A

24103 **120 MINUTES**

1. The purpose of a FASTA search in sequence analysis is:
   A) Identifying homologous sequences
   B) Predicting protein tertiary structure
   C) Determining RNA secondary structure
   D) Analyzing gene expression levels

2. According to Gleason's individualistic concept, plant communities:
   A) Progress through distinct successional stages toward a stable climax state
   B) Are determined by the interactions between species
   C) Exhibit predictable patterns of species composition
   D) Form due to specific physiological requirements of individual species

3. The term which refers to the smallest recognizable unit in phytosociological classification, typically representing a community with distinct vegetation features:
   A) Community association B) Plant formation
   C) Phytocoenosis D) Ecological niche

4. The micronutrient deficiency in plants which lead to the development of interveinal chlorosis in young leaves:
   A) Iron (Fe) B) Zinc (Zn) C) Copper (Cu) D) Manganese (Mn)

5. Which following fungal infection, often found in immunocompromised patients, is caused by an opportunistic fungus that commonly infects the lungs and can spread to other organs?
   A) Aspergillosis B) Candidiasis
   C) Cryptococcosis D) Mucormycosis

6. The enzymes which is responsible for unwinding the DNA helix during replication:
   A) DNA polymerase B) Helicase
   C) Ligase D) Topoisomerase

7. In biochemistry, what does the term 'allosteric regulation' refer to?
   A) Enzyme inhibition by a product of the reaction
   B) Regulation of enzyme activity by binding of a molecule to a site other than the active site
   C) Enzyme activation by a co-factor
   D) Feedback inhibition of enzyme activity

8. In alternative splicing, what determines the specific exons included in mature mRNA?
   A) Endonucleases
   B) Exon Intron boundary mutations

C) Small nuclear RNAs (snRNAs)
D) Regulatory proteins and RNA splicing factors

9. A lower E-value signify in a BLAST search result in:
A) Higher sequence similarity
B) Lower sequence similarity
C) Higher query coverage
D) Lower query coverage

10. Which of the following are both cofactors and coenzymes?
1. Zn^{2+} 2. FAD^{+} 3. NAD^{+} 4. Cu^{2+}

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

11. Which of the following is purely a global alignment algorithm used for sequence comparison?
A) Smith-Waterman algorithm
B) BLAST algorithm
C) FASTA algorithm
D) Needleman-Wunsch algorithm

12. The rate-limiting enzyme in the pentose phosphate pathway:
A) Glucose-6-phosphate dehydrogenase
B) Phosphofructokinase
C) Hexokinase
D) Aldolase

13. The molecules which serves as a secondary messenger:
A) ATP B) GTP C) ADP D) cAMP

14. The pigments responsible for the red coloration in red algae:
A) Chlorophyll a B) Chlorophyll b
C) Phycoerythrin D) Phycocyanin

15. In which habitat would you most likely find endolithic algae?
A) Deep Ocean waters
B) Coral reefs
C) Within rocks or other substrates
D) Floating on the water surface

16. The phylum of algae which includes the giant kelp, one of the fastest-growing organisms in the world:
A) Chlorophyta B) Phaeophyta
C) Rhodophyta D) Euglenophyta

17. What is the function of pyrenoids in certain types of algae cells?
A) Reproduction B) Sense light

C) Storage of proteins D) Involved in the operation of a carbon-concentration process

18. The algae responsible for harmful algal blooms (red tides) that can produce toxins harmful to marine life and humans:
A) Diatoms B) Cyanobacteria
C) Dinoflagellates D) Brown algae

19. The technique commonly used to overcome incompatibility barriers in intergeneric hybridization?
A) Embryo rescue B) Self-pollination
C) Mutation breeding D) Grafting

20. The bacterial genus which includes species that are known for their ability to fix nitrogen in the root nodules of leguminous plants:
A) Escherichia B) Streptococcus
C) Rhizobium D) Clostridium

21. The primary function of bacterial capsule is:
A) Facilitate movement B) Protection against phagocytosis
C) Reproduction D) Nutrient absorption

