Roll. No. .....

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

Question Booklet Number

B.Sc. (PART-III) EXAMINATION, 2021
BIOTECHNOLOGY
[PAPER : SECOND (BBT-302)]
(Plant Biotechnology)

Paper ID		
6	0	2

Question Booklet Series
B

Time : 1 : 30 Hours **Max. Marks : 150**

Instructions to the Examinee :

1. Do not open this Booklet untill you are told to do so.

2. Candidates should fill their roll number, subject and series of question booklet details correctly, otherwise, in case of any discrepancy in the evaluation, it will be the responsibility of the examinee himself.

3. There are 100 questions in the booklet. Examinee is required to answer only 75 questions in the OMR Answer Sheet provided. Four alternative answer to each question are given below the question, out of these four only one answer is correct. The answer which you think is correct or most appropriate, completely fill in the circle containing its letter in your answer sheet (O.M.R. Answer Sheet) with black or blue ball point pen.

परीक्षार्थियों के लिए निर्देश :

1. जब तक कहा न जाये, इस प्रश्नपुस्तिका को न खोलें।

2. परीक्षार्थी अपने अनुक्रमांक, विषय एवं प्रश्नपुस्तिका की सिरीज का विवरण यथास्थान सही-सही भरें, अन्यथा मूल्यांकन में किसी भी प्रकार की विसंगति की दशा में उसकी जिम्मेदारी स्वयं परीक्षार्थी की होगी।

3. प्रश्न-पुस्तिका में 100 प्रश्न हैं। परीक्षार्थी को केवल 75 प्रश्नों का उत्तर दी गई OMR उत्तर-पत्रक में देना है। प्रत्येक प्रश्न के चार वैकल्पिक उत्तर प्रश्न के नीचे दिये गये हैं। इन चारों में से केवल एक ही उत्तर सही है। जिस उत्तर को आप सही या सबसे उचित समझते हैं, अपने उत्तर-पत्रक (O.M.R. Answer Sheet) में उसके अक्षर वाले वृत्त को काले या नीले बॉल प्वाइंट पेन से पूरा भर दें।

(Remaining instructions on last page) *(शेष निर्देश अन्तिम पृष्ठ पर)*

Rough Work

1. Select incorrect match :

(A) Synthetic seed–Germplasm conservation

(B) Protoplast fusion–Asymmetric hybrid

(C) Laminar airflow–Sterilization

(D) Secondary metabolite–Elicitor

2. The most costly gene transfer method is :

(A) Particle bombardment

(B) Microinjection

(C) Electroporation

(D) Silicon fibre mediated gene transfer

3. The Ti-plasmid is referred to as :

(A) Transducing plasmid

(B) Transfer inducing

(C) Tumor inducing

(D) Hairy-root inducing

4. Protoplast isolation is effected by :

(A) Incubation temperature

(B) pH of the incubation mixture

(C) Concentration of enzyme solution

(D) All of the above

5. Clonal propagation not have the following steps :

(A) Fusion of cells

(B) Surface sterilization of explant

(C) Medium preparation

(D) Transplantation of regenerated plants

6. Batch cultures are type of suspension culture where :

(A) Medium is continuously replaced

(B) Medium is loaded only at begining

(C) Composition of medium not varies during culture period

(D) Cellular wastes are continuously replaced

7. Somaclonal variation is one of the limitation for :

(A) Protoplast fusion

(B) Clonal propagation

(C) Embryo rescue

(D) Transgenic production

8. The method to differentiate viable and non-viable cells is :

(A) FDA test

(B) Evan's blue staining

(C) Both (A) and (B)

