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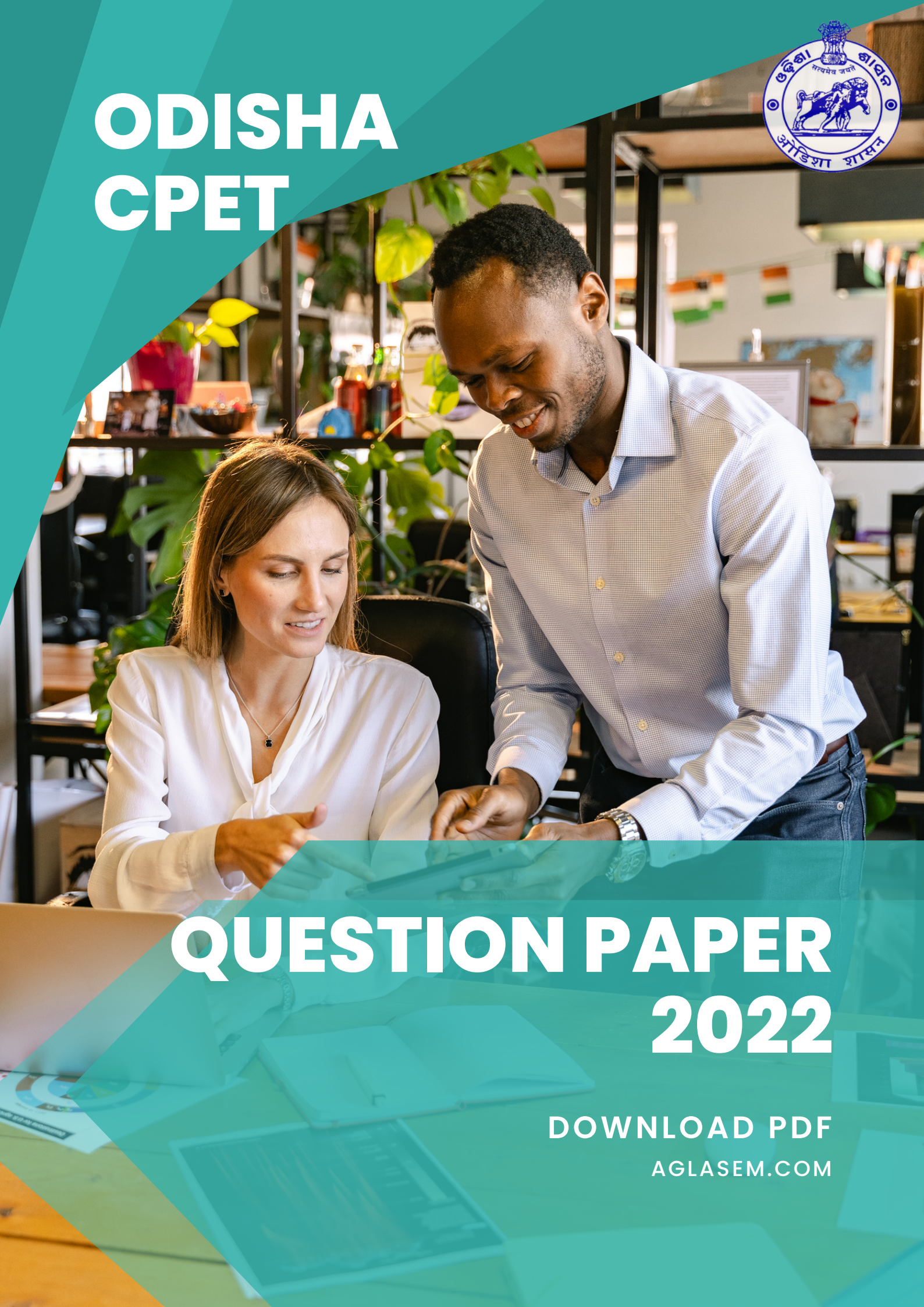

QUESTION PAPER 2022

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COMMON P.G. ENTRANCE TEST–2022 (CPET-2022)

Subject Code : **48**

Test Booklet No.:

Entrance Subject : **Biotechnology**

Hall Ticket No.:

