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

PAPER – II BIOLOGY

Version Code	B4	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 the items such as Name, Roll Number and Signature in the columns given above. Please also write Question Booklet Serial No. given at the top of this page against item 4 in the OMR Answer Sheet.
3. 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**.
4. **Negative Marking:** In order to discourage wild guessing, the score will be subjected 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.
5. 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.

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.

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PLEASE ENSURE THAT THIS QUESTION BOOKLET CONTAINS 120 QUESTIONS SERIALLY NUMBERED FROM 1 TO 120. PRINTED PAGES : 32

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

	Column I (Organism)		**Column II (Approximate life span)**
a.	Butterfly	1.	60 years
b.	Crow	2.	140 years
c.	Parrot	3.	15 years
d.	Crocodile	4.	1 – 2 weeks

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

2. Find out correct order of vegetative propagules of plants like potato, ginger, *Agave*, *Bryophyllum* and water hyacinth

(A) Offset, bulbil, leaf bud, rhizome and eyes
(B) Leaf bud, bulbil, offset, rhizome and eyes
(C) Eyes, rhizome, bulbil, leaf bud and offset
(D) Rhizome, bulbil, leaf bud, eyes and offset
(E) Offset, bulbil, leaf bud, rhizome and eyes

3. Match the items in column I with column II and choose the correct answer.

Column I	**Column II**
1. Funicle	a. Small opening of ovule
2. Integuments	b. Stalk of ovule
3. Chalaza	c. Protective envelopes of ovule
4. Hilum	d. Junction part of ovule and stalk
5. Micropyle	e. Basal part of the ovule

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

4. Which of the following is not a physiological effect of auxin?
   (A) Initiates rooting in stem cuttings
   (B) Promotes flowering
   (C) Prevents fruit and leaf drop at early stages
   (D) Inhibits the growth of lateral buds
   (E) Promotes bolting

5. The stage of suspended development shown by zooplanktons is called
   (A) Desiccation
   (B) Diapause
   (C) Hibernation
   (D) Homeostasis
   (E) Aestivation

6. Which of the following statement is false regarding predators?
   (A) Predators keep prey populations under control
   (B) Predators help in maintaining species diversity in a community
   (C) If a predator is not efficient, then the prey population would become extinct
   (D) Herbivores (predators) have a greater advantage since the plants cannot run away to avoid predation
   (E) Tiger is an example of a predator

7. Match the following.

Population Interaction	**Example**
1. Predation	a. *Cuscuta* and hedge plants
2. Commensalism	b. *Balanus* and *Chathamalus*
3. Parasitism	c. Cactus and moth
4. Competition	d. Orchid and mango

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

8. In a particular climatic condition, decomposition rate is slower if
   (A) Detritus is rich in nitrogen
   (B) Detritus is rich in humus
   (C) Detritus is rich in sugars
   (D) Detritus is rich in lignin and chitin
   (E) Detritus is rich in water soluble substances

9. An inverted pyramid of number and an inverted pyramid of biomass are respectively seen in
   (A) Grassland and Tree ecosystem
   (B) Sea and Tree ecosystem
   (C) Tree and Sea ecosystem
   (D) Sea and Grassland ecosystem
   (E) Tree and Grassland ecosystem

10. Which of the following is a pioneer in xerarch succession?
   (A) Phytoplanktons
   (B) Lichens
   (C) Bryophytes
   (D) Rooted hydrophytes
   (E) Sedges

11. The biomass available for consumption to heterotrophs and the rate of formation of new organic matter by consumers are defined as
   (A) Gross primary productivity and net primary productivity respectively
   (B) Net primary productivity and gross primary productivity respectively
   (C) Gross primary productivity and secondary productivity respectively
   (D) Net primary productivity and secondary productivity respectively
   (E) Secondary productivity and net primary productivity respectively

12. Consider the following statements with respect to pollution.

a. To control air pollution problems, by the end of 2002 all the buses of Delhi were converted to run on unleaded petrol

b. Electrostatic precipitator can remove over 99 % particulated matter present in the exhaust from a thermal power plant

c. It is possible to estimate the amount of organic matter in sewage water by measuring BOD

Of the above statements

(A) a alone is correct (B) b alone is correct (C) c alone is correct

(D) a and b are correct (E) b and c are correct

13. Which of the following strategy is not a correct approach to reduce the global warming?

(A) Cutting down use of fossil fuel

(B) Improving efficiency of energy usage

(C) Reducing deforestation

(D) Cutting trees and increasing the growth of human population

(E) Reducing the emission of green house gases into the atmosphere

14. Find the correct order of biomagnification of DDT in an aquatic food chain

(A) Water (0.003 ppm), zooplankton (0.5 ppm), small fish (0.04 ppm), large fish (2 ppm), fish eating birds (25 ppm)

(B) Water (0.003 ppm), zooplankton (0.04 ppm), small fish (0.5 ppm), large fish (2 ppm), fish eating birds (25 ppm)

(C) Water (0.003 ppm), fish eating birds (25 ppm), zooplankton (0.5 ppm), small fish (0.04 ppm), large fish (25 ppm)

(D Water (0.003 ppm), small fish (0.04 ppm), zooplankton (0.5 ppm), large fish (2 ppm), fish eating birds (25 ppm)

(E) Water (0.003 ppm), large fish (0.04 ppm), small fish (0.5 ppm), zooplankton (2 ppm), fish eating birds (25 ppm)

15. Which one of the following palindromic base sequences in DNA can be easily cut at about the middle by some particular restriction enzyme?