22. The bacterial genus responsible for causing Lyme disease, a tick-borne illness characterized by fever, headache, fatigue, and a characteristic skin rash:
A) Borrelia B) Mycobacterium
C) Clostridium D) Treponema

23. What are the functions of the viral protein coat, or capsid?
1. Translation of viral RNA
2. Targeting of the viral genome to its site of replication.
3. Cell-to-cell and/or systemic movement of the virus
4. Activation of R gene-mediated host defenses,

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

24. Identify the viral enzyme responsible for converting RNA to DNA during the replication of retroviruses:
1. RNA dependant DNA polymerase
2. RNA dependant RNA polymerase
3. DNA dependant DNA polymerase
4. DNA dependant RNA polymerase

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

25. The fungal disease caused by a group of fungi known as dermatophytes and commonly affects skin, hair, and nails in humans and animals:
A) Candidiasis B) Ringworm

C) Aspergillosis D) Histoplasmosis

26. The fungal phylum which includes fungi that produce motile spores and are often found in aquatic habitats:
A) Ascomycota B) Basidiomycota
C) Chytridiomycota D) Glomeromycota

27. The fungal compound produced by some Molds and can contaminate food, causing toxic effects in humans and animals:
A) Ergotamine B) Aflatoxin
C) Penicillin D) Cyclosporine

28. Which fungal structure allows certain fungi to survive adverse conditions, such as lack of nutrients or dehydration?
A) Conidia B) Sporangium C) Sclerotium D) Ascospore

29. Which of the following structures in ferns aids in spore dispersal and is often found on the underside of fronds?
A) Sorus B) Indusium C) Fiddlehead D) Rhizome

30. In the APG IV system of angiosperm classification, which of the following is a eudicot order that includes plants like apples, and cherries?
A) Ranunculales B) Fabales
C) Rosales D) Lamiales

31. The term which refers to a taxonomic group that consists of all the descendants of a common ancestor, both extinct and extant species?
A) Genus B) Clade C) Family D) Order

32. The purpose of using shade net houses in plant cultivation is to:
A) Reduce water consumption
B) Protect plants from extreme weather conditions
C) Filter harmful UV rays and provide diffused light
D) Create a barrier against pests and diseases

33. The compound, found in *Camellia sinensis* leaves, which contributes to the flavour and health benefits by acting as an antioxidant:
A) Tannin B) Theobromine
C) Catechin D) Capsaicin

34. The oilseed plant which is a rich source of alpha-linolenic acid, an essential omega-3 fatty acid:
A) *Glycine max* B) *Helianthus annuus*
C) *Linum usitatissimum* D) *Arachis hypogaea*

35. The embedding materials commonly used for electron microscopy due to its excellent contrast and ability to be sectioned into ultrathin slices:
A) Paraffin wax B) Resin C) Gelatin D) Agar

36. The micronutrient essential for nitrogen fixation in leguminous plants:
A) Boron (B) B) Molybdenum (Mo)
C) Zinc (Zn) D) Copper (Cu)

37. The staining technique specifically used to visualize structures in the nucleus, especially DNA and RNA?
A) Hematoxylin and eosin staining
B) Feulgen staining
C) Periodic acid-Schiff staining
D) Masson's trichrome staining

38. The enzyme, commonly used as a marker in histochemistry, which is responsible for breaking down hydrogen peroxide into water and oxygen?
A) Peroxidase B) Lipase C) Catalase D) Amylase

39. The histochemical stain commonly used to identify the presence of polysaccharides and glycoproteins in tissues:
A) Alcian Blue staining
B) Hematoxylin and eosin staining
C) Giemsa staining
D) Masson's trichrome staining

40. In angiosperms, the primary function of the suspensor during embryonic development is:
A) Nutrient absorption from the endosperm
B) Protection of the embryo inside seed coat
C) Push the embryo deeper into the endosperm within the seed coat
D) Facilitating water uptake from the soil