(D) None of these

9. The best source of plant material for establishment of cell suspension culture is :

(A) Friable callus

(B) Compact callus

(C) Leaf mesophyll cells

(D) Pith tissue

10. Which of the following is not an elicitor ?

(A) Agar

(B) Sucrose and Mannitol

(C) KCl

(D) Radiation

11. Which of the following is a cryoprotectant ?

(A) KCl

(B) Dimethyl Sulfoxide

(C) Thidiazuron

(D) Liquid Nitrogen

12. Select the correct match :

(A) BAP–Somatic embryogenesis

(B) IBA–Rooting

(C) IAA–Embryo rescue

(D) FDA–Flowering

13. Select the correct match :

(A) Redenbaugh–Synthetic seed

(B) Steward–Organogenesis

(C) Cocking–Electroporation

(D) S.S. Bhojwani–Culture medium

14. Protoplast fusion methods are :

(A) Electrofusion

(B) Microinjection

(C) Electroporation

(D) All of the above

15. Plant tissue culture technique is a method of :

(A) Hybridization

(B) Vegetative propagation

(C) Asexual reproduction

(D) Selection

16. Cybrids are produced by :

(A) Nucleaus of one species and cytoplasm of both parents

(B) The fusion of two nuclei of same species

(C) Fusion of nuclei of two parents and cytoplasm of one parent

(D) None of the above

17. Virus free plants can be developed by :

(A) Axillary bud culture

(B) Meristem culture

(C) Node culture

(D) All of the above

18. The asexual mode of embryo formation through plant tissue culture is called :

(A) Somatic hybrid

(B) Somatic embryogenesis

(C) Somaclonal variation

(D) Organogenesis

19. Microinjection involves :

(A) Injection of large amount of DNA

(B) Injection of DNA upto 16 kb into protoplast or plant cell

(C) Injection of DNA into plant embryo

(D) All of the above

20. T-DNA transfer from bacteria to plant cell requires product of which of the following genes ?

(A) Vir A,B

(B) Vir G,D

(C) Vir C,E

(D) All of the above

21. Vir genes required for the T-DNA transfer and processing are located :

(A) on the T-DNA

(B) outside the T-DNA region

(C) outside the Ti-plasmid

(D) on the plant genome

22. Ti-plasmid based vector is :

(A) Binary vector

(B) pBR322

(C) Phagemid

(D) pUC 18/19

23. Method used for gene transfer involving high voltage electrical impulse is :

(A) Electrofusion

(B) Microinjection

(C) Electroporation

(D) Liposome fusion

24. Which of the following is not related with particle bombardment ?

(A) Microcarrier

(B) Silicon fiber

(C) Stopping disc

(D) Rupture disc

25. The limitation of virus vector is :

(A) Non-heritable

(B) Causes diseases (sometimes)

(C) Can carry small size of gene

(D) All of the above

26. Which of the following is a virus vector ?

(A) Cointegrating vector

(B) Cosmid

(C) Expression vector

(D) None of these

27. The most common enzyme for protoplast isolation from cell suspension culture is :

(A) Cellulase

(B) Zymase

(C) Pectinase

(D) Esterase

28. Growth hormone used for maturation of somatic embryo is :

(A) Auxin

(B) Zeatin

(C) 2,4-D

(D) Abscisic acid

29. Protoplast isolation depends on :

(A) Plant material

(B) Enzyme treatment

(C) Pre-enzyme treatment

(D) All of the above

30. Which of the following is not a fusogen ?

(A) Polyethylene glycol

(B) $CaCl_2$

(C) $Na\,NO_3$

(D) Mannitol

31. Which of the following is best source of plant material for protoplast isolation ?

(A) Cell suspension culture

(B) Leaf tissue

(C) Callus

(D) Root

32. Organogenesis is effected by :

(A) Age of explant

(B) Composition of culture medium

(C) Genotype

(D) All of the above

33. Different stages of somatic embryo development are :

(A) Globular $\rightarrow$ Heart $\rightarrow$ Torpedo $\rightarrow$ Cotyledonary stage

(B) Globular $\rightarrow$ Recurrent embryo $\rightarrow$ Cotyledonary stage

(C) Heart $\rightarrow$ Globular $\rightarrow$ Torpedo $\rightarrow$ Cotyledonary

