A

23703 **120 MINUTES**

1. Which among the following is / are examples for Feedback controls in Cellular Respiration?
   A) Elevated levels of glucose-6-phosphate
   B) Elevated levels of ATP & NADH
   C) Elevated levels of succinyl CoA
   D) All the above

2. Name the key enzyme in sucrose synthesis in plants:
   A) UDP glucose pyrophosphorylase
   B) Sucrose-6- phosphate synthase
   C) Sucrose-6- phosphate phosphatase
   D) ADP-glucose pyrophosphorylase

3. Who is considered as the Father of Indian Horticulture?
   A) Dr. K.L. Chadha B) Bala Rathinasabapathi
   C) M.H. Marigowda D) Durga Prasad Patel

4. Indore-2, MCU 7, Rashmi are crops examples for Mutation breeding belongs to which of the following crop variety?
   A) Potato B) Maize C) Cotton D) Sugar cane

5. National Biodiversity Authority is. Headquartered at:
   A) Bangalore B) Hyderabad C) Chennai D) New Delhi

6. Which among the following is/are kinds of male sterility?
   A) Cytoplasm male sterility B) Cytoplasm-genetic male sterility
   C) Genetic male sterility D) All of these

7. -------is a parameter that describes the number of hits one can "expect" to see by chance when searching a database of a particular size. It decreases exponentially as the Score (S) of the match increases and describes the random background noise.
   A) FASTA B) BLAST
   C) Ex PASY D) The Expect value

8. Computer program written for molecular graphics 3D-visualization intended and used mainly to depict and explore biological macromolecule structures, such as those found in the Protein Data Bank
   A) RASMOL B) CLUSTAL C) UPGMA D) SWISS-PROT

9. Accession number is a unique identifier assigned to a particular ------ to uniquely identify it in a database and is assigned to the entire sequence record.
   A) single database entry for Protein only
   B) single database entry for DNA only
   C) multiple database entry for DNA/Protein
   D) single database entry for DNA/Protein

10. Erythromycin, a natural antibiotic relevant for the pharmaceutical industry is isolated from:
   A) Actinomadura B) Streptomyces
   C) Micromonospora D) Acremonium

11. Molecular marker technique used to analyze the Co-dominant mode of inheritance effectively with high Reproducibility and Low-Medium Level of polymorphism:
   A) RFLP B) AFLP C) ISSR D) RAPD

12. Herbicide Tolerant Bt (HTBt) Cotton making the plant resistant to the herbicide:
   A) Trifluralin B) Metribuzin C) Glyphosate D) Imazaquin

13. Lamarckism was labeled as 'Creative Soviet Darwinism' in Soviet Union. What may be the possible reason for this?
   A) Generation arising from the germ cells is a photograph, as it were, of the parent at the particular stage when the germ cells were formed
   B) Organic compounds could have undergone a series of reactions leading to more and more complex molecules formed as coacervates in an aqueous environment
   C) On the Origin of Species, Charles Darwin accepted the principle of the inheritance of acquired characteristics as one of the factors contributory to evolution
   D) On the Origin of Species, Charles Darwin accepted that in Variation of Animals and Plants under Domestication

14. Destruction or deforestation of tropical rain forest leads to poor and slow regeneration as compared to a tropical deciduous forest. This is because
   A) Plant species in tropical rain forest are slow-growing
   B) Invasion of exotic species in the fertile soil of tropical rain forest easily
   C) Seeds of the species in tropical rain forest show poor viability
   D) The soil of tropical rain forest is deficient in nutrients

15. Biofuels are hydrocarbon fuel that is produced from organic matter. The Fourth Generation Biofuels refers:
    A) Produced from non-food weed crops
    B) Made from food sources
    C) Production of biofuels from crops that are genetically engineered
    D) Produced from micro-organisms like algae

16. Appendix-III related with conservation progress for the species prescribed by Convention on International Trade in Endangered Species of Wild Fauna and Flora refers Species ------.
    A) that have legal protection falls under vulnerable as per IUCN Red listed categories
    B) included at the request of a Party that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation
    C) that are at risk of being extinct are included and Commercial trade is prohibited
    D) that require monitoring to ensure that any trade does not pose a threat but is not in danger of becoming extinct

17. Nilgiri Biosphere Reserve the first biosphere reserve in India encloses the protected areas such as:
    1. Wyanaad Wildlife Sanctuary 2. Nagarhole National Park
    3. Mukurthi National Park 4. Silent Valley National Park

    A) 3 & 4 only B) 1 & 2 only C) 1 & 4 only D) 1, 2, 3 & 4

18. Which of the following is/are examples for Critically Endangered species as per IUCN?
    1. Pygmy Hog 2. Malabar Civet 3. Bengal Tiger 4. Red Panda

