

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO

Test Booklet Series

T. B. C. : PGT - 5/17

A

TEST BOOKLET

**PART - B
(BOTANY)**

Sl. No.

5185

Time Allowed : 2 Hours

Maximum Marks : 100

: INSTRUCTIONS TO CANDIDATES :

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET OF THE SAME SERIES ISSUED TO YOU.
2. ENCODE CLEARLY THE TEST BOOKLET SERIES A, B, C OR D, AS THE CASE MAY BE, IN THE APPROPRIATE PLACE IN THE ANSWER SHEET USING BALL POINT PEN (BLUE OR BLACK).
3. You have to enter your **Roll No.** on the Test Booklet in the Box provided alongside. **DO NOT** write *anything else* on the Test Booklet.
4. YOU ARE REQUIRED TO FILL UP & DARKEN ROLL NO., TEST BOOKLET / QUESTION BOOKLET SERIES IN THE ANSWER SHEET AS WELL AS FILL UP TEST BOOKLET / QUESTION BOOKLET SERIES AND SERIAL NO. AND ANSWER SHEET SERIAL NO. IN THE ATTENDANCE SHEET CAREFULLY. WRONGLY FILLED UP ANSWER SHEETS ARE LIABLE FOR REJECTION AT THE RISK OF THE CANDIDATE.
5. This Test Booklet contains **100** items (questions). Each item (question) comprises four responses (answers). You have to select the correct response (answer) which you want to mark (darken) on the Answer Sheet. In case, you feel that there is more than one correct response (answer), you should mark (darken) the response (answer) which you consider the best. In any case, choose **ONLY ONE** response (answer) for each item (question).
6. You have to mark (darken) all your responses (answers) **ONLY** on the **separate Answer Sheet** provided by using **BALL POINT PEN (BLUE OR BLACK)**. See instructions in the Answer Sheet.
7. All items (questions) carry equal marks. All items (questions) are compulsory. Your total marks will depend only on the number of correct responses (answers) marked by you in the Answer Sheet. **There will be no negative markings for wrong answers.**
8. Before you proceed to mark (darken) in the Answer Sheet the responses to various items (questions) in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per the instructions sent to you with your **Admission Certificate**.
9. After you have completed filling in all your responses (answers) on the Answer Sheet and after conclusion of the examination, you should hand over to the Invigilator the *Answer Sheet* issued to you. You are allowed to take with you the candidate's copy / second page of the Answer Sheet along with the **Test Booklet**, after completion of the examination, for your reference.
10. Sheets for rough work are appended in the Test Booklet at the end.

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SEAL

1. The life cycle of *Spirogyra* is :
 - (A) Haplontic
 - (B) Diplontic
 - (C) Haplodiplontic
 - (D) Diplohalontic
2. Heterocyst is found in certain algae belonging to :
 - (A) Chlorophyceae
 - (B) Cyanophyceae
 - (C) Pheophyceae
 - (D) Rhodophyceae
3. *Schizosaccharomyces pombe* belongs to the class of fungi :
 - (A) Deuteromycetes
 - (B) Basidiomycetes
 - (C) Ascomycetes
 - (D) Phycomycetes
4. Concentric vascular bundles are seen in :
 - (A) *Helianthus*
 - (B) *Nictanthes*
 - (C) *Cucurbita*
 - (D) *Dracaena*
5. Out of the four widely known system of classification one remains less phylogenetic and more natural is :
 - (A) Takhtajan
 - (B) Hutchinson
 - (C) Bentham and Hooker
 - (D) Engler and Prantl
6. Which sporophyte from among the following bryophytes possesses columella ?
 - (A) *Porella*
 - (B) *Marchantia*
 - (C) *Riccia*
 - (D) *Anthoceros*
7. The family Magnoliaceae has been considered primitive on the basis of comparing its flower with the strobilus of :
 - (A) Coniferales
 - (B) Bennetitales
 - (C) Cycadales
 - (D) Gnetales
8. Which of the following tissue in microsporogenesis divide by endomitosis resulting in polyploidy cells :
 - (A) Sporogenous tissue
 - (B) Tapetum
 - (C) Endothecium
 - (D) Microspore mother cell
9. Sperms in male gametophyte in angiosperms are formed :
 - (A) As a result of gametogenesis
 - (B) As a result of meiosis of pollen mother cells
 - (C) As a result of mitosis of generative cells
 - (D) As a result of mitosis of vegetative cells