41. The micronutrient essential for nitrogen metabolism, enzyme activation and nucleic acid synthesis in plants:
A) Iron (Fe) B) Copper (Cu)
C) Manganese (Mn) D) Molybdenum (Mo)

42. In microtechnique, what is the role of osmium tetroxide in tissue fixation?
A) Enhance cell permeability
B) Stabilize lipids in cell membranes
C) Preserve DNA structure
D) Harden the tissue

43. In the context of evolution, what does the term "fitness" refer to?
A) Physical strength of an organism
B) Ability of an organism to survive and reproduce in its environment
C) Size of an organism

D) Number of offspring produced by an organism

44. The micronutrient deficiency associated with the development of 'little leaf' symptoms in plants, characterized by reduced leaf size and abnormal leaf shape:
A) Nitrogen (N) B) Manganese (Mn)
C) Iron (Fe) D) Zinc (Zn)

45. The approximate length of DNA wrapped around a single nucleosome core particle is ------ base pairs.
A) 100 B) 146 C) 200 D) 250

46. In a correlation analysis of kinesin and dynein expression levels in cells, if the correlation coefficient is -0.85, what does this indicate?
A) There is a strong positive correlation between kinesin and dynein expression
B) There is a strong negative correlation between kinesin and dynein expression
C) There is no correlation between kinesin and dynein expression
D) Kinesin and dynein expression are unrelated to each other

47. The phenomenon where plants bend in response to touch or mechanical stimulus:
A) Geotropism B) Thigmotropism
C) Phototropism D) Hydrotropism

48. The plant structure which is responsible for the production of lateral roots and contributes to the plant's ability to explore soil for nutrients and water:
A) Root hairs B) Root cap
C) Vascular cambium D) Pericycle

49. The primary role of cryptochromes in plant photoreception is:
A) Regulation of circadian rhythms
B) Phototropism
C) UV-B light perception
D) Shade avoidance response

50. The primary function of heat shock proteins (HSPs) in plants under stress conditions is:
1. Facilitate photosynthesis
2. Prevent denaturation of proteins and assist in protein refolding
3. Enhance water uptake

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

51. The scientist who proposed the idea of punctuated equilibrium, suggesting that evolution occurs in rapid bursts separated by long periods of stability:
A) Richard Dawkins B) Stephen Jay Gould
C) Lynn Margulis D) Ernst Mayr

52. In Raunkiaer's system, plants with perennating buds located just above the soil surface are classified as:
A) Chamaephytes B) Cryptophytes
C) Hemicryptophytes D) Phanerophytes

53. Which of the following is a characteristic of a climax community in Clementsian ecological theory?
A) High species diversity
B) Rapid changes in species composition
C) Stability and resistance to disturbances
D) Constant disturbance regime

54. Which of the following statements about ribozymes is/are true?
1. They are exclusively found in eukaryotic cells.
2. They can act as catalysts without the need for protein enzymes.
3. They are involved in the synthesis of amino acids.
4. They are only present in viruses.

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

55. The purpose of the centrosome duplication checkpoint in the cell cycle is to:
A) Prevent premature entry into the next phase
B) Ensure accurate DNA replication
C) Monitor spindle assembly
D) Regulate cell size

56. What happens if centrosome duplication is not properly regulated and cells enter mitosis with more than two centrosomes?
A) Delay in cell division
B) Formation of multipolar spindles
C) Premature cell death
D) Enhanced DNA replication

57. The repair mechanism which is specifically designed to handle damage to individual bases caused by oxidation or deamination:
A) Base excision repair
B) Direct repair
C) Nucleotide excision repair
D) Mismatch repair

58. During the SOS response in bacteria, what type of DNA repair mechanism is activated in response to extensive DNA damage?
A) Base excision repair B) Nucleotide excision repair
C) Error-prone repair D) Mismatch repair

59. What is the function of small interfering RNAs (siRNAs) in gene regulation?
A) Enhance transcription
B) Inhibit translation
C) Induce mRNA degradation
D) Promote splicing