    A) 1, 3 & 4 only B) 1 & 2 only C) 2 & 4 only D) 1, 2, 3 & 4

19. Which among the following is a Wild Life sanctuary from Kerala?
    A) Anamudi Shola B) Pambadum Shola
    C) Mathikettan Shola D) Kurinjimala

20. State Government categorizes areas noise limits in terms of dB during day and night at silent zone is ------; if violate the limits you will be punishable.
    A) 50 & 40 B) 55 & 45 C) 45 & 35 D) 60 & 50

21. Identify the Green House Gases with highest Global Warming Potential:
    A) Sulphur hexafluoride B) Perfluorocarbons
    C) Nitrous oxide D) Methane

22. Select the correct statement/s connected to United Nations Framework Convention on Climate Change (UNFCCC)
    1. An international environmental treaty which seeks to reduce atmospheric concentrations of greenhouse gases, with the aim of preventing dangerous anthropogenic interference with the earth's climate system.
    2. The UNFCCC was signed in 1992 at the Johannesburg Summit
    3. Kyota Protocol is non-legally binding protocol based on the principle of common but differentiated responsibilities

    A) 1 & 2 only B) 1 only C) 2 & 3 only D) 1, 2 & 3

23. Which of the following is/are true regarding the Montreal protocol?
    1. Montreal protocol is non-legally binding like the Paris Agreement.
    2. All countries are agreed with different timelines to phase out emissions of ozone depleting substances.

    A) 1 only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

24. Which among the following are examples for Dirty Dozen?
    1.Heptachlor 2. Toxaphene 3. Polychlorinated biphenyls 4. DDT

    A) 1, 3 & 4 only B) 2 & 3 only C) 4 only D) 1, 2, 3 & 4

25. Incomplete combustion or organic material such as emissions from vehicles, domestic heating or cooking, burning of agricultural waste, tobacco smoke. Short-term exposure can irritate eyes and breathing passages, while long-term exposure has been linked to lung cancer. The pollutant is:
    A) Ground level Ozone B) Lead
    C) Carbon dioxide D) Polycyclic aromatic hydrocarbons

26. Select the correct statement/s:
    1. The Biological Demand for oxygen is directly proportional to the quantity of discharge of waste in water bodies.
    2. Elevated water temperature generally decreases dissolved oxygen in water which adversely affects aquatic life.

    A) 2 only B) 1 only C) Both 1& 2 D) Neither 1 nor 2

27. Select the correct statement/s with reference to food chain:
    1. 10 % of the energy is transferred to each trophic level from the lower trophic level.
    2. The flow of energy takes place in both directions in the food chain.
    3. The natural interconnected food chains make food web which gives stability to the ecosystem.

    A) 1 & 3 only B) 2 only C) 1, 2 & 3 D) 1 only

28. Analyze the following statements and choose the correct one:
    A) The pyramid of biomass in sea is also generally erect because the biomass of fishes far exceeds that of phytoplanktons.
    B) In a grassland ecosystem, the Pyramid of numbers is inverted.
    C) Pyramid of energy is always upright irrespective of the ecosystems.
    D) If we consider Banyan tree as an example for ecosystem, the pyramid of biomass is inverted.

29. Large biological community of plants and animal species interacting within specific certain climatic conditions such as rainfall, temperature, humidity, and soil conditions that have adapted to the same environment is known as:
    A) Realm B) Biome
    C) Biogeographic zone D) Biogeographic provinces

30. Species distributions responded individualistically to environmental factors, and communities were best regarded as artifacts of the juxtaposition of species distributions i.e., association is not an organism, scarcely even a vegetational unit, but merely a coincidence. This concept was proposed by:
    A) Concept of Gleason B) Clementsian concept
    C) Raunkiaer concept D) Henry Cowles

31. Species belong to the same genetic stock or species and the variations in their morphology are induced by the environmental influences and the variations are temporary, somatic and reversible are known as:
    A) Ecotypes B) Ecospecies C) Ecads D) Eco clines

32. The female gametophyte development in Gnetum is:
    A) Tetrasporic B) Bisporic with chalazal dyad
    C) Monosporic D) Bisporic with micropylar dyad

33. Zimmermann suggested that the following five elementary processes were responsible for the development of megaphyll and reproductive branches in vascular plants from the early vascular cryptogams. Identify the correct sequence of the process.
    A) Overtopping - Planation - Syngenesis - Reduction -Curvation
    B) Planation - Overtopping - Reduction - Syngenesis - Curvation
    C) Reduction - Overtopping - Curvation -Planation -Syngenesis
    D) Overtopping -Syngenesis - Curvation - Reduction - Planation

34. Identify the **incorrect** statement related to seed characteristics of Lepidocarpon:
    A) Development of a single functional megaspore in the megasporangium.
    B) Retention of functional megaspore in the megasporangium
    C) Endosporic megagametophyte development
    D) Formation of true integument