(A) 5' - CGTTCG - 3'
3' - CCAAGC - 5'

(B) 5' - GAATTC - 3'
3' - CTTAAG - 5'

(C) 5' - CTACTG - 3'
3' - GTGCAA - 5'

(D) 5' - CACGTA - 3'
3' - GCATAC - 5'

(E) 3' - CGAATG - 5'
3' - CGAATG - 5'

16. The genetic defect - Adenosine deaminase (ADA) deficiency may be cured permanently by

(A) Administering adenosine deaminase through injection
(B) Bone marrow transplantation
(C) Enzyme replacement therapy
(D) Introducing isolated gene from marrow cells producing ADA into the cells at early embryonic stages
(E) Injecting the functional ADA cDNA into the patient

17. Gel electrophoresis is used for the

(A) Separation and isolation of DNA fragments
(B) Construction of recombinant DNA by joining with cloning vectors
(C) Culturing the host cells in a medium at a large scale
(D) Replication of DNA for many times
(E) Cutting of DNA into fragments

18. Which one of the following is a taxonomical aid for identification of plants and animals based on similarities and dissimilarities?

(A) Flora (B) Keys (C) Monographs
(D) Catalogues (E) Manuals

19. Which one of the following is a saprophytic protist?

(A) Desmid (B) Slime mould (C) *Euglena*
(D) *Gonyaulax* (E) *Nostoc*

20. Which one of the following is a flagellated protozoan?

(A) *Trypanosoma* (B) *Plasmodium* (C) *Amoeba*
(D) *Paramoecium* (E) *Entamoeba*

21. Consider the following statements with respect to reproduction in the lower living organisms.

a. Organisms like yeast and *Planaria* reproduce asexually by means of budding
b. True regeneration is observed in *Hydra*
c. The protonema of mosses multiply by fragmentation
d. In the unicellular organisms like bacteria, algae and *Amoeba*, reproduction is synonymous with growth, i.e., increase in number of cells

Of the above statements
(A) a and b alone are correct
(B) b and c alone are correct
(C) a and d alone are correct
(D) b and d alone are correct
(E) c and d alone are correct

22. Consider the following statements with respect to characteristic features of the kingdom.

a. In Animalia the mode of nutrition is autotrophic

b. In Monera the nuclear membrane is present

c. In Protista the cell type is prokaryotic

d. In Plantae the cell wall is present

Of the above statements

(A) a alone is correct

(B) b alone is correct

(C) c alone is correct

(D) d alone is correct

(E) a, b and c are correct

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

	Column I (Group)		Column II (Example)
a.	Eubacteria	1.	*Trichoderma*
b.	Dinoflagellates	2.	*Albugo*
c.	Phycomycetes	3.	*Gonyaulax*
d.	Deuteromycetes	4.	*Anabaena*

(A) a - 1 b - 2 c - 3 d - 4

(B) a - 2 b - 3 c - 4 d - 1

(C) a - 4 b - 3 c - 2 d - 1

(D) a - 3 b - 4 c - 1 d - 2

(E) a - 4 b - 3 c - 1 d - 2

24. Choose the correct order of colours with respect to pigments, chlorophyll, phycoerythin and fucoxanthin

(A) Green, Red and Brown

(B) Brown, Green and Red

(C) Red, Green and Brown

(D) Green, Brown and Red

(E) Brown, Red and Green

25. Which of the following are the characters of Dinoflagellates?

1. Planktonic golden yellow algae with soap box like structure
2. Marine red biflagellated Protista
3. Appear yellow, green, brown, blue and red in colour
4. Biflagellated organisms with pellicle
5. Saprophytic (or) parasitic unicellular forms

(A) 1, 2 and 3 only
(B) 2, 4 and 5 only
(C) 2 and 3 only
(D) 2 and 5 only
(E) 3, 4 and 5 only

26. The green alga rich in proteins used as food supplements even by space travellers is

(A) *Chlamydomonas* (B) *Volvox* (C) *Spirogyra*
(D) *Spirulina* (E) *Chlorella*

27. Which of the following is a phaeophycean alga?

(A) *Gelidium* (B) *Polysiphonia* (C) *Porphyra*
(D) *Laminaria* (E) *Gracilaria*

28. Which of the following is a character of Rhodophyceae?

(A) Major pigments are chlorophyll - a and chlorophyll - b
(B) Commonly called brown algae
(C) Stored food materials are mannitol and laminarin
(D) Flagellum is absent
(E) Cell wall contains cellulose and algin