60. The type of T cells involved in killing infected cells directly:
A) Helper T cells (Th) B) Cytotoxic T cells (Tc)
C) Regulatory T cells (Treg) D) Memory T cells

61. The "precautionary principle" in environmental science suggests that:
A) Conservation efforts should always prioritize charismatic species
B) If an action or policy has the potential to cause harm to the public or the environment, in the absence of scientific consensus, the burden of proof falls on those advocating for the action
C) Conservation decisions should be made solely based on economic considerations
D) Species should only be protected if they have immediate economic value

62. Which of the following is **not** a criterion used by IUCN for assessing the conservation status of a species?
A) Population size and trends
B) Geographic range
C) Genetic diversity
D) Population viability analysis

63. Which among the following belongs to Arecaceae?
1. Phoenix dactylifera 2. Copernicia prunifera
3. Ceroxylon andicola 4. Roystonea regia

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

64. Which statement correctly define the author citation - Use of ex
A) The names of two authors are linked by ex when the first author had proposed a name but was validly published only by the second author, the first author failing to satisfy all or some of the requirements of the Code.
B) The rules of botanical nomenclature specify that whenever the name of a taxon is changed by the transfer from one genus to another, or by upgrading or downgrading the level of the taxon, the original epithet should be retained by using ex
C) The names of authors are linked by ex when the first author published a new species or a name in a publication of another author.

D) Names of two authors are linked by ex, when the second author makes some change in the diagnosis or in the circumscription of a taxon without altering the type.

65. Identify the correct statement linked to plant classification:
A) Angiosperms was divided into two Classes – Magnoliopsida and Liliopsida = Bessey's system
B) Divided angiosperm into two classes Alternifoliae and Oppositifoliae = Armen Takhtajan system, 1997
C) Plant kingdom is classified in to Dicotyledonae, Gymnospermae and Monocotyledonae = Bentham and Hooker's classification
D) None of these

66. Which among the following is/are **not** the feature/s of Dipterocarpaceaea?
1. Gigantic trees with abundant resin, leaves coracious
2. Flower actionomorphic, hermaphrodite, hypogynous
3. 5 sepals, polysepalous; polypetalous; stamens 5 in one whorl
4. Carpels 3, syncarpous, fruit drupe & enclosed in persistent sepals

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

67. Select the correctly matched pairs of Botanical garden and location:
1. Lloyd's Botanical Garden - Sikkim
2. National Botanical Garden - Lucknow
3. Acharya Jagadish Chandra Bose Indian Botanic Garden - Kolkata
4. Desert Botanical Garden - Morocco

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

68. Formation of gametophyte directly from sporophyte without meiosis is known as:
A) Apospory B) Apogamy C) Amphimixis D) Parthenogenesis

69. Which of the following statements related for seed is **not** correct?
A) As the seed matures, its water content is reduced and seeds become relatively dry (10-15% moisture by mass)
B) The seed dormancy is the innate inhibition of generation of normal viable seeds
C) Scarification refers incubation of seeds at a suitable low temperature over a moist layer before conveying them to a temperature worthy of germination
D) Because of dormancy seeds remain viable for longer period and can be stored

70. Identify the correct statements connected to Paraffin wax:
1. Selection of paraffin was depends on the nature of the tissue to be embedded and thickness of section required.
2. A high melting point of the wax (e.g., 55–60°C) increases the hardness and decreases the thickness to which the tissue may be sectioned (e.g., 45–50°C is considered soft)
3. Paraffin wax is commonly used and heated to a temperature that is 2–3°C above its melting point. Any higher temperature will result in tissue hardening.

