



Paper - II
LIFE SCIENCE

Booklet Code

A

SUBJECT CODE : 03

Test Booklet No.

Roll No. :

Roll No. (in words)

OMR Sheet No. :

Name and Signature of Invigilator/s

Signature

Name

Time : 2 Hours

Maximum Marks : 200

Number of Pages in this Booklet : 24

Number of Questions in this Booklet : 100

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of hundred (100) multiple-choice type of questions.
3. At the commencement of examination, the test booklet will be given to you. In the first 5 minutes, you are requested **To Open the Booklet and Compulsorily Examine it as Below:**
 - (i) To have access to the Test Booklet, tear off the paper seal on the edge of the cover page. Do not accept a booklet without sticker seal or open booklet.
 - (ii) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Test Booklet will be replaced nor any extra time will be given.
 - (iii) After the verification is over, the Test Booklet Number should be entered in the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
Example : (A) (B) (C) (D)
where (C) is the correct response.
5. Your responses to the questions are to be indicated in the **OMR Sheet kept inside this Booklet**. If you mark at any place other than in the circles, the OMR Sheet will not be evaluated.
6. Read the instructions given in OMR Sheet carefully. Fill the Booklet Code of Paper-II in OMR Sheet **Compulsorily**.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space provided for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the OMR answer Sheet to the invigilators at the end of the examination compulsorily and must NOT carry it with you outside the Examination Hall.
10. You can take away test booklet and carbon copy of OMR Answer Sheet after the examination.
11. Use only Blue/Black Ball point pen.
12. Use of any calculator, electronic gadgets or log table, etc. is prohibited.
13. There is no negative mark for incorrect answer.



1. Terrestrial vertebrates evolved from fish in which period?
 - (A) Cambrian
 - (B) Devonian
 - (C) Jurassic
 - (D) Carboniferous
2. DNA double helix is stabilized by:
 - (A) H-bonds only
 - (B) H-bonds and base stacking interactions
 - (C) Electrostatic interactions only
 - (D) Hydrophobic interactions only
3. Isoelectric point (pI) is the pH at which protein has :
 - (A) More positive charge
 - (B) More negative charge
 - (C) Neither positive nor negative charge
 - (D) Equal positive and negative charges
4. Nicotinamide adenine dinucleotide phosphate is generated in :
 - (A) Pentose Phosphate pathway
 - (B) Glycolysis
 - (C) Tricarboxylic acid pathway
 - (D) Fatty acid degradation pathway
5. Which one of the following is not involved in post-transcriptional control of gene regulation?
 - (A) Riboswitch
 - (B) DNA methylation
 - (C) MicroRNA
 - (D) RNA interference
6. Which one of the following is the main site for lipid biosynthesis?
 - (A) Lysosomes
 - (B) Peroxisomes
 - (C) Cytosol
 - (D) Endoplasmic reticulum
7. Following is the list of enzymes that act on different intermediate products of glycolysis:
 1. Aldolase
 2. Hexokinase
 3. Phosphofructokinase
 4. Phosphogluco isomerase

Which one of the following options represents the correct sequence of enzymes that lead to metabolism of glucose to pyruvic acid?

 - (A) 1, 2, 3, 4
 - (B) 3, 4, 2, 1
 - (C) 2, 4, 3, 1
 - (D) 2, 4, 1, 3



8. F_1 particles present in the mitochondria are located in the
- (A) Mitochondrial matrix
 - (B) Inner surface of inner membrane
 - (C) Intermembrane space
 - (D) Outer membrane
9. Which combination of Cyclins and CDKs work together for a cell to pass from G2/M checkpoint?
- (A) Cyclin A -Cdk 2
 - (B) Cyclin B -Cdk 1
 - (C) Cyclin D -Cdk 1
 - (D) Cyclin E- Cdk 2
10. Which one of the following cellular organelles is affected in Zellweger syndrome?
- (A) Peroxisome
 - (B) Endosome
 - (C) Lysosome
 - (D) Mitochondria
11. In the mismatch repair system in *E. coli*, MutS, MutH and MutL are the key players. The repair of mismatch in the newly replicated DNA can be initiated by these proteins because:
- (A) MutS recognizes the mismatch and activates the endonuclease MutH.
 - (B) MutS recognizes the mismatch and binds as a complex with MutL and MutH.
 - (C) The adenine is methylated in the newly synthesized strand.
 - (D) The complex recognizes unmethylated adenine in the GATC sequences in newly synthesized strand
12. Which of the following represents the correct equation for Spearman's Rank Correlation Coefficient (r_s)?
- (A) $\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$
 - (B) $r_{xy} = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{\sqrt{n \sum x_i^2 - (\sum x_i)^2} \sqrt{n \sum y_i^2 - (\sum y_i)^2}}$
 - (C) $\tau = \frac{n_c - n_d}{\frac{1}{2} n(n-1)}$
 - (D) $(p+q+r)^2 = p^2(A_1A_1) + q^2(A_2A_2) + r^2(A_3A_3) + 2pq(A_1A_2) + 2pr(A_1A_3) + 2qr(A_2A_3)$
13. Which one of the following statements is not correct?
- (A) Mitochondria release cytochrome C into the cytosol and triggers programmed cell death through apoptosis
 - (B) In biological membranes, integral proteins and lipids interact mainly by hydrophobic interactions
 - (C) All membrane processes, such as pumping and channeling of molecules are carried out by proteins
 - (D) Channel proteins can facilitate both active and passive transport.