29. The amphibians of the plant kingdom are

(A) Gymnosperms
(B) Bryophytes
(C) Pteridophytes
(D) Fungi
(E) Algae

30. The heterosporous pteridophyte belonging to the class Lycopsida is
(A) *Selaginella*
(B) *Psilotum*
(C) *Equisetum*
(D) *Pteris*
(E) *Adiantum*

31. Which one of the following event takes place after double fertilization?
(A) The pollen grain germinates on the stigma
(B) The pollen tubes enter the embryosac
(C) Two male gametes are discharged into the embryosac
(D) The PEN (Primary Endosperm Nucleus) develops into endosperm
(E) The male gamete fuses with egg to form a zygote

32. The plant of arid regions that modifies its stem into a flattened structure with chlorophyll pigments to carry out photosynthesis is
(A) Euphorbia
(B) Opuntia
(C) Citrus
(D) Bougainvillea
(E) Colocasia

33. Choose the specific characters of flowers of *Canna*
(A) Actinomorphic and radial symmetry
(B) Irregular and bilateral symmetry
(C) Irregular and zygomorphic
(D) Irregular and radial symmetry
(E) Irregular and asymmetric

34. The distinct features of Fabaceae are
(A) Zygomorphic, diadelphous and monocarpellary
(B) Actinomorphic, monadelphous and monocarpellary
(C) Zygomorphic, monadelphous and pentacarpellary
(D) Zygomorphic, polyadelphous and tricarpellary
(E) Zygomorphic, diadelphous and bicarpellary

35. Consider the following statements with respect to algae.

a. Fusion between one large, non-motile female gamete and a smaller, motile male gamete is termed as oogamous

b. Fusion of two gametes dissimilar in size is termed as isogamous

c. Fusion of two gametes similar in size is called anisogamous

d. In Chlorophyceae the major pigments are chlorophyll a and b, and the food is stored as starch

e. In Rhodophyceae the major pigments are chlorophyll a and d, and the food is stored as mannitol

Of the above statements

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

36. Consider the following statements with respect to gymnosperms and angiosperms.

a. Double fertilization is an event unique to gymnosperms

b. Angiosperms range in size from microscopic *Wolfia* to tall trees of *Sequoia*

c. In gymnosperms the seeds are not covered

d. In gymnosperms the male and female gametophytes have an independent free living existence

Of the above statements

(A) a and b alone are correct
(B) c alone is correct
(C) b and c alone are correct
(D) c and d alone are correct
(E) d alone is correct

37. Find out the pairs, which are correctly matched with respect to aestivation of petals.

I. Valvate - *Calotropis*
II. Twisted - Bean
III. Imbricate - *Cassia*
IV. Vexillary - Chinarose

(A) II and IV
(B) I and II
(C) I and III
(D) III and IV
(E) II and III

38. Find out the correctly matched pair.

Placentation Types		**Represented in**
(A) Marginal	-	Tomato
(B) Axile	-	Pea
(C) Parietal	-	Primrose
(D) Free Central	-	*Argemone*
(E) Basal	-	Marigold

39. Match the following and choose the correct combination from the option given.

	Column I (Family)		**Column II (Androecium formula)**
a.	Brassicaceae	1.	A_{3+3}
b.	Fabaceae	2.	$A_{(5)}$
c.	Solanaceae	3.	$A_{(9)+1}$
d.	Liliaceae	4.	A_{2+4}

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

40. Which of the following is seen only in prokaryotic cells?
(A) Dictyosome (B) Ribosome (C) Mesosome
(D) Endoplasmic reticulum (E) DNA

41. The cytoplasm of neighbouring cells is connected with the help of
(A) Middle lamella
(B) Primary wall
(C) Mitochondria
(D) Endomembrane system
(E) Plasmodesmata

42. Which of the following secondary metabolites is a drug?

(A) Abrin (B) Ricin (C) Carotenoids

(D) Concanavalin (E) Vinblastin

43. Choose the wrong statements regarding bacterial cell.

a. Glycocalyx is the outer most envelope in bacteria

b. The glycocalyx could be a loose sheath called capsule

c. The glycocalyx may be thick and tough called slime layer

d. A special structure formed by the plasma membrane is called mesosome

e. Small bristle like fibres sprouting out of the cell are called fimbriae

(A) a and c are wrong (B) a and b are wrong (C) b and c are wrong

(D) a and d are wrong (E) c and d are wrong

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

	Column I (Organic Compound)		**Column II (Example)**
a.	Fatty acid	1.	Glutamic acid
b.	Phospholipid	2.	Tryptophan
c.	Aromatic amino acid	3.	Lecithin
d.	Acidic amino acid	4.	Palmitic acid

(A) a - 1 b - 2 c - 3 d - 4

(B) a - 4 b - 3 c - 2 d - 1

(C) a - 2 b - 3 c - 4 d - 1

(D) a - 3 b - 4 c - 1 d - 2

(E) a - 4 b - 3 c - 1 d - 2

45. Consider the following statements.

a. In prokaryotic cells, a special membranous structure formed by the extension of the plasma membrane into the cell is known as polysome

b. The smooth endoplasmic reticulum is the major site for synthesis of glycoproteins

c. RuBisCO is the most abundant protein in the whole of biosphere

d. Mitochondria, chloroplasts and peroxisomes are not considered as part of endomembrane system

