

Roll No.

Question Booklet Number

O. M. R. Serial No.

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M. Sc. (Microbiology) (Second Semester)
EXAMINATION, 2025-26
(Old Syllabus Effective from 2022)
(Only Back Paper Students)
RECOMBINANT DNA TECHNOLOGY

Paper Code							
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Questions Booklet
Series

D

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)

(Only for Rough Work)

1. What are YAC vectors ?
 - (A) Yeast artificial vectors
 - (B) Yeast aggregative vectors
 - (C) Yeast artificial chromosomes
 - (D) Yeast aggregative chromosomes

2. Identify the hybrid promoter that is used in the expression vector :
 - (A) *araBAD* promoter
 - (B) *tac* promoter
 - (C) *lac* promoter
 - (D) *trp* promoter

3. Why are copy numbers important in a cloning experiment ?
 - (A) Maximum expression
 - (B) Ease of manipulation
 - (C) Cost efficiency
 - (D) Availability of stock

4. Which of the following statements is incorrect with respect to yeast vectors ?
 - (A) Yeast replicating plasmid (YRp) contain an autonomous replicating sequence (ARS)
 - (B) Yeast centromere plasmid (YCp) contain both an ARS and a yeast centromere
 - (C) Yeast episomal plasmids (YEps) are shuttle vectors
 - (D) Yeast integrative plasmid (YIp) can replicate as a plasmid)

5. What is the function of the *HIS3* gene located on the yeast cloning vectors ?
 - (A) Histone modulator
 - (B) Histamine biosynthesis
 - (C) Histidine biosynthesis
 - (D) Required for His-tagged fusion

6. What is the CEN4 region in the YAC (Yeast Artificial Chromosome) ?
 - (A) Centromere DNA
 - (B) Telomere DNA
 - (C) Origin of replication
 - (D) Selectable marker

7. If a plasmid is having two antibiotic resistant genes, say ampicillin resistant and kanamycin resistant. After successful cloning, if the plasmid grows in ampicillin containing medium but not in kanamycin, what can be concluded ?
- (A) The insert is not present in any of the gene.
- (B) The insert is present in ampicillin gene but not in kanamycin gene.
- (C) The insert is present in kanamycin gene but not in ampicillin gene.
- (D) The insert is present between both of the genes.
8. A cloning vector, which has both phage and plasmid properties is known as :
- (A) Fosmid
- (B) Phagemid
- (C) YAC
- (D) HAC
9. Identify the correct order for the following cloning vectors in terms of cloning capacity :
- (A) Plasmid > Lambda Phage > Cosmid > BAC > YAC
- (B) BAC > YAC > Plasmid > Lambda Phage > Cosmid
- (C) YAC > BAC > Cosmid > Lambda Phage > Plasmid
- (D) BAC > YAC > Lambda Phage > Plasmid > Cosmid
10. Cosmid vectors are :
- (A) Phages that lack *cos* site
- (B) Plasmids that contain fragment of λ phage DNA including the *cos* site
- (C) Plasmids that have no selection marker
- (D) Cryptic plasmids
11. Recombinant proteins that have Glutathione S-transferase (GST) tags are purified using :
- (A) Amylose columns
- (B) Glutathione sepharose resins
- (C) Ni-NTA affinity resin
- (D) Immobilized metal ion affinity chromatography

12. The bacteriophage M13 vectors belong to a group of phages called as :
- (A) Filamentous phage
 - (B) M phage group
 - (C) Mu phage group
 - (D) Double stranded phage
13. Which of the following statements is incorrect ?
- (A) Conjugative and non-conjugative plasmids be differentiated on the basis of absence and presence of transfer (*tra*) genes.
 - (B) The phage Lambda Vector, λ EMBL3, is an example of the replacement vector.
 - (C) Blue-White screening for the recombinant plasmids can be performed using the plasmid pBR322.
 - (D) The pUC vector series was developed at the University of California.
14. Find the range of size (Minimum-Maximum) of DNA that can be packaged into a λ phage is :
- (A) 10 Kb - 45 Kb
 - (B) 38 Kb - 52 Kb
 - (C) 70 Kb - 100 Kb
 - (D) 29 Kb - 49 Kb
15. Which divalent cations are usually used to make competent cells ?
- (A) Lead
 - (B) Cadmium
 - (C) Tin
 - (D) Calcium
16. Nick translation is performed for the synthesis of :
- (A) mRNA
 - (B) Recombinant proteins
 - (C) Endogenous proteins
 - (D) Radioactive DNA Probe

