Test Booklet Code & No.
प्रश्नपत्रिका कोड व क्र. **A**

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)

MAY - 34316

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.

   

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 आपणांस 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.

   

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. The biosystematic category comparium is equivalent to ..... of conventional taxonomy.

   (A) Subspecies

   (B) Species

   (C) Genus

   (D) Family

2. Haplo-diploid life-cycle occurs in :

   (A) Bacillariophyta

   (B) Euglenophyta

   (C) Rhodophyta

   (D) Cyanophyta

3. Sporophyte dependent gametophytes are present in :

   (A) Polygonum

   (B) Psilotum

   (C) Pteris

   (D) Pteridium

4. Which of the following is *not* incompatible mating ?

   (A) $S_1\ S_2 \times S_1\ S_2$

   (B) $S_2\ S_3 \times S_2\ S_3$

   (C) $S_3\ S_4 \times S_3\ S_4$

   (D) $S_1\ S_2 \times S_3\ S_4$

5. ..... is a potential petrocrop.

(A) *Litsea polyantha*

(B) *Magnolia sphenocarpa*

(C) *Jatropha curcas*

(D) *Symplocos grandiflora*

6. Net assimilation of CO_2 takes place with the help of ..... of C_4 plants.

(A) PEPcase in mesophyll cell cytoplasm

(B) RUBISCO in bundle sheath cell chloroplast

(C) PEPcase in bundle sheath cell chloroplast

(D) RUBISCO in mesophyll cell chloroplast

7. The pigment phytochrome is converted from Pr to Pfr form by absorbing :

(A) Red light

(B) Far Red light

(C) Infrared light

(D) Ultraviolet light

8. Which of the following breeding methods is *not* linked to self-pollinated crops ?

(A) Pedigree method

(B) Bulk method

(C) Mass selection method

(D) Double haploid technique

9. ..... gene pool is used rarely in breeding programmes.

(A) Primary

(B) Secondary

(C) Tertiary

(D) Quaternary

10. Why micropropagation is *not* popular scientifically due to ?

(A) contamination is a major problem

(B) genetic stability is uncertain

(C) capital intensive

(D) desired skilled labour is not available

11. Which of the following is a deuterostome phylum ?

(A) Pterobranchia

(B) Chaetognatha

(C) Bryozoa

(D) Arthropoda

12. Which of the following is *not* a subgroup of the phylum Chordata ?

(A) Cephalochordata

(B) Hemichordata

(C) Agnatha

(D) Urochordata

13. Which of the following is the contractile protein of a muscle fibre ?

(A) Actin

(B) Troponin

(C) Mysoin

(D) Tubulin

14. The initial effect of arrival of a wave of depolarization at the axon terminal of a neurosecretory cells is :

(A) influx of sodium ions

(B) opening of clacium ionic channels

(C) release of neurohormone into circulation

(D) interaction of neurohormone vesicles with the plasma membrane of axon terminal

15. The male sex differentiation in the echiurid worm *Bonellia* is :

(A) governed by the temperature of sea water in which the larvae live

(B) determined by an XO type of chromosomal interaction

(C) caused when the larvae come in contact with bonellin secreted by the female

(D) induced when the number of females becomes very large

16. Which of the following (in sperm) is primarily responsible for hydrolytic activity during sperm-egg interaction ?

(A) ZP-1

(B) Acrosin

(C) Spermease

(D) Glycolipase

17. ..... is an example of divergent evolution.

(A) Batesian mimicry

(B) Adaptive radiation

(C) Industrial melanism

(D) Wings of insects and bats

18. The male ..... is *not* involved in the care of its young.

(A) sea-horse

(B) dung beetle

(C) moorhen

(D) mid-wife toad

19. Hookworm causes the disease :

(A) Ancylostomiasis

(B) Ascariasis

(C) Enterobiasis

(D) Elephantiasis

20. Sleeping sickness is transmitted by :

(A) *Anopheles stephensi*

(B) *Culex fatigans*

(C) *Glossina palpalis*

(D) *Phlebotomus argentipes*

21. The effects of chemical substances can occur due to contaminant transfer between living organisms along with their toxicological effects at various levels. The level at which responses are based on direct biological effects including mortality, behavioural changes and physiological impairment is :

(A) Population level

(B) Organism level

(C) Community level

(D) Ecosystem level

22. In polarized cells (e.g. epithelial cells) internalized receptor across the cell to the opposite domain of the plasma membrane, a process is called :

