

Molecular biology and plant biotechnology

- Histone proteins are completely devoid of ----- amino acids.
a) Tryptophan **b) Arginine** c) Histidine d) lysine.
- Formation of heat shock proteins in plants results in _____?
a). Elevation of temperature in cold conditions.
b) Embracing the enzymes and other proteins and prevent their denaturation.
c) Change the chemical nature of other proteins thus making them heat resistant.
d) Help in evaporative cooling.
- Heat shock proteins encircle enzymes as a self defense and protect plant against temperature above
a) 10°C b) 20°C c) 30°C **d) 40°C**
- Protein folding is a process in which a polypeptide folds in to _____
a) 2-D structure
b) Globular form
c) 3-D structure
d) Linear form
- Which of them contains all the information required to fold the polypeptide chain in its 3-D structure?
a) DNA sequences
b) RNA
c) Histone protein
d) Amino acid sequences
- The DNA threads which appear inside the nucleus at the time of cell division
a) Spindle fibers
b) Centrioles
c) Asters
d) Chromosomes
- Which of the following is not a major class of chromatin proteins?
a) Histones
b) Topoisomerases
c) SMC proteins
d) Cohesins

8. For isolating DNA from plants, the most suitable method is -----
a) SDS phenol extraction **b) C-TAB method** c) SDS proteinase d) All the above
9. Which of the following reagent is used for precipitating DNA ?
a) ethanol b) chloroform **c) isopropanol** d) isoamyl alcohol
10. Which of the following is an incorrect statement about the terminologies related to protein sorting?
a) Subcellular localization is an integral part of protein functionality
b) Many proteins exhibit functions only after being transported to certain compartments of the cell
c) All the proteins exhibit functions after being transported to certain compartments of the cell
d) Protein sorting is also known as protein targeting
11. For many eukaryotic proteins, newly synthesized protein precursors have to be transported to specific membrane-bound compartments and be proteolytically processed to become functional
a) True
b) False
12. Euchromatin is-----
a) tightly packed form of chromatin b) concentrated form of chromatin
c) elongated form of chromatin **d) lightly packed form of chromatin**
13. Continuous repetitive regions in a genome are called -----
a) Short repetitive units **b) Tandem repeats** c) Alu repeats d) Poly-A tailing
14. Translocation TIM 23 is located in -----
a) outer membrane of mitochondria **b) inner membrane of mitochondria**
c) inner and outer membrane of mitochondria d) outer membrane of chloroplast
15. Number of genes in *Arabidopsis thaliana* is
a) 27,00 b) 19,099 **c) 27,000** d) 37000.
16. The transposable elements are first discovered by
a) Morgan b) McCarthy c) Monod **d) McClintock**
17. _____ number of nucleotides are present in T-DNA
a) 15 **b) 25** c) 55 d) 35
18. 2,4-D is a -----
a) Fungicide b) Bactericide **c) Herbicide** d) Insecticide

19. The 2n chromosome number in *Arabidopsis thaliana* is -----.
 a) 8 **b) 10** c) 12 d) 14
20. The phytochrome pigment was discovered by -----.
 a) Warren Butler b) Harold Sergeant c) **Sterling Hendricks** d) SC Bose
21. A serious limitation of *Ti* plasmid as an effective vector for cloning is
 a) production of phytohormones b) availability of marker gene
 c) presence of origin of replication **d) short size**
22. The chloroplast DNA is
 a) linear & single stranded **b) circular & double stranded**
 c) circular & single stranded d) linear & double stranded
23. Which one of the following is a model organism?
 a) *Tridax* **b) *Arabidopsis*** c) *Oryza* d) *Acetabularia*
24. Which one is used as a reporter gene-----
 a) *Cab* b) *Epsp* **c) *gus*** d) *rbcS*
25. Which of the following histone pairs forms tetramers in solution?
 a. H₁, H₂A b. H₂A, H₂B c. H₂A, H₃ **d. H₃, H₄**
26. Semi conservative replication of DNA was first demonstrated in_____
a. *Escherichia coli* b. *Streptococcus pneumoniae*
 c. *Salmonella typhi* d. *Drosophilla melanogaster*
27. Which of the following plant cell show totipotency?
 a) Xylem vessels b) Sieve tubes **c) Meristem** d) Cork cells
28. Organogenesis is-----
 a) formation of callus tissue **b) formation of shoots and root on callus tissue**
 c) both (a) and (b) d) genesis of organs
29. Artificial seeds are -----
 a) Encapsulated seeds in a gel b) Encapsulated zygote in a gel
c) Encapsulated somatic embryo in a gel d) Encapsulated callus in a gel
30. Which tropical fruit crop has been successfully engineered to be protected against a lethal virus?
 a) Passion fruit **b) Papaya** c) Mango d) Lychee
31. The coating of somatic embryos during the production of synthetic seed is done by using _____.

