

Roll. No.

Question Booklet Number

O.M.R. Serial No.

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B.Sc. (SEM.-VI) (NEP) (SUPPLE.) EXAMINATION, 2024-25

BIOTECHNOLOGY
(Plant Biotechnology)
(Elective)
(BBT6003)

Paper Code							
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Question Booklet
Series

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Time : 1 : 30 Hours

Max. Marks : 75

Instructions to the Examinee :

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

(Remaining instructions on last page)

परीक्षार्थियों के लिए निर्देश :

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

(शेष निर्देश अन्तिम पृष्ठ पर)

1. Androgenesis is just the reverse of:
 - (A) Gynogenesis
 - (B) Rhizogenesis
 - (C) Caulogenesis
 - (D) None of these
2. Haploid plants are produced in large numbers by:
 - (A) Anther culture
 - (B) Ovary culture
 - (C) Both (A) and (B)
 - (D) Embryo culture
3. Which of the following prevents the inactivation of nitrogenase by oxygen?
 - (A) Cytochrome
 - (B) Carotene
 - (C) Xanthophyll
 - (D) Leghaemoglobin
4. Plant growth promoting bacteria promotes plant growth by:
 - (A) Increasing nutrient availability
 - (B) Phytohormone production
 - (C) Enhancing shoots and root development
 - (D) All of the above
5. Which one of the following is correct with respect to the plant growth promoting bacteria?
 - (A) They provide protection against plant pathogens.
 - (B) They can cause disease.
 - (C) They limit the nutrient availability.
 - (D) They can reduce the water availability.
6. Which of the following induces polyploidy in plants?
 - (A) Formamide
 - (B) 5-Bromouracil
 - (C) Colchicine
 - (D) PEG
7. What role do phytohormones play in plant biotechnology?
 - (A) Improving plant taste
 - (B) Controlling plant color
 - (C) Regulating plant growth and development
 - (D) Enhancing plant fragrance
8. Which of the following is an alternative term used to denote flowering plants?
 - (A) Angiosperm
 - (B) Gymnosperms
 - (C) Ferns
 - (D) Mosses

9. A transgenic plant "Golden Rice" contains foreign genes that produce:
- Niacin
 - Biotin
 - Beta-carotene (β -carotene)
 - Yellow fluorescent protein
10. The gene which was used to produce insect resistant transgenic cotton plant was taken from:
- Bacillus clausii*
 - Agrobacterium tumefaciens*
 - Bacillus subtilis*
 - Bacillus thuringiensis*
11. What is plant tissue culture?
- The technique of *in vitro* maintaining and growing cells
 - The technique of *in vivo* growing cells
 - The technique of growing plants in gardens
 - The technique of cutting plants
12. What is an explant?
- A part of plant grown under soil
 - Any part of a plant taken out and grown in a test tube
 - Fungal species grown in a novel medium
 - Algae grew in a test tube
13. Essential requirement of an artificial medium in which explant is being regenerated is:
- Medium should have a sulphur source
 - Medium should have phosphorus source
 - Medium must provide a carbon source
 - Medium must provide a nitrogen donor
14. What are the somaclones?
- Plants chemically identical to the original plant
 - Plants morphologically identical to the original plant
 - Plants anatomically identical to the original plant
 - Plants genetically identical to the original plant
15. Which of the following plant part is free from the attack of the virus?
- Stem
 - Root
 - Meristem
 - Leaves