14. In size exclusion chromatography, the smallest molecule is eluted :

- (A) In the initial fractions of protein
- (B) In the last fractions of protein
- (C) Smallest molecule not eluted
- (D) Smallest molecule comes along with largest molecule

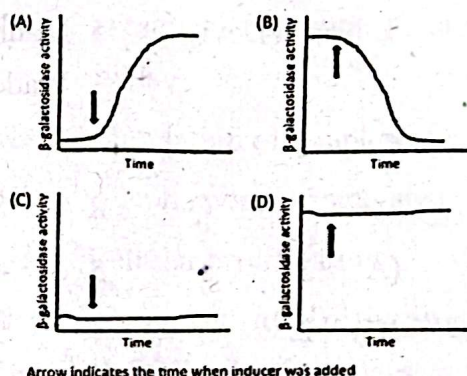
15. Which one of the following cell organelle and its function is mismatched?

- (A) Lysosomes -the breakdown/ digestion of macromolecules
- (B) Peroxisomes -transporting, modifying, and packaging proteins and lipids into vacuoles for delivery
- (C) Cytoskeleton -responsible for the locomotion of the cell itself and the movement of the various organelles within it
- (D) Centrosome – major role in organising the microtubule and cell division

16. The development of pesticide resistance in insects (DDT resistance in mosquitoes) is an example of:

- (A) Natural selection
- (B) Genetic drift
- (C) Artificial selection
- (D) Gene flow

17. The following graphs present β -galactosidase activity in an *E. coli* culture at different points of time before and after addition of lactose. Which one of the following graphs is a correct representation of activity in a mutant that does not synthesize the lac repressor protein?



Arrow indicates the time when inducer was added

18. In bacteria rho- independent termination of transcription involves:

- (A) An RNA binding protein alone
- (B) An RNA binding protein complexed with GTP
- (C) A stem loop structure formed in the transcript RNA molecule
- (D) A stem loop structure formed in the template DNA molecule



19. Match List-I and List-II and select the correct answer from the codes given below:

List-I	List-II
(Biosphere Reserve)	(Location)
P. Nokrek	1 West Bengal
Q. Sunderbans	2 Uttarakhand
R. Panna	3 Meghalaya
S. Gulf of Mannar	4 Tamil Nadu
T. Nanda Devi	5 Madhya Pradesh

Codes:

	P	Q	R	S	T
(A)	3	1	5	4	2
(B)	2	3	4	5	1
(C)	5	2	4	3	1
(D)	1	2	3	4	5

20. Eukaryotic RNA pol III transcribes:

- I. tRNA
- II. 5s RNA
- III. 18s RNA
- IV. mRNA
- V. 28s RNA

Correct option is :

- (A) I and II only
- (B) I, II, III and V only
- (C) II, III and V only
- (D) I and IV only

21. In bacteria, a sequence called _____ I _____ sequence is important for initiation of translation. This sequence base pairs with the _____ II _____ end of the _____ III _____ rRNA. Which one of the following has the correct options corresponding to I, II and III, respectively?

- | | | | |
|-----|---------------------|-----|-----|
| | I | II | III |
| (A) | Kozak sequence, 5', | 16S | |
| (B) | Shine-Dalgarno, 3', | 16S | |
| (C) | Shine-Dalgarno, 3', | 23S | |
| (D) | Kozak sequence, 5' | 23S | |

22. In the DNA segment given in diagram below, the replication fork moves from its left to right.

Strand A - 5' _____ 3'
 Strand B - 3' _____ 5'
 LEFT _____ RIGHT

Based on the diagram the following statements were made:

- I. Strand A is the leading strand
- II. Strand B is the lagging strand
- III. Okazaki fragments will be formed on Strand A

Which of the following statement(s) will present CORRECT set?

