Test Booklet Code & Serial No.
प्रश्नपत्रिका कोड व क्रमांक

B

Paper-III
LIFE SCIENCE

Signature and Name of Invigilator

1. (Signature) .....

(Name) .....

2. (Signature) .....

(Name) .....

Seat No. | | | | | | |

(In figures as in Admit Card)

Seat No. .....

(In words)

OMR Sheet No. | | | | | | |

(To be filled by the Candidate)

APR - 34317

Time Allowed : 2½ Hours] **[Maximum Marks : 150**

Number of Pages in this Booklet : **20** Number of Questions in this Booklet : **75**

Instructions for the Candidates

1. Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
2. This paper consists of **75** objective type questions. Each question will carry *two* marks. *All* questions of Paper-III will be compulsory, covering entire syllabus (including all electives, without options).
3. At the commencement of examination, the question booklet will be given to the student. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as follows :
   (*i*) To have access to the Question Booklet, tear off the paper seal on the edge of this 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 missing pages/ questions or questions repeated or not in serial order or any other discrepancy should not be accepted and correct booklet should be obtained from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given. The same may please be noted.**
   (*iii*) After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
4. Each question 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 : where (C) is the correct response.

   (A) (B) ● (D)

5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only.** If you mark at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done at the end of this booklet.
8. If you write your Name, Seat Number, Phone Number or put any mark on any part of the OMR Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, you will render yourself liable to disqualification.
9. You have to return original OMR Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry the Test Booklet and duplicate copy of OMR Sheet on conclusion of examination.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table, etc., is prohibited.**
12. **There is no negative marking for incorrect answers.**

विद्यार्थ्यांसाठी महत्त्वाच्या सूचना

1. परिक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात लिहावा. तसेच आपणास दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
2. सदर प्रश्नपत्रिकेत **75** बहुपर्यायी प्रश्न आहेत. प्रत्येक प्रश्नास **दोन** गुण आहेत. या प्रश्नपत्रिकेतील **सर्व** प्रश्न सोडविणे अनिवार्य आहे. सदरचे प्रश्न हे या विषयाच्या संपूर्ण अभ्यासक्रमावर आधारित आहेत.
3. परीक्षा सुरू झाल्यावर विद्यार्थ्याला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनीटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून पहाव्यात.
   (*i*) प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्विकारू नये.
   (*ii*) **पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून पहावी. पृष्ठे कमी असलेली/कमी प्रश्न असलेली/प्रश्नांचा चूकीचा क्रम असलेली किंवा इतर त्रुटी असलेली सदोष प्रश्नपत्रिका सुरुवातीच्या 5 मिनिटातच पर्यवेक्षकाला परत देऊन दुसरी प्रश्नपत्रिका मागवून घ्यावी. त्यानंतर प्रश्नपत्रिका बदलून मिळणार नाही तसेच वेळही वाढवून मिळणार नाही याची कृपया विद्यार्थ्यांनी नोंद घ्यावी.**
   (*iii*) वरीलप्रमाणे सर्व पडताळून पहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा नंबर लिहावा.
4. प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उत्तरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा/निळा करावा.
   उदा. : जर (C) हे योग्य उत्तर असेल तर.

   (A) (B) ● (D)

5. या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे **ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत.** इतर ठिकाणी लिहीलेली उत्तरे तपासली जाणार नाहीत.
6. आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
7. प्रश्नपत्रिकेच्या शेवटी जोडलेल्या कोऱ्या पानावरच कच्चे काम करावे.
8. जर आपण ओ.एम.आर. वर नमूद केलेल्या ठिकाणा व्यतिरीक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खूण केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गाचा अवलंब केल्यास विद्यार्थ्याला परीक्षेस अपात्र ठरविण्यात येईल.
9. परीक्षा संपल्यानंतर विद्यार्थ्याने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापी, प्रश्नपत्रिका व ओ.एम.आर. उत्तरपत्रिकेची द्वितीय प्रत आपल्याबरोबर नेण्यास विद्यार्थ्यांना परवानगी आहे.
10. **फक्त निळ्या किंवा काळ्या बॉल पेनचाच वापर करावा.**
11. **कॅलक्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.**
12. **चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.**

Life Science
Paper III

Time Allowed : 2½ Hours] **[Maximum Marks : 150**

Note : This paper contains **Seventy Five (75)** multiple choice questions. Each question carries **Two (2)** marks. Attempt *All* questions.