Of the above statements

(A) c and d alone are correct (B) a and b alone are correct

(C) b and c alone are correct (D) a and d alone are correct

(E) b and d alone are correct

46. Match the items in column I with column II and choose the correct answer.

Column I (Biomolecules)	Column II (Example)
1. Carbohydrates	a) Trypsin
2. Protein	b) Cholesterol
3. Nucleic acid	c) Inulin
4. Lipid	d) Adenylic acid

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

47. Find the correctly matched pairs and choose the correct option.

a. Leptotene – The chromosomes become invisible
b Zygotene – Pairing of homologous chromosomes
c. Pachytene – Dissolution of the synaptonemal complex takes place
d. Diplotene – Bivalent chromosomes appear as tetrads
e. Diakinesis – Terminalization of chiasmata takes place

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

48. Which of the following event(s) is/are not a characteristic feature(s) of telophase?

1. Chromosome material condenses to form compact mitotic chromosomes
2. Nucleolus, Golgi complex and ER reform
3. Nuclear envelope assembles around the chromosome clusters
4. Centromeres split and chromatids separate
5. Chromosomes cluster at opposite, spindle poles and their identity as discrete elements is lost

(A) 1, 2 and 4 only (B) 1 and 4 only (C) 2 and 3 only
(D) 3, 4 and 5 only (E) 1 and 2 only

49. Which of the following with respect to early experiments of photosynthesis is wrongly matched?

(A) Joseph Priestley - Showed that plants release O_2

(B) Jan Ingenhousz - Showed that sunlight is essential for photosynthesis

(C) Julius von Sachs - Proved that plants produce glucose when they grow

(D) T.W. Engelmann - Showed that the green substance is located within special bodies in plants

(E) Cornelius van Niel - Showed that hydrogen reduces CO_2 to carbohydrates

50. The ability to rise in thin tubes and the ability to resist a pulling force are respectively referred to as

(A) Tensile strength and capillarity

(B) Adhesion and capillarity (C) Cohesion and adhesion

(D) Cohesion and capillarity (E) Capillarity and tensile strength

51. One mineral activates the enzyme catalase and the other is a constituent of the ring structure of chlorophyll. These minerals are respectively

(A) Iron and Magnesium (B) Iron and Manganese

(C) Magnesium and Manganese (D) Calcium and Magnesium

(E) Iron and Calcium

52. Which of the following statements regarding C_4 pathway is false?

(A) The primary CO_2 acceptor is phosphoenol pyruvate

(B) The enzyme responsible for CO_2 fixation is PEP case

(C) The mesophyll cells lack RuBisCO enzyme

(D) The C_4 acid OAA is formed in the mesophyll cells

(E) The bundle sheath cells contain the enzyme PEP case

53. One hormone is used to speed up the malting process in barley, another is used to promote flowering in pineapple, while the third helps in the delay of leaf senescence. These are respectively

(A) Auxin, Gibberellin and Cytokinin

(B) Gibberellin, Cytokinin and Auxin

(C) Gibberellin, Auxin and Cytokinin

(D) Cytokinin, Auxin and Gibberellin

(E) Auxin, Cytokinin and Gibberellin

54. Consider the following statements with reference to facilitated transport.

1. Requires ATP energy
2. Transport saturates
3. Highly selective
4. Requires special membrane properties
5. Uphill transport

Of the above statements

(A) 1, 2 and 3 are relevant but 4 and 5 are irrelevant

(B) 2, 3 and 5 are relevant but 1 and 4 are irrelevant

(C) 3, 4 and 5 are relevant but 1 and 2 are irrelevant

(D) 1, 4 and 5 are relevant but 2 and 3 are irrelevant

(E) 2, 3 and 4 are relevant but 1 and 5 are irrelevant

55. Find out the correctly matched pair

	Nutrients		**Functions**
(A)	Zinc	-	Helps to maintain the ribosome structure
(B)	Magnesium	-	Needed during the formation of mitotic spindle
(C)	Calcium	-	Plays a role in the opening and closing of stomata
(D)	Manganese	-	Needed in the splitting of water to liberate oxygen during photosynthesis
(E)	Potassium	-	Needed in the synthesis of auxin

56. Consider the following statements with respect to photosynthesis

a. The first carbon dioxide acceptor in C_4 cycle is PGA

b. In C_3 plants, the first stable product of photosynthesis during dark reaction is RuBP

