A) Centrifugation
   (B) Filtration
   (C) Electrophoresis
   (D) Chromatography

16. What is the importance of mass culture of algae?
   (A) Production of bioactive compounds
   (B) Bioremediation
   (C) Biofuel production
   (D) All of the above

17. Which of the following factors affects algal growth in mass culture?
   (A) Light intensity
   (B) Temperature
   (C) Nutrient availability
   (D) All of the above

18. What is the role of aeration in algal mass culture?

(A) To increase temperature

(B) To reduce contamination

(C) To provide CO2 and mixing

(D) To enhance sedimentation

19. Which type of bioreactor is commonly used for algal mass culture?

(A) Stirred tank bioreactor

(B) Bubble column bioreactor

(C) Photobioreactor

(D) All of the above

20. What is the purpose of monitoring pH in algal culture?

(A) To maintain optimal growth conditions

(B) To enhance pigment production

(C) To reduce contamination

(D) To increase temperature

21. Which method is used to harvest algae from mass culture?

(A) Centrifugation

(B) Filtration

(C) Sedimentation

(D) All of the above

22. What is the importance of sterilization in algal culture?

(A) To reduce contamination

(B) To enhance growth rate

(C) To increase pigment production

(D) To improve nutrient uptake

23. Which of the following algae is commonly used for mass culture?

(A) Chlorella

(B) Spirulina

(C) Dunaliella

(D) All of the above

24. Which type of culture system is used for large-scale algal production?

(A) Open pond system

(B) Closed bioreactor system

(C) Both (A) and (B)

(D) None of the above

25. What is the benefit of using algae for biofuel production?

(A) Renewable energy source

(B) Low greenhouse gas emissions

(C) Sustainable feedstock

(D) All of the above

26. Which pigment is responsible for the red color in some algae?

(A) Chlorophyll

(B) Carotenoids

(C) Phycobiliproteins

(D) Fucoxanthin

27. What is the main reserve food material in green algae?

(A) Starch

(B) Glycogen

(C) Lipids

(D) Proteins

28. Which type of algae stores laminarin as a reserve food material?

(A) Green algae

(B) Red algae

(C) Brown algae

(D) Diatoms

29. What is the composition of cell walls in diatoms?

(A) Cellulose

(B) Silica

(C) Chitin

(D) Pectin

30. Which pigment is common in brown algae and diatoms?

(A) Chlorophyll a

(B) Chlorophyll b

(C) Fucoxanthin

(D) Carotenoids

31. What is the function of carotenoids in algae?

(A) Light absorption

(B) Photoprotection

(C) Energy storage

(D) Nutrient uptake

32. Which type of algae has a cell wall composed of cellulose and xylan?

(A) Green algae

(B) Red algae

(C) Brown algae

(D) Diatoms

33. What is the role of phycobiliproteins in cyanobacteria and red algae?

(A) Light absorption

(B) Energy storage

(C) Nutrient uptake

(D) Photoprotection

34. Which algal pigment is used as a natural food coloring?

(A) Chlorophyll

(B) Carotenoids

(C) Phycobiliproteins

(D) Astaxanthin

35. Which type of algae stores floridean starch as a reserve food material?

(A) Green algae

(B) Red algae

(C) Brown algae

(D) Diatoms

36. Which pigment is responsible for the green color in algae?

(A) Chlorophyll a

(B) Chlorophyll b

(C) Carotenoids

(D) Both (A) and (B)

37. Which type of algae has a cell wall composed of agar?

(A) Green algae

(B) Red algae

(C) Brown algae

(D) Diatoms

38. What is the primary function of heterocysts in cyanobacteria?

(A) Nitrogen fixation

(B) Photosynthesis

(C) Nutrient uptake

(D) Reproduction

39. What is the role of HetR protein in heterocyst differentiation?

(A) Repressor of differentiation

(B) Activator of differentiation

(C) Nutrient uptake

(D) Photosynthesis regulation

40. Which type of cells are involved in the survival of cyanobacteria under stress conditions?

(A) Heterocysts

(B) Akinetes

(C) Hormogonia

(D) Vegetative cells

41. What is the role of NtcA protein in heterocyst differentiation?

(A) Repressor of differentiation

(B) Activator of differentiation

(C) Nutrient uptake

(D) Photosynthesis regulation

42. What is the function of PatS protein in heterocyst differentiation?

(A) Activator of differentiation

(B) Repressor of differentiation

(C) Nutrient uptake

(D) Photosynthesis regulation

43. Which environmental factor inhibits heterocyst differentiation?

(A) High nitrogen levels

(B) Low light intensity

(C) High temperature

(D) Low pH

44. Which molecular mechanism regulates heterocyst pattern formation?

(A) Lateral inhibition

(B) Cell-cell communication

(C) Both (A) and (B)