35. Identify the Pteridophyta member/s where the antherozoids are unicellular, uninucleate and multiciliate

A) Psilotum B) Isoetes C) Equisetum D) All of these

36. Which among the following Bryophyte is **not** a member of Hepaticopsida?

A) Sphaerocarpos B) Calobryum
C) Pellia D) Notothylas

37. Identify the bryophyte commonly known as peat moss:

A) Sphagnum B) Polytrichum C) Calobryum D) Porella

38. Crossotheca has been described as the microsporangia-bearing member of:

A) Bennettitales B) Lyginopteris
C) Williamsonia D) Wielandiellaceae

39. Identify the correct difference between Soredia and Isidia

1. Soredia are vegetative reproductive structure, while Isidia are asexual spore structures
2. Isidia are powdery small clusters of fungal and algal cells surrounded by a protective layer of lichen tissue, while Soredia are elongated structures produced on the surface of the lichen thallus
3. Soredia are small and sessile, while Isidia is large and more complex, stacked and branched or un-branched structures

A) 1 & 3 only B) 1 & 2 only C) 2 & 3 only D) 3 only

40. Analyze the statement connected to classification of Basidiomycetes and select the correct class:

1. Homobasidiomycetes - do not have fragmented basidia, includes rust and smut fungi.
2. Holobasidiomycetes – have fragmented basidium, includes Tremellales, Uredinales, Ustilaginales

A) 1 only B) 2 only
C) Both 1 & 2 D) Neither 1 nor 2

41. Choose the correct statement connected to zygomycetes:

1. Mostly parasites, while a few species are saprobes.
2. Reproduce asexually by producing sporangiospores.
3. To reproduce sexually, two opposing mating strains must fuse or conjugate, thereby, sharing genetic content and creating zygospores.

A) 1 & 3 only B) 2 only C) 2 & 3 only D) 1, 2 & 3

42. Select the correctly matched pairs:
A) Cleistothecium- Fruiting body is flask-shaped with one external opening, e.g. Neurospora
B) Apothecium- Fruiting body is spherical shaped and asci are present in subhymenium, e.g. Peziza
C) Perithecium- Fruiting body is cup shaped and remains tightly woven e.g. Aspergillus
D) Ascostroma- Fruiting body is no differentiated. Asci are present in the stroma, e.g. Mycosphaerella

43. Identify the fungi which is parasitic on cabbage causing club root:
A) Saprolegnia B) Spongospora
C) Plasmodiophora D) Ceratiomyxa

44. Diatoms are sculptured microscopic algae possess:
1. Vegetative cells are diploid (2n).
2. The cells have many discoid or two large plate-like chromatophores.
3. The photosynthetic pigments are chlorophyll a, chlorophyll c along with fucoxanthin, diatoxanthin and diadinoxanthin.
4. Reserve food is oil, volutin and crysolaminarin.
A) 1, 2 & 3 only B) 2 & 4 only
C) 1, 3 & 4 only D) 1, 2, 3 & 4

45. Which among the following is **not** a member of Phaeophyceae?
A) Laminaria B) Macrocystis C) Dictyota D) Porphyra

46. Name the algal species which shows Isomorphic Diplohaplontic life cycle:
A) Cutleria B) Fucus C) Nemalion D) Sargassum

47. Identify the Algae using the following characters:
1. One-celled thallus with prostrate, branched, cylindrical rhizome, which bears rhizoids and erect cylindrical leafy shoots.
2. Coenocyte without transverse septa, disciform chloroplasts without pyrenoids and with single central vacuole
3. Cell wall is thick and is provided with transverse and longitudinal trabeculae
4. Reproduce asexually by zoospores, and appear to remain in reticulate masses within the cell and numerous papillae outgrowths are developed on the surface of the thallus

A) Ulva B) Vaucheria C) Chara D) Caulerpa

48. An example for Single-stranded (ss) negative sense RNA virus:
A) Herpes virus B) Reovirus
C) Ebola virus D) Parvovirus

49. Select the **incorrect** statement:
   A) Pseudovirions may be produced during viral replication when the host genome is fragmented. As a result of this process, host RNA fragments are incorporated into the capsid instead of viral DNA
   B) Prions are misfolded protein which is infectious in nature and is encoded by host chromosomes. Prion protein triggers normal protein to fold abnormally which causes disease
   C) Virusoids possess linear or circular RNA as genetic material and cannot replicate autonomously they require the cells infected with a virus that function as a helper for replication
   D) Viroid is smaller than virus, single stranded covalently closed infectious RNA molecule without capsid and they replicate by RNA-RNA transcription and lack protein coding, infect only plants

50. Select the correctly matched pair of bacteria:
   A) Green sulphur bacteria: Leptothrix
   B) Purple sulphur bacteria: Chlorobium
   C) Non-sulphur bacteria: Rhodopseudomonas
   D) Iron bacteria: Chromatium

51. Teichoic acid present in Gram-positive bacteria binds to ----- ions and helps to protect bacteria from thermal injury by providing an accessible pool of these ions for stabilization of the cytoplasmic membrane.
   A) Phosphorus B) Iron C) Potassium D) Magnesium

