Biology

1. Which of the following statements regarding fats is true?

(a) Arachidonic acid has 20 carbons excluding the carboxyl carbon
(b) Glycerol is a trihydroxy propane
(c) Palmitic acid has 18 carbons including the carboxyl carbon
(d) Oils have higher melting points than fats
(e) Lipids are generally water soluble

2. Coenzymes NAD and NADP contain vitamins

(a) niacin (b) biotin
(c) thiamine (d) vitamin-B_{12}
(e) vitamin-A

3. Which of these is/are wrongly matched?

1. Alkaloid – Codeine
2. Lectin – Morphine
3. Toxin – Abrin
4. Terpene – Curcumin

(a) 1 and 2 (b) 2 and 3
(c) 2 and 4 (d) 3 and 4
(e) 1 and 4

4. Choose the wrong statement

(a) cells swell in hypertonic solutions and shrink in hypotonic solutions
(b) water potential is the kinetic energy of water which helps in the movement of water
(c) the absorption of water by seeds and dry wood takes by a special type of diffusion called imbibition
(d) solute potential or ψ_s is always negative
(e) less than 1% of the water reaching the leaves is used in photosynthesis and plant growth

5. When one element is involved in opening and closing of stomata, the other helps to maintain the ribosome structure. They are

(a) potassium and calcium
(b) phosphorus and sulphur
(c) potassium and magnesium
(d) iron and magnesium
(e) calcium and sulphur

6. Which of the following groups of minerals are micronutrients?

(a) Magnesium, Manganese, Copper, Boron and Phosphorus
(b) Manganese, Copper, Magnesium, Zinc and Boron
(c) Nitrogen, Potassium, Manganese, Copper and Iron
(d) Iron, Manganese, Copper, Molybdenum and Zinc
(e) Carbon, Potassium, Phosphorus, Nitrogen and Oxygen

7. Match the mineral in column I with the enzyme activated in column II and choose the correct option.

Column I	Column II
A. Magnesium	1. Alcohol dehydrogenase
B. Molybdenum	2. Phosphoenol pyruvate carboxylase
C. Zinc	3. Nitrogenase

A B C
(a) 2 3 1
(b) 1 2 3
(c) 2 1 3
(d) 3 2 1
(e) 3 1 2

8. Which of the following statements regarding cycle flow of electrons during light reactions is false?
(a) This process takes place in the stromal lamella
(b) ATP synthesis takes place
(c) $NADPH + H^+$ is synthesised
(d) Takes place only when light of wavelength beyond 680 nm is available for excitation
(e) PS-II is not involved in the process

9. In which of the following steps of citric acid cycle, CO_2 is evolved?
I. Citric acid → α-ketoglutaric acid
II. Succinic acid → Malic acid
III. Malic acid → Oxaloacetic acid
IV. α-ketoglutaric acid → Succinyl Co-A
(a) I and II (b) I and IV
(c) II and III (d) II and IV
(e) III and IV

10. Find out the mismatched pair
(a) C_4 plants – Kranz anatomy
(b) Primary CO_2 fixation product of C_4 plants – OAA
(c) Primary CO_2 acceptor of C_3 plants – RuBP
(d) Calvin pathway of C_4 plants occur in – Bundle sheath
(e) C_3 plants – Maize

11. Which of these is/are not a property of facilitated transport?
A. Requires special membrane proteins
B. Highly selective
C. Uphill transport
D. Requires ATP energy
(a) A and B (b) C and D
(c) A and C (d) B and C
(e) B and D

12. Oxidative decarboxylation of pyruvic acid results in the formation of
I. Acetyl Co-A II. CO_2
III. ATP IV. $NADH + H^+$
(a) I only (b) I and II
(c) I, II and III (d) I, II and IV
(e) III and IV

13. Select the correct order of reactions in glycolysis
A. Conversion of 3-phosphoglyceraldehyde to 1, 3-bisphosphoglycerate
B. Conversion of 3-phosphoglyceric acid to 2-phosphoglycerate
C. Conversion of BPGA to 3-phosphoglyceric acid
D. Splitting of fructose 1, 6-bisphosphate into dihydroxy acetone phosphate and 3-phosphoglyceraldehyde
(a) D, C, A, B (b) B, C, A, B
(c) B, D, A, C (d) A, D, C, B
(e) D, A, C, B

14. Free-living nitrogen fixing aerobic bacterium is
(a) *Rhodospirillum* (b) *Anabaena*
(c) *Nostoc* (d) *Beijernickia*
(e) *Rhizobium*

15. Which of the following plant growth hormone increases the yields of sugar by increasing the length of stem in sugarcane?
(a) Cytokinin (b) Auxin
(c) Abscisic acid (d) Ethylene
(e) Gibberellic acid

16. Which of the following feature (s) is/are common to both wind and water pollinated flowers?

I. Pollen grains are long and ribbon-like
II. Stigma is large and feathery
III. The flowers are not colourful
IV. The flowers do not produce nectar

