

WARNING : Any malpractice or any attempt to commit any kind of malpractice in the Examination will **DISQUALIFY THE CANDIDATE.**

PAPER – II BIOLOGY – 2014

Version Code	B3	Question Booklet Serial Number :	
Time : 150 Minutes	Number of Questions : 120	Maximum Marks : 480	
Name of Candidate			
Roll Number			
Signature of Candidate			

INSTRUCTIONS TO THE CANDIDATE

1. Please ensure that the **VERSION CODE** shown at the top of this **Question Booklet** is the same as that shown in the **OMR Answer Sheet** issued to you. If you have received a Question Booklet with a different **VERSION CODE**, please get it replaced with a Question Booklet with the same **VERSION CODE** as that of the **OMR Answer Sheet** from the invigilator. **THIS IS VERY IMPORTANT.**
2. Please fill in the items such as name, signature and roll number of the candidate in the columns given above. Please also write the Question Booklet Sl. No. given at the top of this page against item 5 in the **OMR Answer Sheet**.
3. Please read the instructions given in the **OMR Answer Sheet** for marking answers. Candidates are advised to strictly follow the instructions contained in the **OMR Answer Sheet**.
4. This Question Booklet contains 120 questions. For each question, five answers are suggested and given against (A), (B), (C), (D) and (E) of which, only one will be the **Most Appropriate Answer**. Mark the bubble containing the letter corresponding to the 'Most Appropriate Answer' in the **OMR Answer Sheet**, by using either **Blue or Black ball-point pen only**.
5. **Negative Marking:** In order to discourage wild guessing, the score will be subject to penalization formula based on the number of right answers actually marked and the number of wrong answers marked. Each correct answer will be awarded **FOUR** marks. One mark will be deducted for each incorrect answer. More than one answer marked against a question will be deemed as incorrect answer and will be negatively marked.

IMMEDIATELY AFTER OPENING THIS QUESTION BOOKLET, THE CANDIDATE SHOULD VERIFY WHETHER THE QUESTION BOOKLET ISSUED CONTAINS ALL THE 120 QUESTIONS IN SERIAL ORDER. IF NOT, REQUEST FOR REPLACEMENT.

DO NOT OPEN THE SEAL UNTIL THE INVIGILATOR ASKS YOU TO DO SO.

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**PLEASE ENSURE THAT THIS BOOKLET CONTAINS 120 QUESTIONS
SERIALLY NUMBERED FROM 1 TO 120.**

(Printed Pages : 32)

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 the vitamins
 - (A) Niacin
 - (B) Biotin
 - (C) Thiamine
 - (D) Vitamin B₁₂
 - (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) only
 - (B) (2) and (3) only
 - (C) (2) and (4) only
 - (D) (3) and (4) only
 - (E) (1) and (4) only

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 place 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) a - 2, b - 3, c - 1
 (B) a - 1, b - 2, c - 3
 (C) a - 2, b - 1, c - 3
 (D) a - 3, b - 2, c - 1
 (E) a - 3, b - 1, c - 2

8. Which of the following statements regarding cyclic flow of electrons during light reactions is false?
- (A) This process takes place in the stromal lamella
 (B) ATP synthesis takes place
 (C) $\text{NADPH} + \text{H}^+$ is synthesized
 (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 CoA |
- (A) I and II only
 (B) I and IV only
 (C) II and III only
 (D) II and IV only
 (E) III and IV only

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) only
(B) (c) and (d) only
(C) (a) and (c) only
(D) (b) and (c) only
(E) (b) and (d) only
12. Oxidative decarboxylation of pyruvic acid results in the formation of
- I. Acetyl CoA
II. CO₂
III. ATP
IV. NADH + H⁺
- (A) I only
(B) I and II only
(C) I, II and III only
(D) I, II and IV only
(E) III and IV only
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 prokaryotic bacterium is
- (A) *Rhodospirillum*
 - (B) *Anabaena*
 - (C) *Nostoc*
 - (D) *Beijernickia*
 - (E) *Rhizobium*
15. Which of the following plant growth hormone increases the yield 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 only
 - (B) II and III only
 - (C) I and II only
 - (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 abscission 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) <i>Zostera</i> |
| (c) <i>Amorphophallus</i> | (d) <i>Vallisneria</i> |
| (e) <i>Yucca</i> | |
- (A) (a), (d) and (e) only
(B) (b) and (e) only
(C) (b) and (d) only
(D) (b), (c) and (d) only
(E) (a), (b) and (d) only
20. The breakdown of detritus into small particles by detritivores is called
- (A) Leaching
(B) Humification
(C) Catabolism
(D) Mineralization
(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 aging 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 aging process of a lake
 - (E) Overgrowth of algae leads to scum that depletes the level of dissolved oxygen in the water