TEST BOOKLET

Time Allowed : **90** Minutes

Full Marks : **70**

INSTRUCTIONS TO CANDIDATES

1. **Please do not open this Question Booklet until asked to do so.**
2. Check the completeness of the Question Booklet immediately after opening.
3. Enter your **Hall Ticket No.** on the Test Booklet in the box provided alongside. **Do not** write anything else on the Test Booklet.
4. Fill up & darken Hall Ticket No. & Test Booklet No. in the OMR Answer Sheet as well as fill up Test Booklet Serial No. & OMR Answer Sheet Serial No. in the Attendance Sheet carefully. Wrongly filled up OMR Answer Sheets are liable for rejection.
5. Each question has four answer options marked (A), (B), (C) & (D).
6. Answers are to be marked on the Answer Sheet, which is provided separately.
7. Choose the most appropriate answer option and darken the oval completely, corresponding to (A), (B), (C) or (D) against the relevant question number.
8. Use only **Blue/Black Ball Point Pen** to darken the oval for answering.
9. Please do not darken more than one oval against any question, as scanner will read such markings as wrong answer.
10. **Each question carries equal marks. There will be no negative marking for wrong answer.**
11. **Electronic items such as calculator, mobile, etc., are not permitted inside the examination hall.**
12. Don't leave the examination hall until the test is over and permitted by the invigilator.
13. **The candidate is required to handover the original OMR sheet to the invigilator and take the question booklet along with the candidate's copy of OMR sheet after completion of the test.**
14. Sheet for rough work is appended in the Test Booklet at the end.

1. The Life-cycle of marine alga *Sargassum* is-

(A) Diplontic

(B) Haplontic

(C) Haplo-diplonitc

(D) None of these

2. Which of the following is correct order of evolutionary history of human?

(A) Peking man, Neanderthal man, Homo sapiens, Heidelberg man

(B) Peking man, Neanderthal man, Heidelberg man, Cro-Magnon man

(C) Peking man, Heidelberg man, Neanderthal man, Cro-Magnon man

(D) Peking man, Heidelberg man, Homo sapiens, Neanderthal man

3. How many molecules of NADPH and ATP are required for fixation of six CO_2 molecules to generate one molecule of glucose during photosynthesis?

(A) 12 NADPH & 12 ATP

(B) 12 NADPH & 18 ATP

(C) 18 NADPH & 12 ATP

(D) 18 NADPH & 18 ATP

4. A flaccid plant cell with 0.3 M solute concentration (ψ_S = - 0.732 MPa) placed in the beaker containing 0.1 M Sucrose solution (ψ_S = - 0.244 MPa), and the flaccid cell became turgid with increment of cell size by 25%. What is the cell hydrostatic pressure (ψ_P), exerted on cell wall?

(A) 0.392 MPa

(B) 0.342 MPa

(C) 0.636 Mpa

(D) 0.586 MPa

5. Which one of the following is considered as missing link between reptiles and birds?

(A) Archaeopteryx

(B) Pteranodon

(C) Avimimus

(D) Caudipteryx

6. The process of formation of seeds without fertilization in flowering plants is known as

(A) Budding

(B) Apomixis

(C) Parthenogenesis

(D) Somatic hybridization

7. The hierarchical organization of taxonomic status of an organism based on evolutionary lineage is known as-

(A) Phenetics

(B) Systematics

(C) Dendrogram

(D) Phylogenetics

8. The genes that are related by vertical descent from a common ancestor and encode proteins with the same function in different species is known as-

(A) Orthologous

(B) Paralogous

(C) Homologous

(D) Heterologous

9. The hormones of the adrenal medulla are-

(A) Modified fatty acids

(B) Modified amino acids

(C) Modified monosaccharides

(D) Steroids

10. During gastrulation, the developing embryo undergoes reorganization of the cells into a multi layered structure, and each of the layer will be differentiated into distinct parts in the fully developed organisms in due course of time. Which one of the following layer is responsible for the development of skin and nervous system?

(A) Endoderm

(B) Mesoderm

(C) Ectoderm

(D) Blastoderm

11. Which one of the following conditions make a biological process spontaneous across all temperature?

(A) When the process is both enthalpically and entropically favored

(B) When the process is enthalpically favored but entropically opposed

(C) When the process is enthalpically opposed but entropically favored

(D) When the process is both enthalpically and entropically opposed

12. _____ is the most abundant element in the human body without any infection and deformities.