- a)borosilicate **b) sodium alginate** c) mercaptoethanol d) Polyacrylamide
32. 5. 'Flavor Savr' tomato is engineered for increasing -----.
- (a)smell b) nutrients **c) shelf life** d) colour
33. Somaclonal variation appears in plants
- a) Transformed by recombinant DNA technology b) Growing in polluted soil
- c) Exposed to gamma rays **d) Raised in tissue culture**
34. Anther viability is checked by-----
- a) Aceto carmine test** b) FAD test c) Clonogenic assay d) Ethidiumhomodimer assay
35. Virulence trait of Agrobacterium tumefaciens is borne on
- a) chromosomal DNA
- b) tumour inducing plasmid DNA**
- v) both chromosomal and plasmid DNA
- d)cryptic plasmid DNA
- 36.** The removal and replacement of tumor causing genes from Ti plasmids is termed as -----
- a) gene replacement **b) disarming** c) insertional inactivation d) gene displacement
37. The size of the virulent plasmid of Agrobacterium tumefaciens is
- a.40-80 kb b.80-120 kb **c.140-235 kb** d.>235 kb
38. Which technique is used to introduce genes into dicots?
- a. electroporation
- b. particle acceleration
- c. microinjection
- d. Ti plasmid infection**
- 39. Direct DNA uptake by protoplasts can be stimulated by**
- A. polyethylene glycol (PEG)**
- B. decanal
- C. luciferin

D. all of these

40. A medium which is composed of chemically defined compound is called_____.
- a.Natural media **b. Synthetic media** c. Artificial media d. None of these
41. Chemicals used for gene transfer methods include_____.
- a.Poly ethylene glycol b. Dextran c. CaCl₂ **d. All the above**
42. The size of nanoparticles is between _____ nm.
- a. 100 to 1000 b. 0.1 to 10 **c. 1 to 100** d. 0.01 to 1
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- a) outer membrane of mitochondria **b) inner membrane of mitochondria**
c) inner and outer membrane of mitochondria d) outer membrane of chloroplast
45. If methods are based on cellular processes that lead to inactivation of gene expression by affecting the RNA, then it is called as:
- a) transcriptional
b) pre-transcriptional
c) post-transcriptional
d) translational
46. The method of post transcriptional gene silencing is particularly useful in:
- a) plants**
b) animals
c) insects
d) microorganisms
47. The process of RNA inactivation by siRNAs is termed as:
- a) RNA silencing**
b) RNA interference
c) Short RNA inactivation
d) RNA disfunction
48. DNA _____ is also a method for gene silencing through short RNAs.
- a) acetylation
b) phosphorylation
c) methylation
d) acylation

49. Which of the following histone pairs forms tetramers in solution?
a. H1, H2A b. H2A, H2B c. H2A, H3 **d. H3, H4**
50. Semi conservative replication of DNA was first demonstrated in_____.
a. *Escherichia coli* **b. *Streptococcus pneumoniae***
c. *Salmonella typhi* d. *Drosophilla melanogaster*
51. Semiconservative nature of replication of eukaryotic chromosome was first demonstrated by _____
a) Walter Flemming on root tip cells of *Vicia faba*
b) J. Herbert Taylor, Philip Wood and Walter Hughes on root tip cells of *Vicia faba*
c) Walter Flemming on root tip cells of *Phaseolus vulgaris*
d) J. Herbert Taylor, Philip Wood and Walter Hughes on root tip cells of *Phaseolus vulgaris*
52. Pick the correct pair with respect to primers used in DNA replication.
a) RNA primer- for prokaryotes only
b) DNA primer-for eukaryotes only
c) DNA primer- for both prokaryotes and eukaryotes
d) RNA primer- for both prokaryotes and eukaryotes
53. Which of the following does not affect DNA replication?
a) Antiparallel nature of DNA
b) End specificity of polymerase
c) SSB protein
d) Helicase
54. Which of the following is not used for degrading RNA from RNA: DNA hybrid in replication?
a) RNase A
b) RNase H
c) Polymerase I
d) Exonuclease
55. Eukaryotes differ from prokaryote in mechanism of DNA replication due to
a) Use of DNA primer rather than RNA primer
b) Different enzyme for synthesis of lagging and leading strand
c) Discontinuous rather than semi-discontinuous replication
d) Unidirectional rather than semi-discontinuous replication
56. Which of the following is true about DNA polymerase?
a) It can synthesize DNA in the 5' to 3' direction

