



Paper Code : 20

Sr. No. 2296

LIFE SCIENCES [Paper-III]

Signature and Name of Invigilator

- (Signature) _____
(Name) _____
- (Signature) _____
(Name) _____

OMR Sheet No. : _____

(To be filled by the candidate)

Roll No.

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(In Figures as per admission card)

Roll No. _____

(In words)

Time : 2½ Hours]

[Maximum Marks : 150

Number of Pages in this Booklet : 16

Number of Questions in this Booklet : 75

Instructions for the Candidates

- Write your roll number in the space provided on the top of this page.
- This paper consists of seventy five multiple-choice type of questions.
- At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
 - Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Fault 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 Question Booklet will be replaced nor any extra time will be given.
 - After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
- Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the oval as indicated below on the correct response against each item.
Example :

A	B	C	D
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where (C) is the correct response.
- Your responses to the items are to be indicated in the Answer Sheet given inside the Paper I Booklet only. If you mark at any place other than in the ovals in the Answer Sheet, it will not be evaluated.
- Read instructions given inside carefully.
- Rough Work is to be done in the end of this booklet.
- If you write your name or put any mark on any part of the test booklet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
- You have to return the test question booklet and OMR Answer sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
- Students can take home carbon copy of this OMR answer sheet.
- Use only Blue/Black Ball point pen.
- Use of any calculator or log table etc., is prohibited.
- There is no negative marks for incorrect answers.

परीक्षार्थियों के लिए निर्देश

- पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
- इस प्रश्न-पत्र में पिछेतर बहुविकल्पीय प्रश्न हैं।
- परीक्षा प्रारम्भ होने पर, प्रश्न-पुस्तिका आपको दे दी जायेगी। पहले पाँच मिनट आपको प्रश्न-पुस्तिका खोलने तथा इसकी निम्नलिखित जाँच के लिए दिये जायेंगे, जिसकी जाँच आपको अवश्य करनी है :
 - कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या को अच्छी तरह चैक कर लें कि वे पूरे हैं। दोषपूर्ण पुस्तिका जिनमें पृष्ठ/प्रश्न कम हों या दुबारा आ गये हों या सीरियल में न हों अर्थात् किसी भी प्रकार की त्रुटिपूर्ण पुस्तिका स्वीकार न करें तथा उसी समय उसे लौटाकर उसके स्थान पर दूसरी सही प्रश्न-पुस्तिका ले लें। इसके लिए आपकी पाँच मिनट दिये जायेंगे। उसके बाद न तो आपको प्रश्न-पुस्तिका वापस ली जायेगी और न ही आपको अतिरिक्त समय दिया जायेगा।
 - इस जाँच के बाद OMR पत्रक की क्रम संख्या इस प्रश्न-पुस्तिका पर अंकित कर दें।
- प्रत्येक प्रश्न के लिए चार उत्तर पत्रक विकल्प (A), (B), (C) तथा (D) दिये गये हैं। आपको सही उत्तर के दीर्घवृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है।
उदाहरण :

A	B	C	D
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जबकि (C) सही उत्तर है।
- प्रश्नों के उत्तर केवल प्रश्न पत्र I के अन्दर दिये गये उत्तर-पत्रक पर ही अंकित करने हैं। यदि आप उत्तर पत्रक पर दिये गये दीर्घवृत्त के अलावा किसी अन्य स्थान पर उत्तर चिह्नित करते हैं, तो उसका मूल्यांकन नहीं होगा।
- अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
- कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें।
- यदि आप उत्तर-पुस्तिका पर अपना नाम या ऐसा कोई भी निशान करते हैं तो परीक्षा के लिये अयोग्य घोषित कर दिये जायेंगे।
- आपको परीक्षा समाप्त होने पर प्रश्न-पुस्तिका एवं OMR उत्तर-पत्रक निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद उसे अपने साथ परीक्षा भवन से बाहर न लेकर जायें।
- परीक्षा समाप्ति पर परीक्षार्थी OMR उत्तर-पत्रक को फार्मन कारपी अपने साथ ले जा सकते हैं।
- केवल नीले/काले बाल प्वाइंट पेन का ही इस्तेमाल करें।
- किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।
- गलत उत्तरों के लिए कोई अंक काटे नहीं जायेंगे।

Paper Code : [20]
Paper-III [LIFE SCIENCES]