(A) Oxygen (O)

(B) Nitrogen (N)

(C) Hydrogen (H)

(D) Carbon (C)

13. Which one of the following bonds is present both in DNA and protein?

(A) N-Glycosidic bond

(B) Peptide bond

(C) Phosphodiester bond

(D) Hydrogen bond

14. Tryptophan is an aromatic amino acid which synthesized in plants via shikimate pathway. The sequence of its synthesis from phospho-enol-pyruvate (PEP) and erythrose-4-phosphate (E-4-P) is–

(A) PEP + E-4-P → DAHP → Shikimate → Chorismate → Anthranilate → Tryptophan

(B) PEP + E-4-P → DAHP → Shikimate → Anthranilate → Chorismate → Tryptophan

(C) PEP + E-4-P → Shikimate → Chorismate → DAHP → Anthranilate → Tryptophan

(D) PEP + E-4-P → Chorismate → DAHP → Shikimate → Anthranilate → Tryptophan

15. How many adenine (A) bases are present in the B-DNA fragment of 1000 bp with 60% G+C content?

(A) 2×10^2

(B) 3×10^2

(C) 4×10^2

(D) 6×10^2

16. The β-sheets are example of –

(A) Primary structure

(B) Secondary structure

(C) Tertiary structure

(D) Quaternary structure

17. Oxidation of palmitic acid (C16) requires ____ rounds of β-oxidation and yields ____ number of Acetyl Coenzyme A.

(A) Seven and eight

(B) Eight and eight

(C) Eight and seven

(D) Seven and seven

18. In Michaelis-Menten equation the enzyme kinetics curve is always-

(A) Linear

(B) Negative

(C) Hyperbola

(D) Bell shaped

19. A phage capable of destroying host cell is known-

(A) Virulent Phage

(B) Temperate Phage

(C) Prophage

(D) Lysogenic phage

20. The hospital acquired infections are known as-

(A) Transient infections

(B) Acquired Infections

(C) Nosocomial infections

(D) Contagious infections

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21. Which one of the following is not an antibiotic?

(A) Amoxycillin

(B) Cephalosporin

(C) Clarithromycin

(D) None of the above

22. Genetic recombination in *E. coli* occurs through-

(A) Transformation

(B) Conjugation

(C) Transduction

(D) All the above

23. Gram staining differentiate *Staphylococcus aureus* (Gram positive) and *Escherichia coli* (Gram negative) due to-

(A) Presence of multiple inter connected layer of peptidoglycans without outer membrane in *S. aureus*

(B) Presence of multiple inter connected layer of peptidoglycans without outer membrane in *E. coli*

(C) Presence of multiple inter connected layer of peptidoglycans with outer membrane in *S. aureus*

(D) Presence of multiple inter connected layer of peptidoglycans with outer membrane in *E. coli*

24. The phase of bacterial growth curve where exponential multiplication of E. coli cells occur is known as-

(A) Lag phase

(B) Log phase

(C) Stationary phase

(D) Decline phase

25. Industrial production of Vinegar through fermentation involves _____.

(A) Only Yeasts

(B) Yeasts with lactic acid producing bacteria

(C) Yeasts with acetic acid producing bacteria

(D) Yeasts with butyric acid producing bacteria

26. The antibacterial action of penicillin is due to its effect on

(A) Cell membrane permeability

(B) Cell wall synthesis

(C) DNA synthesis

(D) Protein synthesis

27. The major components chromosome is DNA and protein. Among them DNA is considered as genetic material because DNA possesses-

(A) Autocatalytic properties

(B) Heterocatalytic properties

(C) Mutability

(D) All the above

28. Which one of the following is used as template strand during transcription of *E. coli?*

(A) Sense strand

(B) Antisense strand

(C) Both sense and antisense strand

(D) None of the above

29. Which one of the following is not a mechanism of post translational modification?

(A) Intein splicing

(B) Proteolytic cleavage

(C) Apurinic cleavage

(D) O-linked glycosylation

30. The interaction of triplet codon of mRNA with the anticodon of t-RNA is stabilized by-

(A) Hydrogen bond

(B) Phosphodiester bond

(C) Electrostatic interaction

(D) Hydrophobic interaction

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31. Which one of the following enzyme is required for the photoreactivation of the T:T dimer?