16. Which of the following is not related to embryo culture?
- Growth of embryos on culture medium
 - Developing seedlings
 - Multiplication of rare plants
 - Making virus-free plants
17. Which of the following is an application of tissue culture?
- Rapid Clonal Propagation
 - Somaclonal Variations
 - Transgenic plants
 - All of the above
18. Which of the following is NOT the feature of plant cells?
- Presence of centrioles
 - The cell wall outside the cell membrane
 - Cell-cell communication through plasmodesmata
 - Consists of plastids
19. Name the term given to the ability of single cells to divide and produce the entire differentiated cell in the organism:
- Unipotent
 - Pluripotent
 - Multipotent
 - Totipotency
20. Out of the following, which one is NOT the basic component of culture media used for plant cultivation?
- Complex mixture of salts
 - Amino acids
 - Serum albumin
 - Sugar/ sucrose
21. Which of the following is NOT a plant growth regulator?
- Auxin
 - Cytokinins
 - Abscisic acid
 - Polyphenols
22. Which of the following plant hormone control fruit ripening?
- Ethylene
 - Auxin
 - Gibbrellins
 - Abscisic acid
23. Increase amount of auxin in callus culture will promote growth of which part of the plant tissue?
- Multilayer tissues
 - Meristem
 - Shoot
 - Root

24. Name the asexual mode of embryo formation?
- Protoplast fusion
 - Callus culture
 - Somatic embryogenesis
 - Protoplast culture
25. Which of the following induces callus formation?
- Auxin
 - Gibberellin
 - Abscisic acid
 - Ethylene
26. What is Bavistin?
- Chemically synthesized plant growth regulator
 - Callus growth inhibitor
 - Fungicide
 - Bactericide
27. Who coined the term protoplast?
- Stephen Hales
 - Thomas Nuttall
 - Johannes von Hanstein
 - James Bolton
28. Which of the following is an advantage of enzymatic method of protoplast isolation?
- Mostly used for vacuolated cells
 - Osmotic shrinkage is maximum
 - Cells remain intact
 - Yield and viability are unpredictable
29. Solidifying agent that is used in plant tissue culture is
- Agar
 - EDTA
 - Cobaltous chloride
 - Nicotinic acid
30. Which of the following is a fusogenic agent used in protoplast culture?
- PEG
 - PVC
 - Salicylic acid
 - Auxin
31. Plant tissue culture is technique of:
- In vivo* growing cells
 - In vitro* maintaining and growing cells
 - Growing plants in a greenhouse
 - Cutting plants
32. Who is known as the Father of Tissue culture?
- Bonner
 - Laibach
 - Haberlandt
 - Gautheret
33. The pair of hormones required for a callus to differentiate is:
- Ethylene and Auxin
 - Auxin and Cytokinin
 - Auxin and Abscisic acid
 - Cytokinin and Gibberellin

34. What is Dimethyl sulfoxide used for?
- (A) A gelling agent
 - (B) Cryoprotectant
 - (C) Chelating agent
 - (D) An Alkylating agent
35. The formation of embryoids from the pollen grains in the tissue culture medium is due to:
- (A) Agar medium
 - (B) Test tube culture
 - (C) Double fertilization
 - (D) Cellular totipotency
36. Synthetic seeds are produced by the encapsulation of somatic embryos with:
- (A) Sodium acetate
 - (B) Sodium nitrate
 - (C) Sodium chloride
 - (D) Sodium alginate
37. Which of the following is the main application of embryo culture?
- (A) Clonal propagation
 - (B) Production of embryoids
 - (C) Induction of somaclonal variations
 - (D) Overcoming hybridisation barriers
38. In tissue culture of parenchyma, mitosis is accelerated in the presence of:
- (A) Auxin
 - (B) Cytokinin
 - (C) Gibberellin
 - (D) Both auxin and cytokinin
39. In which of the following conditions do the somaclonal variations appear?
- (A) Plants raised in tissue culture
 - (B) Plants exposed to gamma rays
 - (C) Plants growing in polluted soil or water
 - (D) Plants transferred by a recombinant DNA technology
40. Haploid plants can be obtained from:
- (A) Anther culture
 - (B) Bud culture
 - (C) Leaf culture
 - (D) Root culture
41. In plant tissue culture, the callus tissues are generated into a complete plantlet by altering the concentration:
- (A) Sugars
 - (B) Hormones
 - (C) Amino Acids
 - (D) Vitamins and minerals
42. Which of the following growth hormones produces apical dominance?
- (A) Ethylene
 - (B) Cytokinin
 - (C) Auxin
 - (D) Gibberellin