(a) III and IV
(b) II and III
(c) I and II
(d) II only
(e) I only

17. One hormone hastens the maturity period in juvenile conifers, a second hormone controls xylem differentiation while, the third increases the tolerance of plants to various stresses and they are respectively

(a) auxin, gibberellin and cytokinin
(b) gibberellin, auxin and cytokinin
(c) gibberellin, auxin and ethylene
(d) gibberellin, auxin and ABA
(e) auxin, gibberellin and ABA

18. Which of the following is not an effect of ethylene?

(a) Promotes senescence and abcission of plant organs
(b) Breaks seed and bud dormancy
(c) Brings about horizontal growth of seedlings
(d) Hastens fruit ripening
(e) Helps to overcome apical dominance

19. Select the plants pollinated by water

A. Water hyacinth
B. *Zostera*
C. *Amorphophallus*
D. *Vallisneria*
E. *Yucca*

(a) A, D and E
(b) B and E
(c) B and D
(d) B, C and D
(e) A, B and D

20. The breakdown of detritus into small particles by detritivores is called

(a) leaching
(b) humification
(c) catabolism
(d) mineralisation
(e) fragmentation

21. Which of the following statements regarding responses of organisms to abiotic factors is false?

(a) All birds and mammals are capable of thermoregulation
(b) Majority of animals and nearly all plants cannot maintain a constant internal environment
(c) Shivering is a kind of exercise which produces heat and raises body temperature
(d) Very small animals are commonly found in polar regions as they have to spend less energy to generate body heat
(e) Diapause is a stage of suspended development seen in zooplanktons

22. An orchid growing as an epiphyte on a mango tree is an example for

(a) parasitism
(b) predation
(c) commensalism
(d) mutualism
(e) competition

23. The ozone hole over Antarctica develops each year between

(a) late December and early February
(b) late February and early April
(c) late April and early June
(d) late August and early October
(e) late October and early December

24. In the equation, $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$, where r stands for

(a) intrinsic rate of natural increase
(b) death rate
(c) population density at time t
(d) carrying capacity
(e) the base of natural logarithms

25. Which of the following statements about productivity is true?

(a) Primary productivity of all ecosystems is a constant
(b) The annual net primary productivity of the whole of the biosphere is 17 billion tons (dry weight) of organic matter
(c) Net primary productivity is the amount of biomass available for consumption by carnivores
(d) Secondary productivity is defined as the rate of formation of new organic matter by decomposers
(e) Primary productivity depends on the plant species inhabiting a particular area

26. The pioneer species in xerarch and hydrarch succession are respectively
(a) lichens and sedges
(b) lichens and rooted hydrophytes
(c) phytoplanktons and lichens
(d) lichens and phytoplanktons
(e) sedges and phytoplanktons

27. Which of the following statements does not apply to eutrophication?
(a) It is the natural ageing of a lake by nutrient enrichment of its water
(b) In a young lake the water is cold and clear and supports less life
(c) The nutrients such as sulphur and phosphorus encourage the growth of aquatic organisms in the lake
(d) Pollutants released by man radically accelerate the ageing process of a lake
(e) Overgrowth of algae leads to scum that depletes the level of dissolved oxygen in water

28. According the Robert Constanza, 50% of the total cost for ecosystem services goes to
(a) recreation (b) soil formation
(c) nutrient cycling (d) climate regulation
(e) habitat for wildlife

29. Which of the following statements (s) regarding energy flow is/are false?
I. The detritus food chain begins with dead organic matter
II. In aquatic ecosystem detritus food chain is the major conduit for energy flow
III. In terrestrial ecosystem a larger fraction of energy flows through grazing food chain
IV. Producers belong to the first trophic level of the food chain
(a) II and III (b) III and IV
(c) I and IV (d) I and II
(e) I, II and III

30. The first recombinant DNA was constructed by linking an antibiotic resistant gene with the native plasmid of
(a) *Escherichia coli*
(b) *Salmonella typhimurium*
(c) *Clostridium butylicum*
(d) *Acetobacter aceti*
(e) *Bacillus thuringiensis*

31. The Polymerase Chain Reaction is a technique that is used for
(a) *in vivo* replication of specific DNA sequence using thermostable DNA polymerase
(b) *in vitro* synthesis of *m*RNA
(c) *in vitro* replication of specific DNA sequence using thermostable DNA polymerase
(d) *in vivo* synthesis of *m*RNA
(e) separation of DNA fragments according to their size

32. Bioreactors are useful in
(a) separation and purification of a product
(b) processing of large volumes of culture
(c) micro-injection
(d) isolation of genetic material
(e) amplification of genes

33. Match column I with column II and select the correct option.

Column I	Column II
A. Ascomycetes	1. *Ustilago*
B. Phycomycetes	2. *Saccharomyces*
C. Basidiomycetes	3. *Trichoderma*
D. Deuteromycetes	4. *Albugo*