4. The paraffin wax should be less to the volume of the tissue used

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

71. Identify the correct statements connected to Electron microscope:
1. The denser regions in the specimen scatter fewer electrons and therefore appear brighter in the image since more electrons strike that area of the screen. In contrast, the transparent regions are darker
2. The electron gun is a heated tungsten filament, which generates electrons
3. Three sets of condenser lenses focus the electron beam on the specimen and then into a thin tight beam
4. The electron beam coming out of the specimen passes down the second of magnetic coils called the objective lens, which has high power and forms the intermediate magnified image. The third set of magnetic lenses called projector (ocular) lenses produce the final further magnified image

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

72. Navashin's fluid was published in 1912 and the principal components used were:
A) Chromic acid, acetic acid and formalin
B) Chromic acid, Picric acid and formalin
C) Chromic acid, acetic acid, picric acid and formalin
D) Chromic acid, acetic acid, picric acid

73. Identify the correct statements connected to apical meristems and intercalary meristems:
I. Both are primary meristems
2. Both appear early in plant life
3. Contribute to the formation of the primary plant body

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

74. Identify the **incorrect** statement:
A) Cork cambium is part of periderm
B) Ground meristem includes cortex and pith of dicot stem
C) Procambium is a primary vascular tissue
D) Protoderm is the initial vascular tissue of monocot stem

75. Who is known as the Father of Indian Ethno botany?
A) Sudhanshu Kumar Jain B) B M Johri
C) Kailas Nath Kaul D) Janaki Ammal

76. The plant species which yield gum:
A) Acacia nilotica B) Acacia catechu
C) Steruculia urens D) All the above

77. The membrane attack complex (MAC) in the complement pathway consists of:
A) C5b, C6,C7, C8, C9 B) C3b, C3 , C2, C1a

C) Colicins D) Properdin

78. Identify the disease symptoms of Red Rust of Tea:
1. Leaves develop lesions that are roughly circular, raised, and purple to reddish brown. The alga may spread from leaves to branches and fruit. Most algal spots develop on the upper leaf surface. Older infections become greenish-gray and look like lichen.
2. Yellowing of the leaf followed by wilting and then sudden death of the bush or entire bush with the weathered leaves are attached to the stem for several days

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

79. Which statements given below are true about certification?
1. As far as possible only seeds certified as pathogen free are allowed to enter the country.
2. Other planting materials can be allowed to enter the country without certification.
3. Quarantine is needed for the seeds from foreign countries while it is certified.
4. Is meant to prevent existing pathogens.
5. Certification is the method of management of pathogen i.e. avoiding the contact between the pathogen and the host

A) 2, 4 & 5 only B) 1, 3, 4 & 5 only
C) 1, 2 & 3 only D) 1, 2, 3, 4 & 5

80. Match the List I with List II

List I	List II
a. Seed plant technique was developed by	1. Peerson
b Male sterility in cauliflower was introduced by	2. Pushkarnath
c. Father of Organic Farming	3. Decandolle
d. Father of pomology	4. Albert Howard

A) a-2, b-1, c4, d-3 B) a-4, b-3, c-2, d-1
C) a-3, b-4, c-1, d-2 D) a-1, b-2, c-3, d-4

81. Identify the correct statement/s:
1. MACAW is a local multiple sequence alignment program and a sequence editing tool.
2. Major disadvantage of the PRSS program is that it doesn't allow partial shuffling
3. A sequence can be aligned with itself to identify internal repeat elements.
4. BLASTN is not a site on internet for alignment of sequence pairs

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

82. Match the following examples of Gene Regulation with type of Recombination and select the correct one/s:

System & Recombinase / recombination site	Type of Recombination
1. Phase variation (Salmonella) Hin/hix	Site-specific
2. Mating-type switch (yeast) HO endonuclease, RAD52 protein, other proteins/MAT	Nonreciprocal gene conversion

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

83. The transgenic plants are glyphosate resistance and will survive in the field application of glyphosate that kills weeds. Which of the following enzyme is inhibited by glyphosate?
A) Chorismate synthase
B) 5-enolpyruvylshikimate-3-phosphate
C) 3-deoxy-d-arabino-heptulosonate-7-phosphate synthase
D) 3- dehydroquinate dehydratase/shikimate 5-dehydrogenase