28. According to 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 statement(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 only
 - (B) III and IV only
 - (C) I and IV only
 - (D) I and II only
 - (E) I, II and III only
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 (PCR) is a technique that is used for
- (A) *In vivo* replication of specific DNA sequence using thermostable DNA polymerase
 - (B) *In vitro* synthesis of mRNA
 - (C) *In vitro* replication of specific DNA sequence using thermostable DNA polymerase
 - (D) *In vivo* synthesis of mRNA
 - (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.

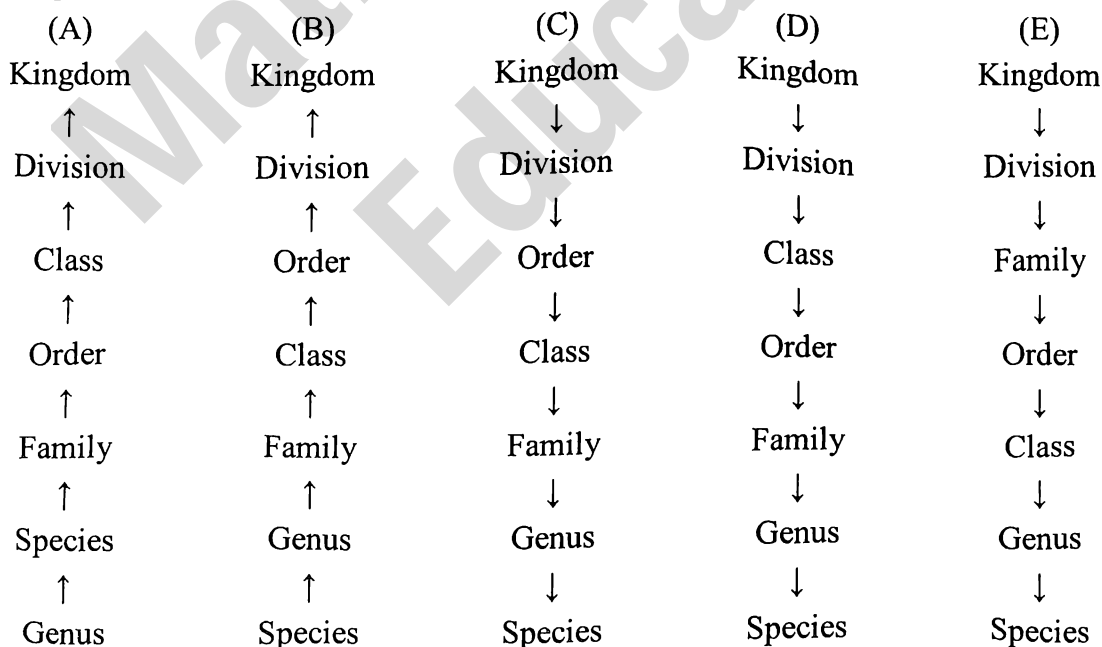
	Column I		Column II
(a)	Ascomycetes	(1)	<i>Ustilago</i>
(b)	Phycomycetes	(2)	<i>Saccharomyces</i>
(c)	Basidiomycetes	(3)	<i>Trichoderma</i>
(d)	Deuteromycetes	(4)	<i>Albugo</i>

- (A) a - 2, b - 1, c - 4, d - 3
 (B) a - 4, b - 3, c - 2, d - 1
 (C) a - 2, b - 4, c - 1, d - 3
 (D) a - 3, b - 4, c - 1, d - 2
 (E) a - 1, b - 4, c - 2, d - 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 an 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 only (B) I, II and III only
 (C) I and IV only (D) I only
 (E) IV only

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



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 comprises 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 only (B) II and III only
 (C) III and IV only (D) II and IV only
 (E) I and IV only

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

	Column I (Alga type)		Column II (Example)
(a)	Green alga	(1)	<i>Dictyota</i>
(b)	Brown alga	(2)	<i>Porphyra</i>
(c)	Red alga	(3)	<i>Spirogyra</i>

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

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 *Wolffia* 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 an endosperm

Of the above statements

- (A) (a), (b) and (d) alone are correct
 (B) (a), (b) and (e) alone are correct
 (C) (a), (b) and (c) alone are correct
 (D) (b), (c) and (d) alone are correct
 (E) (b), (c) and (e) alone are correct