- (A) III only
- (B) I and II only
- (C) II and III only
- (D) I, II, and III



23. Consider the following statements:
- Statement 1:** Human papillomavirus (HPV) infection is a well-established cause of cervical cancer.
- Statement 2:** Bivalent and quadrivalent vaccines against HPV were licensed in India in 2008.
- Statement 3:** Gardasil and Cervavac are the quadrivalent vaccines against HPV.
- Statement 4:** India's first indigenously made HPV vaccine, Gardasil was launched by Serum Institute of India in 2023.
- Which of the above statements is/are FALSE.
- (A) Only 1
(B) Only 2
(C) Only 3
(D) Only 4
24. The effect of the neurotransmitter acetylcholine on the rapid relaxation of smooth muscle cells is signalled via:
- (A) G-protein coupled receptor
(B) Ion-channel coupled receptor
(C) JAK-STAT pathway
(D) Receptor tyrosine kinase
25. Cell signaling pathway not regulated by ubiquitination is:
- (A) Wnt signaling
(B) Hedgehog signaling
(C) STAT3 signaling
(D) NF-kappa B signaling
26. Burkitt's lymphoma is a cancer of:
- (A) T lymphocytes
(B) B lymphocytes
(C) Erythrocytes
(D) Monocytes
27. Which of the following apply uniquely to secondary lymphoid organs?
- (A) presence of precursor B and T cells
(B) circulation of lymphocytes
(C) lymphocytes are activated
(D) cellular proliferation
28. Which one of the following is INCORRECT about the processing of an antigen, such as a bacterial protein, in the acid compartments of the cell?
- (A) It results in production of potentially immunogenic peptides that associate with MHC class II molecules
(B) It may lead to activation of CD4⁺ T cells
(C) It may lead to the activation of CD8⁺ T cells
(D) Bacterial- derived peptides displace a fragment of the invariant chain from the MHC class II binding groove



29. Which of the following is true for direct allorecognition?
- (A) Donor dendritic cells in the allograft migrate to secondary lymphoid tissues, where they present allogeneic MHC molecules to host T cells.
 - (B) Recognition of donor MHC peptides presented by self-cells
 - (C) Caused by pre-existing antibodies against blood-group or MHC antigens
 - (D) Causes graft rejection in 7 days
30. In a biochemical pathway, if the product of Gene A is required for Gene B to function, Gene A is said to be:
- (A) Hypostatic to Gene B
 - (B) Epistatic to Gene B
 - (C) Co-dominant with Gene B
 - (D) Independent of Gene B
31. What is a nomen novum?
- (A) A new species description
 - (B) A replacement name for a preoccupied taxon
 - (C) A junior homonym that remains valid
 - (D) A name reserved for extinct species
32. Which of the following correctly represents the conversion process in the nitrogen cycle?
- (A) Ammonification – Conversion of organic nitrogen to ammonia (NH_3)
 - (B) Nitrification – Conversion of nitrate (NO_3^-) to ammonia (NH_3)
 - (C) Denitrification – Conversion of nitrogen gas (N_2) to nitrate (NO_3^-)
 - (D) Nitrogen Fixation – Conversion of nitrate (NO_3^-) to nitrogen gas (N_2)
33. Following are some of the characteristics of restriction endonucleases :
- I. Nature of enzyme: Bifunctional enzyme with both endonucleases and methylase activity
 - II. Protein structure: Three identical subunits
 - III. Requirement for restriction activity: ATP, Mg^{2+}
 - IV. Cleavage sites: At or near restriction site
- Select the correct option for type I restriction endonucleases
- (A) I and II
 - (B) II and III
 - (C) III and IV
 - (D) I and III



34. Match List-I and List-II and select the correct answer from the codes given below:

List-I

- P. Thermal Imaging
Q. Hyperspectral Imaging
R. SAR (Synthetic Aperture Radar)
S. LIDAR (Light Detection and Ranging)

List-II

- Utilized in mapping topography, detecting surface displacement, and monitoring land subsidence.
- Used for mapping terrain features, vegetation structure, and forest canopy height with precise 3D modeling.
- Aids in detecting heat loss, urban heat islands, and assessing climate conditions on earth surface.
- Used for detecting vegetation health, crop stress, and other environmental factors by capturing data across a wide range of wavelengths.