Note : • This paper contains Seventy Five (75) multiple choice questions, each question carrying two (2) marks.
नोट : • इस प्रश्नपत्र में पिच्छेत्तर (75) बहुविकल्पीय प्रश्न हैं। प्रत्येक प्रश्न के दो (2) अंक हैं।

1. Lipoproteins are those proteins which :
(A) Are readily soluble in lipids
(B) Are present between the lipid bilayers
(C) Can easily associated with lipids
(D) Are conjugated proteins having lipids as their prosthetic groups
2. The length of DNA fibre associated with a nucleosome is about (average size of a base = 3.4 Å) :
(A) 200 nm
(B) 147 nm
(C) 50 nm
(D) 68 nm
3. The least conserved among the five histones involved in formation of nucleosomes is :
(A) H₁
(B) H₂A
(C) H₃
(D) H₄
4. The molar concentration of H⁺ in a solution with pH 5 will be :
(A) 5
(B) 5 × 10⁻¹
(C) 10⁻⁵
(D) 5 × 10⁻⁵
5. The bond between amino acids in a protein is known as :
(A) Glycosidic
(B) Phosphodiester
(C) Ionic
(D) Peptide
6. How many atoms of oxygen will be there in 4.5 g of water ? (Avogadro number = 6.023 × 10²³)
(A) 1.5055 × 10²³
(B) 3.011 × 10²³
(C) 0.75275 × 10²³
(D) 6.022 × 10²³
7. The total number of proto filaments present in nine doublets of a flagella is :
(A) 207
(B) 229
(C) 260
(D) 233

8. Apoplastic movement of water in plants does not occur through :
- (A) Cell walls (B) Intracellular air spaces
(C) Plasmodesmata (D) Xylem vessels
9. The desmotubule a structural component of plasmodesmater is made up of :
- (A) Membranes (B) Microtubules
(C) Microfilaments (D) Intermediate filaments
10. A plasmid that can integrate reversibly with chromosome of its bacterial host and multiplies as an integrated part of the chromosome and is also capable of multiplying independently of the chromosome is known as :
- (A) Episomes (B) Exosomes
(C) Endosomes (D) Mesosomes
11. Giant chromosomes produced by interphase replication without division and consisting of many identical chromatids arranged side by side in a lable like pattern are known as :
- (A) Lampbrush chromosome (B) Polytene chromosomes
(C) Isochromosomes (D) Polychromosomes
12. Which one of the following has all correct matches between the stems of column A having (1) ribosomes (2) centriole, (3) mesosome and (4) Golgi bodies and Column B comprising (a) protein modification and targeting (b) bacterial DNA anchorage (c) microtubule organizing centre and (d) protein synthesis ?
- (A) 1-d, 2-c, 3-b, 4-a (B) 2-d, 1-c, 3-b, 4-a
(C) 1-b, 2-c, 3-d, 4-a (D) 1-a, 2-c, 3-b, 4-d
13. The drug tetracylin interfere with :
- (A) Peptidyl transferases (B) Aminoacyl-tRNA binding
(C) Cell wall synthesis (D) Translocation

14. What will happen if lac operator from region of DNA is deleted :
- (A) Cells will express β -galactosidase, permease and transacetylase even in absence of lactose
 (B) Cells will not express β -galactosidase, permease and transacetylase even in absence of lactose
 (C) Cells will express β -galactosidase and permease in absence of lactose
 (D) None
15. What percentage of RNA in most bacterial cells is mRNA :
- (A) Less than 5% (B) 10-15%
 (C) 35-40% (D) 50-60%
16. Which of the following is not directly related to gene regulation :
- (A) Acetylation of histones (B) Glycosylation in the endoplasmic reticulum
 (C) Splicing (D) Silencer
17. In bacteria, which of the following is not an inducer of an operon :
- (A) Allolactose (B) IPTG
 (C) Tryptophan (D) L-arabinose
18. Select the item having all the correct matches between column A and column B :

Column A	Column B
P. Transgenic	1. Catalytic RNA
Q. Proteome	2. Polyadenylate polymerase
R. Ribozyme	3. Complement of a protein expressed by a genome
S. Poly-A-tail	4. A cell having foreign gene
(A) P-3, Q-2, R-4, S-1	(B) P-2, Q-1, R-4, S-3
(C) P-4, Q-3, R-1, S-2	(D) P-1, Q-4, R-2, S-3