(D) Globular $\rightarrow$ Torpedo $\rightarrow$ Cotyledonary

34. Which of the following is not the part of clonal multiplication ?

(A) Protoplast culture

(B) Preparative stage

(C) Culture establishment

(D) Multiplication and rooting of shoots

35. Which of the following is an application of protoplast fusion ?

(A) Making callus

(B) Making somatic hybrids

(C) Triploid production

(D) In-vitro fertilization

36. For establishment of plant tissue culture, all are required, except :

(A) Culture medium

(B) Plant material

(C) Inoculation of plant material and incubation in culture room

(D) Gene cloning

37. The best plant material for shoot organogenesis is :

(A) Leaf tissue

(B) Node section

(C) Zygotic embryo

(D) Endosperm

38. Hairy root culture for secondary metabolite production are induced by transforming plant cells with :

(A) *Agrobacterium tumefaciens*

(B) *Bacillus thuringiensis*

(C) *Agrobacterium rhizogenes*

(D) Both (A) and (C)

39. Cellular totipotency is the property of :

(A) Plants

(B) Animals

(C) Bacteria

(D) All of the above

40. Which of the following is used as selection marker for the cells transformed with *Agrobacterium* ?

(A) Neomycin phosphotransferase

(B) Hygromycin phosphotransferase

(C) Streptomycin phosphotransferase

(D) Any one of the above

41. Which of the following gene of Ti–plasmid is constitutively expressed ?

(A) Vir A

(B) Vir C

(C) Vir B

(D) Vir D

42. Which of the following is true about *Agrobacterium tumefaciens* ?

(A) It causes crown gall diseases of plants

(B) It infects dicotyledenous species

(C) It is a soil bacteria

(D) All of the above

43. The Left and Right Border of T-DNA is flanked by a direct repeat of :

(A) 12bp

(B) 20bp

(C) 25bp

(D) 30bp

44. Which of the following is used to produce haploid plants ?

(A) Microspore

(B) Meristem

(C) Root

(D) Leaf

45. Protoplasts are the cell devoid of :

(A) Cell membrane

(B) Cell wall

(C) Cell wall and cell membrane

(D) Protoplast membrane

46. Which of the following chemical is used for protoplast fusion ?

(A) Mannitol

(B) Polyethylene glycol

(C) Sorbitol

(D) Cellulase

47. Protoplast viability can be tested by :

(A) Packed cell volume

(B) Fresh weight measurement

(C) Fluorescin diacetate staining methods

(D) All of the above

48. Synthetic seeds are produced by encapsulating somatic embryo within :

(A) Sodium chloride

(B) Calcium alginate

(C) Sodium nitrate

(D) Calcium chloride

49. Haploids plants can be obtained from :

(A) Anther culture

(B) Root culture

(C) Meristem culture

(D) Zygotic embryo culture

50. Select incorrect statement :

(A) Somatic embryo is bipolar structure

(B) Organogenesis is unipolar structure formation

(C) Somatic embryogenesis was discovered by T. Murashige

(D) Both (A) and (B) are correct

51. Development of haploid plants from *Datura innaxia* was first reported by :

(A) White's and Group

(B) Guha and Maheshwari

(C) Bhojwani and Razdan

(D) Reinert and Steward

52. What is the application of Embryo culture ?

(A) Obtaining rare hybrids

(B) In shortening of breeding cycle

(C) Embryo-rescue

(D) All of the above

53. Some strains of *Bacillus thuringiensis* can kill certain insects such as :

(A) Scorpion

(B) Lepidopterans

(C) Fruit fly

(D) Dragonfly

54. To which cells the activated Bt-toxin bind ?

(A) Lymphocytes

(B) Skeletal muscle cells

(C) Epithelial cells

(D) Basophils

55. A gall producing gene in *Agrobacterium tumefaciens* is :

(A) Ti–plasmid

(B) Ri-plasmid

(C) T-DNA

(D) Vir gene

56. Plant Biotechnology involves :

(A) Production of valuable metabolites by cell culture

(B) Rapid clonal multiplication of desired plants

(C) Production of virus free plant

(D) All of the above

57. All are plant derived elicitors, except :

(A) Chitin

(B) Pectin

(C) Cellulase

(D) Pectic Acid

58. Select an insect resistant gene :

(A) Bt-gene

(B) Trypsin-inhibitor gene

(C) α – Amylase inhibitor gene

(D) All of the above

59. Herbicide resistant transgenic plants can be developed by :

(A) Introduction of an enzyme system to detoxify the herbicide prior to its action