52. ------- hormone promotes bolting, meanwhile the hormone responsible for speeding up of malting process in brewing industry is ----.
   A) Auxin & Ethylene B) BA and 2, 4 D
   C) GA and GA3 D) Kinetin and BA

53. Identify the correct statement/s
   1. Scarification uses temperature to break dormancy i.e., to overcome physiological dormancy
   2. Stratification breaks down the seed coat, which is hard and impermeable to water i.e., to overcome physical dormancy

   A) 1 only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

54. Which among the following bacteria are correctly matched connected with nitrogen metabolism?
   A) Free-living nitrogen-fixing bacteria: Azotobacter, Beijernickia
   B) Denitrification bacteria: Proteus, Bacillus ramosus
   C) Ammonification bacteria: Thiobacillus, Micrococcus
   D) Nitrogen fixing cyanobacteria: Microcystis, Dolichospermum

55. Identify the correct statement/s related with salinity:

1. Saline soil - the electrical conductivity is greater than 4 dS/m and pH is greater than 8.5. These soils are less dominated by K^+, Ca^{2+}, Mg^{2+} and Cl^- ions.
2. Alkaline soil wherein, the electrical conductivity is less than 4 dS/m, exchangeable sodium percentage is greater than 15% and pH of the soil is greater than 8.5. Dominating compound in alkaline soil is sodium carbonate.

A) 1 only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

56. Two living cells X and Y. Cell X has pressure potential of 9 bars and an osmotic potential of -16 and cell Y with 3 bars and an osmotic potential of -10 . What is the direction of movement of water in the cells?

A) From cells X to Y
B) From cells Y to X
C) No movement of water between the cells
D) Both cells are get plasmolyzed

57. Which among the following is/are examples for Mitigation of low temperature stress?

1. Foliar spray of 0.1 % Ammonium molybdate reduces the low temperature stress effect.
2. Application of Paclobutrazol increases the activity of Scavenging enzymes thereby reduce stress.
3. Electrolyte leakage is reduced by the application of Uniconzole (50 ppm).
4. ABA has a role in induction of freezing tolerance

A) 1 & 4 only B) 1, 3 & 4 only C) 2 & 3 only D) 1, 2, 3 & 4

58. The correct sequence of components in cyclic photophosphorylation of light reaction of photosynthesis is:

A) Light hits Photosystem-l -> P700 reaction centre -> ferredoxin -> Plastoquinone -> Cyt b6f -> Phycocyanin -> P700
B) Light hits Photosystem-l -> P700 reaction centre -> Pheophytin -> ferredoxin -> Plastoquinone -> Cyt b6f -> Phycocyanin -> P700
C) Light hits Photosystem-l -> P700 reaction centre -> Pheophytin -> Plastoquinone -> Cyt b6f -> Phycocyanin -> P700
D) Light hits Photosystem-l -> P700 reaction centre -> Plastoquinone -> Cyt b6f -> Phycocyanin -> P700

59. Apomixis is also known as asexual seed formation seen in many plant species. The term is coined by:

A) S.C. Maheswari B) W. Hofmeister
C) Hans Winkler D) S.G. Nawaschin

60. Embryo sac of Oenothera lamarckiana is formed by the----.

A) micropylar megaspore of the tetrad, which undergoes only two nuclear divisions instead of the usual three and results in to 4 nuclei which organize into the one synergids, the egg, and a two polar nucleus

B) micropylar megaspore of the tetrad, which undergoes only two nuclear divisions instead of the usual three and results in to 4 nuclei which organize into the two synergids, the egg, and a single polar nucleus

C) chalazal megaspore of the tetrad, which undergoes only two nuclear divisions instead of the usual three and results in to 4 nuclei which organize into the one synergids, the egg, and a two polar nucleus

D) chalazal megaspore of the tetrad, which undergoes only two nuclear divisions instead of the usual three and results in to 4 nuclei which organize into the two synergids, the egg, and a single polar nucleus

61. Identify the correct statement that explains the principle of Coomassie Brilliant Blue method in protein detection:

A) In an acidic environment, the red dye is converted into its blue form after binding to the protein. The stain forms a strong, noncovalent complex with the carboxyl group of the protein by van der Waals force and the amino group through electrostatic interactions.

B) In an alkaline environment, the red dye is converted into its blue form after binding to the protein. The stain forms a strong, noncovalent complex with the carboxyl group of the protein by van der Waals force and the amino group through electrostatic interactions

C) In an acidic environment, the red dye is converted into its blue form after binding to the protein of interest. The stain forms electrostatic interactions complex with the carboxyl group of the protein by van der Waals force and the amino group through noncovalent complex

D) In an alkaline environment, the red dye is converted into its blue form after binding to the protein of interest. The stain forms electrostatic interactions complex with the carboxyl group of the protein by van der Waals force and the amino group through noncovalent complex

62. Curved ribbon in serial section in micro technique may be the result of which of the following conditions?

1. A dull spot on the knife; shift the knife laterally in its holder or replace with a good knife and the upper and lower edges of the paraffin block are not parallel; trim with a razor blade.
2. The lower edge of the paraffin block is not parallel to the knife-edge and the piece of tissue is centered laterally in the paraffin
3. The piece of tissue is of irregular shape and bulk.