c. Cyclic photophosphorylation results in the formation of ATP

d. Oxygen which is liberated during photosynthesis comes from water

Of the above statements

(A) a and b alone are correct

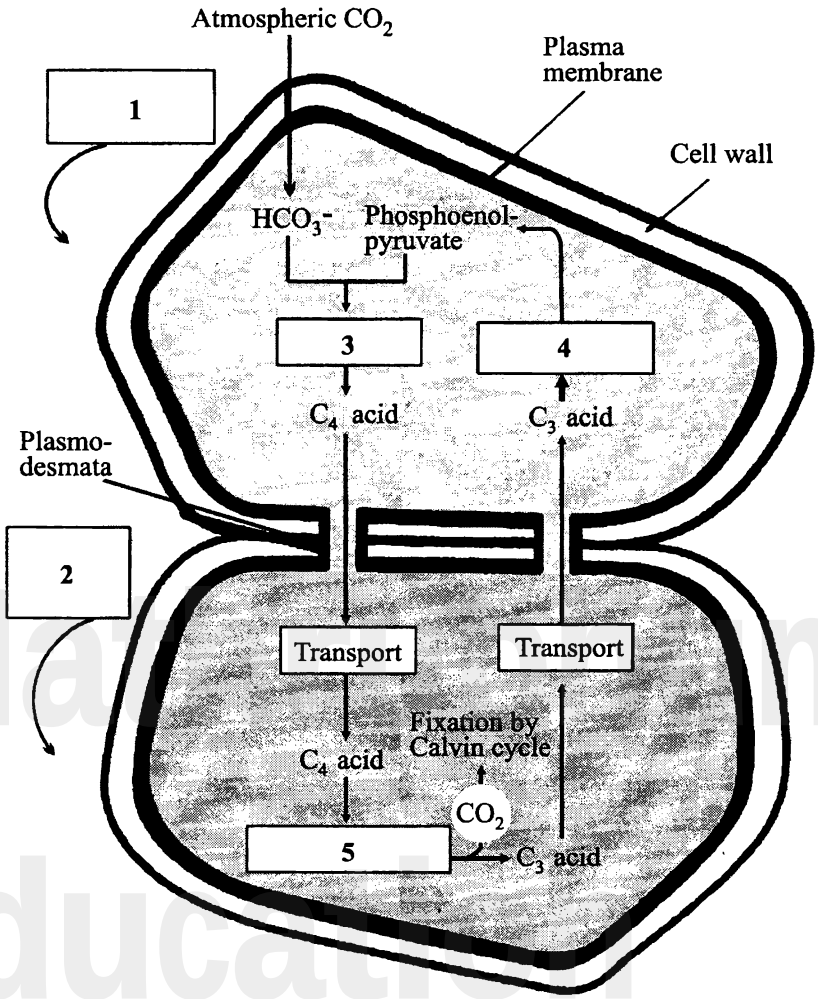
(B) a and c alone are correct

(C) c and d alone are correct

(D) b and c alone are correct

(E) b and d alone are correct

57. The diagram represents the Hatch and Slack pathway. Choose the correct combination of labeling numbered as 1 to 5.



Of the above statements

(A) 1. Mesophyll cell 2. Bundle sheath cell 3. Regeneration 4. Fixation 5. Decarboxylation

(B) 1. Bundle sheath cell 2. Mesophyll cell 3. Fixation 4. Regeneration 5. Decarboxylation

(C) 1. Mesophyll cell 2. Bundle sheath cell 3. Decarboxylation 4. Fixation 5. Regeneration

(D) 1. Mesophyll cell 2. Bundle sheath cell 3. Fixation 4. Regeneration 5. Decarboxylation

(E) 1. Mesophyll cell 2. Bundle sheath cell 3. Fixation 4. Decarboxylation 5. Regeneration

58. Consider the following statements with respect to respiration.

a. Glycolysis occurs in the cytoplasm of the cell

b. Aerobic respiration takes place within the mitochondria

c. Electron transport system present in the outer mitochondrial membrane

d. $C_{51}H_{98}O_6$ is the chemical formula of Tripalmitin – a fatty acid

e. Respiratory quotient = $\frac{\text{Volume of } O_2 \text{ evolved}}{\text{Volume of } CO_2 \text{ consumed}}$

Of the above statements

(A) a, b and d alone are correct

(B) b, c and d alone are correct

(C) c, d and e alone are correct

(D) b, d and e alone are correct

(E) a, c and e alone are correct

59. Which of the following is not a purpose of transpiration?

(A) Helps in absorption and transport in plants

(B) Prevents loss of water

(C) Maintains shape and structure of plants by keeping the cell turgid

(D) Supplies water for photosynthesis

(E) Cools leaf surfaces

60. Which of these is a condition that makes flowers invariably autogamous?

(A) Dioecy

(B) Self incompatibility

(C) Cleistogamy

(D) Xenogamy

(E) Syngamy

61. Choose the wrong statement

(A) In ureotelic organisms, ammonia is not a product of metabolism

(B) In mammals some amount of urea may be retained in the kidney matrix of ureotelics to maintain osmolarity

(C) In fishes, kidneys do not play any significant role in the removal of ammonium ions