	A	B	C	D
(a)	2	1	4	3
(b)	4	3	2	1
(c)	2	4	1	3
(d)	3	4	1	2
(e)	1	4	2	3

34. Which of the following statement(s) about taxonomical aids is/are true?
I. Keys are used to identify plants and animals based on similarities and dissimilarities
II. Flora contains the account of habitat and distribution of plants in a given area
III. Flora provide and index to the plant species found in a particular area
IV. Monographs provide information for identifying the species found in an area
(a) I and II
(b) I, II and III
(c) I and IV
(d) I only
(e) IV only

35. Which one of the following shows, the hierarchial arrangement of taxonomic categories of plants descending order?

(A)	(B)	(C)	(D)	(E)
Kingdom	Kingdom	Kingdom	Kingdom	Kingdom
↑	↑	↓	↓	↓
Division	Division	Division	Division	Division
↑	↑	↓	↓	↓
Class	Order	Order	Class	Family
↑	↑	↓	↓	↓
Order	Class	Class	Order	Order
↑	↑	↓	↓	↓
Family	Family	Family	Family	Class
↑	↑	↓	↓	↓
Species	Genus	Genus	Genus	Genus
↑	↑	↓	↓	↓
Genus	Species	Species	Species	Species

36. Which of the following does not apply to Ascomycetes?
(a) Mycelium is coenocytic and aseptate
(b) Commonly known as sac fungi
(c) Asexual spores called conidia are produced exogenously
(d) Sexual spores called ascospores are produced endogenously
(e) They are saprophytic, decomposers, parasitic or coprophilous

37. As per Whittaker's classification, an organism possessing eukaryotic cell structure, multicellular organisation, with a cell wall and nuclear membrane showing heterotrophic nutrition can be placed under the kingdom
(a) Monera
(b) Protista
(c) Plantae
(d) Fungi
(e) Animalia

38. Which of the following groups of algae belongs to class–Rhodophyceae?
(a) *Laminaria, Fucus, Porphyra, Volvox*
(b) *Gelidium, Porphyra, Dictyota, Fucus*
(c) *Gracilaria, Gelidium, Porphyra, Polysiphonia*
(d) *Volvox, Spirogyra, Ulothrix, Sargassum*
(e) *Sargassum, Laminaria, Fucus, Dictyota*

39. Select the correct statement
(a) Biological names are generally in Greek and written in italics
(b) Family comprise a group of related species which has more characters in common
(c) *Triticum aestivum* comes under the order–Sapindales
(d) An order includes related classes
(e) Families like Convolvulaceae, Solanaceae are included in the order–Polymoniales mainly based on the floral characters

40. Which of the following groups of organisms have a protein rich layer called pellicle?
(a) Chrysophytes
(b) Euglenoids
(c) Dinoflagellates
(d) Slime moulds
(e) Protozoans

41. Which of the following are heterosporous pteridophytes?
I. *Lycopodium*
II. *Selaginella*
III. *Equisetum*
IV. *Salvinia*
(a) I and II
(b) II and III
(c) III and IV
(d) II and IV
(e) I and IV

42 Match the following and choose the correct combination from the options given.

Column I (Algae form)	Column II (Example)
A. Green alga	1. *Dictyota*
B. Brown alga	2. *Porphyra*
C. Red alga	3. *Spirogyra*

A B C
(a) 3 2 1
(b) 3 1 2
(c) 2 3 1
(d) 1 2 3
(e) 2 1 3

43. Choose the correct statement.
(a) bryophytes can live in soil, but are dependent on water for sexual reproduction
(b) the sex organs in bryophytes are unicellular
(c) in bryophyte the main plant body is a gametophyte which is differentiated into true root, stem and leaves
(d) common example of liverwort is *Polytrichum*
(e) common example of moss is *Marchantia*

44. Read the following statements and identify the correct options given
A. Angiosperms range in size from microscopic *Wolfia* to tall trees of *Eucalyptus*
B. In angiosperms, the seeds are enclosed by fruits
C. Double fertilisation is an event unique to angiosperms
D. In angiosperms, each cell of an embryo sac is diploid
E. In angiosperms, the zygote develops into and endosperm
Of the above statements
(a) A, B and D (b) A, B and E
(c) A, B and C (d) B, C and D
(e) B, C and E

45. Match the plants in column I with their modification types in column II and choose the right options given below

Column I	Column II
A. Ginger	1. Flattened stems
B. Pumpkin	2. Thorns
C. Bougainvillea	3. Stem tendrils

A B C D
(a) 4 3 2 1
(b) 4 1 2 3
(c) 2 4 1 3
(d) 3 4 2 1
(e) 2 1 4 3

46. In one plant adventitious roots are modified for storage and in the other plant a lateral branch with short interludes and each node bearing a rosette of leaves and a tuft of roots is found. They are
(a) Sweet potato and *Pistia*
(b) *Eichhornia* and jasmine
(c) Carrot and mint
(d) Turnip and *Chrysanthemum*
(e) Sweet potato and mint