10. Biparental inheritance of plastid is a characteristic feature of cytoplasmic inheritance seen in :
- (A) *Lycopersicon type*
 (B) *Solanum type*
 (C) *Riticum type*
 (D) *Pelargonium type*
11. In angiosperms, the triploid endosperm is formed in the embryo sac as a result of :
- (A) Fusion of the secondary nucleus with the one of sperm nuclei
 (B) Fusion of one the polar nuclei with the one of the sperm nuclei
 (C) Fusion of one the polar nuclei with the two antipodal nuclei
 (D) Fusion of the two synergid nuclei with one of the sperm nuclei
12. Which one of the following plants is found in mangroves ?
- (A) *Dalbergia sissoo*
 (B) *Dalbergia spinosa*
 (C) *Bacopa monnieri*
 (D) *Adhatoda vasica*
13. Ergot alkaloids having medicinal applications is derived from :
- (A) *Penicilline chrysogenum*
 (B) *Aspergillus flavous*
 (C) *Cleviceps pupurea*
 (D) *Fusarium oxysporum*
14. Which one of the following is a millet ?
- (A) Rice
 (B) Ragi
 (C) Wheat
 (D) Green gram
15. The National Botanical Research Institution is located in :
- (A) New Delhi
 (B) Kolkata
 (C) Lucknow
 (D) Mumbai
16. Agar-agar is produced from :
- (A) *Laminaria*
 (B) *Polysiphonia*
 (C) *Fucus*
 (D) *Gracilaria*
17. Regulation of stomatal opening-closing mechanism involves :
- (A) Abscicic acid
 (B) Cytokinin
 (C) Gibberellic acid
 (D) Auxin

18. *Arabidopsis thaliana* belongs to the family :
- (A) Liliaceae
 - (B) Brassicaceae
 - (C) Asteraceae
 - (D) Fabaceae
19. *Comellia sinensis*(tea) belongs to the family :
- (A) Commelinaceae
 - (B) Piperaceae
 - (C) Cannabinaceae
 - (D) Theaceae
20. The stamens are gynandrous in :
- (A) *Capparis*
 - (B) *Passiflora*
 - (C) *Calotropis*
 - (D) *Cucurbita*
21. Psammophytes grow on :
- (A) High saline soils
 - (B) Rocks
 - (C) Sand and pebbles
 - (D) Very cold soil with limited water
22. A mycorrhiza is a symbiotic association between :
- (A) Bacteria and the roots of a vascular host plant
 - (B) Algae and fungi
 - (C) Algae and the roots of a vascular host plant
 - (D) Fungus and the roots of a vascular host plant
23. Vessels are present in :
- (A) All vascular plants
 - (B) All angiosperms
 - (C) All spermatophytes
 - (D) All gymnosperms
24. Which of the following is a lichen ?
- (A) Reindeer moss
 - (B) Club moss
 - (C) Spike moss
 - (D) Peat moss
25. Homospory is a characteristic feature of :
- (A) *Selaginella*
 - (B) *Psilotum*
 - (C) *Marsilia*
 - (D) *Isoetes*
26. Late blight of potato is due to :
- (A) *Puccinia graminis*
 - (B) *Phytophthora infestans*
 - (C) *Ustilago cynodotis*
 - (D) *Xanthomonas axonopodis*
27. Citrus canker is a disease affecting citrus fruit is due to :
- (A) Nematode infection
 - (B) Fungal infection
 - (C) Viral infection
 - (D) Bacterial infection