(D) Urea and uric acid are less toxic than ammonia

(E) Ammonia is readily soluble and can diffuse easily

62. Choose the correct option.

In a normal human

i. the skull is dicondylic

ii. metacarpals are five in numbers

iii. patella is a cup shaped bone covering the knee dorsally

iv. scapula is a large triangular flat bone, situated on the ventral side of the thorax

v. the pelvic girdle has two coxal bones

(A) i and v alone are wrong

(B) i and ii alone are wrong

(C) ii and v are alone wrong

(D) iii and iv alone are wrong

(E) v alone is wrong

63. Decreased levels of estrogen is a common cause for

(A) myasthenia gravis

(B) tetany

(C) osteoporosis

(D) gout

(E) arthritis

64. In a muscle, the functional unit of contraction is the

(A) portion of myofibril between two successive 'Z' lines

(B) I band

(C) A band

(D) H zone

(E) I band with a Z line

65. Which one of the following is correct?
In normal humans

(A) pH of urine is around 8
(B) on an average, 25-30 mg of urea is excreted via urine
(C) presence of ketone bodies in urine is an indicator of diabetes mellitus
(D) glycosuria can be treated with hemodialysis
(E) relaxation of smooth muscles of bladder and simultaneous contraction of urethral sphincter causes release of urine

66. Match column I (hormone) with column II (endocrine gland) and column III (function).

Column I	**Column II**	**Column III**
1. Melatonin	a. thyroid	i. acts on the renal tubules
2. MSH	b. adrenal	ii. regulates blood calcium levels
3. Aldosterone	c. pituitary	iii. maintains diurnal rhythm of our body
4. TCT	d. pineal	iv. acts on the melanocytes

(A)	4 - a - iv	3 - d - iii	1 - b - ii	2 - c - i
(B)	1 - d - iii	2 - c - iv	3 - b - i	4 - a - ii
(C)	1 - b - i	4 - a - iii	3 - c - ii	2 - d - iv
(D)	2 - d - ii	1 - b - i	4 - c - iv	3 - c - iii
(E)	2 - c - iv	3 - a - ii	1 - d - iii	4 - b - i

67. hCG, hPL and relaxin are produced in women

(A) at the time of puberty
(B) only during pregnancy
(C) before puberty
(D) at the time of menopause
(E) during menstruation

68. Which of the following is wrongly matched?

(A) IUI - semen collected from husband or donor is artificially introduced either into the vagina or into the uterus
(B) GIFT - transfer of embryos with more than 8 blastomeres into the fallopian tube
(C) ICSI - sperm directly injected into the ovum
(D) ZIFT - transfer of embryos with upto 8 blastomeres into the fallopian tube
(E) IVF - fertilization outside the body in almost similar conditions as that in the body

69. During spermatogenesis the first meiotic division is observed in

(A) Sertoli cells
(B) Spermatids
(C) Spermatozoans
(D) Primary spermatocytes
(E) Secondary spermatocytes

70. The relation between species richness and area is described on a logarithmic scale by the equation (where S = species richness, A = area, Z = slope of the line (regression co-efficient), C = Y-intercept)

(A) $\log S = \log C - Z \log A$
(B) $\log S = Z \log A$
(C) $\log S = \log C + Z \log A$
(D) $\log S = \log C$
(E) $\log C = \log S + Z \log A$

71. Choose the wrongly matched pair

(A) World Summit on Sustainable Development 2002 - Johannesburg
(B) Carrot grass - Lantana
(C) Wildlife safari parks - *Ex-situ* conservation
(D) Amazon Rain Forest - Lungs of the planet
(E) Khasi and Jaintia Hills - Meghalaya

72. Which of the statements about breeding is wrong?
(A) By inbreeding purelines cannot be evolved
(B) Continued inbreeding, especially close inbreeding reduces fertility and productivity
(C) Cross-breeding allows desirable qualities of two different breeds to be combined
(D) Inbreeding exposes harmful recessive genes that are eliminated by selection
(E) A single outcross often helps to overcome inbreeding depression

73. Breeding crops for improved nutritional quality is refered to as
(A) Biomagnification
(B) Biome
(C) Biofortification
(D) Biomining
(E) Bioremediation

74. People administered with preformed antibodies get
(A) Active immunity
(B) Innate immunity
(C) Auto immunity
(D) Natural immunity
(E) Passive immunity

75. The 'clot buster' produced by streptococcus and modified by genetic engineering is
(A) Streptokinase
(B) Penicillin
(C) Strepsils
(D) Cyclosporin A
(E) Statins

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

i. Increase in melanised moths after industrialisation in Great Britain is a proof for Natural Selection

ii. When more individuals of a population acquire a mean character value, it is called disruption

iii. Changes in allelic frequency in a population will lead to Hardy-Weinberg equilibrium

iv. Genetic drift changes the existing gene or allelic frequency in future generations

(A) ii alone is correct

(B) iv alone is correct

(C) i and iv alone are eorrect

(D) i and iii alone are correct

(E) ii and iv alone are correct

77. Match the evolution concepts and their proposers and select the right option.

i.	Saltation	a.	Darwin
ii.	Formation of life was preceded by chemical evolution	b.	Louis Pasteur
iii.	Reproductive fitness	c.	de Vries
iv.	Life comes from pre-existing life	d.	Oparin and Haldane