1. Which of the following fishes is *not* a dipnoan ?

   (A) *Neoceratodus*

   (B) *Notopterus*

   (C) *Lepidosiren*

   (D) *Protopterus*

2. ..... is the outermost connective cover of a skeletal muscle.

   (A) Myomysium

   (B) Endomysium

   (C) Perimysium

   (D) Epimysium

3. The arteries are thicker-walled as compared to that of the veins. This helps in :

   (A) increased force of contraction of the veins as compared to by the arteries.

   (B) the arteries can exert more force of contraction than that of the veins.

   (C) O_2 diffusion can take place better in the arteries than in the veins.

   (D) CO_2 diffusion can take place better in the veins than in the arteries.

4. In birds and reptiles the primordial germ cells originate in the :

(A) Epiblast

(B) Hypoblast

(C) Germinal crescent

(D) Embryonic allantois

5. Which of the following are responsible for prevention of polyspermy ?

(A) Change in the mambrane potential of egg plasma membrane

(B) Cortical granule exocytosis/ cortical reaction

(C) Both (A) and (B)

(D) Molecular changes in the zona pellucida proteins

6. Damage of one of the following structure(s) resulted in loss of a Circadian rhythm. The structure is most likely to be :

(A) Liver

(B) Eyes

(C) Pituitary

(D) Suprachiasmatic nucleus.

7. When birds such as great tit are removed from their territory :

(A) they tend to be replaced by the same number of birds.

(B) the territories are left vacant

(C) they are replaced by the local birds to the exclusion of new members

(D) They are replaced by a greater number of birds

8. To overcome intracellular Leishmania infection host should preferably mount a :

(A) TH 1 response

(B) TH 2 response

(C) Mucosal immune response

(D) T cell-independent response

9. Which one of the following insects is used for the biological control of the weed *Lantana camara* ?

(A) Shoot fly

(B) Aphid

(C) Lantana bug

(D) Lantana weevil

10. In order to cover one hectare of an agricultural land, which type of sprayers among the following will require the lowest volume of spray solution ?

(A) hand sprayer

(B) foot sprayer

(C) knaspack sprayer

(D) power sprayer

11. The genome of which of the following virus obeys Chargaff's rule ?

(A) TMV

(B) Mu phage

(C) ϕx 174

(D) Adenovirus

12. The DNA protein ratio in chromatin in general is :

(A) 3 : 1

(B) 2 : 1

(C) 1 : 2

(D) 4 : 1

13. Binding of epinephrine to a G-protein-linked receptor causes adenyl cyclase to produce large amounts of :

(A) Inositol triphosphate

(B) cAMP

(C) cGMP

(D) G Protein

14. The limiting factor for productivity in an aquatic ecosystem is :

(A) Temperature

(B) Wind

(C) Light

(D) Water mass movement

15. Which one of the following groups of fishes is considered to be 'living fossil' ?

(A) Holocephali

(B) Coelocanths

(C) Elasmobranchs

(D) Dipnoi

16. Which animal of the following list is also called as white socks ?

(A) Rhinoceros

(B) Slender Loris

(C) Indian Gaur

(D) Pangolin

17. In the lakes the top consumer must be :

(A) fishes that eat phytoplankton

(B) fishes that consume detritus

(C) fishes that are piscivores

(D) fishes that eat zooplankton

18. The neuromasts present in the lateral line organ of fish serve as :

(A) chemoreceptor

(B) rheoreceptor

(C) gustoreceptor

(D) alfactoreceptor

19. During conjugation, if the F factor is attached to the bacterial genome, the donor is called as :

(A) F+

(B) F++

(C) Hfr

(D) F+ super strain

20. Epstein-Barr Virus (EBV) is *not* associated with :

(A) Infectious Mononucleosis

(B) Kaposis Sarcoma

(C) Burkitt's Lymphoma

(D) Nasopharyngeal carcinoma

21. Which of the following is used to remove excess metal ions from molasses for citric acid production by *A. niger* ?

(A) Potassium ferrocyanate

(B) Potassium permanganate

(C) Potassium hydroxide

(D) Calcium carbonate

22. *Staphylococcus aureus* is one of the important food-borne pathogen responsible for food-poisoning in India. Which of the following statements is most appropriate regarding this pathogen ?