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)	<i>Bougainvillea</i>	(3)	Stem tendrils
(d)	<i>Opuntia</i>	(4)	Underground stem

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

46. In one plant adventitious roots are modified for storage and in the other plant a lateral branch with short internodes 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 and 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) only
 (B) (d) and (e) only
 (C) (a) and (b) only
 (D) (a) and (d) only
 (E) (c) and (d) only

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) only
 - (B) (b) and (c) only
 - (C) (b) and (e) only
 - (D) (a), (b) and (c) only
 - (E) (c), (d) and (e) only
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. Pick out the **wrong** statement
- (A) Gymnosperms lack vessels in their xylem
 - (B) The cell wall of collenchyma is made up of cellulose, hemicellulose and pectin
 - (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 parenchyma is absent
- (A) I and II only
 - (B) II and III only
 - (C) III and IV only
 - (D) III only
 - (E) I and IV only

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) Heart wood 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) only
 - (B) (a) and (d) only
 - (C) (a), (b) and (c) only
 - (D) (b) and (d) only
 - (E) (b), (c) and (d) only
56. Which of these organelles does not contain ribosomes?
- I. Rough endoplasmic reticulum
 - II. Chloroplast
 - III. Golgi apparatus
 - IV. Mitochondria
- (A) I and II only
 - (B) I and IV only
 - (C) IV only
 - (D) III only
 - (E) II, III and IV only

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)	Terminalization of chiasma
(b)	Zygotene	(2)	Crossing over and recombination
(c)	Pachytene	(3)	Synapsis
(d)	Diakinesis	(4)	Visibility of chromosomes

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

58. Which of the following scientists discovered the triple helical structure of collagen?

- (A) G.N. Ramachandran (B) Anton von Leeuwenhoek
 (C) Mathias Schleiden (D) Theodor Schwann
 (E) Rudolf Virchow

59. One type of chromosome has middle centromere whereas the other has a terminal centromere. They are

- (A) Metacentric and acrocentric
 (B) Metacentric and telocentric
 (C) Sub-metacentric and telocentric
 (D) Telocentric and acrocentric
 (E) Acrocentric and metacentric

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) a - 1, b - 2, c - 3, d - 4
 (B) a - 1, b - 3, c - 2, d - 4
 (C) a - 4, b - 3, c - 2, d - 1
 (D) a - 4, b - 1, c - 2, d - 3
 (E) a - 4, b - 2, c - 3, d - 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 tRNA pairs through hydrogen bonding with the triplet codes on mRNA?
- (A) Codon
 - (B) 5' end of tRNA
 - (C) 3' end of tRNA
 - (D) Anticodon
 - (E) Amino acid acceptor end
63. Find the **wrongly** matched pair
- (A) Har Gobind Khorana – synthesized RNA molecules chemically
 - (B) George Gamow – codon is triplet
 - (C) Meselson and Stahl – regulation of gene expression
 - (D) Alec Jeffreys – DNA finger printing
 - (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
- (A) hnRNA
 - (B) 18S rRNA
 - (C) 28S rRNA
 - (D) tRNA
 - (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) Galactose
(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** statement 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 facilitate 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
(i)	Epithelial cells of Bowman's capsule	(a)	Juxtamedullary nephron
(ii)	Extension of cortex between the medullary pyramids as renal columns	(b)	Vasa recta
(iii)	Nephrons with long loop of Henle running deep into the medulla	(c)	Juxtaglomerular apparatus
(iv)	A fine vessel of the peritubular capillaries running parallel to Henle's loop	(d)	Podocytes
(v)	A special sensitive region in the DCT and afferent arteriole at the location of their contact	(e)	Columns of Bertin
		(f)	Cortical nephron

- (A) i - c, ii - b, iii - a, iv - d, v - e
 (B) i - e, ii - a, iii - b, iv - c, v - d
 (C) i - d, ii - c, iii - f, iv - e, v - a
 (D) i - d, ii - e, iii - a, iv - b, v - c
 (E) i - b, ii - d, iii - f, iv - a, v - c