43. Cybrids are produced by:
- (A) The nucleus of one species but cytoplasm from both the parent species
 - (B) The fusion of two same nuclei from the same species
 - (C) The fusion of two different nuclei from different species
 - (D) None of these
44. Which of the following mediums is composed of chemically defined compounds?
- (A) Natural media
 - (B) Artificial media
 - (C) Synthetic media
 - (D) None of these
45. Which of the following chemicals are most widely used for protoplast fusion?
- (A) Mannitol
 - (B) Polyethylene glycol
 - (C) Sorbitol
 - (D) Mannol
46. What is Callus?
- (A) Tissues that grow to form an embryoid
 - (B) Unorganised, actively dividing the mass of cells maintained in a culture
 - (C) An insoluble carbohydrate
 - (D) A tissue that grows from an embryo
47. Autoclave machine is used for:
- (A) Precipitation
 - (B) Vaporization
 - (C) Sterilization
 - (D) Incineration
48. Which of the following provides a place free from dust particle/micro contaminants and helps in carrying out cell culture under an aseptic environment?
- (A) BOD Incubator
 - (B) Laminar airflow cabinet
 - (C) Microwave oven
 - (D) Shakers
49. The explant is a part of the plant like:
- (A) Root, Stem, Leaf
 - (B) Meristematic tissues
 - (C) Floral parts
 - (D) All of the above
50. Which one of the following is the most preferred external source of carbon used in the plant tissue culture medium?
- (A) Agarose
 - (B) Ribose
 - (C) Fructose
 - (D) Sucrose
51. Somaclonal variation appears in:

- (A) Organisms produced through somatic hybridization
- (B) Plants growing in highly polluted conditions
- (C) Apomictic plants
- (D) Tissue culture raised plants
52. Which of the following is not properly matched?
- (A) Explant – excised plant part used for callus formation
- (B) Cytokinins – root initiation in callus
- (C) Somatic embryo – embryo produced from a vegetative cell
- (D) Callus – undifferentiated mass of cells
53. Variations observed during tissue culture of some plants are known as:
- (A) Clonal variations
- (B) Somaclonal variations
- (C) Somatic variations
- (D) Tissue culture variations
54. High levels of auxin promotes formation of:
- (A) Shoot
- (B) Root
- (C) Needle like leaves
- (D) All of the above
55. The development of organs like roots, shoots, and flowers directly from an explant or from the callus is called:
- (A) Embryogenesis
- (B) Transgenesis
- (C) Organogenesis
- (D) Gynogenesis
56. The initiation of root formation (adventitious roots) is termed:
- (A) Gynogenesis
- (B) Rhizogenesis
- (C) Caulogenesis
- (D) None of these
57. Initiation of shoot formation is called
- (A) Gynogenesis
- (B) Rhizogenesis
- (C) Caulogenesis
- (D) None of these
58. Organogenesis has been obtained from :
- (A) Shoot apex
- (B) Root
- (C) Flower petals
- (D) All of the above

59. The process of organogenesis involves two steps:
- (A) Denaturation and Renaturation
 - (B) Dedifferentiation and Redifferentiation
 - (C) Dehydration and Rehydration
 - (D) Desiccation
60. Which of the following is cultured to obtain haploid plants?
- (A) Embryo
 - (B) Nucleus
 - (C) Apical bud
 - (D) Entire anther
61. Cybrids are:
- (A) Nuclear hybrids
 - (B) Hybrid plants derived from cross pollination
 - (C) Plants derived from self-pollination
 - (D) Cytological hybrids
62. A group of genetically similar organisms obtained by asexual reproduction is called:
- (A) Population
 - (B) Clone
 - (C) Assembly
 - (D) None of these
63. Plant biotechnology involves:
- (A) A production of valuable products in plants
 - (B) Rapid clonal multiplication of desired genotypes
 - (C) Production of virus free plants
 - (D) All of these
64. The process of organogenesis is regulated by various factors such as:
- (A) Physiological state and size of explants
 - (B) Environmental conditions
 - (C) Quality and quantity of light
 - (D) All of the above
65. Shoot Bud Formation is inhibited by:
- (A) Low light intensity
 - (B) High light intensity
 - (C) Blue light
 - (D) None of these
66. Rooting is stimulated by :
- (A) Green light
 - (B) Red light
 - (C) Blue light
 - (D) UV rays