A) 2 only B) 1 & 3 only C) 1 only D) 1, 2 & 3

63. Which among the following is **not** a dehydrating reagent?
A) Glycerin (glycerol) B) Tertiary butyl alcohol
C) Dioxan D) Xylene

64. Analyze the following Vascular bundles arrangement connected to Boerhaavia stem and select the correct statement:
A) Four large centrally placed medullary vascular bundles, middle ring of 6-14 loosely arranged smaller vascular bundles and an outer ring of 15 to 20 medium-sized vascular bundles
B) Two large centrally placed medullary vascular bundles, middle ring of 6-14 loosely arranged medium sized vascular bundles and an outer ring of 15 to 20 small sized vascular bundles
C) Inner ring of 6 loosely arranged larger vascular bundles unsheathed by an outer ring of 15 to 20 medium sized vascular bundles.
D) Inner large centrally placed two medullary vascular bundles, middle ring of eight loosely arranged small sized vascular bundles and an outer ring of numerous medium vascular bundles

65. The stain commonly used to confirm lignin in histochemical studies which on reaction with lignin yields a red colour?
A) Aqueous methylene blue B) Chlorzinciodine solution
C) Phloroglucin/HCl D) Chlorazol

66. Identify the correct statement/s connected to vascular cambium:
1. Tangential division of the cambial cell forms two apparently identical daughter cells; one of the daughter cells remains meristematic and the other becomes a xylem mother cell or a phloem mother cell depending upon its position internal or external to the initial
2. The ray initials, elongated tapering cells that divide to form all cells of the vertical system and the fusiform initials which are more or less isodiametric and give rise to vascular rays

A) 1 only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

67. Tiger orchid is a common name for the ornamental orchid and also one of the largest orchids referred to -----.
A) Platanthera ciliaris B) Grammatophyllum speciosum
C) Dendrobium crumenatum D) Oncidium altissimum

68. Identify the family with the following characters:
Stellate radiating hairs, leaves are alternate and often palmately lobed, free lateral stipule, bisexual, actinomorphic flowers, ovary superior position, and the placentation is axile
A) Solanaceae B) Polygalaceae
C) Portulacaceae D) Malvaceae

69. Which among the following does **not** belong to Rubiaceae?
A) Gardenia B) Canthium C) Galium D) Lonicera

70. Name the capsule which splits so that valves fall off leaving seeds attached to the central axis:
A) Loculicidal B) Septifragal C) Septicidal D) Denticidal

71. Identify the plant possess thorns modified from axillary buds. They provide protection against grazing animals.
A) Asparagus B) Carissa
C) Bougainvillea D) Opuntia

72. Neem shows therapeutics role in health management due to rich source of various types of ingredients. The active constituent is/are:
A) Nimbolinin B) Azadirachtin
C) Nimbir D) All of these

73. The species used by Kani tribes as medicinal plants for curing many ailments:
1.Andrographis paniculata 2. Cyclea peltata
3. Ficus hispida 4. Anaphyllum beddomei

A) 1, 2 & 3 only B) 3 & 4 only C) 1 & 2 only D) 1, 2, 3 & 4

74. Principles of Priority starts with the Species Plantarum of Linnaeus published on:
A) 1-5-1743 B) 1-5-1763 C) 1-5-1753 D) 1-5-1752

75. Which among the following feature is applicable with Takhtajan Classification?
1. Most primitive order of class Magnoliopsida (Dicot) is Magnoliales, while most advanced order is Asterales (monocot). While in class Liliopsida, most primitive order is Alismatales and most advanced order is Arales.
2. The classification incorporates data from a number of branches but greater emphasis is given to Phenetic information than Cladistic information
A) 1 only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

76. Identify the unique tool used in relation to taxonomy in the following groups of families for additional authentication:
1. Tool could be useful for the identification of Rosa species belonging to sections Gallicanae, Cinnamomeae, Caninae, and Synstylae
2. The classification of Eucalyptus has been difficult on the basis of gross morphology. Baker and Smith divided this genus into larger groups based on other evidences and also correlated with leaf venation and bark structure

A) Chemotaxonomy B) Anatomy
C) Embryology D) Cytotaxonomy

77. Choose the correct statements of secondary growth in Dicot roots:
1. Part of the root vascular cambium differentiates between the primary xylem and phloem and rest from endodermal cells divide simultaneously with the procambium initials. The result is a cylinder of cambium encircling the primary xylem
2. Secondary medullary rays are less prominent in the dicot root than that of the dicot stem.
3. Annual rings are not formed in roots because in the soil, temperature is almost uniform throughout the year.