Codes:

	P	Q	R	S
(A)	4	2	3	1
(B)	3	2	4	1
(C)	3	4	1	2
(D)	1	4	2	3

35. Which of the following is the correct order of steps in the ELISA process?

(A) Blocking → Adding the Sample → Coating the Plate → Adding the Enzyme-Conjugated Detection Antibody → Substrate Addition → Stopping the Reaction → Measuring the Results.

(B) Coating the Plate → Blocking → Adding the Sample → Adding the Enzyme-Conjugated Detection Antibody → Substrate Addition → Stopping the Reaction → Measuring the Results.

(C) Adding the Sample → Coating the Plate → Blocking → Adding the Enzyme-Conjugated Detection Antibody → Substrate Addition → Stopping the Reaction → Measuring the Results.

(D) Coating the Plate → Adding the Enzyme-Conjugated Detection Antibody → Blocking → Adding the Sample → Substrate Addition → Stopping the Reaction → Measuring the Results.



36. Match the hormone action of 1,25-dihydroxycholecalciferol (Vitamin D) with its corresponding effects or characteristics :

	List-I (Action)		List-II (Effect)
P	Promotes calcium absorption in the intestines	1	Increases calcium and phosphate reabsorption in the kidneys
Q	Enhances phosphate absorption in the intestines	2	Formation of calbindin in intestinal epithelial cells
R	Decreases calcium and phosphate excretion in urine	3	Stimulates formation of calcium-stimulated ATPase in the brush border
S	Promotes bone calcification	4	Forms a complex with the retinoid-X receptor and activates transcription
T	Vitamin D receptor binding	5	Increases bone respiration at high doses and bone mineralization at lower doses

Codes:

	P	Q	R	S	T
(A)	3	1	5	2	4
(B)	1	2	3	4	5
(C)	2	1	4	3	5
(D)	2	3	1	5	4

37. What clinical application is Circular Dichroism (CD) spectroscopy commonly used for?

- (A) Drug discovery and metabolomics
(B) Monitoring protein misfolding in diseases like Alzheimer's

- (C) Measuring oxidative stress in tissues
(D) Investigating protein-ligand binding affinities

38. A person receiving an injection of gamma globulin as protection against hepatitis is an example of :

- (A) naturally acquired active immunity
(B) naturally acquired passive immunity
(C) artificially acquired active immunity
(D) artificially acquired passive immunity

39. In sea urchins and mammals a rise in Ca^{2+} concentration following fertilization is responsible for cortical granule reaction. The source of Ca^{2+} ions is :

- (A) From the surrounding water in case of sea urchin and Ca^{2+} sequestered in organelles within the egg in case of mammals
(B) Ca^{2+} sequestered in organelles within the egg in both sea urchins and mammals
(C) Ca^{2+} from environment surrounding the egg in both sea urchins and mammals
(D) Ca^{2+} sequestered in organelles within the egg in case of sea urchins, while the source in mammals is still not established



40. Which PET radiotracer is commonly used to assess brain activity and metabolic rates?
- (A) Fluorodeoxyglucose (FDG)
(B) Oxygen-15
(C) Carbon-11
(D) Technetium-99m
41. During amphibian development the localization of β -catenin in dorsal nuclei is an important event in establishing the dorso-ventral polarity. Which one of the following proteins contributes to the above localization?
- (A) Disheveled
(B) Chordin
(C) Noggin
(D) BMP4
42. The first binary decision in mammalian development is to form:
- (A) Primordial germ cells or Inner cell mass
(B) Primordial germ cells or Trophoblast cells
(C) Trophoblast cells or Inner cell mass
(D) Hypoblast cells or Trophoblast cells
43. The technique used to study the dynamics and mobility of fluorescently labelled molecules within the living cells is known as :
- (A) Fluorescent Microscopy
(B) LSCM
(C) FACS
(D) FRAP
44. Hans Spemann and Hilde Mangold :
- (A) Identified the Nieukoop centre
(B) Demonstrated that blastopore lip of amphibians functioned as a Primary Organizer
(C) Identified several mutants in *Drosophila* involved in early embryonic development
(D) Were the first to carry out somatic nuclear transfer in frog eggs
45. The CLAVATA3 (CLV3)-WUSCHEL (WUS) signalling pathway has evolved as the central regulatory pathway that:
- (A) Coordinates stem cell proliferation with differentiation in shoot apical meristem
(B) Maintenance of adaxial identity in the developing leaf primordia
(C) Development of nitrogen fixing root nodules
(D) Alteration of leaf size and shape