67. MS medium was originally formulated by:
- (A) Mehta and Sahu
 - (B) Mark and Spencer
 - (C) Murashige and Skoog
 - (D) Martin and Smith
68. Relatively high levels of cytokinin promote:
- (A) Leaf formation
 - (B) Root differentiation Root
 - (C) Shoot bud differentiation
 - (D) All of the above
69. Which of the following is the plant stress hormone?
- (A) Auxin
 - (B) Gibberellin
 - (C) Absciscic acid
 - (D) Ethylene
70. Find the name of the artificial process in which a plant or embryo is derived from a single somatic cell:
- (A) Gynogenesis
 - (B) Rhizogenesis
 - (C) Somatic embryogenesis
 - (D) Androgenesis
71. What is the first stable product of nitrogen fixation in the root nodules of leguminous plants?
- (A) Glutamate
 - (B) NO_3^-
 - (C) Ammonia
 - (D) NO_2^-
72. Leghaemoglobin is present in the root nodules of legumes. What is the function of leghaemoglobin?
- (A) Oxygen removal
 - (B) Inhibition of nitrogenase activity
 - (C) Expression of nif gene
 - (D) Nodule differentiation
73. Which of the following is correct for nitrifying bacteria?
- (A) They convert free nitrogen to nitrogen compounds
 - (B) They oxidize ammonia to nitrates
 - (C) They reduce nitrates to free nitrogen
 - (D) They convert proteins into ammonia
74. Nitrogen is absorbed by plants as:
- (A) Nitrites
 - (B) Ammonium
 - (C) Nitrites
 - (D) All of the above
75. This element plays a key role in the nitrogen fixation:
- (A) Manganese
 - (B) Molybdenum
 - (C) Zinc
 - (D) Copper

76. Cells where nitrogen fixation takes place in *Nostoc* are known as:
- (A) Hormogonia
 - (B) Heterocysts
 - (C) Akinetes
 - (D) Nodules
77. In pea plant, there are:
- (A) 10 chromosomes
 - (B) 12 chromosomes
 - (C) 14 chromosomes
 - (D) 16 chromosomes
78. Which of the following bacteria cannot fix atmospheric nitrogen?
- (A) *Nostoc*
 - (B) *Anabaena*
 - (C) *Oscillatoria*
 - (D) *Lactobacillus*
79. Which of the following is not a free-living Nitrogen-fixing bacteria?
- (A) *Azotobacter*
 - (B) *Clostridium*
 - (C) *Klebsiella*
 - (D) *Xanthomonas*
80. Which of the following is not a biofertilizer?
- (A) *Mycorrhiza*
 - (B) *Rhizobium*
 - (C) *Agrobacterium*
 - (D) *Nostoc*
81. Which of the following is commonly used as a nitrogen fixer in paddy fields?
- (A) *Frankia*
 - (B) *Oscillatoria*
 - (C) *Azospirillum*
 - (D) *Rhizobium*
82. Pick the correct statement:
- (A) Legumes do not fix nitrogen
 - (B) Legumes fix nitrogen independent of bacteria
 - (C) Legumes fix nitrogen through bacteria in their roots
 - (D) Legumes fix nitrogen through bacteria in their leaves
83. Which of the following eubacteria is known for its ability to fix nitrogen in soil?
- (A) *Escherichia coli*
 - (B) *Streptococcus pyogenes*
 - (C) *Rhizobium leguminosarum*
 - (D) *Salmonella typhimurium*
84. Nitrogenase converts nitrogen into:
- (A) Nitric acid
 - (B) Ammonia
 - (C) Nitrous oxide
 - (D) None of these