17. The phage Lambda (λ) Vectors, Lambda-EMBL3 (λ EMBL3) and Lambda-ZAPII (λ ZAPII) are examples of :
- (A) Insertional vector and replacement vector, respectively
- (B) Replacement vector and insertional vector, respectively
- (C) Hybrid vector and Mammalian vector, respectively
- (D) Cosmid and Phagemid, respectively
18. Circularization of the injected linear phage DNA molecule is facilitated by which of the following ?
- (A) Polyhedral head
- (B) *cos* sites
- (C) Phage tail
- (D) Capsid proteins
19. The process of introducing DNA molecules into the recipient host organism is known as :
- (A) Translation
- (B) Transformation
- (C) Transduction
- (D) Transcription
20. Find the microorganism that can be the source of the restriction endonuclease *XhoI* :
- (A) *Xanthomonas oryzae*
- (B) *Xanthomonas campestris*
- (C) *Xanthomonas holicicola*
- (D) *Xanthomonas badrii*
21. A restriction enzyme (*AluI*) has as its recognition sequence 5'- AGTC - 3'. Find the number of restriction sites for *AluI* in the genome (7936 bp) of the Cauliflower mosaic virus (CaMV) (assuming that the nucleotides are ordered randomly and the four different nucleotides are present in equal proportions in the CaMV genome).
- (A) 1984
- (B) 124
- (C) 31
- (D) 2

22. Which of the statements is incorrect with respect to Alpha (α -) complementation ?
- (A) One part of the *lacZ* gene (*lacZ'*) is present in the cloning vector.
 - (B) Another part is present in the host itself.
 - (C) The cloning vector is moved to host cell and transformants are selected on growth medium in the presence of IPTG, X-gal and antibiotic, blue colonies are observed.
 - (D) The cloning vector containing insert, is moved to host cell and transformants are selected on growth medium in the presence of IPTG, X-gal and antibiotic, blue colonies are observed.
23. Which antibiotic resistance is present in pBR322 vector ?
- (A) Ampicillin
 - (B) Kanamycin
 - (C) Tetracycline
 - (D) Both ampicillin and tetracycline
24. Plasmid incompatibility is :
- (A) Inhibition of growth of the bacterial host cell by the plasmids
 - (B) Ability of two different plasmids to coexist in the same cell in the absence of selection pressure
 - (C) Inability of two different plasmids to coexist in the same cell in the absence of selection pressure
 - (D) None of the above
25. Size of the pBR322 cloning vector is
- (A) 4.3 Kb
 - (B) 1 Kb
 - (C) 2.8 Kb
 - (D) 10 Kb
26. How can conjugative and non-conjugative plasmids be differentiated ?
- (A) On the basis of size
 - (B) Presence of antibiotic resistance
 - (C) Number of restriction sites
 - (D) Presence of transfer (*tra*) genes

27. Which of the following components are required for the 5'- end labeling of DNA with radioactive phosphorus ?
- (A) Terminal deoxynucleotidyl transferase and (gamma) $\gamma - ^{32}\text{P}$ dNTP
- (B) Polynucleotide kinase and (gamma) $\gamma - ^{32}\text{P}$ dNTP
- (C) Terminal deoxynucleotidyl transferase and (alpha) $\alpha - ^{32}\text{P}$ dNTP
- (D) Polynucleotide kinase and (alpha) $\alpha - ^{32}\text{P}$ dNTP
28. Which of the following parts of vector helps in identifying transformed cells ?
- (A) Multiple cloning sites
- (B) Selectable marker
- (C) Origin of replication
- (D) All of the above
29. The *par* region from a plasmid such as pSC101 can be cloned into pBR322. What is the function of this region ?
- (A) Partitioning function and maintains plasmid stability
- (B) Maintains cloning efficiency
- (C) Aids in replication
- (D) None of the above
30. Which of the following statements is incorrect ?
- (A) A library encompassing an entire genome is called a genomic library.
- (B) Genomic library contains both coding and noncoding DNA.
- (C) A cDNA library is made using mRNA instead of DNA as the starting material.
- (D) A cDNA library contains both coding and noncoding DNA.