46. Which of these animals is an example of eusociality?
(A) Lion
(B) Naked mole-rat
(C) Tiger
(D) Elephant
47. The fossil of "Lucy" belongs to which species of early human ancestor?
(A) *Homo sapiens*
(B) *Homo erectus*
(C) *Homo habilis*
(D) *Australopithecus afarensis*
48. Victor Ambros and Gary Ruvkun awarded Nobel prize in physiology and medicine in year 2024 for :
(A) The discovery of microRNA
(B) The discovery of receptors for temperature and touch
(C) The discovery of Hepatitis C virus
(D) The discovery of cancer therapy by inhibition of negative immune regulation
49. Given below are two statements:
Statement-I: A modified Hoagland solution contains all known mineral elements needed for rapid plant growth.
Statement-II: The concentrations of these elements are set at the lowest possible concentrations without producing deficiency symptoms or stress, and thus may be several orders of magnitude lower than those found in the soil around plant roots.
- In light of the above statements, choose the most appropriate answer from the codes given below :
(A) Both (I) and (II) are correct
(B) Both (I) and (II) are incorrect
(C) (I) is correct, but (II) is incorrect
(D) (I) is incorrect, but (II) is incorrect
50. Given below are two statements about Photosystem I and II :
Statement I: PS-I preferentially absorbs far-red light of wavelengths greater than 680 nm; PSI produces a strong reductant, capable of reducing NADP⁺, and a weak oxidant.
Statement II: PS-II preferentially absorbs red light of 680 nm and is driven very poorly by far-red light. PS-II produces a very strong oxidant, capable of oxidizing water, and a weaker reductant than the one produced by PSI.
- In light of the above statements, choose the most appropriate answer from the codes given below:
(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.



51. Given below are the statements about Photoreceptors:

- (1) Phototropins - regulate phototropism, chloroplast movements, and stomatal opening
- (2) Phytochrome- absorb red and far-red light most strongly (600–750 nm), but also absorb blue light (350–500 nm) and UV-A radiation (320–400 nm) and mediate vegetative and reproductive development,
- (3) Cryptochrome - mediate several blue-light responses, including suppression of hypocotyl elongation, promotion of cotyledon expansion, inhibition of petiole elongation, anthocyanin production, and circadian clock.

Which of the above statement/s is /are correct?

- (A) Only (1)
- (B) Only (1) and (2)
- (C) (1), (2) and (3)
- (D) Only (3)

52. During ABA-mediated stomatal closure, membrane depolarization is caused by net influx of which of the following ions?

- (A) Chloride
- (B) Potassium
- (C) Hydrogen
- (D) Calcium

53. The pigment molecules responsible for photosynthesis are located in the :

- (A) Cytoplasm
- (B) Stroma of chloroplast
- (C) Thylakoid membrane of the chloroplast
- (D) Mitochondria

54. Which of the statements about the C4 plants are not true?

- 1. The CO_2 compensation point is about 50–100 ppm at 25°C reflecting CO_2 production because of photorespiration
- 2. They have lower net assimilation at high temperature in comparison to C3 plants
- 3. Their bundle sheath cells contains many larger-sized chloroplasts
- 4. Fixation of CO_2 occurs by the carboxylation of phosphoenolpyruvate in the mesophyll cells to form malate/aspartate
- 5. Decarboxylation of the C4 acids within the bundle sheath cells and generation of CO_2 , which then enters in Calvin Cycle.

Codes:

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



55. Which one of the following combinations represent the CORRECT location and their associated key functions?

- (A) Bowman capsule - medulla of the kidney - ultrafiltration
- (B) Proximal convoluted tubule – cortex of the kidney - regulates salt, water, organic solutes
- (C) Henle's loop – cortex of the kidney - ultrafiltration
- (D) Distal convoluted tubule - medulla of the kidney - regulates salt, water, organic solutes

56. Which of the following is not a transcriptional activator ?

- (A) P-TEFb
- (B) Zinc fingers
- (C) Leucine zipper
- (D) Helix-turn-helix

57. Given below are the steps of action of a water-soluble hormone on its target cell:

- I. Adenylate cyclase is activated, catalyzing the conversion of ATP to cAMP.
- II. Enzymes catalyze reactions that produce a physiological response attributed to the hormone.