(A) DNA Photoligase

(B) DNA Photolyase

(C) AP endonuclease

(D) DNA glycosylase

32. Termination of DNA replication in E. coli is triggered by

(A) DNA polymerase-III

(B) Helicase

(C) Rho protein

(D) Tus protein

33. Tryptophan operon in *E. coli* is regulated by the unique phenomenon of –

(A) Induction

(B) Repression

(C) Attenuation

(D) None of the above

34. The cDNA clone differs from genomic DNA clone by _____.

(A) presence of intron

(B) absence of intron

(C) presence of exon

(D) absence of exon

35. Resolving power of the microscope can be increased by-

(A) Using an illumination of shorter wave length and decreasing the numerical aperture

(B) Using an illumination of shorter wave length and increasing the numerical aperture

(C) Using an illumination of longer wave length and increasing the numerical aperture

(D) Using an illumination of longer wave length and decreasing the numerical aperture

36. The fluidity of the plasma membrane increases with

(A) Increase in saturated fatty acids in the membrane

(B) Increase in unsaturated fatty acids in the membrane

(C) Increase in glycolipid content in the membrane

(D) Increase in phospholipid content in the membrane

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37. Which of the following plasma membrane receptors activate signalling pathways usually by forming molecular dimers that result in protein phosphorylation reactions upon binding of their specific ligand?

(A) G-protein coupled receptors

(B) Steroid hormone receptors

(C) Receptor tyrosine kinases

(D) Ligand gated ion channels

38. Which one of the following cell organelles is semi autonomous in all eukaryotic cells?

(A) Chloroplast

(B) Mitochondria

(C) Ribosomes

(D) Lysosomes

39. Which of the following cytoskeleton proteins have an almost all helical secondary structure?

(A) Actin

(B) Tubulin

(C) Keratin

(D) Amanitin

40. Assuming Hardy-Weinberg equilibrium, the genotype frequency of heterozygotes will be_____, if the frequency of the two alleles of the gene being studied are 0.6 and 0.4.

(A) 0.64

(B) 0.48

(C) 0.32

(D) 0.16

41. Mitochondrial DNA (Mt DNA) is advantageous for evolutionary studies because:

(A) Mt DNA is inherited maternally which paves the way to elucidate phylogenetic relationship.

(B) Mt DNA evolves more accurately than the genes of the nucleus.

(C) Mt DNA first appeared in humans and is not found in other animals

(D) Mt. DNA evolves more slowly than the genes in the nucleus

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42. If one gene mask the effect of other gene during a dihybrid experiment, then the mode of gene action is considered as

(A) Lethal gene action

(B) Pleotropic gene action

(C) Dominant gene action

(D) Epistatic gene action

43. A cross between two true breeding lines a plant one with dark blue flowers and one with bright white flowers produces F_1 offspring that are light blue. When the F1 progeny ar selfed the F_2 progenies have segregated in the ratio of 1 dark blue : 2 light blue : 1 white for its flower colour. What genetic phenomenon is consistent with these results?

(A) Epistasis

(B) Dominance

(C) Incomplete dominance

(D) Codominance

44. Place the following five steps of DNA isolation and purification in the correct order.

1. Breaking up of the cell and tissue under suitable cell lysis buffer
2. Separation of DNA by Phenol: Chloroform:Isoamyl alcohol (25:24:1) extraction.
3. Ethanol precipitation of DNA and Solubilization of DNA with TE buffer
4. Assessment of the quality by UV-spectrophotometry.
5. Purification of DNA using RNAse and Proteinase-K.

(A) 5, 4, 3, 2, 1

(B) 1, 2, 3, 5, 4

(C) 1, 2, 5, 3, 4

(D) 1, 5, 2, 3, 4

45. Antibodies are-

(A) DNAs and RNAs

(B) Carbohydrates

(C) Glycoproteins

(D) All of the above

46. Light chain and heavy chain of antibody are joined by

(A) Hydrogen bond

(B) Hydrophobic bond

(C) Ionic bond

(D) Di-sulphide bond

47. _____ gives a primary immune response in human beings.

(A) IgG

(B) IgM

(C) IgA

(D) IgE

48. The monoclonal antibody recognizes-

(A) B- Cell

(B) Antigen

(C) Epitope

(D) None of the above

49. Which one of the following is the component of the aeration and agitation system of a fermentor?

(A) Impeller

(B) Baffles

(C) Sparger

(D) All the above

50. Which one of the following cloning vector incorporate highest length DNA fragment?

(A) Bacterial artificial chromosome

(B) Yeast artificial chromosome

(C) Phagemid

(D) Cosmid

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51. DNA ligase is –

(A) An enzyme that joins fragments during cloning of gene

(B) An enzyme involved in protein synthesis

(C) An enzyme of bacterial origin which cuts DNA at defined base sequences

(D) An enzyme that facilitates of specific gene amplification

52. _____ used as probe during DNA fingerprinting of human beings.