84. Identify the correct statements related to Introns:

1. Introns can remain at a corresponding position in a eukaryotic gene for long periods of evolutionary time.
2. The intron structure of genes in a particular eukaryote is used for predicting the location of genes of genome sequences
3. Eukaryotic genes that encode proteins are interrupted by introns of varying number but same length
4. There are four major classes of introns: self-splicing group I and group II introns, tRNA and/or archaeal introns and spliceosomal introns in nuclear pre-mRNA

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

85. Suppose you as a pet dealer who rear goldfish. You have more than 10,000 fish in one large tank but, due to an electrical short circuit, 95% of the fishes perished in one night. The remaining 5% are left to breed and repopulate, passing their genes and traits on to future generations. What type of genetic drift this may be considered?
A) Extinction B) Natural selection
C) Bottleneck effect D) Founder effect

86. ----- is a disease involving antibodies to non-organ specific antigens such as DNA and induces immune complexes which deposit in the vascular bed causing kidney, skin, joint and cerebral lesions.
A) Pernicious anemia B) Systemic lupus erythematosus
C) Hashimoto's thyroiditis D) Myasthenia gravis

87. You are researching a population of 100 Malayan squirrels, where 20 are black and 80 of them are gray. You know that the black color is a recessive trait for this type of squirrel. Using the Hardy-Weinberg Equilibrium equation, what number would be heterozygous (having gray fur, but with only one gray fur allele)?
A) 35 B) 20 C) 10 D) 50

88. A polygenic trait is controlled by 3 genes A, B and C. In a cross AaBbCc × AaBbCc, the phenotypic ratio of the off springs was observed as 1: 6: x: 20: x: 6: 1. What is the possible value of x?

A) 15 B) 9 C) 25 D) 3

89. Assertion (A): A flower is defined as modified shoot i.e., the shoot apical meristem changes in to floral meristem.
Reason (R): Internode of the shoot gets condensed to form various floral appendages laterally at successive nodes instead of leaves.

A) (A) is false but (R) is true.
B) Both (A) and (R) are true and (R) is the correct explanation of (A).
C) Both (A) and (R) are true but R is NOT the correct explanation of (A).
D) (A) is true but (R) is false

90. Match the List I with List II

List I	List II
a. Sex-influenced trait	1. Porcupine skin
b. Holandric trait	2. Pattern baldness
c. Sex-linked trait	3. Duchenne muscular dystrophy
d. Sex-limited traits	4. Barred coloring in chickens

A) a-2, b-1, c-3, d-4 B) a-1, b-2, c-4, d-3
C) a-1, b-2, c-3, d-4 D) a-4, b-3, c-2, d-1

91. Identify the correct statements related to Pleiotropy:
1. Pleiotropy means controlling of multiple traits by a multiple gene.
2. Mechanism behind pleiotropy is the effect of a gene on metabolic pathways
3. Phenylketonuria is an example for pleiotropy, individual which is affected by lacks a liver enzyme called phenylalanine hydroxylase which is responsible for converting phenylalanine into tyrosine
4. It has a wide range of genotypic results and usually unaffected by environmental variables

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

92. Pisum dihybrid cross produces the following progenies - AaBb = 200; Aabb =774; aaBb = 746; aabb =280. What is the distance between the two genes on the chromosome?
A) 20 map units B) 12.5 map units
C) 1 map unit D) 25 map units

93. The fern which shows leptosporangiate type of development:
A) Azolla B) Ophioglossum
C) Marattia D) Tmesipteris

94. Identify the species which displays cctophloic solenostele in the adult plant:
A) Adiantum B) Osmunda
C) Lygodium D) Gleichenia

95. Analyze the features of Salvinia and find out the **incorrect** one:
A) Vascular arrangement of Rhizome suggests an ectophloic siphonostele
B) Sporocarps are mono-sporangiate, the first one or two sporocarps in each cluster are megasporangiate whereas all the later formed ones are microsporangiate.
C) Degenerating spores and the tapetum harden and surround the functional megaspores in the form of a thick layer. This is often called the perispore.
D) Archegonia are deeply sunk in the apical cushion have a short neck, an egg cell, a venter canal cell and a two neck canal cells.