A) 1 & 2 only B) 1 & 3 only C) 2 & 3 only D) 1, 2 & 3

78. Select the correctly matched pairs related to types of interspecies antagonisms leading to biological control of plant pathogens.
1. Direct antagonism: Hyperparasitism/predation mechanism
2. Mixed-path antagonism: Physical/chemical interference mechanism
3. Indirect antagonism: Induction of host resistance// Competition mechanism

A) 1 & 2 only B) 1 & 3 only C) 2 & 3 only D) 1, 2 & 3

79. Which of the following statement is/are true regarding the T-cell receptor?
1. T cell receptors (TCRs) are responsible for driving specific immune responses against invading organisms and, in the case of autoimmunity, against self.
2. The antigen receptor of T cells is the T-cell receptor (TCR), which is composed of two chains, either the TCR-alpha and -beta chains, or the TCR-delta and gamma chains
3. The three main pathways activated through the TCR that control transcription are the MAPK, NF-κB, and calcium pathways

A) 1, 2 & 3 B) 1 & 3 only C) 1 only D) 2 & 3 only

80. Within a population of rabbits, the color brown (B) is dominant over the color white (b). Suppose 40% of all rabbits are white. What will be the frequency of homozygous dominant individuals in this case?
A) 0.47 B) 0.14 C) 0.94 D) 0.6

81. In an experimental student group, only the ‘A’ and ‘B’ alleles are present in the ABO system; there are no students with type O blood or with O alleles in this particular group. If 175 students have type ‘A’ blood, 75 have type AB blood, and 25 have type ‘B’ blood, what are the alleleic frequencies (p and q) of this student population?
A) 0.772 and 0.228 B) 0.425 and 0.125
C) 0.664 and 0.336 D) 0.792 and 0.208

82. Identify the correct statement/s connected with Small nucleolar RNAs:
1. Are components of small nucleolar ribonucleoproteins (snoRNPs), which are complexes that are responsible for sequence-specific nucleotide modification
2. It is involved in maintaining genome stability in germline cells and also play a role in gametogenesis
3. Small nucleolar RNAs consists of 24-30 nt

A) 2 only B) 1 & 3 only C) 1 only D) 3 only

83. Identify the **incorrect** statement:
1. Monomeric Enzyme- made of a single polypeptide e.g. LDH, aspartate carbamoylase
2. Oligomeric Enzyme- more than one polypeptide e.g. ribonuclease, trypsin
3. Multienzyme complex- specific sites to catalyse different reactions in sequence. Only native conformation is active not individual e.g. pyruvate dehydrogenase

A) 1 only B) 2 only C) 1 & 3 only D) 1 & 2 only

84. Choose the correct statement/s connected with drugs vs enzyme inhibition:
1. Relenza drug acts as a competitive inhibitor, binding to the neuraminidase's active site to prevent the cleavage of the docking protein. By this way, the virions are not released and do not spread.
2. Allopurinol competitive inhibitor, the target enzyme is Xanthine oxidase and used in case of prevention of gout
3. Discoumarol competitive inhibitor used as an anti-coagulant against the target enzyme Vitamin K-epoxide reductase

A) 1 & 3 only B) 3 only C) 1 & 2 only D) 1, 2 & 3

85. Match the List I (source) with List II (characteristic emission):

List I	List II
a. ^{210}Po	1. α
b. ^{60}Co	2. β
c. ^{63}Ni	3. γ

A) a-1, b-3, c-2 B) a-1, b-2, c-3
C) a-3, b-1, c-2 D) a-2, b-1, c-3

86. Select the correct statement/s of Atomic Force Microscopy (AFM) from the following;

1. AFM microscopes operate on the principle of surface sensing using an extremely sharp tip on a micromachined silicon probe. This tip is used to image a sample by raster scanning across the surface line by line, although the method varies dramatically between distinct operating modes.
2. Gerd Binnig and Heinrich Rohrer developed at IBM Zurich Research Laboratories in Switzerland
3. Use a laser beam deflection system where a laser is reflected from the back of the reflective AFM lever and onto a position-sensitive detector. AFM tips and cantilevers are typically micro-fabricated from Si or Si_3N_4. Typical tip radius is from a few to 10s of nm

A) 1 & 3 only B) 1 only C) 2 only D) 1, 2 & 3

87. Colorimeter is based on two fundamental laws of photometry. Which among the following is/are correctly matched with the law:

1. Beer's law: Log_{10} Io/It = asc
2. Lambert's law: A = $\log_{10}$ Io/It = asb

A) 1 only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

88. In a statistical report, in the data whose mode = 80 and median = 70. Calculate the mean value:

A) 55 B) 65 C) 70 D) 80

89. Regression is an important concept in Statistical research, which is based on variable distribution. Which among the following justifies Regression?