(A) SNP sequence

(B) SSR sequence

(C) VNTR sequence

(D) All the above

53. Which of the following is used as selection marker for the plant cells transformed with an *Agrobacterium tumefaciens* based vector?

(A) Neomycin phosphotransferase-II (Npt-II)

(B) β-Glucuronidase (GUS)

(C) Bacterial Luciferase (LUX)

(D) Green Fluorescent Protein (GFP)

54. Which of the following is a direct gene transfer method used in plant system?

(A) Electrofusion

(B) Particle bombardment

(C) Liposome mediated transformation

(D) Agrobacterium mediated transformation

55. A non-anchorage dependent cell is host to a Baltimore Type V virus. If the cells are grown in the presence of carbon-14-labelled deoxy-uridine triphosphate ([^{14}C]-dUTP], which of the following statements are correct?

(A) Newly synthesized viral genomes will become radioactively labelled.

(B) Newly synthesized mitochondrial genomes will become radioactively labelled.

(C) Newly synthesized nuclear genomes will become radioactively labelled.

(D) None of the above

56. Which one of the following statements is true for enzymes?

(A) Apoenzyme (inactive) + Cofactor ⇌ Holoenzyme (active)

(B) Holoenzyme (inactive) + cofactor ⇌ Apoenzyme (active)

(C) Apoenzyme (active) + Cofactor ⇌ Holoenzyme (inactive)

(D) Holoenzyme (active) + cofactor ⇌ Apoenzyme (inactive)

57. Which technique(s) were used for quantitative estimation DNA in a plant extract

(A) Centrifugation

(B) Electrophoresis

(C) UV spectrophotometry

(D) Polymerase Chain reaction

58. Which one of the following methods used for exponential synthesis of targeted DNA fragmentsin vitro?

(A) Next generation sequencing

(B) Polymerase chain reaction

(C) Southern hybridization

(D) Gene cloning

59. In agarose gel electrophoresis PCR amplified DNA samples migrate towards-

(A) Cathode

(B) Anode

(C) Doesn't move

(D) None of the above

60. 'NCBI' stands for _____.

(A) National Center for Bioinformatics information

(B) National Center for Biological information

(C) National Center for Biotechnology information

(D) None of the above

61. Which one of the following is not coming under intellectual property rights?

(A) Patents

(B) Copyrights

(C) Trademarks

(D) Geographical distributions

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62. Secondary metabolites including alkaloids are produced through _____

(A) Root culture

(B) Microspore culture

(C) Embryo culture

(D) Meristem culture

63. The first vaccine developed through animal cell culture technique was-

(A) Hepatitis-B vaccine

(B) Influenza vaccine

(C) Smallpox vaccine

(D) Polio vaccine

64. Which of the following is emerged as an international issue through the advent of environment biotechnology?

(A) Global warming

(B) Marine pollution

(C) Both 'a' and 'b'

(D) None of the above

65. Secretory cells that release relatively large quantities of glycoproteins contain relatively large amounts of _____.

(A) Ribosomes

(B) Lysosomes

(C) Smooth endoplasmic reticulum

(D) Rough endoplasmic reticulum

66. Transition type of gene mutation is represented by-

(A) GC substituted by AT

(B) CG substituted by GC

(C) AT substituted by CG

(D) TA substituted by AT

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67. Which set of following gene components are transcribed in eukaryotes and are present in the mRNA but are not translated to amino acids?

(A) Intron, Exon, 5' cap and 3' Poly A tail

(B) Exon, Ribosome binding site, 5' cap and 3' Poly A tail

(C) Intron, 5' UTR, 3' UTR and 3' Poly A tail

(D) Intron, Exon, 5' UTR and 3' UTR

68. Find the range, mean, median, and mode of the following data set.

Data set: 5, 17, 21, 21, 7, 13, 1, 3

(A) Range- 5-21, Mean- 11, Median -10 and Mode 21

(B) Range- 5-20, Mean- 11, Median -21 and Mode 21

(C) Range- 5-20, Mean- 11, Median -10 and Mode 21

(D) Range- 5-21, Mean- 10, Median -10 and Mode 21

69. If all the points of a scatter diagram lie on a straight line moving from left bottom to right top corner, the correlation is called as

(A) No correlation

(B) Perfect positive correlation

(C) Perfect negative correlation

(D) The high degree of positive correlation

70. Which one of the following genetically modified crops is based on antisense RNA technology?

(A) Bt Brinjal

(B) Golden Rice

(C) Flavr-savr Tomato

(D) Terminator Cotton

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