(A) Phagocytosis

(B) Transcytosis

(C) Pinocytosis

(D) Endocytosis

23. The category given to protection of a species in its occupancy area which encapsulates other species is :

(A) Umbrella species

(B) Flagship species

(C) Threatened species

(D) Keystone species

24. Which of the following is an example of numerical change in chromosome number ?

(A) Down's syndrome

(B) Progeria syndrome

(C) Xeroderma pigmentosum

(D) Parkinson's disease

25. Chemicals like peroxides and metal ions such as Fe^{2+} and Cu^{2+} can cause mutations in DNA by :

(A) Converting thymine to uracil

(B) Introducing double-strand break

(C) Inducing single-strand break of phosphodiester bond

(D) Causing transversion of bases

26. Lampbrush chromosome of *Xenopus* is a good experimental system to study :

(A) DNA replication

(B) *r*RNA gene transcription

(C) DNA recombination

(D) Chromosomal aberration

27. Which of the following cellular signaling pathways is involved in macromolecular export through nuclear pore complex in mammalian cells ?

(A) receptor tyrosine kinase

(B) JAK-STAT

(C) Ran-GTP

(D) G-protein coupled receptor

28. Water readily dissolves charged biomolecules by replacing ..... .

(A) water molecules by solute molecules

(B) solute-solute hydrogen bonds by solute-water hydrogen bonds

(C) big molecules by small molecules

(D) positive charges by negative charges

29. Food webs based on the impact of species on the structure of community are called :

(A) Energy flow food webs

(B) Functional food webs

(C) Connectedness webs

(D) Source webs

30. The pyramid of biomass is always :

(A) in upright position

(B) in inverted position

(C) subject to reversals

(D) subject to no change

31. Reverse transcriptase is an enzyme unique to the retroviruses. Its function includes all the following activities *except* :

(A) DNA-dependent DNA polymerase activity

(B) RNA polymerase activity

(C) RNA-dependent DNA polymerase activity

(D) Integration activity

32. Mycoplasma are bacterial cells that :

(A) fail to reproduce on artificial media

(B) have a rigid cell wall

(C) are resistant to penicillin

(D) stain well with Gram's stain

33. Ideally, an antibiotic should focus on a microbial target not found in mammalian cells. By this standard, which of the following antibiotic agents would be expected to be most toxic to humans ?

(A) Penicillin

(B) Mitomycin

(C) Bacitracin

(D) Vancomycin

34. After the formation of products in the biorector, it undergoes through some processes, before a finished product to be ready for marketing is called :

(A) Elution

(B) Downstream processing

(C) Inoculation

(D) Upstream processing

35. Which of the following protein plays a central role in determining the choice between the lytic and lysogenic cycles of λ phage ?

(A) N protein

(B) CII protein

(C) Cro protein

(D) Q protein

36. Exogenous antigens are presented to T lymphoctes via :

(A) MHC class I molecules

(B) MHC class II molecules

(C) MHC class III molecules

(D) Interleukins

37. A transmembrane signal receptor protein or related molecules with roles in innate immunity came to be known as :

(A) Pattern recognition receptor

(B) Toll-like receptors

(C) Complement proteins

(D) Lipopolysaccaride receptor

38. The forces that hold the non-polar regions of the molecules together are called :

(A) hydrophilic interaction

(B) hydrophobic interaction

(C) ionic interaction

(D) amphipathic interaction

39. How many base pairs per helical turn are present in short stretches of Z-DNA in bacteria ?

(A) 11

(B) 10.5

(C) 12

(D) 9

40. The enzymatic activity of the L19 IVS ribozyme results from :

(A) Transesterification

(B) Phosphodiester bond hydrolysis

(C) Covalent bond formation

(D) Triphosphate bond cleavage

41. All of the following statements about allosteric enzymes are true, *except* :

(A) allosteric enzymes display Michaelis-Menten kinetics

(B) allosteric enzymes are often subject to feedback inhibition

(C) allosteric effectors can act to either increase or decrease affinity for substrates at the active sites

(D) allosteric enzymes are often regulated by binding of ligands to sites different than the active sites

42. In coordinated control of metabolism, malate can cross the mitochondrial membrane and give rise to oxaloacetate in the cytosol, which further biotransforms to ..... .