1. It explains how an independent variable is numerically associated with the dependent variable
2. No difference between Dependent and Independent variables

A) 1 only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

90. Which among the following statement connected with hydrogen bond is/are correct?

1. Intramolecular hydrogen bond is exemplified by that in proteins and nucleic acid- DNA
2. Intermolecular hydrogen bond formation is that occurring in water
3. Intramolecular and Intramolecular hydrogen bonds found in cellulose molecules.

A) 1 & 2 only B) 2 only C) 3 only D) 1, 2 & 3

91. The Auxin is synthesized from ------ through several intermediates.
A) Glutamate B) Methionone C) Tryptophan D) Tyrosine

92. Which among the following factors influence Ionic Bond Formation?
1. Ionization energy 2. Electron affinity 3. Lattice energy

A) 1, 2 & 3 B) 2 & 3 only C) 1 & 2 only D) 1 only

93. The type of senescence seen in the plants like Eucalyptus and Pinus:
A) Shoot senescence
B) Whole plant senescence
C) Synchronous or simultaneous senescence
D) Sequential senescence

94. The experimental evidence which justifies that chromosomal crossover occurs at the four-stranded stage rather than at the two-stranded stage:
A) Red flowers and round pollen grain and blue flower and long pollen grain of sweet pea
B) Ascospore arrangement in Neurospora 2:2:2:2
C) Meiosis in maize
D) Chromosomal linkage maps in Drosophila

95. It is a molecule that reacts with specific antibody but it is **not** immunogenic by itself; it can be made immunogenic by conjugation to a suitable carrier:
A) Epitope B) Hapten C) Immunogen D) Adjuvant

96. Percentage of recombination involving the Fruit shape and Fruit colour in water melon is 10%. What is the distance (mu) between the genes on a chromosome controlling these characters?
A) 20 B) 10 C) 90 D) 30

97. In a crossing over study on corn, the scientist observed the following % crossing over between the genes A & B, C & D, A & D, B & C and A & C were 4%, 8%, 10%, 14% and 18% respectively. Find out the correct sequence of genes on the chromosomes
A) ABCD B) ABDC C) DACB D) CADB

98. A phenotypically wild-type female fruit fly that was heterozygous for genes controlling body color and wing length was crossed to a homozygous mutant male with red body (allele r) and vestigial wings (allele vg). The cross produced the following progeny: gray body, normal wings 126; gray body, vestigial wings 24; red body, normal wings 26; red body, vestigial wings 124. What is the frequency of recombination?
A) 0.2 B) 0.287 C) 0.284 D) 0.167

99. Which among the following is/are examples of multiple alleles?
1. Self-Sterility in Plants 2. Coat Colour in Rabbit 3. Wings of Drosophila

A) 3 only B) 2 only C) 2 & 3 only D) 1, 2 & 3

100. Observe the following Types of Epistasis gene interaction and select the correctly matched pair:

A) Dominant epistasis = 15:1 (awn character in rice)
B) Duplicate dominant epistasis = 9:6:1 (fruit shape in summer squash)
C) Dominant and recessive epistasis = 13:3(anthocyanin pigmentation in rice)
D) Duplicate interaction = 12:3:1 (fruit colour in summer squash)

101. Match the following Genes of the Lac-operon (List I) with their respective products (List II):

List I	List II
a. y gene	1. β- galactosidase
b. z gene	2. Permease
c. i gene	3. Repressor

A) a-2, b-3, c-1 B) a-3, b-2, c-1
C) a-2, b-1, c-3 D) a-1, b-2, c-3

102. Type of cytoskeletal element made up of multiple strands of fibrous proteins wound together and has no role in cell movement is known as:

A) Microfilaments B) Intermediate filaments
C) Actin filaments D) Microtubules

103. Select the correct statement/s connected with Prokaryotic ribosomes:
1. Prokaryotic ribosomes contain 30S and 50S, the smaller and the larger unit respectively.
2. In prokaryotes, RNA is organized into four strands in ribosomes
3. Cells have ribosomes which are in free and membrane bound forms

A) 1 only B) 2 only C) 1 & 3 only D) 1, 2 & 3

104. Histones are protein which wrapped DNA into a condensed form. The amino acids present in histones are:

A) arginine and lysine B) proline and methionine
C) leucine and cysteine D) aspartate and phenyl alanine

105. Identify the correct statement/s:
A) Telomerases are RNA-dependent DNA polymerase enzyme complex
B) RNA polymerase II: located in the nucleoli, synthesizes mRNA precursors and RNA polymerase I: occurs in the nucleoplasm and synthesizes precursors of most ribosomal RNAs
C) RNA replicase an enzyme that catalyzes the replication of RNA from an RNA template
D) Both A and C