47. The type of placentation seen in *Argemone* and primrose are respectively
(a) axile and free-central
(b) parietal and free-central
(c) parietal and basal
(d) marginal and free-central
(e) basal and parietal

48. Consider the following characters with respect to the gynoecium of Fabaceae choose the correct options given below.
A. Ovary monocarpellary
B. Many styles
C. Placenta swollen
D. Superior ovary
E. Axile placentation
(a) A, D and E (b) B and E
(c) A and B (d) A and D
(e) C and D

49. Which of the following characters are not applicable to the anatomy of dicot stem and choose the correct options given below?
A. Collenchymatous hypodermis
B. Polyarch xylem
C. Presence of casparian strips on the endodermis
D. Open vascular bundle
E. Presence of medullary rays
Of these
(a) A, D and E (b) B and C
(c) B and E (d) A, B and C
(e) C, D and E

50. Which of the followings are the characteristic features of Solanaceae?

A. Exstipulate leaves
B. Persistent calyx
C. Racemose inflorescence
D. Unilocular ovary
E. Fruits are either berry or capsule

Of these
(a) A, B and E are correct
(b) A, C and D are correct
(c) A only is correct
(d) B only is correct
(e) D and E are correct

51. Choose the wrong statement
(a) gymnosperms lack vessels in their xylem
(b) the cell wall of collenchyma is made up of cellulose, hemicellulose and pection
(c) the first formed primary xylem elements are called protoxylem
(d) the cell wall of parenchyma is made up of pectin
(e) gymnosperms have albuminous cells and sieve cells in their phloem

52. Which of these characters does/do not apply to the vascular bundle of monocot stem?

I. Conjoint
II. Endarch protoxylem
III. Open
IV. Phloem parencyma is absent

(a) I and II (b) II and III
(c) III and IV (d) III only
(e) I and IV

53. When one wood is lighter in colour with a lower density, the other wood is darker with a higher density. They are
(a) spring wood and autumn wood
(b) heartwood and late wood
(c) spring wood and early wood
(d) sap wood and spring wood
(e) autumn wood and spring wood

54. Which of the following part of dicot root is made up of cells with suberin deposition in tangential as well as radial walls?
(a) Epidermis (b) Endodermis
(c) Cortex (d) Pericycle
(e) Xylem

55. Choose the matched ones.

A. Vibrio – Rod-like bacteria
B. Mesosome – Helps in cell wall formation
C. Smooth endoplasmic reticulum – Synthesis of lipid
D. Vacuoles – Rich in hydrolytic enzymes

(a) B and C (b) A and D
(c) A, B and C (d) B and D
(e) B, C and D

56. Which of these organelles does not contain ribosomes?

I. Rough endoplasmic reticulum
II. Chloroplast
III. Golgi apparatus
IV. Mitochondria

(a) I and II (b) I and IV
(c) IV only (d) III only
(e) II, III and IV

57. Match the sub-stage of prophase-I of meiosis in column I and the events in column II and choose the right option.

Column I	Column II
A. Leptotene	1. Terminalisation of chiasma
B. Zygotene	2. Crossing over and recombination
C. Pachytene	3. Synapsis
D. Diakinesis	4. Visibility of chromosomes

	A	B	C	D
(a)	1	2	3	4
(b)	1	3	2	4
(c)	4	3	2	1
(d)	4	1	2	3
(e)	4	2	3	1

58. Which of the following scientists discovered the triple helical structure of collagen?
(a) GN Ramachandran
(b) Anton van Leeuwenhoek
(c) Mathias Schleiden
(d) Theodor Schwann
(e) Rudolf Virchow

59. One type of chromosome has middle centromere, whereas the other has terminal centromere. They are
(a) metacentric and acrocentric
(b) metacentric and telocentric
(c) sub-metacentric and telocentric
(d) telocentric and acrocentric

60. Match the following and choose the correct combination from the options given.

Column I (Chemical compounds)	Column II (Example)
A. Nitrogen base	1. RNA
B. Nucleoside	2. Thymidylic acid
C. Nucleotide	3. Cytidine
D. Nucleic acid	4. Uracil

	A	B	C	D
(a)	1	2	3	4
(b)	1	3	2	4
(c)	4	3	2	1
(d)	4	1	2	3
(e)	4	2	3	1

61. In eukaryotic genes, coding sequences are called
(a) introns
(b) exons
(c) regulatory sequence
(d) repetitive DNA
(e) histones

62. Which site of the *t*RNA pairs through hydrogen bonding with the triplet codes on *m*RNA?
(a) Codon (b) 5'end *t*RNA
(c) 3'end of *t*RNA (d) Anticodon
(e) Amino acid acceptor end

63. Find the wrongly matched pair
(a) Har Govind Khorana – synthesised RNA molecules chemically
(b) George Gamow – codon is triplet
(c) Meselson and Stahl – regulation of gene expression
(d) Alec Jeffreys – DNA fingerprinting
(e) Frederick Sanger – amino acid sequencing