31. The complete set of genetic information in an organism is called :
- (A) Gene
 - (B) Genome
 - (C) Genomics
 - (D) Proteome
32. Which of following are the characteristics of the type II restriction enzymes ?
- (P) Cleavage sites : At or near recognition sequence
 - (Q) Requirement for restriction enzyme activity : ATP
 - (R) Cleavage sites : Cleave at 24-26 bp away from recognition site
 - (S) Nature of enzyme : Unifunctional enzyme, two identical subunits
- (A) P and S
 - (B) Q and R
 - (C) P and Q
 - (D) Q and S
33. Reverse transcriptase is an enzyme used to generate complementary DNA (cDNA) from an mRNA template, a process known as reverse transcription. Reverse transcriptase is also called :
- (A) RNA-dependent RNA polymerase
 - (B) DNA-dependent RNA polymerase
 - (C) RNA-dependent DNA polymerase
 - (D) DNA-dependent DNA polymerase
34. The RNA strand in the RNA-DNA hybrid is removed by :
- (A) RNaseH
 - (B) RNaseA
 - (C) DNase I
 - (D) RNA Polymerase
35. Which enzyme is used to join together two different types of DNA molecules ?
- (A) Transferase
 - (B) Reverse transcriptase
 - (C) Ligase
 - (D) DNase

36. Find the microorganism that can be the source of the restriction endonuclease *AluI* :
- (A) *Escherichia coli*
 - (B) *Staphylococcus aureus*
 - (C) *Arthrobacter luteus*
 - (D) *Haemophilus influenza*
37. The S1 Nuclease is an endonuclease enzyme that splits single stranded DNA and RNA into oligo- or mononucleotides. The S1 Nuclease is isolated from :
- (A) Mung bean sprouts
 - (B) *Aspergillus oryzae*
 - (C) *Penicillium citrinum*
 - (D) *Alteromonas espejiana*
38. Which of the following is responsible for the conversion of covalently closed circular DNA to supercoiled DNA of the plasmid ?
- (A) Endonuclease
 - (B) DNA Gyrase
 - (C) Topoisomerase
 - (D) Exonuclease
39. Which enzyme is used in homopolymer tailing for producing sticky ends ?
- (A) Terminal Deoxynucleotidyl Transferase
 - (B) Alkaline Phosphatase
 - (C) Polynucleotide Kinase
 - (D) DNA Polymerase
40. Which is the enzyme used to remove phosphate group from the 5' end of the DNA ?
- (A) Polynucleotide Kinase
 - (B) Terminal Deoxynucleotidyl Transferase
 - (C) Alkaline Phosphatase
 - (D) Restriction Endonuclease
41. What is the characteristic of *lacZ* gene of pUC18 vector among the following ?
- (A) Encodes for antibiotic resistance
 - (B) Encodes for β -galactosidase enzyme
 - (C) Encodes for β -lactamase enzyme
 - (D) Encodes for β -galactoside transferase enzyme

42. The T4 DNA ligase and *Escherichia coli* DNA ligase require cofactors, respectively.
- (A) ATP and GTP
 (B) ATP and NAD⁺
 (C) NAD⁺ and FAD⁺
 (D) GTP and FAD⁺
43. Pairs of restriction enzymes that have slightly different recognition sequences, but upon cleavage of DNA, generate identical overhanging termini sequences, are called :
- (A) Isoschizomers
 (B) Neoschizomers
 (C) Isocaudomers
 (D) None of the above
44. Identify the restriction site for restriction endonuclease, *EcoRI* :
- (A) 5'-GAAATC-3'
 (B) 5'-GAAAAC-3'
 (C) 5'-GAAGGC-3'
 (D) 5'-GAATTC-3'
45. Three restriction endonucleases *HaeIII*, *KpnI*, and *NotI* recognize recognition site of 4bp, 6bp, and 8bp sequences, respectively. The relative frequency of occurrence of these recognition sites on a bacterial genome is :
- (A) *HaeIII* > *KpnI* > *NotI*
 (B) *HaeIII* > *NotI* > *KpnI*
 (C) *NotI* > *KpnI* > *HaeIII*
 (D) *KpnI* > *NotI* > *HaeIII*
46. Which type of restriction endonucleases is used most in genetic engineering ?
- (A) Type I
 (B) Type II
 (C) Type III
 (D) Type IV