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

78. Which one of these was a flying dinosaur?

(A) *Triceratops* (B) *Tyranosaurus* (C) *Stegosaurus*

(D) *Brachiosaurus* (E) *Pteranodon*

79. Choose the correct pair

(A) Radial symmetry - Coelenterates

(B) Coelomates - Aschelminthes

(C) Metamerism - Molluscs

(D) Triploblastic - Sponges

(E) Metagenesis - Echinoderms

80. Which among these is not a homiotherm?

(A) *Aptenodytes* (B) *Testudo* (C) *Delphinus*
(D) *Neophron* (E) *Ornithorhynchus*

81. Match the following and choose the correct option.

i. *Physalia*	a. sea anemone
ii. *Meandrina*	b. brain coral
iii. *Gorgonia*	c. sea fan
iv. *Adamsia*	d. Portuguese man-of-war

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

82. Read the following statements and select the correct option.

i. Circulatory system in arthropods is of closed type
ii. Parapodia in annelids help in swimming
iii. Phylum Mollusca is the second largest animal phylum
iv. Aschelminthes are dioecious

(A) i and iii alone are wrong
(B) i alone is wrong
(C) iii alone is wrong
(D) iii and iv alone are wrong
(E) ii alone is wrong

83. Specialised chemoreceptors located on the anterior part of earthworms are

(A) heat receptors
(B) photo receptors
(C) taste receptors
(D) pressure receptors
(E) auditory receptors

84. In cockroaches, digestive juice is secreted by the

(A) gizzard (B) Malpighian tubules (C) crop
(D) oesophagus (E) hepatic caeca

85. The triangular sac like structure which receives blood through the vena cava in frog is

(A) ventricle (B) sinus venosus

(C) hepatic portal system (D) conus arteriosus

(E) left auricle

86. Identify the wrong statement about frog

(A) Parathyroid and pineal body are present

(B) There are ten cranial nerves only

(C) Optic lobes are situated in the mid brain

(D) The ventricle opens into the conus arteriosus

(E) Its an ureotelic organism

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

i. Blood cells secrete fibres of structural proteins called collagen or elastin

ii. Neuroglial cells protect and support the nephrons

iii. Osteocytes are present in spaces called lacunae

iv. Striated muscle fibres are bundled together in a parallel fashion

v. Biceps are involuntary and striated

(A) iii and iv alone are wrong

(B) ii and iv alone are wrong

(C) i and iii alone are wrong

(D) ii and iii alone are wrong

(E) i, ii and v alone are wrong

88. Find the wrongly matched pair

(A) Unicellular glandular cells - Goblet cell

(B) Saliva - Exocrine secretion

(C) Fusiform fibres - Smooth muscle

(D) Cartilage - Areolar tissue

(E) Intercalated discs - Cardiac tissue

89. In XO type of sex determination

(A) Females produce two different types of gametes

(B) Males produce two different types of gametes

(C) Females produce gametes with Y chromosome

(D) Males produce single type of gametes

(E) Males produce gametes with Y chromosome

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

i. Nitrogenous base is linked to the pentose sugar through a N-glycosidic linkage

ii. Phosphate group is linked to 5'-OH of a nucleoside through phosphoester linkage

iii. Two nucleosides are linked through 3'- 5' N-glycosidic linkage

iv. Negatively charged DNA is wrapped around positively charged histone octamer to form nucleosome

v. The chromatin that is more densely packed and stains dark are called euchromatin

(A) i, ii and iii alone are wrong

(B) iv alone is wrong

(C) iii and v alone are wrong

(D) i alone is wrong

(E) i, ii and iv alone are wrong

91. Who used the frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes and mapped their position on the chromosome?

(A) Gregor Mendel (B) Correns (C) Tschermark

(D) Watson and Crick (E) Alfred Sturtevant

92. Sickle cell anaemia is caused by the substitution of

(A) valine by glutamic acid at sixth position of alpha chain of haemoglobin

(B) valine by glutamic acid at sixth position of beta chain of haemoglobin

(C) glutamic acid by valine at sixth position of alpha chain of haemoglobin

(D) glutamic acid by valine at sixth position of beta chain of haemoglobin

(E) glutamic acid by methionine at sixth position of alpha chain of haemoglobin

93. Select the correct statement regarding protein synthesis

(A) When the small subunit of the ribosome encounters a mRNA the process of translation begins

(B) Peptidase catalyses the formation of peptide bond

(C) UTRs are present between the start codon and stop codon

(D) At the end of translation the release factor binds to the initiation codon

(E) The completed polypeptide is stored in the ribosome and released when required

94. Which among the following codons do not have tRNAs?

(A) Start codons (B) AUG (C) GGG
(D) UUU (E) Stop codons

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

Column I	Column II
a. Incomplete dominance	i. Hershey and Chase
b. Linkage	ii. *Antirrhinum sp.*
c. Transforming principle	iii. Griffith
d. Proved that DNA is the genetic material	iv. Morgan

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

96. The behaviour of the chromosomes was parallel to the behaviour of genes during meiosis was noted by

(A) Correns (B) Tschermark (C) Sutton and Boveri
(D) de Vries (E) Henking

97. The enzyme required to catalyse the polymerization of deoxynucleotides is

(A) DNA ligase (B) DNA polymerase (C) β -galactosidase
(D) Transacetylase (E) RNases

98. To which of the following factor, RNA polymerase binds transiently to initiate transcription?

(A) rho (B) beta (C) gamma
(D) sigma (E) alpha

99. When yellow round heterozygous pea plants are self fertilized, the frequency of occurrence of RrYY genotype among the offsprings is

(A) 9/16 (B) 3/16 (C) 2/16
(D) 1/16 (E) 6/16

100. The enzyme(s) responsible for the transcription of snRNAs in eukaryotes is/are

(A) RNA polymerase I
(B) RNA polymerase I and II
(C) RNA polymerase II
(D) RNA polymerase III
(E) RNases

101. The presence and position of which one of the following defines the template and coding strands in a transcription unit?