(B) By exposing to herbicide

(C) By making artificial seeds

(D) None of these

60. Biotransformation reaction includes :

(A) Esterification

(B) Glycosylation

(C) Isomerisation

(D) All of the above

61. What are the benefits of micropropagation ?

(A) Rapid multiplication of superior clones

(B) Multiplication of diseases free plant

(C) Multiplication of somatic hybrids

(D) All of the above

62. What is callus ?

(A) Embryogenic mass

(B) Tissue that divide and form embryo

(C) A type of carbohydrate

(D) Unorganised mass of actively dividing cells maintained in culture

63. Which of the following can be totipotent ?

(A) Xylem vessels

(B) Tracheids

(C) Meristems

(D) Cytodifferentiated cells

64. Cell suspension culture can be used for :

(A) Production of vaccines

(B) Production of enzymes

(C) Production of secondary metabolites

(D) Production of sucrose

65. The technique used for single cell culture is :

(A) Cell suspension culture

(B) Filter paper raft-nurse technique

(C) Bioreactor culture

(D) None of these

66. Select the correct statement :

(A) Cell culture can be used for mutant selection

(B) Cell culture can be used for polyploidy induction

(C) Both (A) and (B) are correct

(D) None of these

67. Endosperm tissue is an excellent system for production of :

(A) Haploid plants

(B) Diploid plants

(C) Triploid plants

(D) Tetraploid plants

68. The clone obtained from culture of somatic cells is known as :

(A) Somaclone

(B) Gametoclone

(C) Somaclonal variants

(D) Gametoclonal variants

69. Growth regulator used for induction of somatic embryogenesis is :

(A) IAA

(B) IBA

(C) NAA

(D) 2,4-D

70. Restriction endonuclease are used in genetic engineering, because :

(A) They can degrade harmful proteins

(B) They can join DNA fragments

(C) They can cut DNA at specific sites

(D) They can cut DNA at variable sites

71. Select the correct statement :

(A) Immobilization of cells is beneficial for secondary metabolite production

(B) Elicitation can enhance metabolite production

(C) Bioreactors can be used for large scale production of metabolite

(D) All are correct

72. Which method is used to overcome cytoplasmic male sterility ?

(A) Callus culture

(B) Somatic embryogenesis

(C) Cybrid

(D) Somaclonal cultures

73. Cry-protein is related with :

(A) Insect resistance

(B) *Bacillus thuringiensis*

(C) Both (A) and (B)

(D) None of these

74. Through gene transfer and transgenic production following not possible :

(A) Production of hybrids

(B) Production of insect resistant plants

(C) Production of herbicide resistant plants

(D) All of the above

75. Resistance to glyphosate in transgenic *Petunia* has been developed by the transfer of :

(A) Gene for EPSPS (5-enol-pyruvyl shikimate 3- phosphate synthase)

(B) Gene for ALS (acetolactate synthase)

(C) Gene for Glutamine synthase

(D) All of the above

76. Macroelements are the elements required by plants in concentration greater than :

(A) 0.05m mol ℓ^1

(B) 5.0m mol ℓ^1

(C) 0.5m mol ℓ^1

(D) 0.05 mol ℓ^1

77. Organic nutrients used as component of plant tissue culture medium are :

(A) Vitamins

(B) Amino acids

(C) Myo-inositol

(D) All of the above

78. Which of the following is not an undefined supplement of culture medium ?

(A) Coconut milk

(B) Glycine

(C) Tomato juice

(D) Malt extract

79. The most common carbon source of culture medium is :

(A) Glucose

(B) Fructose

(C) Sucrose

(D) Starch

80. Growth hormone having potential to induce shoot bud is :

(A) 6-benzyl aminopurine

(B) Thidiazuron

(C) Cytokinins

(D) All of the above

81. Which of the following is not an plant hormone ?

(A) Auxin

(B) Inositol

(C) Ethylene

(D) Kinetin

82. Growth of cell suspension culture can be measured by :

(A) Evan's blue test

(B) Fresh weight measurement

(C) TTC test

(D) All of the above

83. The ability of the competent cells of callus to form whole plant is known as :

(A) Dedifferentiation

(B) Somatic embryogenesis

(C) Redifferentiation

(D) Cybrids

84. The first step in somatic hybridization is :

(A) Isolation of protoplast

(B) Fusion of protoplast

(C) Culture of protoplast

(D) Regeneration of protoplast

85. The method used for selection of hybrid cell :

(A) Cytological analysis

(B) Biochemical method

(C) DNA based marker

(D) All of the above

86. Which of the following is the type of continuous cell suspension culture ?

(A) Chemostat

(B) Turbidostat

(C) Batch culture

(D) Both (A) and (B)