28. *Cyathium* inflorescence is common found in the genus :
- (A) *Ficus*
 - (B) *Azadirachta*
 - (C) *Euphorbia*
 - (D) *Ocimum*
29. The Casparian strip, the layer of suberin (and in some instances lignin as well) on the radial and transverse walls of the endodermal cells, regulates :
- (A) The movement of water and minerals into protoxylem
 - (B) The movement of water and minerals into phloem
 - (C) The movement of water and minerals into pericycle
 - (D) The movement of water and minerals into the stele
30. The viral genome that remains integrated into the host bacterial genome is called as :
- (A) Plasmid
 - (B) Bacteriophage
 - (C) Episome
 - (D) Prophage
31. The main chemical feature of the cell wall responsible to cause differential staining distinction between gram positive and gram negative bacteria is :
- (A) Presence or absence of peptidoglycan
 - (B) Presence or absence of lipoteichoic acid
 - (C) Peptidoglycan layer thickness
 - (D) Presence or absence of teichoic acid
32. The genetic material of plant virus is :
- (A) Single stranded RNA
 - (B) Double stranded linear RNA
 - (C) Single circular RNA
 - (D) Single stranded, linear, positive strand RNA
33. The main function of the pyrenoid prominently seen in the chloroplast of *Chlamydomonas* is :
- (A) To accumulate Ribulose-1, 5-bisphosphate carboxylase oxygenase (RuBisCo)
 - (B) To cluster carbon dioxide (CO₂) around RuBisCo
 - (C) To act as the centre of CO₂ fixation by generating and maintaining a CO₂ rich environment around RuBisCo
 - (D) The possession of a unique protein Essential Pyrenoid Component 1 (EPCY1)

34. The unique distinction of Archaea from Bacteria is :
- Extremophilic distribution
 - Ester-linked lipid, peptidoglycans
 - Asexual reproduction, horizontal gene transfer
 - Ether-linked lipids, pseudo-peptidoglycan
35. During secondary growth in woody plants the cork cambium produces to the inward side :
- Secondary xylem
 - Phelloderm
 - Periderm
 - Cork cell
36. During secondary growth a normal cambial ring is formed by the union of intra-fascicular and inter-fascicular cambium. Certain segments of the cambial ring, however, cease producing secondary xylem inward but continue producing secondary phloem outward that results in ridged and furrowed stele common in :
- Aristolochia*
 - Bauhinia*
 - Bignonia*
 - Tinospora*
37. Secondary vascular bundles formed as a result of secondary growth in stem of :
- Boerhaavia*
 - Dracaena*
 - Chenopodium*
 - Calotropis*
38. Intraxylary phloem is characteristic feature of secondary growth in the stem of :
- Leptadenia*
 - Bauhinia*
 - Bignonia*
 - Amaranthus*
39. The two large central medular vascular bundles in the innermost ring is the characteristic feature of :
- Boerhaavia*
 - Mirabilis*
 - Chenopodium*
 - Amaranthus*
40. The life history of *Selaginella* approaches towards seed habit evident from the fact that :
- The plant is eusprongiate
 - The plant is heterosporous
 - The plant tend to retain of megaspores inside megasporangium
 - The number of megaspores in megasporangium is reduced

41. A sporangium developing from a group of cells, rather than a single cell is called :
- (A) Synangium
 (B) Homosporangium
 (C) Leptosporangium
 (D) Eusporangium
42. Haplostele is the most primitive type of protostele seen in :
- (A) *Psilotum*
 (B) *Selaginella*
 (C) *Lycopodium*
 (D) *Marsilea*
43. The zygospores formed as a result of conjugation is the feature of :
- (A) Sexual reproduction in *Spirogyra* only
 (B) Sexual reproduction in *Rhizopus* only
 (C) Sexual reproduction in both *Spirogyra* and *Rhizopus*
 (D) Sexual reproduction in *Chlamydomonas* only
44. Which of the following nitrogen fixing plants do not possess cyanobacterial symbionts ?
- (A) *Lichen*
 (B) *Anthoceros*
 (C) *Casuarina*
 (D) *Cycas*
45. *Rhizopus stolonifer* a saprophytic fungi under class Zygomycetes, is characterized by its :
- (A) Haploid thallus, consisting of coenocytic mycelium
 (B) Diploid thallus consisting of septate mycelium
 (C) Diploid thallus consisting of coenocytic mycelium
 (D) Haploid thallus consisting of coenocytic mycelium
46. The structure and physiology of the heterocyst found in Cyanobacteria is designed to be anaerobic, the precondition for N_2 fixation, achieved by :
- (A) Lacking the water-splitting photosystem II(PSII)
 (B) Lacking the ATP generating photosystem I(PSI) through cyclic photophosphorylation
 (C) Lacking PSII but possessing PSI
 (D) Lacking both PSI and PSII