(D) None of the above

45. What is an algal bloom?

(A) A sudden increase in algal population

(B) A decrease in algal population

(C) A change in algal species composition

(D) All of the above

46. Which type of algae is commonly associated with harmful algal blooms?

(A) Green algae

(B) Cyanobacteria

(C) Diatoms

(D) Dinoflagellates

47. Which environmental factor triggers algal bloom formation?

(A) Nutrient enrichment

(B) High light intensity

(C) Low temperature

(D) All of the above

48. Which type of algal bloom is known for producing toxins?

(A) Green algal bloom

(B) Cyanobacterial bloom

(C) Diatom bloom

(D) Dinoflagellate bloom

49. What is the impact of algal blooms on aquatic ecosystems?

(A) Increased biodiversity

(B) Decreased oxygen levels

(C) Improved water quality

(D) None of the above

50. Which environmental factor can limit algal bloom formation?

(A) Low nutrient levels

(B) High water temperature

(C) Low light intensity

(D) All of the above

51. What is the role of zooplankton in controlling algal blooms?

(A) Grazing on algae

(B) Promoting algal growth

(C) No effect on algae

(D) Depends on the type of zooplankton

52. Which nutrient is often the limiting factor for algal growth?

(A) Nitrogen

(B) Phosphorus

(C) Carbon

(D) Both (A) and (B)

53. Which type of water body is more prone to algal blooms?

(A) Oligotrophic waters

(B) Eutrophic waters

(C) Mesotrophic waters

(D) All of the above

54. What is the primary mode of action of cyanobacterial toxins?

(A) Neurotoxicity

(B) Hepatotoxicity

(C) Cytotoxicity

(D) All of the above

55. Which cyanobacterial toxin is known for its hepatotoxic effects?

(A) Microcystin

(B) Anatoxin-a

(C) Saxitoxin

(D) Cylindrospermopsin

56. Which dinoflagellate toxin is associated with paralytic shellfish poisoning (PSP)?

(A) Saxitoxin

(B) Brevetoxin

(C) Ciguatoxin

(D) Okadaic acid

57. Which diatom toxin is known for its role in amnesic shellfish poisoning (ASP)?

(A) Domoic acid

(B) Saxitoxin

(C) Brevetoxin

(D) Okadaic acid

58. Which type of toxin is produced by the dinoflagellate Gambierdiscus toxicus?

(A) Saxitoxin

(B) Brevetoxin

(C) Ciguatoxin

(D) Okadaic acid

59. What is the mode of action of okadaic acid?

(A) Inhibition of protein phosphatases

(B) Activation of protein kinases

(C) Disruption of cell membranes

(D) None of the above

60. What is the mode of action of anatoxin-a?

(A) Neurotoxicity

(B) Hepatotoxicity

(C) Cytotoxicity

(D) Cardiotoxicity

61. Which type of algae is known for producing antimicrobial compounds?

(A) Green algae

(B) Red algae

(C) Brown algae

(D) All of the above

62. Which cyanobacterial compound has promising role as an anticancer agent?

(A) Microcystin

(B) Anatoxin-a

(C) Cryptophycin

(D) Saxitoxin

63. What is the mechanism of action of algal-derived antimicrobial compounds?

(A) Inhibition of cell wall synthesis

(B) Disruption of cell membranes

(C) Interference with DNA replication

(D) All of the above

64. Which algal compound has shown promise as an antiviral agent?

(A) Sulfated polysaccharides

(B) Polyphenols

(C) Terpenes

(D) All of the above

65. Which type of cyanobacteria is known for producing bioactive compounds?

(A) Nostoc

(B) Anabaena

(C) Synechocystis

(D) All of the above

66. Which type of algae is known for producing carotenoids with antioxidant activity?

(A) Dunaliella

(B) Spirulina

(C) Chlorella

(D) All of the above

67. What is the potential application of cyanobacterial bioactive molecules in agriculture?

(A) Biopesticides

(B) Biofertilizers

(C) Both (A) and (B)

(D) None of the above

68. What is the primary role of algae in global climate regulation?

(A) Carbon sequestration

(B) Oxygen production

(C) Nutrient cycling

(D) All of the above

69. Which type of algae is known for its ability to sequester carbon through calcification?

(A) Coccolithophores

(B) Diatoms

(C) Green algae

(D) Cyanobacteria

70. What is the role of algae in the global carbon cycle?

(A) Carbon source

(B) Carbon sink

(C) Both (A) and (B)

(D) None of the above

71. What is the impact of ocean acidification on algal calcification?

(A) Increased calcification

(B) Decreased calcification

(C) No effect on calcification

(D) Depends on the type of algae

72. What is the potential application of algal carbon sequestration?

(A) Climate change mitigation

(B) Ocean fertilization

(C) Both (A) and (B)

(D) None of the above

73. What is the primary role of algae in water pollution?

(A) Indicator of pollution

(B) Cause of pollution

(C) Both (A) and (B)

(D) None of the above

74. Which type of algae is commonly found in polluted waters?

(A) Green algae

(B) Cyanobacteria

(C) Diatoms

(D) All of the above

75. What is the role of algae in sewage treatment?

(A) Nutrient removal

(B) Oxygen production

(C) Both (A) and (B)

(D) None of the above

76. Which type of algae is used in wastewater treatment?

(A) Chlorella

(B) Spirulina

(C) Both (A) and (B)