III. The hormone binds to a membrane receptor.

IV. Activated protein kinases phosphorylate cellular proteins.

V. The hormone-receptor complex activates G proteins.

VI. Cyclic AMP activates protein kinases.

Choose the option representing the correct order the action from below:

- (A) III, V, I, VI, IV, II
- (B) III, I, V, VI, IV, II
- (C) V, I, IV, II, III, VI
- (D) III, IV, V, I, VI, II

58. Function of enterogastrone is:

- (A) Inhibition of bile flow
- (B) Inhibition of gastric secretions
- (C) Stimulation of gastric secretions
- (D) Stimulation of pancreatic juice flow

59. During DNA replication, events at the replication fork require various types of enzymes having specialized functions except :

- (A) DNA polymerase III
- (B) DNA glycosylase
- (C) DNA ligase
- (D) Topoisomerases



60. The amount of oxygen dissolved in human plasma:
- (A) 98%
 - (B) 2%
 - (C) 10%
 - (D) 20%
61. Which of the following modifications of proteins is not post-translational in a mammalian system?
- (A) Palmitoylation
 - (B) Glycosylation
 - (C) Phosphorylation
 - (D) Peptidylation
62. In which year the International Botanical Congress adopted the International Code of Nomenclature for Algae, Fungi and Plants (ICN) and replaced the International Code of Botanical Nomenclature (ICBN)?
- (A) 1999 St. Louis
 - (B) 2005 Vienna
 - (C) 2011 Melbourne
 - (D) 2017 Shenzhen
63. Children with Patau's syndrome have ____.
- (A) Trisomy 13
 - (B) Trisomy 18
 - (C) Trisomy 21
 - (D) Monosomy 18
64. In *Drosophila melanogaster* the allele for yellow body color (*y*) is located on the X chromosome. Yellow body is recessive to the wild type body color. A yellow-bodied male is crossed to a wild type heterozygous female. Which one of the following statements correctly represents observation of F₂ progeny?
- (A) All males are expected to show yellow body color
 - (B) All females are expected to show wild type body color
 - (C) The ratio of progeny with wild type to yellow body color is expected to be 3:1
 - (D) 50% of the males are expected to show yellow body color
65. A transgenic plant was developed with a gene (*bar*) that was resistant to the herbicide Basta. The gene is integrated at a single locus and is present on only one of the pair of homologous chromosomes. This transgenic plant was selfed. What percentage of the progeny is expected to show resistance to Basta?
- (A) 12.5
 - (B) 25.0
 - (C) 50.0
 - (D) 75.0



66. Segregation of alleles can occur at Anaphase I or at Anaphase II. In which one of the following organisms can first-division segregation (M_I) and second-division segregation (M_{II}) pattern be distinguished?
- (A) *Drosophila melanogaster*
(B) *Neurospora crassa*
(C) *Saccharomyces cerevisiae*
(D) *Caenorhabditis elegans*
67. In Archaeogniatae, which of the following plant groups are studied?
- (A) *Ulva, Riccia, Pteris and Pinus*
(B) *Riccia, Pteris and Pinus*
(C) *Pteris, Pinus and Magnolia*
(D) *Riccia, Pteris and Magnolia*
68.  This is the logo of:
- (A) Global Taxonomic Initiative (GTI)
(B) Global Strategy for Plant Conservation (GSPC)
(C) Convention on Biological Diversity (CBD)
(D) Sustainable Development Goal 15 (SDG15)
69. Which of these group of plants produce seeds without fruit?
- (A) Cycads
(B) Orchids
(C) Grasses
(D) Palms
70. Sedges are common name of :
- (A) Grass-like plants having circular stem
(B) Grass-like plants having triangular stem
(C) Grass-like hedge plants
(D) Grass-like plants having solid circular stem
71. Which of the following is not a larva of Echinoderm?
- (A) Bipinnaria
(B) Veliger
(C) Ophiopluteus
(D) Doliolaria
72. Which one of the following is not a characteristic feature of Urochordata?
- (A) Pharyngeal gill clefts
(B) Distinct cranium or brain box
(C) Notochord found in larva and is confined to the tail only
(D) Tadpole undergoes retrogressive metamorphosis



73. Match the disease (List – I) with Pathogen (List – II) given in table below :

	List-I		List-II
P	Creutzfeldt Jakob	1	Fungi
Q	Pneumocystis	2	Virus
R	Legionnaire's diseases	3	Prion
S	Rabies	4	Bacteria

Select the option with correct match from codes given below:

- | | | | | |
|-----|---|---|---|---|
| | P | Q | R | S |
| (A) | 4 | 3 | 2 | 1 |
| (B) | 3 | 1 | 4 | 2 |
| (C) | 1 | 2 | 3 | 4 |
| (D) | 2 | 4 | 1 | 3 |

74. Which one of the following acts as a test organism in the procedure of phenol-coefficient method?

- (A) *Escherichia coli*
- (B) *Streptococcus faecalis*
- (C) *Staphylococcus aureus*
- (D) *Lactobacillus rhamnosus*