96. What is the role of topoisomerases II in eukaryotic cells?
A) That binds to the 3′ Carbon end of the DNA and unwind using ATP
B) That cuts on a single strand of DNA. It is not an ATP-dependent enzyme
C) That binds to the 3′ Carbon end of the DNA and forms nick in one strand without using ATP
D) That cut both strands of the DNA helix simultaneously in order to manage DNA tangles and supercoils and utilize ATP

97. Identify the correct statements among the following:
1. Lichens are the first organisms to colonise a bare rock.
2. Selaginella is a homosporous pteridophyte.
3. Coralloid roots in Cycas have vesicular-arbuscular mycorrhiza.
4. Main plant body in bryophytes is gametophytic, whereas in pteridophytes it is sporophytic.

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

98. Read the following statements and select the **incorrect** ones:
1. Archegonium of Mosses possesses a ventral canal cell and an egg. The neck consists of an axial row of 5 neck canal cells. The tip of the neck is closed by four cover cells
2. In liverworts, the haploid free living sporophyte is formed by spore germination.
3. Polytrichum is dioecious
4. Marchantia is a homosporous bryophyte.

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

99. Identify the correct statements related to Lichens:
1. It is of the opinion that algal-fungal relationship in lichens as helotism
2. Rhizocarpon is an example for crustose & saxicolous lichen
3. Majority, lichens are the pollution indicators of Sulphur
4. Vegetative reproduction in lichens takes place by isidia & Soredia

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

100. Observe the virus with corresponding diseases. Select the correctly matched pair?
1. SARS-CoV-2 causes COVID-19
2. Enterovirus cause dengue fever
3. coxsackievirus causes hand, foot and mouth disease
4. Herpesviridae causes chickenpox

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

101. Identify the correct Red algal features:
1. The first sporophyte is the carposporophyte and the second sporophyte is tetrasoporophyte
2. Absence of flagella and centrioles
3. They form pit connections and pit plugs form during cytokinesis following mitosis. The pit connections are thought to play a role *in* cell-to-cell communication and/ or symplastic transport.
4. Their cell wall is composed of cellulose, pectin, and pigment-aligned molecules.

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

102. ------- shows the relationship between two quantitative variables measured for the same individuals. The values of one variable appear on the horizontal axis, and the values of the other variable appear on the vertical axis
A) Bar chart B) Scatter plot
C) Histograms D) Three-dimensional graph

103. If the mean and the standard deviation of a data set is 18 and 5 respectively. Find the variance and the coefficient of variation.
A) 36 & 27.77% B) 25 & 27.77%
C) 25 & 33.33% D) 36 & 33.33%

104. Atomic force microscope (AFM) was invented by:
A) Wolfgang Gohde B) Binning, Quate & Gerber
C) Fredrick W. Herschel D) Gerd Binnig and Heinrich Rohrer

105. Analyze the example which displays homologous or Analogous organs and choose the correct ones?
1. Forelimbs of mammals 2. Mouthparts of cockroaches, mosquitoes and honey bee
3. Wings of an insect and wings of a bat 4. Eyes of octopus & mammals

A) 1 & 3 homologous; 2 & 4 Analogous
B) 1 & 2 homologous; 3 & 4 Analogous
C) 2 & 3 homologous; 1 & 4 Analogous
D) 1 & 4 homologous; 2 & 3 Analogous

106. Identify the saturated fatty acid:
A) Behenic acid B) Erucic acid
C) Nervonic acid D) Linoleic acid

107. Which of the following is/are example/s for allosteric enzymes?
A) Isocitrate dehydrogenase B) Aspartate transcarbamoylase
C) Phosphofructokinase D) All of these

108. Identify the correct statement/s linked to Gibbs free energy:
1. Free energy change criteria for predicting spontaneity is better than entropy change criteria because the former requires free energy change of system only, whereas the latter requires entropy change of system and surroundings
2. In an irreversible reaction, the free energy of the reaction mixture is lower than the free energy of reactants as well as products. Hence, free energy decreases whether we start from reactants or products.