(A) *S. aureus* is Gram negative

(B) Incubation time for staphylococcal food poisoning is very short because the organisms grow in food and produce heat-stalle enterotoxin in food

(C) Incubation time for staphylococcal food poisoning is 3 to 4 days

(D) *S. aureus* causes food poisoning because it produces endotoxin

23. A living microbe with reduced virulence that is used for vaccination is considered :

(A) Dormant

(B) Virulent

(C) Attenuated

(D) Denatured

24. The percentage of human peripheral blood T cells bearing a gamma delta T cell receptor is :

(A) 30–80%

(B) 1–5%

(C) 100%

(D) 0%

25. The follwing are some of the characteristic features of enzyme inhibitors. Which of the following are true with respect to competitive inhibitors ?

Select the *correct* answer from the options given below it :

(*i*) Competitive inhibition can be overcome by a sufficiently high concentration of substrate.

(*ii*) A competitive inhibitor diminishes the rate of catalysis by reducing the proportion of enzyme molecules bound to a substrate.

(*iii*) The competitive inhibitor binds only to the enzyme substrate complex

(*iv*) Competitive inhibitor can be used as drugs.

(A) (*i*), (*ii*), (*iii*), (*iv*)

(B) (*i*), (*ii*), (*iii*)

(C) (*ii*), (*iii*), (*iv*)

(D) (*i*), (*ii*), (*iv*)

26. Among the following three forms of DNA, which one has deeper major groove ?

(A) A-Form

(B) B-Form

(C) Z-Form

(D) Both A and Z forms

27. Thylakoid membranes of chloroplasts are rich in :

(A) gangliosides and cerebrosides

(B) sphingolipids and galactolipids

(C) sulfolipids and sphingolipids

(D) galactolipids and sulfolipids

28. In plants and some microorganisms, a metabolic pathway is operated that allows the conversion of acetyl CoA generated from fat stores into glucose. Which of the following is that pathway ?

(A) Citric acid cycle

(B) β oxidation

(C) Glyoxylate cycle

(D) Urea cycle

29. Maple syrup disease is caused due to defect in :

(A) the degradation of Tyrosine

(B) urea synthesis

(C) formation of Tyrosine

(D) the degradation of branched chain amino acids

30. The amount of energy that must be added to break a bond is exactly equal to the amount that is released upon formation of the bond. Which law of thermodynamics among the following is applicable to this situation ?

(A) First

(B) Second

(C) Third

(D) Fourth

31. Dam methylase show strand discrimination by :

(A) Methylation of Cytosine

(B) Methylation of Thymine

(C) Methylation of Guanine

(D) Methylation of Adenine

32. tRNA having an anticodon AAA will interact with one of the following amino acids during protein synthesis.

(A) phenylalanine

(B) Lysine

(C) Glycine

(D) Methionine

33. Rapid amplification of cDNA ends (RACE) is used :

(A) to obtain full length sequence of a transcript

(B) to detect a gene

(C) to detect protein DNA interaction

(D) to measure protein RNA interaction

34. DNA methylation at CpG island can be detected by :

(A) Regular sequencing

(B) Bisulphite sequencing

(C) Deep sequencing

(D) Single nucleotide polymorphism study

35. cDNA is used to express mammalian proteins in bacteria rather than genomic DNA. Which one of the following is the best explanation ?

(A) It is easier to done cDNA than genomic DNA of comparable size.

(B) It is easier to clone RNA than DNA.

(C) It is not possible to clone entire coding region of the gene.

(D) Most eukaryotic genes have introns that cannot be removed in bacteria.

36. The main principle behind Sanger's method of DNA sequencing.

(A) use of reverse transcriptase enzyme.

(B) use of thymidine dimers

(C) use of di-deoxy nucleotide analogues.