47. Viviparous germination an unique feature common associated with some of the :
- (A) Epiphytes
 - (B) Hydrophytes
 - (C) Mangroves
 - (D) Halophytes
48. The modified underground stem of *Colocasia esculanata* :
- (A) Rizome
 - (B) Dracaena
 - (C) Corm
 - (D) Tuber
49. Which of the following is an albuminous seeds ?
- (A) *Tamarindus indicus*
 - (B) *Cicer arietum*
 - (C) *Pisum sativum*
 - (D) *Cocus nucifera*
50. The inflorescence of rice is a :
- (A) Spike
 - (B) Catkin
 - (C) Spikelet
 - (D) Spadix
51. Petaloid polyphyllous perianth is a characteristic feature of the following :
- (A) *Gloriosa superba*
 - (B) *Clitoria ternatea*
 - (C) *Bougainvillea spectabilis*
 - (D) *Polyalthes tuberosa*
52. Androeclium having indefinite stamens in monadelphous condition is a characteristic feature of the family :
- (A) Brassicaceae
 - (B) Fabaceae
 - (C) Malvaceae
 - (D) Poaceae
53. Bicarpellary syncarpous, ovary falsely two celled by the presence a replum is the feature of the family :
- (A) Brassicaceae
 - (B) Fabaceae
 - (C) Malvaceae
 - (D) Poaceae
54. Fruit is a siliqua in :
- (A) *Pisum sativum*
 - (B) *Brassica nigra*
 - (C) *Hibiscus esculatus*
 - (D) *Datura metel*

55. The simple dry indehiscent fruit Caryopsis is found in :
- (A) *Zea mays*
 - (B) *Mirabilis jalpa*
 - (C) *Heliumthus annuus*
 - (D) *Amaranthus oleraceous*
56. The leaf lamina is succulent in :
- (A) *Vanda roxburghi*
 - (B) *Citrus limon*
 - (C) *Catharanthus roseus*
 - (D) *Aloe barbadensis*
57. The leaf apex is modified to a tendril to climb up on the support :
- (A) *Boerhaavia diffusa*
 - (B) *Gloriosa superba*
 - (C) *Smilax macrophylla*
 - (D) *Cucurbita pepo*
58. The modified tuberous roots for food storage is seen in :
- (A) *Solanum tuberosum*
 - (B) *Amorphophalus campanulatus*
 - (C) *Ipomoea batatas*
 - (D) *Asparagus recemosus*
59. One of the five sepals in the calyx is modified into coloured leaf-like structure showing prominent venation :
- (A) *Bougainvillea spectabilis*
 - (B) *Mussaendra frondosa*
 - (C) *Curcuma longa*
 - (D) *Impatiens basamina*
60. The stamen is petaloid :
- (A) *Canna indica*
 - (B) *Mussaendra frondosa*
 - (C) *Artabotrys hexapetalous*
 - (D) *Michelia champaka*
61. An ecological niche is a very specific space in a ecosystem :
- (A) Occupied by several species on the basis of mutualism
 - (B) Occupied by two species basis of symbiosis
 - (C) Occupied by a single species on the basis of competitive exclusion principle
 - (D) Occupied by several species competing with each other for the same or overlapping resources or food chain.
62. The major component of green house gases in the atmosphere is :
- (A) Methane
 - (B) Ozone
 - (C) Carbon dioxide
 - (D) Nitrous oxide
63. Nitrogen fixing bacteria are called :
- (A) Autotrophs
 - (B) Heterotrophs
 - (C) Phototrophs
 - (D) Diazotrophs