64. If an inheritable mutation is observed in a population at high frequency, it is referred as
(a) DNA polymorphism
(b) expressed sequence tag
(c) sequence annotation
(d) linkage
(e) triplet codon

65. In eukaryotes, RNA polymerase II transcribes
(c) 28S *r*RNA (d) *t*RNA
(e) snRNAs

66. Match column I with column II and Column III. Choose the correct option.

Column I (Substrate)	Column II (Enzyme)	Column III (Product)
1. Lactose	(a) Lipase	(i) Gallactose
2. Monoglycerides	(b) Trypsin	(ii) Maltose
3. Starch	(c) Lactase	(iii) Fatty acid
4. Peptones	(d) Amylase	(iv) Dipeptides

(a) 1–a–i, 2–c–ii, 3–b–iii, 4–d–iv
(b) 1–d–i, 2–a–ii, 3–b–iii, 4–c–iv
(c) 1–c–i, 2,a–iii, 3–d–ii, 4–b–iv
(d) 1–c–i, 2–a–ii, 3–d–iii, 4–b–iv
(e) 1–b–i, 2–d–ii, 3–c–iii, 4–a–iv

67. Choose the wrong statements among the following
(a) trypsinogen is activated by enterokinase
(b) the optimum pH for salivary amylase activity is 8.9
(c) rennin helps in the digestion of milk proteins
(d) goblet cells secrete mucous
(e) submucosal glands of the intestine are also known as Brunner' s glands

68. To generate pressure gradients to faciliate expiration and inspiration, the human body uses the intercostal muscles and
(a) alveolar sacs
(b) bronchi
(c) primary, secondary and tertiary bronchioles
(d) diaphragm
(e) windpipe

69. Choose the wrong statement
(a) solubility of CO_2 in blood is 20-25 times higher than that of O_2
(b) the total volume of air accommodated in the lungs at the end of a forced inspiration is called the 'vital capacity'
(c) O_2 can bind with haemoglobin in a reversible manner to form oxyhaemoglobin
(d) every 100 mL of deoxygenated blood delivers approximately 4 mL of CO_2 to the alveoli
(e) the diffusion membrane is made of three major layers namely the thin squamous epithelium of alveoli, the endothelium of alveolar capillaries and the basement substance in between them

70. Match column I with column II regarding human excretory system. Choose the correct option.

Column I	Column II
A. Epithelial cells of Bowman's capsule	1. Juxtamedullary nephron
B. Extension of cortex between the medullary pyramids as renal columes	2. Vasa recta
C. Nephrons with long loop of Henle running deep into the medulla	3. Juxtaglomerular apparatus
D. A fine vessel of the peritubular capillaries running parallel to Henle's loop	4. Podocytes
E. A special sensitive region in the DCT and afferent arteriole at the location of their contact	5. Columns of Bertin
	6. Cortical nephron

	A	B	C	D	E
(a)	3	2	1	4	5
(c)	4	3	6	5	1
(e)	2	4	6	1	3

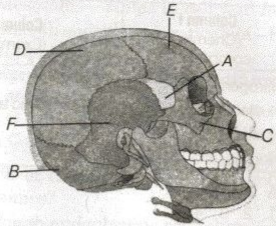
	A	B	C	D	E
(b)	5	1	2	3	4
(d)	4	5	1	2	3

71. Thrombokinase is associated with
(a) elimination of urea and other excretory products from the body
(b) production of erythrocytes from the bone marrow
(c) pulmonary and systemic circulation
(d) cardiac cycle and its regulation
(e) enzymatic reactions in coagulation of blood

72. What is the pO_2 and pCO_2 in the systemic arteries?
(a) pO_2 40 mm Hg; pCO_2 45 mm Hg
(b) pO_2 95 mm Hg; pCO_2 104 mm Hg
(c) pO_2 40 mm Hg; pCO_2 40 mm Hg
(d) pO_2 45 mm Hg; pCO_2 40 mm Hg
(e) pO_2 104 mm Hg; pCO_2 159 mm Hg

73. The striated appearance of a myofibril is due to the distribution pattern of
(a) actin and myosin
(b) fascicles
(c) troponin
(d) meromyosin
(e) sarcoplasmic reticulum

74. Label the parts marked in the human skull and select the correct option



(a) A–temporal bone B–parietal bone C–sphenoid bone D–frontal bone E–zygomatic bone F–occipital bone
(b) A–frontal bone B–zygomatic bone C–occipital bone D–sphenoid bone E–parietal bone F–temporal bone
(c) A–sphenoid bone B–occipital bone C–zygomatic bone D–parietal bone E–frontal bone F–temporal bone
(d) A–sphenoid bone B–zygomatic bone C–occipital bone D–frontal bone E–temporal bone F–parietal bone
(e) A–zygomatic bone B–occipital bone C–parietal bone D–frontal bone E–sphenoid bone F–temporal bone

75. The U-shaped bone present at the base of the buccal cavity is
(a) maleus (b) ethmoid
(c) zygomatic (d) hyoid
(e) sphenoid