(D) use of ATP

37. Hallmark of Apoptosis is :

(A) DNA synthesis

(B) Nuclear fragmentation

(C) Nuclear division

(D) Fat deposition

38. Which of the following types of protein could be coded by a tumour-suppressor gene ?

(A) A protein that forms part of a growth factor signaling pathway

(B) A protein that codes for a DNA repair enzyme

(C) A protein that helps prevent apoptosis

(D) A protein that controls progression through the cell cycle.

39. A virus that kills its host is said to be :

(A) Lysogenic

(B) Temperate

(C) Lytic

(D) Lytic or Lysogenic but not temperate

40. The green fluorescent protein reporter construct transfection can be used to monitor :

(A) Cell size

(B) Intracellular gene expression

(C) DNA content

(D) Cell granularity

41. Somatic embryos obtained from cotyledonary explant of a diploid plant will be :

(A) Diploid

(B) Haploid

(C) Triploid

(D) Tetraploid

42. During the growth of animal cells in culture it is noticed that the cells do not look very healthy. After an investigation it was found that there is a lot of lactic acid in the culture medium. What is possibly *wrong* with this culture ?

(A) The cells have too much oxygen

(B) Ethyl alcohol is being produced in excess

(C) Glycolysis is being investigated

(D) The cells do not have enough oxygen

43. Cystic fibrosis is caused by a mutation in the gene for a transporter protein, cystic fibrosis transmembrane conductance regulator (CFTR). CFTR is an ion channel in the plasma membrane of epithelial cells. Which of the following channels does CFTR belong to ?

(A) Sodium channel

(B) Potassium channel

(C) Chloride channel

(D) Acetylcholine receptor channel

44. The main difference between active transport and facilitated diffusion is :

(A) in active transport the molecules move from areas of low concentration to areas of high concentration without spending energy.

(B) in diffusion the molecules move from areas of low concentration to areas of high concentration without spending energy.

(C) in active transport energy is consumed to move molecules againt a concentration gradient.

(D) although a carrier molecule may not be needed in active transport, diffusion cannot take place without a carrier molecule.

45. In fluorescence microscopy, the function of exciter filter is to remove all colours, but it allows only ..... to pass through.

(A) Green colour

(B) White colour

(C) Yellow colour

(D) Blue colour

46. What is the purpose of the fluidics system of a flow cytometer ?

(A) To serve as a buffer for cell maintenance.

(B) To dilute the concentration for the sample.

(C) To deliver sample appropriately to the interrogation point for the measurement.

(D) To provide a cushion to prevent cell death following excitation.

47. High performance liquid chromatography achieves better purification because of :

(A) High retention time

(B) High volumetric phase ratio

(C) Increased number of partition plates

(D) High pressure

48. Free radical content in a sample can be detected using spectroscopic technique :

(A) ESR

(B) NMR

(C) Fluorescence

(D) UV-visible absorption

49. One nanometer is equal to :

(A) 0.1 µm

(B) 0.01 µm

(C) 0.001 µm

(D) 0.0001 µm

50. For-UV CD spectra of proteins give infromation on :

(A) Primary structure

(B) Secondary structure

(C) Tertiary structure

(D) Quarternary structure

51. Half life of radioactive I^{131} is 8 days. If you have 200 micromoles of this isotope at one instant, how many micromoles will remain at the end of thirty two days ?

(A) 12.5

(B) 25

(C) 50

(D) 100

52. In general, which among the following groups is most resistant to ionizing radiations ?

(A) Thermotolerant bacteria

(B) Spore-forming bacteria

(C) Viruses

(D) Fungi

53. Cell proliferation is generally measured by :

(A) Thymidine uptake assay

(B) Chemotaxis assay

(C) ELISA

(D) Chromium release assay

54. Most commonly used radioisotopes in biology emit :

(A) α-rays

(B) β-rays

(C) γ-rays

(D) Positrons

55. In binomial distribution of a sample where $n > 10$ and p is ≈ 0.5, the standard deviation is determined by :

(A) square root of p

(B) square root of pq

(C) square root of npq

(D) square root of np

56. Tautonyms are *not* accepted in :

(A) Botanical nomenclature

(B) Zoological nomenclature

(C) Virus nomenclature

(D) Bacteriological nomenclature

57. Linnaeus gave a system of nomenclature called as :

(A) Binomial

(B) Bimodal

(C) Biphasic

(D) Binary

58. The disappearance of tradition division of flowering plants into monocots and dicots is the major outcome of ..... system of classification.