47. DNA M and DNA N were digested with restriction enzyme *EcoRI* and analyzed by agarose gel electrophoresis. If DNA M gave three fragments and DNA N gave four fragments, then which of the following are correct ?
- (P) DNA M has two restriction recognition sites and is circular.
- (Q) DNA N has four restriction recognition sites and is circular.
- (R) DNA M has two restriction recognition sites and is linear.
- (S) DNA N has two restriction recognition sites and is linear.
- (A) Q and R
- (B) P and S
- (C) P and Q
- (D) R and S
48. Which of the following bacterial strains cannot be isolated during a genetic analysis of the restriction-modification system ?
- (A) Restriction-Modification Proficient (R+ M+)
- (B) Restriction-Modification Deficient (R-M-)
- (C) Restriction Deficient-Modification Proficient (R-M+)
- (D) Restriction Proficient-Modification Deficient (R+M-)
49. Bacteria protect themselves from viruses by fragmenting viral DNA upon entry with :
- (A) Exonuclease
- (B) Gyrase
- (C) Endonuclease
- (D) Ligase
50. Who discovered restriction enzymes ?
- (A) Watson and Crick
- (B) Jacob and Monad
- (C) Nathan, Arber and Smith
- (D) Boyer and Cohen

51. Which of the following is a high copy number plasmid ?
- (A) Conjugative plasmids
 - (B) Stringent plasmids
 - (C) Non-conjugative plasmids
 - (D) F-plasmid
52. The 2 micrometer circle found in yeast is a :
- (A) Phage
 - (B) Plasmid
 - (C) Virus
 - (D) Gene product
53. Which of the following is the correct order of steps when performing a southern blot after isolation of the DNA ?
- (A) Probe hybridization, restriction enzyme digestion, denaturation, electrophoresis
 - (B) Denaturation, electrophoresis, probe hybridization, restriction enzyme digestion
 - (C) Restriction enzyme digestion, electrophoresis, denaturation, probe hybridization
 - (D) Electrophoresis, Restriction enzyme digestion, probe hybridization, denaturation
54. Which of the following statements is incorrect with respect to Embryonic Stem (ES) cells ?
- (A) Inner cell mass of the blastocyst is the source of ES cells.
 - (B) ES cells are multipotent stem cells.
 - (C) ES cells can be cultured in medium.
 - (D) ES cells can give rise to all cell types except placenta.

55. If any protein-encoding gene is expressed in a heterologous host, it is called a :
- (A) Pure protein
 - (B) Mixed protein
 - (C) Recombinant protein
 - (D) Similar protein
56. What form does the phage DNA take when it is injected into the host ?
- (A) Linear
 - (B) Circular
 - (C) Double helical
 - (D) Supercoiled
57. His-tagged fusion proteins can easily be purified by :
- (A) Amylose columns
 - (B) Sucrose columns
 - (C) Ni-NTA affinity resin
 - (D) Glutathione sepharose resins
58. A dye called 'SYBR Green' is used in :
- (A) Nested PCR
 - (B) Inverse PCR
 - (C) Anchored PCR
 - (D) Real-Time PCR
59. Reverse transcription PCR uses :
- (A) Protein as a template to form cDNA
 - (B) mRNA as a template to form cDNA
 - (C) DNA as a template to form single stranded DNA
 - (D) All of the above
60. The research on host controlled restriction modification system is responsible for the discovery of :
- (A) DNA Polymerase III
 - (B) DNA Polymerase I
 - (C) Restriction Enzymes
 - (D) RNA Polymerase

61. Nucleic acids are readily labelled with tags that facilitate detection or purification. Which of the following components are required for the 3'-end labelling of DNA with radioactive phosphorus ?
- (A) Terminal deoxynucleotidyl transferase and (gamma) $\gamma - ^{32}\text{P}$ dNTP
- (B) Polynucleotide kinase and (gamma) $\gamma - ^{32}\text{P}$ dNTP
- (C) Terminal deoxynucleotidyl transferase and (alpha) $\alpha - ^{32}\text{P}$ dNTP
- (D) Polynucleotide kinase and (alpha) $\alpha - ^{32}\text{P}$ dNTP
62. Identify the label used for the generation of non-radioactive hybridization probes :
- (A) Fluorescein
- (B) Biotin
- (C) Digoxigenin
- (D) All of the above
63. From which organism is the enzyme reverse transcriptase isolated ?
- (A) Bacteria
- (B) Fungi
- (C) Virus
- (D) Prions
64. The Southern blotting technique depends on :
- (A) Similarities between the sequences of probe DNA and experimental DNA
- (B) Similarities between the sequences of probe RNA and experimental RNA
- (C) Similarities between the sequences of probe protein and experimental protein
- (D) The molecular mass of proteins