106. Choose the correct statement/s related to tumor suppressor protein:
1. P53 is a tumor suppressor protein that arrests the cell growth by holding the cell cycle at the G1/S regulation point upon detecting DNA damage and initiates apoptosis if the DNA damages are irreparable
2. P21 is a tumor suppressor protein and a CDK interacting protein that is capable of binding to G2-S/CDK complexes and inhibiting the activity of CDK complexes upon induction by P53 and promotes apoptosis due to cleavage by cyclin expression cycle

A) 1 only B) 2 only C) Both 1 & 2 D) Neither 1 nor 2

107. Which among the following is/are factors for highly conserved receptors and pathways families of Paracrine signaling?
1. Fibroblast growth factor (FGF) family 2. Hedgehog family
3. Wnt family 4. TGF-β superfamily

A) 1 & 4 only B) 2 & 3 only C) 1, 2 & 3only D) 1, 2, 3 & 4

108. Which among the following are G protein-coupled receptor classes based on sequence homology and functional similarity?
1. Rhodopsin-like receptors 2. Secretin family
3. Metabotropic glutamate/pheromone 4. Cyclic AMP receptors

A) 1, 3 & 4 only B) 2 & 4 only C) 2 only D) 1, 2, 3 & 4

109. The tool used for physical mapping of genomes and rapid finding of target genes in the chromosomes and it narrows the gap between the target gene and the available known markers for genome mapping is:
A) Restriction map B) Primer walking
C) Chromosome jumping D) Chromosome walking

110. Trehalose, a non-reducing disaccharide that can be seen in many of the insects hemolymph and is made up of---- and -----..
A) Mannose and mannose B) Galactose and galactose
C) Fructose and Fructose D) Glucose and glucose

111. Name the mechanism that removes DNA damage induced by UV light results in bulky DNA adducts mostly thymine dimers and 6, 4-photoproducts
   A) Nucleotide excision repair
   B) Base excision repair
   C) DNA mismatch repair
   D) Homologous recombination repair

112. Identify the correct difference between Shine Dalgarno sequence and Kozak sequence:
   A) Kozak sequence is a ribosomal binding site found in bacterial and in archaeal messenger RNA, while Shine Dalgarno is a protein translation initiation site found in most eukaryotic messenger RNA
   B) Shine Dalgarno sequence is 5' (gcc) gccRccAUGG-3' while, Kozak sequence is 5'AGGAGGU3'
   C) Shine Dalgarno sequence is a ribosomal binding site found in bacterial and rarely in archaeal messenger RNA, while Kozak sequence is a protein translation initiation site found in most eukaryotic messenger RNA
   D) Shine Dalgarno sequence start codon is present in the sequence itself while, Kozak sequence is located 8 bases upstream of the start codon

113. Relationships among amino acids and codons is said to be the genetic code. The triplet codon for methionine is:
   A) UCU B) AUG C) AUU D) AGU

114. The major difference between Taq polymerase and Pfu polymerase is:
   A) Taq polymerase possesses 5'-3' exonuclease proofreading activity, while Pfu polymerase possesses 3'-5' exonuclease proofreading activity
   B) Pfu polymerase possesses 5'-3' exonuclease proofreading activity, while Taq polymerase possesses 3'-5' exonuclease proofreading activity
   C) Pfu DNA polymerase-generated PCR fragments will have slightly more possible errors than Taq-generated PCR inserts
   D) Pfu DNA polymerase which exhibits less fidelity of replication than Taq DNA polymerase

115. Chemically, spermaceti is a wax, liquid at body temperature, obtained from the head of a sperm whale consists principally of:
   A) cetyl palmitate B) myricyl palmitate
   C) esters of sterols D) myricyl cerotate

116. Select the correctly matched pairs:
   A) Polar negatively charged amino acids: arginine, lysine and histidine
   B) Polar positive charge amino acids: aspartic acid and glutamic acid
   C) Polar uncharged amino acids: phenyl alanine, tryptophan, proline
   D) Non polar amino acids: valine, leucine, isoleucine

117. Simple protein which are insoluble in water, but soluble in dilute salt solutions. They are heat coagulable and precipitate on half-saturation with ammonium sulphate:
A) Protamines B) Glutelins C) Globulins D) Albumins

118. Which among the following types of linkage or bond can be found in nucleotide units?
1. N–glycosidic linkage between nitrogenous base to the pentose sugar
2. Phospho-glucosidic bonds formed via the 3′–OH of a pentose sugar of a nucleoside with phosphate
3. Successive nucleotides are joined by phosphodiester which connects the 5'-hydroxyl group of one nucleotide to the 3'-hydroxyl group of the next nucleotide

A) 1 & 3 only B) 2 & 3 only C) 1 only D) 1 & 2 only

119. White fly is associated with:
A) Powdery mildew of rubber
B) Leaf spot of mango
C) Yellow vein mosaic disease of okra
D) Red rust of tea

120. The linkage group of sickle cell anemia, leukemia and albinism is present on chromosome:
A) 10 B) 11 C) 12 D) 13

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