(A) Bentham and Hooker's

(B) APG

(C) Engler and Prantl's

(D) Armen Takhtajan's

59. Trypsin was used to digest a protein, before its amino acid sequencing. The cleavage occurs at :

(A) Carboxyl side of lysine and arginine residues

(B) Carboxyl side of methionine residues

(C) Carboxyl side of aspartate and glutamate residues

(D) Carboxyl side of Phenylalanine Isoleucine and Valine residues

60. The structure which produces male gametes in prothallus are :

(A) Gametophytes

(B) Sporophytes

(C) Antheridia

(D) Archegonia

61. Presence of elators in the sporangium is a characteristic feature of .....

(A) *Equisetum*

(B) *Ceratopteris*

(C) *Marsilea*

(D) *Actinopteris*

62. In mature coconuts the liquid endosperm becomes milky and .....

(A) it does not contain free nuclei or cells

(B) it contains free nuclei only

(C) it contains cells only

(D) it contains free nuclei or cells.

63. In family *Rutaceae*, fruits are mainly :

(A) Schizocarp

(B) Capsule

(C) Hesperidium

(D) Siliqua

64. Regeneration of plants avoiding fertilization is known as :

(A) Apogamy

(B) Apospory

(C) Diplospory

(D) Syngamy

65. A pentacarpellary, pentalocular ovary has 2 ovules per locule. It develops into parthenocarpic fruit. The number of seeds in the fruit will be :

(A) 20

(B) 10

(C) 40

(D) 00

66. Common bread wheat *Triticum aestivum* is :

(A) Diploid

(B) Tetraploid

(C) Hexaploid

(D) Octoploid

67. In plants stomatal closure is induced by :

(A) High K^+ concentration

(B) Low CO_2 concentration

(C) Low pH

(D) ABA

68. The major ureide compounds that are used to transport nitrogen from sites where their deamination will provide nitrogen for amino acid and nucleoside synthesis are .....

(A) oxaloacetic acid, tyrosine and allantoin.

(B) allantoic acid, allantoin and citrulline.

(C) Citrulline, pyruvic acid and glutamate

(D) allantoic acid, methionine and oxaloacetic acid

69. In which of the following photosynthetic pigments, the central magnesium has been replaced by two hydrogens ?

(A) phycocyanin

(B) chlorophyll-b

(C) phaeophytin

(D) chlorophyll-a

70. Stomata remains open for CO_2 absorption in CAM plants during :

(A) Night time

(B) Early morning

(C) Day time

(D) Noon

71. A flash of ..... light during the dark period induces flowering in a long-day plant and the effect is reversed by a flash of ..... light.

(A) red, far-red

(B) far-red, red

(C) blue, red

(D) red, blue

72. Which of the following is electromagnetic radiations that are used in mutation breeding ?

(A) γ-rays

(B) α-rays

(C) β-rays

(D) UV-rays

73. Typically the insect leg consists of six segments :

(*i*) coxa,

(*ii*) femur,

(*iii*) pretarsus,

(*iv*) tarsus,

(*v*) tibia, and

(*vi*) trochanter.

Their *correct* proximal to distal sequence is :

(A) (*ii*)→(*vi*)→(*i*)→(*v*)→(*iii*)→(*iv*)

(B) (*ii*)→(*i*)→(*vi*)→(*iii*)→(*iv*)→(*v*)

(C) (*i*)→(*vi*)→(*ii*)→(*v*)→(*iv*)→(*iii*)

(D) (*i*)→(*ii*)→(*iii*)→(*iv*)→(*v*)→(*vi*)

74. The coelom of animals belonging to the phyla ..... develops by the process of schizocoele.

(A) Porifera, coelenterata, Platyhelminthes

(B) Annelida, Arthropoda, Mollusca

(C) Pogonophora, Nematoda, Chaetognatha

(D) Echinodermata, Chordata

75. Urochordates show resemblance to invertebrates like Molluscs *except* in :

(A) Presence of cartilage

(B) Presence of pericardium and pancreatic tissue

(C) Presence of radula

(D) Ammonia as excretory product

ROUGH WORK