(D) None of the above

77. What is the role of algae in bioremediation?

(A) Removal of pollutants

(B) Addition of pollutants

(C) Both (A) and (B)

(D) None of the above

78. Which factor affects the efficiency of algal bioremediation?

(A) Nutrient availability

(B) Light intensity

(C) pH

(D) All of the above

79. Which parameter is used to assess the effectiveness of algal-based sewage treatment?

(A) BOD (Biochemical Oxygen Demand)

(B) COD (Chemical Oxygen Demand)

(C) Both (A) and (B)

(D) None of the above

80. What is the primary nutritional benefit of algae as food?

(A) High protein content

(B) High carbohydrate content

(C) High lipid content

(D) All of the above

81. Which type of algae is commonly used as a food supplement?

(A) Spirulina

(B) Chlorella

(C) Both (A) and (B)

(D) None of the above

82. What is Single Cell Protein (SCP)?

(A) Protein derived from single-celled organisms

(B) Protein derived from multicellular organisms

(C) Both (A) and (B)

(D) None of the above

83. Which algae-derived compound is used as a thickening agent in food products?

(A) Agar

(B) Carrageenan

(C) Alginate

(D) All of the above

84. What is the biotechnological application of algae in the production of biofuels?

(A) Production of biodiesel

(B) Production of bioethanol

(C) Both (A) and (B)

(D) None of the above

85. Which type of algae is used for the production of agar?

(A) Red algae

(B) Brown algae

(C) Green algae

(D) All of the above

86. Which algae-derived compound has potential applications in cosmetics?

(A) Carotenoids

(B) Phycobiliproteins

(C) Mycosporine like Amino acids

(D) All of the above

87. Which type of algae is used for the production of bioplastics?

(A) Green algae

(B) Cyanobacteria

(C) Both (A) and (B)

(D) None of the above

88. What is the benefit of using algae in biotechnological applications?

(A) Renewable resource

(B) Sustainable production

(C) Both (A) and (B)

(D) None of the above

89. Which one of the following is placed in Prokaryote?

(A) Cyanophyceae

(B) Chlorophyceae

(C) Phaeophyceae

(D) Rhodophyceae

90. A pigment that is absent in Phaeophyceae is:

(A) Chlorophyll a

(B) Chlorophyll b

(C) ß-carotene

(D) Fucoxanthin

91. Reserve food-laminarin and mannitol-are found in:

(A) Chlorophyceae

(B) Phaeophyceae

(C) Rhodophyceae

(D) All of the above

92. Floridean starch occurs in:

(A) Phaeophyceae

(B) Rhodophyceae

(C) Cyanophyceae

(D) Bacillariophyceae

93. In which class of algae chlorophyll b is present?

(A) Chlorophyceae

(B) Phaeophyceae

(C) Cyanophyceae

(D) Rhodophyceae

94. Alginates are found in the cell wall of:

(A) green algae

(B) yellow-green algae

(C) brown algae

(D) red algae

95. Oil as reserve food material is found in:

(A) Chlorophyceae

(B) Phaeophyceae

(C) Rhodophyceae

(D) Xanthophyceae

96. In a cyanophycean cell $CO_2$ fixing enzymes are found in the:

(A) mucilagenous sheath

(B) cell membrane

(C) chromoplasm

(D) polyhedral bodies

97. Agar-agar is obtained from:

(A) Gracilaria

(B) Chara

(C) Chlorella

(D) Sargassum

98. Which one of the following algae serves as a biofertilizer in rice fields?

(A) Chlamydomonas

(B) Nostoc

(C) Cladophora

(D) Chara

99. The influence of Nostoc and Anabaena on the biological amelioration of alkali soils is called as :

(A) Waste treatment

(B) Reclamation

(C) Remediation

(D) Reduction

100. Pruteen was obtained by which of the following microbe?

(A) Methylophilus methylotrophus

(B) Methylophilus aquaticus

(C) Methylophilus flavus

(D) Methylophilus glucosoxydans

## Rough Work / रफ कार्य

**Example :**

**Question :**

Q.1 Ⓐ ● Ⓒ Ⓓ

Q.2 Ⓐ Ⓑ ● Ⓓ

Q.3 Ⓐ ● Ⓒ Ⓓ

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.

6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.

7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.

8. After the completion of the examination, candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.

9. There will be no negative marking.

10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.

11. To bring and use of log-book, calculator, pager & cellular phone in examination hall is prohibited.

12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

**Impt. On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.**

**उदाहरण :**

**प्रश्न :**

प्रश्न 1 Ⓐ ● Ⓒ Ⓓ

प्रश्न 2 Ⓐ Ⓑ ● Ⓓ

प्रश्न 3 Ⓐ ● Ⓒ Ⓓ

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।

6. सभी उत्तर केवल ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।

7. ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।

8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।

9. निगेटिव मार्किंग नहीं है।

10. कोई भी रफ कार्य, प्रश्न-पुस्तिका में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।

11. परीक्षा-कक्ष में लॉग-बुक, कैल्कुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।

12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

**महत्वपूर्णः प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्नपुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्नपुस्तिका प्राप्त कर लें।**