- b) It can synthesize DNA in the 3' to 5' direction
- c) It can synthesize mRNA in the 3' to 5' direction
- d) It can synthesize mRNA in the 5' to 3' direction

57. Which of the following enzymes remove supercoiling in replicating DNA ahead of the replication fork?

- a) DNA polymerases
- b) Helicases
- c) Primases
- d) Topoisomerases**

58. DNA unwinding is done by _____

- a) Ligase
- b) Helicase**
- c) Topoisomerase
- d) Hexonuclease

59. Which of the following enzymes is the principal replication enzyme in *E. coli*?

- a) DNA polymerase I
- b) DNA polymerase II
- c) DNA polymerase III**
- d) None of these

60. The enzyme used to join bits of DNA is-----

- a) DNA polymerase
- b) DNA ligase**
- c) Endonuclease
- d) Primase

61. The eukaryotic initiation codon recognizes _____

- a) f-Met-tRNA-f-Met
- b) Met-tRNAⁱ-Met
- c) f-Met-tRNAⁱ-Met**
- d) f-Met-tRNA-Me

62. EF2 structurally mimics _____

- a) EF1**

- b) tRNA
- c) Ribosomal subunit
- d) EF-Ts

63. In Eukaryotes the region between 1st AUG and 5'-G cap is known as _____

- a) Leader
- b) Attenuator
- c) **UTR**
- d) ORF

64. mRNA links up with ribosomes to start _____

- a) translation
- b) transcription
- c) replication
- d) **Splicing**

65. Phosphatase is a protein enzyme that removes _____

- a) sulphate group
- b) amino group
- c) **Phosphate group**
- d) hydroxyl group

66.

67. Synthesis of all protein chains in prokaryotic and eukaryotic cells begins with amino acid

- a) **methionine**
- b) adenine
- c) proline
- d) arginine

68. The process of copying a gene's DNA sequence into a sequence of RNA is called

- a) replication
- b) **transcription**
- c) translation
- d) PCR

69. The transcribing enzyme is _____

- a) DNA polymerase
- b) **RNA polymerase**
- c) Endonuclease
- d) amino-acyl transferase

70. The first mRNA codon to specify an amino acid is always _____

- a) TAC
- b) UAA
- c) UAG
- d) **AUG**

71. In the case of a circular DNA synthesis how many replication forks are observed?

- a) 1 **b) 2** c) 3 d) 4

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81. The growth of plant tissues in artificial media is called_____

- a) Gene expression
b) Transgenesis
c) Plant tissue culture
d) Cell hybridization

82. Name the term given to the ability of single cells to divide and produce all the differentiated cell in the organism?

- a) Unipotent
b) Pluripotent
c) Multipotent

d) Totipotency

83. Out of the following, which one is NOT the basic component of culture media used for plant cultivation?

- a) Complex mixture of salts
- b) Amino acids
- c) Serum albumin**
- d) Sugar/ sucrose

84. Which of the following is NOT a plant growth regulator?

- a) Auxin
- b) Cytokinins
- c) Abscisic acid
- d) Polyphenols**

85. Which of the following is the main effect of cytokines in the tissue culture system?

- a) Adventitious shoot formation**
- b) Induction of somatic embryos
- c) Adventitious root formation
- d) Shoot elongation

86. Which one of them is NOT the main effect of polyamines in the tissue culture system?

- a) Promotion of tuber and bulb formation**
- b) Adventitious root formation
- c) Promotion of shoot formation
- d) Somatic embryogenesis

87. Which of the following plant hormone control fruit ripening?

- a) Ethylene**
- b) Auxin
- c) Gibberellins
- d) Abscisic acid

88. An example of a fusogenic agent is_____

- a) Methanol
- b) ethanol
- c) Polyethylene glycol
- d) Polyethylene alcohol**

89. The isolated protoplasts are grown in_____
- a) Hypotonic culture medium
 - b) Hypertonic culture medium
 - c) Isotonic culture medium**
 - d) Agar culture medium
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- a. Poly ethylene glycol
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96. What protects the intellectual property created by artists?
- a) copyright**
 - b) geographical indications
 - c) patents
 - d) trademarks