71. Thrombokinase is associated with

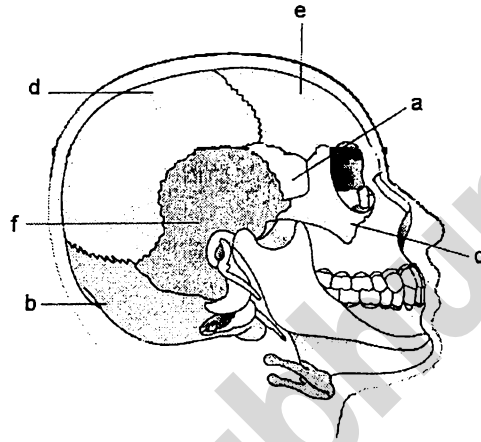
- (A) elimination of urea and other excretory products from the body
 (B) production of erythrocytes from the bone marrow
 (C) pulmonary and systemic circulation
 (D) cardiac cycle and its regulation
 (E) enzymatic reactions in coagulation of blood

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 95 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?
- In a resting neuron, the axonal membrane is more permeable to K^+ ions and nearly impermeable to Na^+ ions
 - Fluid outside the axon has a high concentration of Na^+ and low concentration of K^+ , in a resting neuron
 - Ionic gradients are maintained by Na-K pumps across the resting membrane, which transport 3 Na^+ ions outwards for 2 K^+ ions into the cell
 - Resting potential is the electrical potential difference across the resting membrane
 - A neuron is polarized 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
- Angina
 - CAD
 - Emphysema
 - Gout
 - Myasthenia gravis
78. Which of the following statement is **wrong**?
- Sella turcica is a bony cavity where the pituitary gland is located
 - Parathyroid hormone decreases the Ca^{2+} levels in blood
 - Thymosins play a major role in T cell differentiation
 - The middle layer of adrenal cortex is zona fasciculata
 - Insulin stimulates glycogenesis
79. Match the hormones secreted by various endocrine structures and choose the correct option.
- | | |
|---------------------|------------------------------------|
| 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 |
- i - e, ii - a, iii - d, iv - b, v - c
 - i - e, ii - d, iii - a, iv - b, v - c
 - i - b, ii - d, iii - a, iv - c, v - e
 - i - c, ii - a, iii - d, iv - b, v - 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 filled 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 Rain Forest
 - (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 and Howard Florey's contribution was
- (A) discovery of streptokinase
 - (B) establishing the potential of penicillin as an effective antibiotic
 - (C) discovery of the DNA sequencer
 - (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 the 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) S.L. 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 homology
 - (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 deVries	(b)	Studies on populations
(3)	Charles Darwin	(c)	Use and disuse theory
(4)	Lamarck	(d)	Saltation

- (A) 1 - d, 2 - a, 3 - c, 4 - b
 - (B) 1 - b, 2 - d, 3 - a, 4 - c
 - (C) 1 - b, 2 - d, 3 - c, 4 - a
 - (D) 1 - c, 2 - b, 3 - a, 4 - d
 - (E) 1 - b, 2 - a, 3 - c, 4 - d
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 organization	(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 organization
III. Polyp forms are free swimming
IV. Exhibits metagenesis
V. Polyps produce medusae sexually and medusae form polyps asexually
(A) II and IV only
(B) III and V only
(C) I, II and III only
(D) III only
(E) II, III and V only

101. Choose the **wrong** statement

- (A) Teeth in Chondrichthyes 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 structures in earthworm
- (A) Testes - 10th and 11th segments
 - (B) Spermathecae - 6th to 9th segments
 - (C) Male genital pore - 9th segment
 - (D) Ovaries - Inter segmental septum of 12th and 13th segments
 - (E) Female genital pore - 14th segment
104. In cockroach, the arthroal membrane
- (A) forms 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 through 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) i, 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 man
 - (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) Kornberg
 - (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 syndrome
 - (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 results 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 X 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 XO 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 & colleagues	(a)	<i>Lac</i> operon
(2)	Hershey & Chase	(b)	DNA replicates semi-conservatively
(3)	Griffith	(c)	Transforming principle
(4)	Jacob & Monod	(d)	DNA is the genetic 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 anemia, the sequence of amino acids 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 tRNA 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 tRNA
 4. When hnRNA undergoes capping process, adenylate residues are added at 3'end in a template independent manner
 5. hnRNA is the precursor of mRNA
- (A) 2 only is correct
 - (B) 2, 3 and 5 only are correct
 - (C) 3 and 4 only are correct
 - (D) 1 and 4 only are correct
 - (E) 2 and 5 only are correct
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 Watson and Crick
 - (E) Ratios between adenine, thymine and guanine, cytosine are not constant
120. Aminoacylation of tRNA is essential for
- (A) replication of RNA
 - (B) formation of peptide bond
 - (C) splicing
 - (D) initiation of transcription
 - (E) termination

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