(A) Repressor (B) Operator (C) Structural gene
(D) Promotor (E) Inducer

102. ABO blood groups is determined by three different alleles. How many genotypes and phenotypes are possible?

	Genotype	**Phenotype**
(A)	3	1
(B)	6	4
(C)	4	6
(D)	9	7
(E)	2	1

103. The codon which has dual function is

(A) UGA (B) UUU (C) AUG
(D) AAA (E) GUC

104. Choose the wrong statement

(A) VNTR belong to a class of mini-satellite DNA
(B) DNA sequencers work on the principle developed by Frederick Sanger
(C) HGP was coordinated by US Department of Energy and the National Institute of Health
(D) DNA finger printing involves identifying similarities in repetitive DNA
(E) Satellite DNA normally do not code for proteins

105. In *lac* operon, the genes *a, i, y* and *z* code respectively for

(A) Repressor protein, permease, β -galactosidase, transacetylase

(B) Transacetylase, permease, β -galactosidase, repressor protein

(C) Permease, transacetylase, repressor protein, β -galactosidase

(D) β -galactosidase, transacetylase, repressor protein, permease

(E) Transacetylase, repressor protein, permease, β -galactosidase

106. In humans, most number of genes are located on chromosome

(A) 1 (B) 6 (C) X

(D) 21 (E) Y

107. The layer lining the lumen of the human alimentary canal is

(A) serosa (B) sub-mucosa (C) muscularis

(D) pleura (E) mucosa

108. The parietal cells secrete

(A) pepsinogen (B) mucus (C) lysozyme

(D) intrinsic factor (E) parathormone

109. The part of a nephron which opens into the collecting duct is/are

(A) DCT

(B) DCT and PCT

(C) Henle's loop

(D) Glomerulii

(E) Bowman's capsule

110. Integration of the visual, tactile and auditory inputs occurs in the

(A) peripheral nervous system

(B) corpus callosum

(C) limbic system

(D) medulla oblongata

(E) midbrain

111. Epinephrine is secreted by the

(A) adrenal cortex
(B) parathyroid glands
(C) anterior pituitary
(D) adrenal medulla
(E) testis

112. In man, Glisson's capsule is associated with the

(A) digestive system
(B) excretory system
(C) nervous system
(D) reproductive system
(E) endocrine system

113. The amount of O_2 transported in a dissolved state through plasma is approximately

(A) 97 % (B) 20-25 % (C) 7 %
(D) 49 % (E) 3 %

114. Read the statements regarding the cardiac system and choose the right option.

i. human heart is an ectodermal derivative
ii. mitral valve guards the opening between the right atrium and left ventricle
iii. SAN is located on the left upper corner of the right atrium
iv. stroke volume × heart rate = cardiac output

(A) i alone is correct
(B) i and ii alone are correct
(C) ii and iii alone are correct
(D) iv alone is correct
(E) ii and iv alone are correct

115. The 'thick' filament in muscles are polymerized proteins of

(A) meromyosins (B) actins (C) troponins
(D) tropomyosins (E) keratin

116. Which hormone among these is not secreted by an endocrine gland?

(A) ADH (B) ANF (C) T_4

(D) PTH (E) MSH

117. Choose the wrong statement

(A) Lipases and nucleases are not present in pancreatic juice

(B) Goblet cells secrete mucus

(C) Brunner's glands are sub-mucosal glands

(D) Carboxypeptidase catalyses conversion of proteins, peptones and proteoses to dipeptides

(E) Bile contains no enzymes

118. In humans, which among these is not a step in respiration?

(A) Pulmonary ventilation

(B) Alveolar diffusion of O_2 and CO_2

(C) Transport of gases by blood

(D) Diffusion of O_2 and CO_2 between blood and tissues

(E) Utilisation of CO_2 by cells for catabolic reactions

119. The enzyme essential for the transport of CO_2 as bicarbonate in blood is

(A) carboxypeptidase

(B) succinic dehydrogenase

(C) carbonic anhydrase

(D) thrombokinase

(E) lactase

120. Choose the correct statement

(A) The T-wave in an ECG represents excitation of ventricles

(B) The sum of P and T waves in a given time period can determine the heart beat rate of an individual

(C) The end of the P-wave marks the end of the systole

(D) In a standard ECG, a person is connected to the machine with three electrical leads

(E) In a normal ECG, the highest peak is represented by 'S'

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