19. Select the correctly matched option :

Column A

Column B

- | | |
|--|----------------------------|
| P. General name for long, linear highly charged polysaccharides composed of a repeating pair of sugar, one of which is always an amino sugar that is found covalently linked to a protein core in the extracellular matrix | 1. Fibronectin |
| Q. Type of collagen molecule that assembles into ropelike structures and larger cable like bundles | 2. Elastin |
| R. Extracellular matrix protein that binds to cell surface integrins to promote adhesion of cells to the matrix and to provide guidance to migrating cells during embryogenesis | 3. Fibrillar collagen |
| S. Hydrophobic protein that forms extensible fibers that give tissues their stretchability and resilience | 4. Glycosaminoglycan (GAG) |

(A) P-1, Q-4, R-3, S-2

(B) P-2, Q-1, R-4, S-3

(C) P-4, Q-3, R-1, S-2

(D) P-3, Q-2, R-4, S-1

20. Methotrexate a common cancer chemotherapeutic agent is :

(A) an antimetabolite drug

(B) an alkylating agent

(C) an antibiotic

(D) a topoisomerase inhibitor

21. An action potential is a brief large electrical depolarization and repolarization of the neuronal plasma membrane caused by :
- (A) Inward movement of potassium ions and subsequent outward movement of sodium ions
 - (B) Inward movement of sodium ions and subsequent outward movement of potassium ions
 - (C) Short and pulsed movement of positively charged ions inward and negatively charged ions outwards
 - (D) Specific inward movement of Ca^{2+} ions followed by unidirectional movement of charge down the axon
22. Which subunit of G-protein generally stimulates neighbouring pores and enzymes :
- (A) α
 - (B) β
 - (C) γ
 - (D) β and γ
23. The cells involved in allergic reactions, having surface receptor for IgE antibodies and containing histamines are known as :
- (A) Neutrophils
 - (B) Monocytes
 - (C) Basophils
 - (D) Dendritic cells
24. Diacylglycerols, cAMP and calcium ions that stimulate protein kinases are known as :
- (A) First messenger
 - (B) Second messengers
 - (C) Neurotransmitters
 - (D) Agonists
25. The cytoplasmic male sterility in following plants is caused by the expression of abnormal proteins in :
- (A) Mitochondria
 - (B) Chloroplast
 - (C) Peroxisome
 - (D) Nucleus

26. How is the ABC model for floral identity in *Arabidopsis* reminiscent of the models for homeotic gene function derived from studies in *Drosophila* ?
- (A) In both organism, homeobox genes specify the identity of the region's of the mature organisms
 - (B) In both organisms, one homeotic gene is expressed at the two ends, a second expressed in to domains more central to that of the first, and a third expressed more centrally, thus contributing unambiguous identities to all regions of the organism
 - (C) The key responsibility of the homeotic genes is patterning of dorso-ventral symmetry
 - (D) In both organisms, the homeotic genes interact, so that it is often the combination of genes present that is critical in unambiguously specifying structures in adult.
27. Sperm storage area in *Caenorhabditis elegans* is called :
- (A) Uterus
 - (B) Spermatheca
 - (C) Testis
 - (D) Distal tip
28. In *Xenopus* and most vertebrates the factor that arrests the secondary oocyte in metaphase II of meiosis is :
- (A) Cytostatic factor
 - (B) Vitellogenesis factor
 - (C) Mitosis promoting factor
 - (D) Tumour neuosis factor
29. The three genes that control the development of flower parts appear to be homeotic genes because they control zones of development and the gene products regulates gene expression by binding to :
- (A) Transcription factor
 - (B) Elongation factor
 - (C) DNA directly
 - (D) mRNA directly
30. The portion of a developing limb bird where most *hox* genes are expressed is described as :
- (A) Proximal anterior
 - (B) Distal anterior
 - (C) Proximal posterior
 - (D) Distal posterior