64. The largest active carbon dioxide sink on Earth is the :
- (A) Glaciers
 - (B) Grassland
 - (C) Forests
 - (D) Ocean
65. The hard non-living outer cover of Earth, that supports all the living organisms is the :
- (A) Hydrosphere
 - (B) Atmosphere
 - (C) Lithosphere
 - (D) Biosphere
66. In an ecosystem food chain, carnivores represent the :
- (A) Primary producer
 - (B) Primary consumer
 - (C) Secondary consumer
 - (D) Primary decomposer
67. In a food web the carnivorous plants represent :
- (A) Autotroph
 - (B) Mixotroph
 - (C) Heterotroph
 - (D) Chemolithotrophs
68. The genetic material of virus is nucleic acid, which can be :
- (A) Either RNA or DNA
 - (B) Either single stranded or double stranded, DNA or RNA
 - (C) Either linear or circular DNA
 - (D) Either linear or circular RNA
69. The attachment of bacteriophages on the surface of bacteria is :
- (A) Random
 - (B) Non-random
 - (C) At specific receptor sites include lipopolysaccharides and proteins, techoic acids, flagella and pili
 - (D) At non-receptor sites with the aid of specific proteins on the viral capsid
70. The cell wall having peptidoglycans with no muramic acid is the characteristic feature of :
- (A) Bacteria
 - (B) Eucharua
 - (C) Cyanobacteria
 - (D) Archea

71. *Methanobacterium* is a :
- (A) Gram positive archaea
 - (B) Gram positive bacteria
 - (C) Gram negative bacteria
 - (D) Gram negative archaea
72. The transfer of bacterial genes by viruses is called :
- (A) Transformation
 - (B) Transduction
 - (C) Conjugation
 - (D) Lysogeny
73. The nucleolar organiser DNA containing the rRNA genes contributes to the formation of the nucleolus. RNA polymerase I transcribes rRNA :
- (A) in pieces, which in turn get assembled with ribosomal proteins (translated in cytoplasm) forming ribosomal subunits in the nucleolus.
 - (B) In a single long piece, then spliced to form the rRNA molecules assembled with ribosomal proteins (translated in cytoplasm) forming ribosomal subunits in the nucleolus
 - (C) That is stored in the nucleolus and then move to the cytoplasm to assemble with the proteins forming ribosomal subunits ultimately to take part in translation.
 - (D) That in association with ribosomal proteins form the ribosomes in the nucleolus
74. There are at least three check points, at G1/S prevent initiation of S phase, at G2/M prevent initiation of mitosis (M) and at spindle organisation prevent alignment chromosomes. These check points are controlled by :
- (A) Action of cyclin proteins (Cyclin A and B)
 - (B) Action of cyclin dependent kinases (CDKs)
 - (C) Coordinated phosphorylation and dephosphorylation
 - (D) The Maturation Promoting Factor (MPF), a dimer of cyclin B and CDKs, through phosphorylation and dephosphorylation

75. In a three point test cross for gene mapping the middle gene will be decided on the basis of :
- Non cross over frequency
 - Double cross over frequency
 - Single cross over frequency
 - Both double and single cross over frequency
76. A given standard diploid plant having $2n = 2x = 14$ chromosomes, up on meiotic analysis instead of the expected seven bivalents(7, II) revealed six bivalents(6, II) and one univalent(1, I) in metaphase I of pollen mother cells. The plant can be said to be :
- Trisomic ($2n + 1$)
 - Monosome ($2n - 1$)
 - Nullisomic ($2n - 2$)
 - Stranded diploid ($2n$)
77. The principle of Mendel's independent assortment of genes is based on :
- Mendel's F₂-monohybrid cross ratio(3 : 1) demonstrated
 - Epistasis
 - Mendel's F₂-dihybrid cross ratio(9 : 3 : 3 : 1)
 - Linkage
78. The non-ionising radiation UV (254-260 nm) induces mutation by causing :
- Demination of guanine in DNA
 - Intercalate in between the opposite bases in the two strands of DNA
 - Thymine dimmers in DNA
 - Depurination of DNA
79. The chromosome count of plant can be represented either in gametic(n), somatic($2n$) or in basic(x) number. The correct representation of the bread wheat *Triticum aestivum*, which is a allohexaploid having three different genomes AABBDD is :
- $6n = 6x = 42$
 - $2n = 6x = 42$
 - $2n = 2x + 2x' + 2x'' = 42$
 - $2n = 42$
80. The specialised cytoplasmic organelle present in oil rich seeds contains enzymes such as isocitrate lyase and malate synthetase involved in the conversion of lipids to carbohydrates during germination is :
- Mitochondrion
 - Glyoxysome
 - Peroxisome
 - Golgi bodies