75. Cryptococcosis is a disease caused due to :

- (A) Viral infection
- (B) Mycotic infection
- (C) Parasitic infection
- (D) Bacterial infection

76. In Geological Time Scale, Currently we are in Phanerozoic Eon, Cenozoic Era and in :

- (A) Quaternary Period ,Holocene Epoch
- (B) Tertiary Period,Pliocene Epoch
- (C) Tertiary Period , Miocene Epoch
- (D) Quaternary Period, Pleistocene Epoch

77. An aquifer is a rock formation which is :

- (A) Porous and not necessarily permeable
- (B) Porous and essentially permeable
- (C) Highly porous and impermeable
- (D) Highly impermeable

78. In the family Asteraceae the Pappus is:

- (A) Often persistent fringe of scaly, bristly or hairy appendages on the rim of floral axis representing the calyx
- (B) Cypsela bearing the persistent corolla
- (C) A receptacle that bear ray florets and disc florets
- (D) Style passing through the staminal tube



79. Match the following pathogens (List I) and diseases (List II) given below:

	List-I		List-II
P	<i>Albugo candida</i>	1	Red root of Sugarcane
Q	<i>Phytophthora infestense</i>	2	Early blight of tomato
R	<i>Colletotrichum falcatum</i>	3	White rust of crucifers
S	<i>Alternaria solani</i>	4	Late blight of Potato

Codes:

- | | | | | |
|-----|---|---|---|---|
| | P | Q | R | S |
| (A) | 1 | 2 | 3 | 4 |
| (B) | 2 | 3 | 4 | 1 |
| (C) | 3 | 4 | 1 | 2 |
| (D) | 4 | 1 | 2 | 3 |
80. Which of the following statement/s is /are correct?
- I. Numerical taxonomy aims at determining phenetic relationships between organisms or taxa
- II. APG system of classification is established by taking the information from recent molecular studies
- III. Phylogenetic classification is constructed in such a way that all the descendents of a common ancestor should be placed in the same group i.e group should be monophyletic.

Which one of the options represent all correct statements?

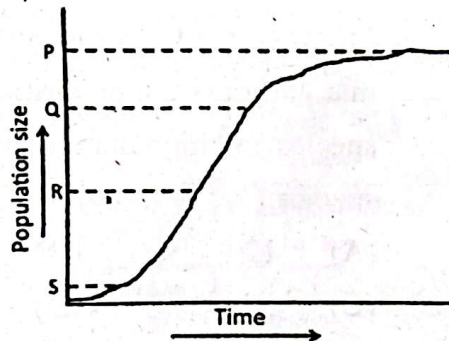
- (A) Only I
- (B) Only II
- (C) Only II and III
- (D) Only I, II and III
81. Which one of the following is the first national park of India?
- (A) Satpura National Park
- (B) Panna National Park
- (C) Kaziranga National Park
- (D) Jim Corbett National Park
82. Species 'A' produces many seeds smaller in size, while species 'B' produces few seeds bigger in size. Selection method followed by species 'A' and 'B' is respectively:
- (A) r - and k - selection
- (B) k - and r - selection
- (C) r - and s - selection
- (D) j - and k - selection
83. Which one of the following combinations of nutrients follow sedimentary pattern of biogeochemical cycling?
- (A) Carbon and Sulphur
- (B) Sulphur and Phosphorus
- (C) Phosphorus and Nitrogen
- (D) Nitrogen and Carbon



84. Which one of the following statements describes the characteristics of a keystone species?
- (A) The species, which dominate in the ecosystem and contributes in the productivity and biomass
 - (B) The species those occur outside their natural range, possess high reproductive potential, spread rapidly and contribute enormously to global change
 - (C) The species, which has low abundance and biomass in the community, but it has large ramifying effect on the community structure either by controlling populations of other species or by providing critical resources for a wide range of species.
 - (D) The species with its rare occurrence and restricted distribution and no effect on the local biodiversity
85. Which one of the following statements is not correct?
- (A) Pyramid of Biomass in a grassland is upright
 - (B) Pyramid of Biomass in a pond is inverted
 - (C) Pyramid of energy (Kcal per unit area within unit time or season) in any ecosystem is always inverted
 - (D) Pyramid of numbers in a pond ecosystem is upright
86. India is one of the _____ Megadiverse Countries in the world that harbours the majority of earth's species and high number of endemic species.
- (A) 12 (B) 17
(C) 18 (D) 36
87. Given below are two statements regarding the ecosystem stability
- Statement I:** The tropical rain forest ecosystems are said to be highly stable and resistant because they have strong resilience, once greatly perturbed they may quickly return to the original state.
- Statement II:** Mycorrhizal symbionts act as positive feedbacks by amplifying the processes that increase the ecosystem stability and self sustaining ecosystem processes.
- In light of the above statements, choose the most appropriate answer from the codes given below:
- (A) Both Statement I and Statement II are correct
 - (B) Both Statement I and Statement II are incorrect
 - (C) Statement I is correct and Statement II is incorrect
 - (D) Statement I is incorrect and Statement II is correct



88. The following S-curve represents a logistic population growth :



Which one of the following marks (as optioned A to D) on the Y-axis refers to the carrying capacity of the population?