31. If the light of wavelengths beyond 680 nm is only available for excitation :
- (A) ATP will not be synthesized (B) NADPT is not reduced
(C) PS I will not be active (D) PS II will be active
32. The alteration of plant growth pattern in response to a mechanical stimuli is known as :
- (A) Heliotropism (B) Thigmotropism
(C) Nostic response (D) Mechanotactio
33. Oxygen poisons the enzyme nitrogenase, therefore in heterocysts present in some cyanobacteria :
- (A) Photosystem I is absent (B) Photosystem II is absent
(C) Both are absent (D) Both are present
34. Which element is essential for the synthesis of plant growth regulator Indole-3-acetic acid ?
- (A) Zinc (B) Iron
(C) Calcium (D) Sodium
35. The hormone associated with the closure of stomata during drought is :
- (A) Indole-3-acetic acid (B) Gibberellic acid
(C) Abscisic acid (D) Kinetin
36. The immediate precursor of ethylene in plants is :
- (A) 1-aminocyclopropane-1-carboxylic acid (B) S-adenosylmethionine
(C) Aminoelhoxy-vingl glycine (D) Aminoxyacetic acid
37. Electrical synapse are characteristic of :
- (A) Vertebrates (B) Invertebrates
(C) Lions (D) Electric fish

38. Functions of hypothalamus are :

- (A) Autonomic and neuroendocrine control (B) Coordination of movement and memory
(C) Motor control and emotion (D) Higher cognitive function

39. A person with defective otolith sensory receptors :

- (A) Is deaf (B) Has a difficult time in maintaining balance
(C) Cannot detect external temperature (D) Has a faulty sense of smell

40. Autoimmune diseases are produced when :

- (A) immune system fails to recognize self antigens
(B) immune system becomes overactive
(C) immune system starts fight with pathogens
(D) All of the above

41. The cardiac cycle consists of systole and diastole, the ventricles contract at :

- (A) Diastole (B) Systole
(C) Both at systole and diastole (D) Neither at systole nor at diastole

42. Select the option that represents all the correct matches between items of column A and B.

Column A

1. Animal
2. Radiata
3. Bilateria
4. Cnidaria
5. Open circulatory system
6. Choanocytes

- (A) 1-5, 2-6, 3-1, 4-3, 5-4, 6-2
(C) 1-5, 2-6, 3-3, 4-1, 5-4, 6-2

Column B

1. Triploblastic
2. Sponges
3. Hydra
4. Insects
5. Heterotrophs
6. Diploblastic

- (B) 1-6, 2-5, 3-1, 4-3, 5-4, 6-2
(D) 1-5, 2-5, 3-1, 4-3, 5-2, 6-4

43. Deletion of a part of the long arm of chromosome 22 produces an abnormality known as :
- (A) Turner syndrome (B) Down syndrome
(C) Philadelphia chromosome (D) Klinefelter syndrome
44. A large number of hybrid diploid cells arising from the mating of two alanine-requiring mutants of *E. coli* can synthesize their own alanine. This observation tells us that the new phenotype most likely arose as a result of :
- (A) back mutations (B) cis complementation
(C) trans complementation (D) transposable elements
45. The type of gene regulation governing the tryptophan operon of *E. coli* is described as :
- (A) Positive inducible (B) Negative inducible
(C) Attenuation (D) Feedback inhibition
46. Any variation in chromosomal number that does not involve whole sets of chromosomes :
- (A) Allopolyploidy (B) Aneuploidy
(C) Triploidy (D) Euploidy
47. The distances between bacterial genes as determined from interrupted conjugation experiments are measured in units of :
- (A) Recombination (B) Micrometer
(C) Percentage of genome (D) Minutes

48. A type of allelic interaction in which a phenotype of a heterozygote is outside the phenotypic units of the corresponding homozygotes is called :

- (A) Variance
- (B) Over dominance
- (C) Heterosis
- (D) Continuous variation

49. Chemotrophic bacteria are :

- (A) Primary consumer
- (B) Primary producer
- (C) Secondary consumer
- (D) Decomposer

50. What characteristics are commonly used to identify the biomass of earth ?

- (A) Temperature
- (B) Precipitation
- (C) Vegetation
- (D) Temperature and Precipitation only

51. Succession following a volcanic eruption is referred as :

- (A) Climax succession
- (B) Primary succession
- (C) Secondary succession
- (D) Seral stage

52. Which of the following has low lethality but high intimacy ?

- (A) Parasitoids
- (B) Predators
- (C) Parasites
- (D) Herbivores

53. As the number of individuals of the predatory species increases, the prey population :
- (A) Increases (B) Decreases
(C) Stabilizes (D) First increases and then begins to decrease
54. Two organisms that use the same resources, when those resources are in short supply are said to be :
- (A) Predators (B) Competitors
(C) Mutualists (D) Commensalists
55. Postzygotic isolating mechanisms are those in which :
- (A) Hybrid zygotes fail to develop (B) Hybrid zygotes develop abnormally
(C) Hybrids cannot be established in nature (D) All of the above
56. Evolution of genome is contributed by :
- (A) Whole genome duplication (B) Segmental duplication
(C) Loss of gene function (D) All of the above
57. The term "industrial melanism" refers to the process by which :
- (A) Darker individuals come to predominate over lighter individuals
(B) Lighter individuals come to predominate over darker individuals
(C) No dominance by either lighter individuals or darker individuals
(D) Lighter individuals come to predominate
58. Speciation occurs much more readily in the :
- (A) Presence of gene flow among population
(B) Absence of gene flow among population
(C) Presence or absence of gene flow among population
(D) Presence of gene flow among species