81. In DNA replication, the discontinuous pieces of DNA in the lagging strand called Okazaki fragments are synthesised :
- Along the direction of replication fork movement
 - In the direction opposite to the replication fork movement
 - On either directions with respect to the direction of replication fork movement
 - Without requiring any RNA primer
82. The DNA polymerase I found in *Escherichia coli* acts as an exonuclease that hydrolyze DNA or RNA :
- In the 3' to 5' direction only
 - In the 5' to 3' direction only
 - Remove Okazaki fragments from the 3' end
 - In either the 3' to 5' or 5' to 3' direction
83. DNA polymerase III is the major replicative enzymes *Escherichia coli*. The eukaryotic counterpart of the prokaryotic DNA polymerase III is :
- DNA polymerase α (alpha)
 - DNA polymerase β (beta)
 - DNA polymerase δ (delta)
 - DNA polymerase ϵ (epsilon)
84. The Base Excision Repair(BER) is one of the several mechanisms to repair DNA damage involving several repair enzymes. One key enzyme involved in the BER that removes the wrongly incorporated purine or pyrimidine from the nucleotide by cleaving the bond between the base and deoxyribose resulting in an APsite. The said key enzyme is :
- DNA glycolase
 - DNA Polymerase I
 - AP endonuclease
 - DNA lygase
85. There are 64 codons in total of which three are stop codons specify no amino acid, one start codon specify methionine and rest 61 codons specify amino acids. All amino acids are specified by more than two codons with exception to a few amino acids, which are specified by only one codon. The number of such amino acids specified by a single codon is :
- 5
 - 4
 - 3
 - 2
86. Eukaryotic cells contain three distinct nuclear RNA ploymerases(I, II and III). The one responsible to transcribe the gene encoding mRNA is :
- RNA polymerase I
 - RNA polymerase II
 - RNA polymerase III
 - All the RNA polymerases

87. The translation starts at a specific initiation site at the 5' end of mRNA. In both prokaryotes and eukaryotes the first step of the initiation stage is the binding of :

- (A) A non-specific aminoacyl tRNA and mRNA containing the initiation codon to the small ribosomal subunit. The large subunit then joins the complex, forming functional ribosome on which elongation of the polypeptide chain proceeds.
- (B) A specific aminoacyl tRNA and mRNA containing an initiating codon to the small ribosomal subunit on the mRNA. The large subunit then joins the complex, forming functional ribosome on which elongation of the polypeptide chain proceeds.
- (C) A specific methionyl tRNA(formylmethionyl tRNA in prokaryotes) and mRNA containing an AUG initiating codon to the large ribosomal subunit. The small subunit then joins the complex, forming functional ribosome on which elongation of the polypeptide chain proceeds.

(D) A specific methionyl tRNA(formylmethionyl tRNA in prokaryotes) and mRNA containing an AUG initiating codon to small ribosomal subunit. The large subunit then joins the complex, forming functional ribosome on which elongation of the polypeptide chain proceeds.

88. Induction is the process in which the expression of genes are 'Turned on' in response to substance in the environment called 'Inducer'. Repression is the reverse or 'Turned off' process. Both operate at the level of transcription. In LAC operon, cAMP-CRP complex serves as :

- (A) A repressor
- (B) Negative regulator of repression through binding with repressor forming a complex capable of binding to the operator thereby preventing RNA polymerase to initiate transcription
- (C) Positive regulator of induction through binding to a base sequence in the DNA in the promoter region that facilitates better binding of RNA polymerase to the promoter leading to initiation of transcription
- (D) An inducer