(A) Proline, arginine and glutamine

(B) Lysine, threonine and asparagine

(C) Phenylalanine, tryptophan and tyrosine

(D) Lucine and lysine

43. Which of the following enzyme is carrying reversible reaction in glycolysis ?

(A) Hexokinase

(B) Phosphofructokinase

(C) Phosphoglycerate kinase

(D) Pyruvate kinase

44. Which of the following reactions will not proceed in the direction written, assuming that the reactants are initially present in a 1 : 1 molar ratio ?

(A) ATP + Creatine $\rightarrow$ Creatine Phosphate + ADP

(B) ATP + Glycerol $\rightarrow$ Glycerol 3-phosphate + ADP

(C) ATP + Fructose $\rightarrow$ Fructose 6-phospahte + ADP

(D) ATP + Glucose $\rightarrow$ Glucose 6-phosphate + ADP

45. Coupling of oxidation and phosphorylation can be demonstrated by using oligomycin. This antibiotic inhibits which of the following process ?

(A) Inhibition of electron transfer

(B) Inhibition of ATP synthase

(C) Uncoupling of phosphorylation from electron transfer

(D) Inhibition of ATP-ADP exchange

46. Which one of the following genes is involved in colon carcinoma ?

(A) NF-KB

(B) APC

(C) EGFR

(D) BRCA1

47. Inteins are :

(A) external or internal segments of proteins that are removed by proteolysis resulting in an active protein

(B) external segment of proteins that are added to other proteins by protein ligase

(C) Internal segments of proteins that are removed after translation with the external segments becoming linked together

(D) External segments of proteins that are covalently attached to lipids for membrane insertion

48. For transcriptome analysis of a cell one estimates :

(A) all RNA molecules present in a cell

(B) protein coding RNA molecules present in a cell

(C) ribosomal RNA molecules present in a cell

(D) transfer RNA molecules present in a cell

49. The principle of genetic linkage refers to :

(A) the fact that the different levels for a given gene will be located at the same position in a chromosome

(B) the discovery that multiple genes are responsible for some traits

(C) the observation that some genes will be inherited together if they are located in the same chromosome

(D) the observation that darkly staining regions of chromosomes do not contain genes

50. Promoter escape in transcription means :

(A) transition of closed complex to open complex

(B) movement of RNA polymerase away from the promoter region and its commitment to making RNA transcript

(C) release of RNA polymerase from the preinitiation complex so that no transcript is syntherized

(D) transition of open complex to ternary complex

51. In bacteria which of the following enzymes remove the RNA primer present at the start of each okazaki fragment :

(A) DNA polymerase I

(B) DNA polymerase III

(C) DNA polymerase II

(D) RNase H

52. Lateral gene transfer includes all of the following DNA exchanges, *except* :

(A) The transfer of genes from bacteria to archea

(B) The transfer of genes from archea to bacteria

(C) The transfer of genes from one species to another

(D) The transfer of genes by micromanipulation

53. Tryptophan operon is :

(A) – vely repressed

(B) + vely induced

(C) – vely induced

(D) + vely repressed

54. Codon-anticodon pairing occurs by :

(A) Covalent bonds

(B) Electrostatic interactions

(C) Hydrogen bonds

(D) Hydrophobic interactions

55. Which of the following modifications in the core histones in a chromatin indicates its active conformation for transcriptions of genes contained in it ?

(A) Methylation

(B) Acetylation

(C) Ubiquitination

(D) Phosphorylation

56. Why cytochrome P 450 mediated reactions are usually called as mixed function oxidases ?

(A) Cytochrome P 450 is involved in both oxidation and reduction of xenobiotics

(B) One atom of oxygen is reduced to water and other is used for oxidation of xenobiotics

(C) Cytochrome P 450 and cyt. P 450 reductase are involved in biotransformation

(D) These reactions are the combination of phase I and II

57. RNA tumor virus can be oncogenic and lead to cell transformation because it possesses :

(A) LTRS

(B) GAG proteins

(C) Protooncogene

(D) V-onc

58. All DNA polymerases are template dependent, *except* :

(A) DNA polymerase I

(B) Sequenase

(C) Terminal deoxynucleotidyl transferase

(D) DNA polymerase and primase

59. Match the following and select the correct answer from the codes given below :

(1)	PCR	(p)	For hybridisation
(2)	Probe	(q)	For gene amplification
(3)	Electrophoresis	(r)	For monoclonal antibody production
(4)	Hybridoma	(s)	For DNA fragment separation