76. Which of the following statement is wrong regarding conduction of nerve impulse?
(a) In a resting neuron, the axonal membrane is more permeable to K^+ ions and nearly impermeable to Na^+ ions
(b) Fluid outside the axon has high concentration of Na^+ and low concentration of K^+, in a resting neuron
(c) Ionic gradients are maintained by Na-K pumps across the resting membrane, which transport 3 Na^+ ions outwards for 2K^+ ions into the cell
(d) Resting potential is the electrical potential difference across the resting membrane
(e) A neuron is polarised only when the outer surface of the axonal membrane possess a negative charge and its inner surface is positively charged

77. An autoimmune disorder affecting the neuromuscular junction is
(a) angina (b) CAD
(c) emphysema (d) gout
(e) myasthenia gravis

78. Which of the following statement is wrong?
(a) Sella turcica is a bony cavity where the pituitary gland is located
(b) Parathyroid hormone decreases the Ca^{2+}
(c) Thymocytes play a major role in T-cell differentiation
(d) The middle layer of adrenal cortex is zona fasciculata
(e) Insulin stimulates glycogenesis

79. Match the hormones secreted by various endocrine structures and choose the correct option.

Column I	Column II
I. Hypothalamus	A. Melanocyte stimulating hormone
II. Pars intermedia	B. Aldosterone
III. Pineal gland	C. Gonadotrophin releasing hormone
IV. Adrenal medulla	D. Melatonin
V. Adrenal cortex	E. Catecholamines

(a) I–E, II–A, III–D, IV–B, V–C
(b) I–E, II–D, III–A, IV–B, V–C
(c) I–B, II–D, III–A, IV–C, V–E
(d) I–C, II–A, III–D, IV–B, V–E
(e) I–C, II–A, III–D, IV–E, V–B

80. Choose the wrongly matched pair
(a) Portion of myofibril between two Z-lines – sarcomere
(b) Isotropic band – Actin
(c) Anisotropic band – Myosin
(d) Central part of I-band – M-line
(e) Central part of A-band – H-zone

81. Chylomicrons are
(a) small fat globules coated with protein
(b) protein molecules coated with fat
(c) small granules found in gastric juice
(d) neural signals that stimulate intestinal secretions
(e) aerobic microbes

82. When percentage saturation of haemoglobin with O_2 is plotted against pO_2, the curve obtained is
(a) J-shaped
(b) hyperbola
(c) sigmoid
(d) U-shaped
(e) urn-shaped

83. Identify the correct statement regarding cardiac activity
(a) Normal activities of the human heart is regulated intrinsically, hence it is neurogenic
(b) a special neural centre in the medulla oblongata can moderate the cardiac function through the CNS
(c) parasympathetic neural signals increase the rate of heart beat
(d) adrenal medullary hormones can increase cardiac output
(e) the end of a T-wave marks the end of diastole

84. Identify the correct statement regarding urine formation
(a) Counter current mechanism works around the glomerulus and PCT
(b) To prevent diuresis, ADH facilitates water reabsorption from the latter parts of the tubule
(c) Maximum absorption of electrolytes occurs in the Henle' s loop
(d) A decrease in blood pressure can increase the glomerular filtration rate
(e) The collecting duct is impermeable to water and thus helps in diluting the urine

85. The yellowish pigmented spot at the posterior pole of the human eye lateral to the blind spot is
(a) crista
(b) saccule
(c) iris
(d) meatus
(e) macula lutea

86. Which of the following statement is wrong?
(a) Sertoli cells provide nutrition to the developing male germ cells
(b) Leydig cells synthesize and secrete androgens
(c) Secretions of the acrosome helps the sperm to enter into the cytoplasm of the ovum
(d) Secondary spermatocytes are diploid
(e) The fluid filed cavity in the tertiary follicle is called antrum

87. The inner glandular layer of the uterus is
(a) endometrium
(b) myometrium
(c) Fallopian tubes
(d) perimetrium
(e) infundibulum

88. The release of sperms from the seminiferous tubules is called
(a) spermiogenesis
(b) spermiation
(c) spermatogenesis
(d) fertilisation
(e) gametogenesis

89. Find the wrongly matched pair
(a) Endemism – species confined to one region and not found anywhere else
(b) Hot spots – regions with species richness
(c) Alien species to India – Clarias gariepinus
(d) Lungs of the planet – Amazon Rainforest
(e) *in situ* conservation – IVF

90. Which one among these is not an *ex situ* conservation strategy?
(a) Seed banks
(b) Botanical gardens
(c) Cryopreservation
(d) Biosphere reserves
(e) Tissue culture

91. The semi dwarf wheat which was instrumental in increasing wheat production was developed by
(a) Alexander von Humboldt
(b) Paul Ehrlich
(c) Dr. Kurien
(d) Edward Jenner
(e) Norman E. Borlaug