65. A molecular technique in which DNA sequences between two oligonucleotide primers can be amplified is known as :
- (A) Southern blotting
 - (B) Northern blotting
 - (C) Polymerase chain reaction
 - (D) DNA replication
66. Which of the following is untrue regarding the classic yeast two-hybrid method ?
- (A) It is used for the detection of protein interactions.
 - (B) Method that relies on the interaction of “bait” and “prey” proteins in molecular constructs in yeast.
 - (C) DNA-binding domain and a trans-activation domain don't necessarily interact.
 - (D) In this strategy, a two-domain transcriptional activator is employed as a helper for determining protein-protein interactions.
67. Klenow fragment is the modified enzyme of which of the parent DNA polymerase ?
- (A) DNA Polymerase I
 - (B) DNA Polymerase II
 - (C) DNA Polymerase III
 - (D) DNA Polymerase IV
68. Western blotting is the technique for the detection of :
- (A) Specific protein in the sample
 - (B) Specific DNA in the sample
 - (C) Specific RNA in the sample
 - (D) Specific glycolipid in the sample
69. The inheritance pattern of RFLP markers are :
- (A) Dominant
 - (B) Recessive
 - (C) Co-dominant
 - (D) Random

70. Polymerase used for PCR is extracted from :
- (A) *Escherichia coli*
 - (B) *Homo sapiens*
 - (C) *Thermus aquaticus*
 - (D) *Saccharomyces cerevisiae*
71. Phage display technique makes use of which of the following vectors ?
- (A) M13
 - (B) Lambda
 - (C) 2 micron circle
 - (D) BAC
72. Dolly is the name of the :
- (A) First cloned sheep
 - (B) First cloned monkey
 - (C) First test-tube baby
 - (D) First human fossil
73. Using the Wallace rule, find the T_m ($^{\circ}\text{C}$) for the Primer :
5'-CCTGGACAATGTACCATA-3'.
- (A) 56
 - (B) 52
 - (C) 48
 - (D) 42
74. In pronuclear microinjection method) :
- (A) The transgene is injected in to the female pronucleus just after fertilization.
 - (B) The transgene is injected in to the male pronucleus just after fertilization.
 - (C) Electric impulse is used for the DNA injection.
 - (D) The transgene is injected in to the embryonic stem cells.
75. Which of the following is the basic requirement of PCR reaction ?
- (A) Two oligonucleotide primers
 - (B) DNA segment to be amplified
 - (C) A heat-stable DNA polymerase
 - (D) All of the above
76. Antibiotics are used in recombinant DNA technology. They are used :
- (A) To keep culture free of microbial infections
 - (B) To promote the ligation between foreign DNA and vector
 - (C) To initiate the replication of vectors
 - (D) As selectable markers

77. Embryonic stem cells are :
- (A) Totipotent stem cells
 - (B) Pluripotent stem cells
 - (C) Multipotent stem cells
 - (D) Omnipotent stem cells
78. How many phage particles are released per generation upon coliphage infection ?
- (A) 10
 - (B) 100
 - (C) 500
 - (D) 1000
79. Transformation carried out using a particle gun is known as biolistic transformation. It falls under which category of transformation ?
- (A) Physical
 - (B) Chemical
 - (C) Electroporation
 - (D) Natural
80. Generation of recombinant DNA involves :
- (A) Cleaving and rejoining DNA segments with ligase alone
 - (B) Cleaving DNA segments with ligase and rejoining them with restriction endonuclease
 - (C) Cleaving and rejoining DNA segments with restriction endonuclease alone
 - (D) Cleaving DNA segments with restriction endonuclease and rejoining them with ligase
81. What is name of an antibody that is produced by plants that have been genetically engineered with DNA encoding a specific human antibody ?
- (A) Plantibody
 - (B) Edible vaccine
 - (C) Immunoglobulin
 - (D) Immunobody

82. Molecular farming is involved in :

- (A) Crop improvement
- (B) Production of metabolites
- (C) Therapeutics proteins
- (D) None of the above

83. In a plant tumor cell :

- (A) Complete Ti plasmid is incorporated in plant nuclear DNA.
- (B) Different parts of the Ti-plasmid are incorporated.
- (C) Only a small specific segment of the Ti-plasmid (T-DNA) is incorporated.
- (D) Complete Ti plasmid is incorporated in the plant chloroplast DNA.