Codes :

(A) (1)—(p), (2)—(q), (3)–(r), (4)—(s)

(B) (1)—(q), (2)—(s), (3)–(p), (4)—(r)

(C) (1)—(q), (2)—(p), (3)–(s), (4)—(r)

(D) (1)—(p), (2)—(q), (3)–(s), (4)—(r)

60. The genetically modified (GM) brinjal in India has been developed for :

(A) enhancing shelf life

(B) insect resistance

(C) drought resistance

(D) enhancing mineral content

61. Liposome encapsulated drugs are good candidates for drug targeting against :

(A) intracellular parasites

(B) extracellular parasites

(C) free living parasites

(D) gut dwelling parasites

62. Mark the correct statement for Na-K ATPase. It exchanges :

(A) equal numbers of Na^+ and and K^+

(B) $3Na^+$ for $2K^+$

(C) $2K^+$ for 1 Na^+

(D) $2Na^+$ for $3K^+$

63. Mark the incorrect statement for most of the channels in a biological membrane, they :

(A) typically show less stereo-specificity than carriers

(B) are usually saturable

(C) are mostly oligomeric complexes

(D) allow transport of molecules from higher to lower concentration gradient

64. The kinetics of DNA-renaturation during nucleic acid hybridisation is given by which of the following expressions :

(A) $c/co = \frac{co + k_2 \cdot t}{1 + co \cdot t}$

(B) $c/co = \frac{1}{1 + co \cdot k_2 \cdot t}$

(C) $c/co = \frac{1 + co \cdot t}{k_2}$

(D) $c/co = k_2 \cdot t$

65. Biological specimens observed under a light microscope usually have a size range of :

(A) 1 nm to 100 nm

(B) 1 µm to 1 mm

(C) 100 nm to 1 µm

(D) 0.1 nm to 100 nm

66. Which of the following techniques does not require a primer ?

(A) nested PCR

(B) rt PCR

(C) nick translation

(D) random primer labelling

67. Which of the following protein purification techniques would be suitable for glycoproteins ?

(A) Lectin affinity chromatography

(B) Gel filtration chromatography

(C) Silica gel chromatography

(D) Ion exchange chromatography

68. You are carrying out sub-cellular fractionation by differential centrifugation. Which of the following cell component will pellet at the last ?

(A) Plasma membrane

(B) Lysosomes

(C) Microsomes

(D) Cytosol

69. If animal cells are cultured in DMEM medium with HEPES buffer, fetal cast serum and antibiotics to achieve 100% confluency, the colour of the medium will :

(A) change from pink to orange-yellow

(B) change from colourless to pink

(C) not change

(D) change from orange yellow to pink

70. One picomole of a 2.0 kb gene (X) with EcoRI ends was inserted at an EcoRI site present in the middle of another 1 p mole 2 kb gene (Y) by ligation. The ligated DNA product was completely digested by EcoRI. The resultant product will be :

(A) 2 p mole of a 3 kb DNA

(B) 1 p mole each of a 2 kb DNA and two 1 kb DNA

(C) 0.5 p mole of a 3 kb DNA

(D) 0.5 p mole each of a 2 kb DNA and two 1 kb DNA

71. Which one of the following is used as a tracking dye for agarose gel electrophoresis of nucleic acids ?

(A) Ethidium bromide

(B) Amido black

(C) Comassie brilliant blue

(D) Xylene-cynol

72. The fluorescence of fluorescein mercuric acetate when reacted with RNase in 1 m NaOH is decreased due to :

(A) disulfide bond

(B) peptide bond

(C) ionic bond

(D) protein lysis

73. A population of different types of cells expressing A and B cell surface antigens was subjected to analysis by flow cytometry using anti-A and anti-B antibodies labelled with two different fluorescent dyes. In order to calculate percentage of cells expressing A and/or B antigen(s) the data should be plotted as :

(A) A + B versus A

(B) A + B versus B

(C) B versus A

(D) A – B versus A or B

74. The mean for a binomial distribution of 10 samples having a probability of occurrence of 0.4 will be :

(A) 2

(B) 4

(C) 2^4

(D) 40

75. As compared to the distribution of actual sample values, the distribution of "Sample means" will show :

(A) A lower mean, no change in standard deviation

(B) A higher standard deviation, no change in mean

(C) No change in mean or standards deviation

(D) A lower standard deviation, no change in mean

ROUGH WORK