87. HEPA is a type of filter with pore size :

(A) 0.2 to 0.3 micron

(B) 0.1 to 0.5 micron

(C) 2 to 3 micron

(D) 5 to 10 micron

88. Select the incorrect statement :

(A) Somatic hybrid cannot produced by fusion of two cells

(B) Node is a good plant material for shoot organogenesis

(C) Aseptic established cultures are incubated at 25^0C temperature

(D) Both (B) and (C) are correct

89. Somaclonal variation may occur from :

(A) Presence of pre-existing variation

(B) Endoreduplication

(C) Culture condition

(D) All of the above

90. Artificial seed can be prepared by encapsulating :

(A) Node segment

(B) Apical meristem

(C) Somatic embryo

(D) All of the above

91. The artificial seeds can be used for :

(A) Transportation of plant material

(B) Making somatic hybrid

(C) Gene transfer

(D) None of these

92. Who is known as the father of Plant Tissue Culture ?

(A) F.C. Steward

(B) E.C. Cocking

(C) Gottlieb Haberlandt

(D) T. Murashige

93. Which of the following is not a culture medium for plant tissue culture ?

(A) Woody plant medium

(B) Murashige and Skoog's medium

(C) White's medium

(D) Knop's salt solution

94. The most commonly used gelling agent of culture medium is :

(A) Agarose

(B) Agar

(C) Gelrite

(D) All of the above

95. Totipotency refers to :

(A) Development of plants from seed

(B) Flowering in culture medium

(C) Development of plant from a cell in culture medium

(D) All of the above

96. Laminar airflow is used for the purpose of :

(A) Medium sterilization

(B) Aseptic transfer

(C) Medium preparation

(D) Culture growth

97. The absence of all form of microorganism, including spore is known as :

(A) Sterilization

(B) Disinfection

(C) Sterility of egg

(D) Sanitization

98. Which of the following method is recommended for the sterilization of heat-labile chemicals ?

(A) Autoclave sterilization

(B) Filter sterilization

(C) Alcohol use

(D) None of these

99. Which of the following statement is correct ?

(A) Chemicals cannot be used for sterilization

(B) Pasteurization does not kills pathogens present in milk

(C) Radiations can be used for sterilization

(D) None of these

100. Culturing of cells in liquid agitated medium is called :

(A) Liquid culture

(B) Micropropagation

(C) Broth culture

(D) Cell suspension culture

Rough Work

Example :

Question :

Q.1 Ⓐ ● Ⓒ Ⓓ

Q.2 Ⓐ Ⓑ ● Ⓓ

Q.3 Ⓐ ● Ⓒ Ⓓ

If more than 75 questions are attempted by candidate, then the first attempted 75 questions will be considered for evaluation.

4. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
5. 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.
6. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
7. After the completion of the examination, candidates should leave the examination hall only after providing their question booklet and OMR Answer Sheet separately to the invigilator.
8. There will be no negative marking.
9. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
10. To bring and use of log-book, calculator, pager & cellular phone in examination hall is prohibited.
11. 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 Ⓐ ● Ⓒ Ⓓ

यदि परीक्षार्थी द्वारा 75 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 75 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा।

4. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
5. 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।
6. ओ०एम०आर० उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
7. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी प्रश्नपुस्तिका बुकलेट एवं ओ०एम०आर० शीट पृथक-पृथक उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें।
8. निगेटिव मार्किंग नहीं है।
9. कोई भी रफ कार्य, प्रश्न-पुस्तिका में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
10. परीक्षा-कक्ष में लॉग-बुक, कैल्कुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
11. 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।