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

109. Noise Pollution (Control and Regulation) Rules, 2000 define ambient noise levels for Commercial Area is ---- dB, day time; ---- dB, night time.
A) 65 & 55 B) 55 & 45 C) 70 & 55 D) 60 & 50

110. Select the group of GHGs with increasing global warming potential:
A) Sulfur Hexafluoride, Hydrofluorocarbons, Nitrous Oxide, Methane
B) Methane, Nitrous Oxide, Hydrofluorocarbons, Sulfur Hexafluoride
C) Nitrous Oxide, Methane, Sulfur Hexafluoride, Hydrofluorocarbons
D) Hydrofluorocarbons, Nitrous Oxide, Methane, Sulfur Hexafluoride

111. Identify the correct statement connected to Dissolved Oxygen (DO):
A) The presence of organic molecules in water reduces its DO content and inorganic wastes in water increase its DO content
B) Water with a DO content less than 8.0 g/L may be considered contaminated
C) Surface turbulence, photosynthetic activity, O_2 consumption by organisms, and organic matter decomposition are all factors that influence the amount of DO in water
D) Chemical oxygen demand and Biochemical Oxygen Demand are inversely related

112. Identify the animals which are classified as critically endangered by IUCN:
1. White-rumped Vulture 2. Himalayan Quail
3. Sociable Lapwing 4. Malabar Civet

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

113. Identify the statement which correctly explains Carbon Farming:
A) Identification, management and restoration of degraded soils, as well as in the adoption of anticipatory measures
B) Smart and precision farming using sensors and other scientific tools to manage soil health and use appropriate herbicides and pesticides
C) Forecasting tools using data analytics that will aid farmers in making informed decisions on crop choices, a good step in farming
D) Methods of agricultural management that can help the land store more carbon and reduce the amount of GHG that it releases into the atmosphere, in a way maintaining soil health and atmospheric stability

114. Select the correctly matched pairs in terms of Wildlife Sanctuary and districts from Kerala:
1. Peppara Wildlife Sanctuary in Thiruvananthapuram
2. Ranipuram Wildlife Sanctuary in Kasaragod
3. Karimpuzha Wildlife Sanctuary in Malappuram
4. Kurinjimala Sanctuary in Idukki

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

115. Identify the correct statements among the following:
1. Ecotone is a zone of junction between two or more diverse ecosystems
2. The influence of the uneven bordering communities in the ecotone is referred as biotype.
3. A well-developed ecotone may contain some unique organisms which might be absent in the adjacent ecosystems

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

116. Analyze Entities of Incomparable Value (EIV) related to National Environmental Policy. Identify the major criteria for Identification of EIV
1. Unique Biodiversity
2. Life Support Systems
3. Natural entities providing eco-system resilience
4. Introductions of species with rigorous quarantine checks

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

117. Homologous genes where a gene diverges after a speciation event, but the gene and its main function are conserved
A) Paralogous B) Homologous
C) Xenologs D) Orthologous

118. Analyze the statement with major histocompatibility complex and select the correct Ones:

1. MHC I are distributed in all nucleated cells, while MHC-II in Antigen-presenting cells
2. Binding site for T cell co-receptor MHC I = CD8 binds to the α3 region, while in MHC II = CD4 binds to the β2 region
3. Interferon-g (INF-y) increases the expression of MHC-I or MHC-II molecules and can induce the expression of MHC-II molecules on certain cell types that do not normally express them. This may be very important both in normal immunologic function and in autoimmuni

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

119. The matrix which can be used to identify more related proteins:

A) PAM100 B) PAM250 C) BLOSUM62 D) BLOSUM80

120. Name the most powerful eye irritant in the smoke:

A) Ozone B) Peroxyacetyl nitrate
C) Sulphur dioxide D) Carbon dioxide