92. Ernest Chain Howard Florey's contribution was
(a) discovery of streptokinase
(b) establishing the potential of penicillin as an effective antibiotic
(c) discovery of the DNA sequences
(d) isolating the bacterial plasmid
(e) production of genetically engineered insulin

93. Match column I with column II and choose the correct option.

Column I	Column II
1. Totipotency	A. Breeding crops with higher levels of nutrients
2. Micropropagation	B. Plant grown from hybrid protoplast
3. Somaclone	C. Producing a large number of plants through tissue culture
4. Somatic hybrid	D. Capacity to generate a whole plant from an explant
5. Biofortification	E. Plants genetically identical to original plant

(a) 1 – D, 2 – C, 3 – E, 4 – B, 5 – A
(b) 1 – A, 2 – E, 3 – B, 4 – D, 5 – C
(c) 1 – C, 2 – B, 3 – E, 4 – D, 5 – A
(d) 1 – D, 2 – E, 3 – A, 4 – D, 5 – C
(e) 1 – D, 2 – E, 3 – B, 4 – A, 5 – C

94. Viruses of the genus *Nucleopolyhedrovirus* are employed as
(a) Gobar gas producers
(b) Biological control agents
(c) Anaerobic sludge digesters
(d) Antibiotics
(e) Atmospheric nitrogen fixing agents

95. Choose the wrong statement
(a) Louis Pasteur demonstrated that life comes only from pre-existing life
(b) SL Miller observed that electric discharge in a flask containing CH_4, H_2, NH_3 and water vapour at 800°C formed amino acids
(c) Flippers of penguins and dolphins are examples for homolgy
(d) Homology indicates common ancestry
(e) Analogous structures are the result of convergent evolution

96. Match column I with column II and choose the right option.

Column I	Column II
1. Thomas Malthus	A. Branching descent
2. Hugo de Vries	B. Studies on populations
3. Charles Darwin	C. Use and disuse theory
4. Lamarck	D. Saltation

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

97. The hominid fossils discovered in Java in 1891 revealed a stage in the human evolution, which was called

(a) *Homo erectus* (b) *Dryopithecus*
(c) *Australopithecus* (d) *Homo habilis*
(e) *Ramapithecus*

98. Functional systems for specific physiological functions are not seen in

(a) Annelids (b) Molluscs
(c) Arthropods (d) Echinoderms
(e) Coelenterates

99. Match column I with column II and choose the correct answer.

Column I	Column II
I. Incomplete digestive system	A. Sponges
II. Cellular level of organisation	B. Coelenterates
III. Radial symmetry	C. Annelids
IV. Pseudocoelomate	D. Platyhelminthes
V. Metamerism	E. Aschelminthes

(a) I-C, II-D, III-A, IV-B, V-E
(b) I-D, II-E, III-B, IV-C, V-A
(c) I-D, II-A, III-B, IV-E, V-C
(d) I-A, II-B, III-C, IV-D, V-E
(e) I-B, II-C, III-D, IV-A, V-E

100. Which of the following statement(s) regarding coelenterates is/are wrong?

I. Cnidocytes are present on the tentacles and on the body
II. Diploblastic with cellular level of organisation
III. Polyp forms are free swimming
IV. Exhibits metagenesis
V. Polyps produce medusae sexually and medusae form polyps asexually

(a) II and IV
(b) III and V
(c) I, II and III
(d) III only
(e) II, III and V

101. Choose the wrong statement

(a) Teeth in Chondrichtyes are modified ctenoid scales
(b) Air bladder in fishes regulates buoyancy
(c) In amphibians, the tympanum represents the ear
(d) Long bones in birds are pneumatic
(e) Reptiles are poikilotherms

102. Which one of the following is not a sensory structure in cockroach?

(a) Antennae (b) Eyes
(c) Anal cerci (d) Maxillary palps
(e) Proventriculus

103. Choose the **wrongly** matched pair regarding the position of reproductive structure in earthworm

(a) Testes – 10^{th} and 11^{th} segments
(b) Spermathecae – 6^{th} to 9^{th} segments
(c) Male genital pore – 9^{th} sement
(d) Ovaries – Inter segmental septum of 12^{th} and 13^{th} segments
(e) Female genital pore – 14^{th} segment

104. In cockroach, the arthrodial membrane

(a) froms the hind wings
(b) covers the compound eyes
(c) forms the hypopharynx
(d) forms the tegmina
(e) joins the sclerites

105. Choose the wrong statement regarding the circulatory system of frog

(a) Sinus venosus receives blood throught major veins called vena cava
(b) The ventricle opens into a sac like conus arteriosus
(c) The erythrocytes are nucleated
(d) Special venous connection between liver and intestine called renal portal system is present
(e) Lymphatic system consists of lymph, lymph channels and lymph nodes

106. Read the following statements and choose the correct answer.

I. Gap junctions cement adjacent cells together
II. Areolar tissue contains fibroblasts, macrophages and mast cells

III. Tight junctions facilitate the cells to communicate with each other
IV. Adhering junctions help to stop substances from leaking across tissues
V. Cells of connective tissue except blood secrete fibres of structural proteins called elastin