85. A plasma membrane-bound vesicle formed as a result of removal of the cell wall is called:
- (A) Tonoplast
 - (B) Trophoblast
 - (C) Protoplast
 - (D) Spheroplast
86. *In vitro* fusion of plant protoplasts derived either from a somatic cell of the same plant or from two genetically different plants is called:
- (A) Somatic hybridization
 - (B) Nuclear hybridization
 - (C) Protoplasmic hybridization
 - (D) Cellular hybridization
87. The protoplasts are generally isolated:
- (A) Shoot
 - (B) Root
 - (C) Leaf
 - (D) Bark
88. The Ti plasmid used in plant genetic engineering is derived from:
- (A) *Agrobacterium rhizogenes*
 - (B) *Escherichia coli*
 - (C) *Agrobacterium tumefaciens*
 - (D) *Bacillus thuringiensis*
89. Which of the following methods is used to introduce foreign DNA into plant cells?
- (A) Microinjection
 - (B) Electroporation
 - (C) Particle bombardment
 - (D) All of the above
90. Which of the following process that leads to plants that exclusively originates from the female genetic background?
- (A) Gynogenesis
 - (B) Rhizogenesis
 - (C) Caulogenesis
 - (D) Androgenesis
91. Micropropagation involves:
- (A) Microspores used for vegetative multiplication of plants
 - (B) Microbes used for vegetative multiplication of plants
 - (C) Small explants used for vegetative multiplication of plants
 - (D) Megaspores and microspores used for non-vegetative multiplication of plants

92. Which one of the following is incorrect about Agar as a gelling agent in plant tissue culture medium?
- (A) It is not digested by the enzymes of plants
 - (B) Agar remains stable at incubation temperature
 - (C) Does not react with media constituents
 - (D) None of these
93. Which bacteria are present in the root nodules of pea plant?
- (A) *Escherichia coli*
 - (B) *Rhizobium leguminosarum*
 - (C) *Streptococcus pyogenes*
 - (D) *Salmonella typhimurium*
94. Benefit of clonal propagation or micropropagation is:
- (A) Multiplication of sexually derived sterile hybrids
 - (B) Multiplication of disease free plants
 - (C) Rapid multiplication of superior clones
 - (D) All of these
95. Protoplasts can be synthesized from suspension cultures, intact tissues or callus tissues by the enzymatic treatment with:
- (A) Proteolytic enzymes
 - (B) Pectolytic and cellulolytic enzymes
 - (C) Restriction enzymes
 - (D) Galactosidase enzymes
96. In artificial media, the growth of plant tissues is called:
- (A) Gene expression
 - (B) Transgenesis
 - (C) Plant tissue culture
 - (D) Cell hybridization
97. An excised piece of stem tissue or leaf used in micropropagation is:
- (A) Scion
 - (B) Explant
 - (C) Medium
 - (D) Microshoot
98. Insect resistance transgenic cotton has been developed by inserting a piece of DNA from:
- (A) An insect
 - (B) Wild relative of cotton
 - (C) A virus
 - (D) A soil bacterium
99. Protoplasts are devoid of:
- (A) Cell wall
 - (B) Cell membrane
 - (C) Both cell membrane and cell wall
 - (D) None of these
100. Which one of the following method is used to develop virus free plants?
- (A) Cell suspension culture
 - (B) Protoplast culture
 - (C) Meristem culture
 - (D) Organ culture

Rough Work / रफ कार्य

Example :

Question :

Q.1 (A) ● (C) (D)

Q.2 (A) (B) ● (D)

Q.3 (A) ● (C) (D)

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer Sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination, candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager & cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

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

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)

प्रश्न 2 (A) (B) ● (D)

प्रश्न 3 (A) ● (C) (D)

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैल्कुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

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