59. The DNA fingerprinting process involved :
- (A) Chain termination (B) Degenerate oligonucleotides
(C) VNTR Loci (D) RFLPs
60. To produce plants that are homozygous for all traits, the best choice is :
- (A) Cell suspension culture (B) Anther/pollen culture
(C) Protoplast culture (D) Callus culture
61. Germline gene therapy could potentially correct a genetic defect in a (n) :
- (A) Affected individual only
(B) Affected individual and his or her offsprings only
(C) Affected individual and all of his or her descendants
(D) Parents of an affected child
62. Which of the following assay is currently being used for the detection of *Helicobacter pylori*
- (A) Agglutination
(B) Enzyme-linked immunoabsorbent assay
(C) Immunodiffusion
(D) Flow Cytometry
63. Desensitization to an allergen involves injection of the allergen beneath the skin to induce production of the following immunoglobulins :
- (A) Ig A (B) Ig D
(C) Ig G (D) Ig E
64. In the creation of a microarray (biochip) fragments of DNA are placed on a :
- (A) Microscope slide (B) Circuit board
(C) Silicon chip (D) Membrane

65. Darwin proposed that :
- (A) Natural selection on variants with population leads to evolutionary changes
 - (B) Natural selection on variants may not lead to evolutionary changes
 - (C) Variation was not responsible for evolution
 - (D) Evolution is unpredictable
66. Phase contrast microscopy enables the viewing of unstained and thin objects by :
- (A) Converting phase differences to amplitude differences
 - (B) Making use of amplitude differences caused by the object
 - (C) Converting amplitude differences to phase differences
 - (D) Optically staining the object
67. What is the standard deviation for a sample of 10 calf body weight given below :
210, 215, 220, 225, 215, 205, 220, 210, 215, 225
- (A) ± 10
 - (B) ± 6.58
 - (C) ± 5.68
 - (D) ± 3.24
68. The best statistical method for finding the closeness between two sets of data is :
- (A) Correlation analysis
 - (B) Regression analysis
 - (C) Chi square test
 - (D) Student t-test
69. The correct hierarchical order of the following taxonomic terms is :
- (A) Family-Phylum-Class-Order
 - (B) Phylum-Order-Class-Family
 - (C) Class-Family-Phylum-Order
 - (D) Phylum-Class-Order-Family
70. In five-kingdom system of classification all prokaryotes have been put under :
- (A) Protista
 - (B) Monera
 - (C) Plantae
 - (D) Mycota

71. The organisms referred to as mycoplasmas are :

- (A) Eubacteria (B) Anchaebacteria
(C) Cyanobacteria (D) Mycobacteria

72. Which group of plants are referred to as amphibians of the plant kingdom ?

- (A) Xanthophytes (B) Bryophytes
(C) Chlorophytes (D) Pteridophytes

73. Swim bladder is present in :

- (A) Bony fishes (B) Frogs
(C) Aquatic snakes (D) Aquatic reptiles

74. Which one of the following correctly matches all the items of column A with those given in column B ?

Column A

Column B

- | | |
|---|------------------------|
| 1. The enzyme that synthesizes pre mRNA | (a) RNA polymerase I |
| 2. The enzyme that synthesizes m RNA | (b) RNA polymerase II |
| 3. The enzyme that synthesizes 4 S rRNA | (c) RNA polymerase III |
| 4. The enzyme that synthesizes t RNA | 4. RNA polymerase IV |
| (A) 1-a, 2-b, 3-c, 4-d | (B) 1-b, 2-c, 3-a, 4-c |
| (C) 1-c, 2-b, 3-c, 4-a | (D) 1-a, 2-b, 3-d, 4-c |

75. Which of the following is not a source for stem cells :

- (A) Early embryo (B) Umbilical cord blood
(C) Sperm and egg (D) Certain adult tissues