(a) I, II and III only are wrong
(b) II, III and IV only are wrong
(c) III and V only are wrong
(d) I, II and V only are wrong
(e) II, IV and V only are wrong

107. Tendons which attach one bone to another bone are made up of
(a) dense regular connective tissue
(b) dense irregular connective tissue
(c) areolar tissue
(d) adipose tissue
(e) cuboidal epithelial tissue

108. Multiple allelism is observed in
(a) flower colour in Snapdragon
(b) pod colour in *Pisum sativum*
(c) haemophilia in human
(d) sex determination in birds
(e) ABO blood types

109. The graphical representation to calculate the probability of all possible genotypes of offsprings in a genetic cross was developed by
(a) Gregor Mendel (b) Korberg
(c) Har Gobind Khorana (d) George Gamow
(e) Reginald C Punnett

110. Choose the wrong statement
(a) Failure of segregation of chromatids during cell division results in aneuploidy
(b) Additional copy of X-chromosome in males results in Klinefelter's synrdome
(c) Closely located genes in a chromosome always assort independently resulting in recombinants
(d) According to Mendel, recessive character never blend in heterozygous condition
(e) Failure of cytokinesis after DNA replication result in polyploidy

111. A person affected with phenylketonuria, lacks an enzyme that converts the amino acid phenylalanine into
(a) valine (b) proline
(c) histidine (d) tyrosine
(e) methionine

112. Identify the wrong statement about DNA
(a) the length of DNA is defined as the number of base pairs present in it
(b) cytosine is common to both DNA and RNA
(c) in a nucleotide, the nitrogenous base is linked to a phosphate group
(d) thymine is chemically 5-methyl uracil
(e) deoxythymidine is a nucleoside

113. Choose the wrong statement
(a) In grasshoppers, besides autosomes males have only one X-chromosome, whereas females have a pair of X-chromosomes
(b) In XY type of sex determination, both males and females have same number of chromosomes
(c) In *Drosophila*, males have one Z and one Y chromosome, whereas females have a pair of X-chromosome besides autosomes
(d) In birds, females have one Z and one W chromosomes, whereas males have a pair of Z chromosomes besides autosomes
(e) In insects with OX type of sex determination, all sperms bear X-chromosome besides autosomes

114. Which property among these listed below is not a criteria for a molecule to act as a genetic material?
(a) Generate its replica
(b) Chemically and structurally stable
(c) Mutate slowly to facilitate evolution
(d) Express itself in the form of Mendelian characters
(e) Destroy itself after every cell cycle

115. Match column I with column II and choose the correct option.

Column I (Scientist)	**Column II** (Concept)
1. Taylor and colleagues	A. *Lac* operon
2. Hershey and Chase	B. DNA replicates semi-conservatively
3. Griffith	C. Transforming principle
4. Jacob and Monod	D. DNA is the gentic material
	E. Transcription

(a) 1–B, 2–E, 3–A, 4–C
(b) 1–C, 2–D, 3–B, 4–A
(c) 1–B, 2–D, 3–C, 4–A
(d) 1–A, 2–E, 3–D, 4–B
(e) 1–C, 2–E, 3–B, 4–A

116. In sickle-cell anaemia, the sequence of amino from from the first to the seventh position of the β-chain of haemoglobin S(HbS) is

(a) His, Leu, Thr, Pro, Glu, Val, Val
(b) Val, His, Leu, Thr, Pro, Glu, Glu
(c) Thr, His Pro, Val, Pro, Val, Glu
(d) Glu, His, Leu, Pro, Val, Glu, Glu
(e) Val, His, Leu, Thr, Pro Val, Glu

117. Which triplet codon does not have a *t*RNA associated with it?

(a) UAA
(b) UUA
(c) UUU
(d) AUU
(e) GUU

118. Read the following statements and choose the correct option.

1. RNA polymerase associates transiently with 'Rho' factor to initiate transcription
2. In bacteria, transcription and translation takes place in the same compartment
3. RNA polymerase-I is responsible for transcription of *t*RNA
4. When *hn*RNA undergoes capping process, adenylate residues are added at 3′ end in a template independent manner
5. *hn*RNA is the precursor of *m*RNA

(a) 2 only
(b) 2, 3 and 5
(c) 3 and 4
(d) 1 and 4
(e) 2 and 5

119. Choose the correct statement

(a) Haploid content of human DNA is 4.6×10^6 bp
(b) A nitrogenous base is linked to pentose sugar through phosphodiester linkage
(c) X-ray diffraction data of Maurice Wilkins and Rosalind Franklin was the basis of Watson and Crick's DNA model
(d) DNA is an acidic substance was first identified by Waston and Crick
(e) Ratios between adenine, thymine and guanine, cytosine are Contant are not constant

120. Aminoacylation of *t*RNA is essential for

(a) replication of RNA
(b) formation of peptide bond
(c) splicing
(d) initiation of transcription
(e) termination