97. What protects the intellectual property created by Inventors?
- a) copyright
 - b) geographical indications
 - c) patents**
 - d) trademarks
98. Which of these is a geographical indicator?
- a) BMW
 - b) Champagne**
 - c) Hogwarts
 - d) Playstation
99. What does a trademark protect?
- a) an invention
 - b) a work of art
 - c) logos, names and brands**
 - d) a secret formula
100. How long do patents usually last for?
- a) 10 years
 - b) 5 years
 - c) 15 years
 - d) 20 years**

Unit1

1. Give an account on nuclear genome organization.
2. Write short notes on protein targeting in chloroplast.
3. Briefly explain the organization of chromatin fiber
4. Explain the types of gene silencing.
5. Write short note on disarmed vector.
6. Comment on RNA interference.
7. Write an essay on protein targeting in mitochondria.
8. Briefly explain about *Ti* plasmid based binary vector system

9. Give an account of Mitochondrial genome and its organization

Unit2

10. Give an experimental proof for the semi-conservative method of replication.
11. Distinguish the primer and template
12. Describe central dogma of life
13. Discuss about enzymes role in DNA Replication
- 14.

Unit3

15. Highlight the significance of the instruments, for tissue culture laboratory
16. Write notes on callus culture
17. Give a brief account on sterilization techniques in plant tissue culture
18. Describe the role of growth promoting substances in tissue culture
19. Write short notes on various stages of Micropropagation
20. Comment on meristem culture.
21. Write short notes on suspension culture.
22. Write a critical account on somaclonal variation.
23. Describe somatic Hybridization.
24. Describe the role of growth promoting substances in tissue culture.
25. Write notes on GLP in plant tissue culture lap
26. Comment on somatic embryogenesis.
27. Write notes on MS-Medium preparation
28. Discuss the various pathways involved in haploid production in microspore culture.

Unit 4

29. Explain the operon concept of prokaryotic gene expression.
30. Explain the structure of Ti plasmids.
31. Describe the gene expression mechanism in Eukaryotes

32. Discuss in detail about direct methods of DNA delivery into plants.
33. Draw and label the structure of Ti plasmid.
34. Discuss about patent, Copy right and Geographical indicator.
35. Discuss on ethics in plant biotechnology

Unit 5

36. What are the types of nanomaterials? Explain.
37. Define: Carbon Nanotubes and how are they produced?
38. Explain Fullerenes?
39. Explain the structure of Nanowires?
40. What are the properties of Nanomaterials?
41. Give the uses and applications of Nanowires?
42. Give the applications of Nanotechnology in Biology?

Unit 1 K4

1. Discuss in detail about heat shock proteins
2. Discuss in detail about Molecular markers role in plants.
3. Explain the structure and organization of chloroplast genome
4. Explain the structure and organization of mitochondrial genome
5. Explain the construction of Ti Plasmid derived cloning vector system.
6. Describe the targeting of proteins to chloroplast and mitochondria in plant cells.

Unit 2 K4

7. Give a detailed account on protein synthesis.
8. Give a detailed account on DNA replication in eukaryotic organism.
9. Briefly explain the enzymes role in protein synthesis
10. Discuss in detailed about transcription process in protein synthesis.
11. Discuss in detailed about translation process in protein synthesis.

Unit 3 K4

12. Comment on cryopreservation.
13. Discuss the various pathways involved in haploid production in microspore culture
14. Describe about protoplast isolation and fusion methods
15. What are the synthetic seeds? How do you obtain it through tissue culture?
16. How will you obtain virus free clones through tissue culture? Add a note on its applications.
17. Give a detailed account on somatic embryogenesis and its applications.

Unit 4 k4

18. Explain the molecular events occur in T-DNA transfer to plants.
19. How will you develop transgenic plants for virus resistance
20. With the help of a suitable example explain the production of a transgenic plant for herbicide tolerance by using bacterial foreign gene
21. Discuss in detailed about IPR.
22. Describe the physical methods of gene transfer in plants.
23. Explain direct methods of DNA delivery into plants. Explain particle bombardment mediated transformation.
24. Explain the various steps involved in the production of *Bt* cotton
25. Discuss the role of promoter and marker genes in plant transformation

Unit 5

26. Nano particles used in treatment of industrial wastes- Discuss.
27. Mention the properties and industrial applications of Carbon Nanotubes?
28. List out the applications of nanomaterials.
29. Define: Nanowires? Name five types of Nanowires?