84. What are opines ?

- (A) Bacterial nutrients
- (B) Plant nutrients
- (C) Telomere sites
- (D) T-DNA ends

85. A transgenic plant 'Golden Rice' contains foreign genes that produce :

- (A) Niacin
- (B) Biotin
- (C) Beta-carotene (β -carotene)
- (D) Yellow fluorescent protein

86. The first transgenic plant was :

- (A) Tobacco
- (B) Rice
- (C) Tomato
- (D) Cotton

87. In which region in the YAC vector is the new DNA inserted in a cloning experiment ?
- (A) TEL
 - (B) CEN4
 - (C) ARS
 - (D) SUP4
88. The first human protein produced through recombinant DNA technology is :
- (A) Insulin
 - (B) Interferon
 - (C) Somatostatin
 - (D) Erythropoietin
89. Gene transfer across the protoplast membrane is promoted by :
- (A) Phenol
 - (B) Benzoic acid
 - (C) Polyethylene glycol
 - (D) Naphthalene
90. Which of the following statements is incorrect with respect to Liposome-mediated gene delivery to plant cells ?
- (A) Enhanced delivery of encapsulated DNA by membrane fusion.
 - (B) This method makes encapsulated DNA prone to nuclease activity.
 - (C) Involves fusion of liposomes with protoplast.
 - (D) None of the above
91. Identify the DNA virus that have been developed as vector for the gene transfer to the plant cell :
- (A) Tobacco mosaic virus
 - (B) Cauliflower mosaic virus
 - (C) Brome mosaic virus
 - (D) Potato virus X

92. Disarmed Ti vectors do not contain :
- (A) Oncogenes located in the T-DNA region
 - (B) Opine catabolic genes
 - (C) *vir* genes
 - (D) Left and right border sequences
93. Which of the following statements is incorrect with respect to T-DNA binary vector system ?
- (A) The *vir* genes and the disarmed T-DNA containing the transgene are located on separate plasmids.
 - (B) The *vir* functions are supplied in *trans*, causing transfer of the recombinant T-DNA to the plant genome.
 - (C) Mini-Ti plasmid and helper Ti plasmid forms T-DNA binary vector system.
 - (D) Gene of interest (transgene) is cloned in the helper Ti plasmid.
94. 'Flavr savr' is genetically engineered tomato that show :
- (A) Longer shelf life
 - (B) Delayed ripening
 - (C) Enhanced flavor
 - (D) All of the above
95. Identify the genes that encode for a two-component signal system that drive the expression of other *vir* genes of Ti plasmid via sensing plant-derived signals such as plant phenolics and monosaccharides :
- (A) *virD* and *virE*
 - (B) *virC1* and *virC2*
 - (C) *virA* and *virG*
 - (D) *virB* and *virD*

96. Ti plasmid directs the formation of transfer apparatus which allow the transfer of T-DNA into the host plant. The transfer apparatus belong to the class of :
- (A) Type I secretion system
 - (B) Type II secretion system
 - (C) Type III secretion system
 - (D) Type IV secretion system
97. The *vir* genes required for the T-DNA transfer are located :
- (A) Within the T-DNA region of the Ti plasmid
 - (B) Outside of the T-DNA region of the Ti plasmid
 - (C) On the plant genome
 - (D) On the chloroplast genome
98. What are the origins of replication ?
- (A) Gene component
 - (B) Initiation sites
 - (C) Initiation codons
 - (D) Stop codons
99. The Ti (tumor inducing) plasmid is found in :
- (A) *Agrobacterium*
 - (B) Yeast as a 2-micron plasmid
 - (C) *Rhizobium*
 - (D) *Azotobacter*
100. What will happen if the incubation period, post restriction digestion is shortened ?
- (A) Indigestion
 - (B) Partial digestion
 - (C) Double digestion
 - (D) Complete digestion

(Only for Rough Work)

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 :

Example :

Question :

- Q. 1 (A) ● (C) (D)
 Q. 2 (A) (B) ● (D)
 Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

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 and 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.

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 छँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

- प्रश्न 1 (A) ● (C) (D)
 प्रश्न 2 (A) (B) ● (D)
 प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. 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. ओ. एम. आर. 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 के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, 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 प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।