- (A) P
(B) Q
(C) R
(D) S
89. 'Capture-mark-recapture method' is used to determine population sizes for many organisms. In an experiment 250 grasshoppers were captured on day 1 from a field in Jammu University. They were marked and released. On the second day 175 grasshoppers were recaptured from the same field. Of the recaptured grasshopper, 70 were marked. What is the estimated population size of grasshoppers in the field?
- (A) 490
(B) 525

(C) 625

(D) 780

90. Which type of protected area conservation introduced after the amendment to the Wildlife (Protection) Act 1972 in 2002?

(A) National Park
(B) Wildlife Sanctuary
(C) Community Reserve
(D) None of the above

91. Natural selection can alter the frequency distribution of heritable traits in different ways, depending on which phenotypes are favored. In one of the selection modes the birth weights of most human babies lie between 3 to 4 kg; babies who are either much smaller or much larger suffer higher mortality rates. This is an example of :

(A) Directional selection
(B) Disruptive selection
(C) Stabilizing selection
(D) Both directional and stabilizing selection



92. A population of squirrels, which could interbreed, was split into two groups of nearly equal sizes because of a man made waterway in the middle of their habitat. This led to reproductive isolation and formation of new species. This is an example of:
- (A) Allopatric speciation
 - (B) Peripatric speciation
 - (C) Parapatric speciation
 - (D) Sympatric speciation
93. Which of the following statements is correct about telomerase?
- (A) Telomerase has 5' – 3' DNA-dependent DNA polymerisation activity
 - (B) Telomerase has 3' – 5' DNA-dependent DNA polymerisation activity
 - (C) Telomerase has 5' – 3' RNA-dependent DNA polymerisation activity
 - (D) Telomerase carry out polymerisation on both leading and lagging strands
94. Which of the following assumption support the Hardy-Weinberg Equilibrium?
- (A) Presence of Natural Selection
 - (B) Random Mating
 - (C) Genetic Drift
 - (D) Assortative Mating
95. Which one of the following components is necessary for screening of recombinant plasmid molecules?
- (A) A gene like β -lactamase
 - (B) β -galactosidase gene
 - (C) Multiple cloning sites
 - (D) Origin of replication
96. What is the generation time of a bacterial culture that grows from 10^2 to $\sim 13 \times 10^3$ in ~ 210 min?
- (A) 20 min
 - (B) 30 min
 - (C) 45 min
 - (D) 60 min



97. Match the List-I (Dye) with the List-II (component to which it stain)

List-I (Dye)	List-II (component to stain)
P. Toluidine blue	1. Lipids
Q. Lactophenol	2. Proteins
R. Coomassie Brilliant blue	3. RNA
S. Sudan III	4. Fungal Hyphae

Select the correct match from the options give below

	P	Q	R	S
(A)	1	2	4	3
(B)	3	2	4	1
(C)	3	4	2	1
(D)	1	4	2	3

98. Which species concept(s) could you apply to both asexual and sexual species?

- (A) morphological species concept
- (B) ecological species concept
- (C) phylogenetic species concept
- (D) morphological as well as ecological species concepts

99. Consider the following statements :

Statement 1: Chimeric antigen receptor (CAR) T cell therapy has emerged as a novel therapeutic cell engineering practice, in which polymorphonuclear cells derived from patient blood are engineered in vitro to express artificial T cell receptors targeted to a specific tumor antigen.

Statement 2: The use of this CAR T cell therapy has been successful for treatment of Acute Lymphoblastic Leukemia.

- (A) Both Statement 1 and Statement 2 are correct
- (B) Statement 1 is correct but Statement 2 is incorrect
- (C) Statement 1 is incorrect but Statement 2 is correct
- (D) Both Statement 1 and Statement 2 are incorrect

100. A Chromatography Technique wherein the size of molecule is the primary criteria for separation of biomolecules is called as:

- (A) Gel filtration chromatography
- (B) Ion-exchange chromatography
- (C) Affinity chromatography
- (D) Isoelectric chromatography