89. The DNA-dependent RNA polymerase transcribes RNA using :
- The 3' to 5' strand of DNA as the template, known as the sense strand
 - The 5' to 3' strand of DNA as the template, known as the antisense strand
 - Either of the strands as the template, sense or antisense
 - The 5' to 3' strand of DNA as the template, known as the sense strand
90. The classical hypothesis "one gene one enzyme" no more holds true after the discovery that an enzyme may have several subunits as is the case with several holoenzymes. A gene represents a cistron. The transcription of eukaryotic mRNA is :
- Polycistronic
 - Monocistronic
 - Either polycistronic or monocistronic depending on the enzyme structure
 - Is independent of the enzyme structure
91. The simplest type mutation in which a nucleotide in DNA duplex is replaced with different nucleotide pair. In a mutation 'T' is replaced by 'C' or 'A' is replaced by 'G'. This type of base substitution is called :
- Silent mutation
 - Transverse mutation
 - Transition mutation
 - Non-sense mutation
92. The herbicidal action of glyphosate is through the inhibition of 5-enolpyruvyl shikimate-3-phosphate synthetase (EPSPS) that blocks the shikimate pathway responsible for the synthesis of aromatic amino acids in bacteria and plants. The engineered glyphosate resistant crop plants :
- Contain an EPSPS-encoding gene isolated from a glyphosate-resistant strains of *Escherichia coli* capable synthesising aromatic amino acid
 - Are capable of degrading glyphosate to non-toxic compounds
 - synthesize the needed aromatic amino acids through an alternate route
 - May contain some glyphosate degrading enzymes

93. The strains the bacterium **Bacillus thuringiensis** have been the source of the **cry** genes that encodes the protoxin protein(delta-endotoxin) that are insecticidal to the lepidopteran larvae include moths and butterflies beetles, cotton bollworms etc. The scientific challenge is that **cry** genes are not particularly well expressed in plants. One of the best approaches to overcome and enhance the expression of the toxic **cry** in plants is :
- (A) By shortening the gene sequence so that the extra polypeptide portion from N-terminus not contributing to insecticidal property is removed
 - (B) By using a shortened or improved version of **cry** gene put under the transcriptional control of a strong constitutional of 35s promoter from CMV and the napoline synthase transcription termination-polyadenylation site
 - (C) By using cointegrate type Ti plasmid vector for transformation
 - (D) By using binary cloning vector under transcription control of CMV 35s promoter and the napoline synthase transcription termination-polyadenylation site
94. Somaclonal variation in plant tissue culture results from :
- (A) Physiological variation in culture conditions
 - (B) Changes pH 5.8 of the culture media
 - (C) Genetic variation of somatic cells in **in vitro** culture
 - (D) Spontaneous phenotypic mutations of somatic cells in vitro culture
95. Ribulose Bisphosphate Carboxylase-Oxygenase(rubisco) capable of catalyzing two different reactions depending the relative concentrations of CO_2 and O_2 as below :
- (A) Under conditions of low O_2 and high CO_2 rubisco has oxygenase activity
 - (B) Under conditions of high illumination, CO_2 levels around a plant may increase triggering rubisco's carboxylase activity
 - (C) Under conditions of high O_2 and low CO_2 , rubisco has carboxylase activity
 - (D) Under conditions of low O_2 and high CO_2 , rubisco has carboxylase activity

96. From epidermis to the endodermis of the root there are three pathways through which the water can flow : the apoplast, transmembrane and symplast of which the water movement through apoplast pathway is well established :
- (A) That involves exclusively plasmodesmata
 - (B) That involves exclusively the cell wall without crossing membranes
 - (C) That involves exclusively the suberized casparian stripes present on the cell wall
 - (D) That involves exclusively root hydrolytic pressure
97. The enzyme nitrite reductase catalyses the conversion of :
- (A) Nitrate to nitrite
 - (B) Molecular nitrogen to ammonium
 - (C) Nitrite to ammonium
 - (D) Ammonium to amino acids
98. The two hormones that are critical for root and shoot initiation in tissue culture are :
- (A) Gibberellin and cytokinin
 - (B) Auxin and cytokinin
 - (C) Ethylene and cytokinin
 - (D) Auxin and gibberellin
99. Senescence and fruit ripening is enhanced by :
- (A) Auxin
 - (B) Gibberellin
 - (C) Cytokinin
 - (D) Ethylene
100. There are five major types of histones(H1, H2A, H2B, H3 and H4) responsible for the structural organisation and packaging from 2nm diameter DNA duplex to 1400nm diameter metaphase chromatid through the formation of nucleosomes. The histone excluded from the nucleosome octamer core, found attached in between linker DNA is :
- (A) H1
 - (B) H2A
 - (C) H2B
 - (D) H4

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