Roll No. | | | | | | | |

(Write Roll Number from left side exactly as in the Admit Card)

Signature of Invigilators

1. _____

2. _____

1415

Question Booklet Series **A**

PAPER–II

Question Booklet No.

Subject Code : 14

OMR Sheet No. .....

(To be filled by the candidate)

LIFE SCIENCES

Time : 1 Hour 15 Minutes *Maximum Marks: 100*

Instructions for the Candidates

1. Write your Roll Number in the space provided on the top of this page as well as on the OMR Sheet provided.
2. At the commencement of the examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and verify it:
   (i) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page.
   (ii) Faulty booklet, if detected, 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.
   (iii) After this verification is over, the Question Booklet Series and Question Booklet Number should be entered on the OMR Sheet and the OMR Sheet Number should be entered on this Question Booklet.
3. This paper consists of fifty (50) multiple-choice type questions. All the questions are compulsory. Each question carries *two* marks.
4. Each Question has four alternative responses marked: (A) (B) (C) (D). You have to darken the circle as indicated below on the correct response against each question.

   Example: (A) (B) ● (D), where (C) is the correct response.
5. Your responses to the questions are to be indicated correctly in the OMR Sheet. If you mark your response at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Rough work is to be done at the end of this booklet.
7. If you write your Name, Roll 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, such as change of response by scratching or using white fluid, you will render yourself liable to disqualification.
8. Do not tamper or fold the OMR Sheet in any way. If you do so, your OMR Sheet will not be evaluated.
9. You have to return the 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 question booklet and duplicate copy of OMR Sheet after completion of examination.
10. **Use only Blue/Black Ball point pen.**
11. **Use of any calculator or log table or mobile phone etc. is strictly prohibited.**
12. **There are no negative marks for incorrect answers.**

[Please Turn Over]

LIFE SCIENCES

PAPER-II

1. The cells with high levels of Maturating Promoting Factor (MPF) are present in:

(A) G_0 phase
(B) M phase
(C) G_1 phase
(D) S phase

2. Dense areas in smooth muscle contain

(A) α-actinin
(B) Vimentin
(C) Desmin
(D) Calmodulin

3. Choose the *incorrect* match based on malignant growth.

(A) Myeloma - Malignancy in connective tissue
(B) Carcinoma - Malignant growth of the epithelial cell
(C) Lymphoma - Malignancy of the lymph node
(D) Melanoma - Malignancy in pigment cell

4. Mycolic acids are characteristically found in the cell walls of:

(A) *Mycoplasma*
(B) *Mycobacterium*
(C) Myxobacteria
(D) *Methanobacterium*

5. An example of a glycerophospholipid involved in cell signaling is:

(A) Arachidonic acid
(B) Ceramide
(C) Phosphatidylinositol
(D) Vitamin A (retinol)

6. The heptad repeat of a coiled-coil protein is an imperfect repeats of a sequence of:

(A) 7 amino acids
(B) 17 amino acids
(C) 300 amino acids
(D) 30 amino acids

7. Which of the following has *no* DNA binding motif?

(A) Helix-turn-helix
(B) Zinc fingures
(C) Basic Helix-loop helix
(D) Isoleucine Zipper

8. Which one of the following is a stoichiometric co-factor of pyruvate dehydrogenase complex?

(A) TPP
(B) Lipoic acid
(C) CoA
(D) FAD

9. Calmodulin is made up of four EF-hand motifs, each of which can bind with

(A) A single Ca^{2+} ion
(B) Four Ca^{2+} ion
(C) Two Na^{+} ion
(D) Two K^{+} ion

10. The entry of ADP into mitochondria is coupled to the exit of ATP by

(A) Malate - aspartate shuttle
(B) Glycerol 3-phosphate shuttle
(C) Dicarboxylate carrier
(D) ATP-ADP translocase

11. The antibiotic streptomycin prevents the correct initiation of protein synthesis in prokaryotes by interfering with the binding of ribosome to

(A) fMet - tRNA

(B) 28S ribosomal RNA

(C) 16S ribosomal RNA

(D) ADP-ribose

12. Cytochrome bf links

(A) Photosystem II to photosystem I

(B) Photosystem I to cytochrome b

(C) Cytochrome f to cytochrome c

(D) Photosystem I to ferredoxin

13. Which one of the following hormones promotes insulin resistance and is secreted from adipocytes?

(A) RBP4

(B) Glucagon

(C) Oxytocin

(D) GH-RH

14. Which one of the following reproduce by budding?

(A) *Bacillus subtilis*

(B) *Lactobacillus lactis*

(C) *Clostridium pasteurianum*

(D) *Rhodopseudomonas acidophila*

15. Select the enzyme which is irreversibly inhibited in individuals suffering from *alcoholic* scurvy.

(A) Thiolase

(B) Carbonic anhydrase

(C) Propyl hydroxylase

(D) CoA transferase

16. Digitalis specifically inhibits the $Na^+ - K^+$ pump by blocking its

(A) Phosphorylation

(B) Dephosphorylation

(C) Isomerization

(D) Acetylation

17. Nitric oxide synthase contributes to erection by

(A) raising cAMP levels that relax smooth muscle and increase blood flow.

(B) blocking PDE to increase cGMP levels that release smooth muscle and increase blood flow.

(C) activating soluble guanylate cyclases to increase cGMP levels that relax smooth muscle and increase blood flow.

(D) raising intracellular Ca^{2+} concentrations that relax smooth muscles and increase blood flow.

18. The HIV has a protein coat and a genetic material which is

(A) ss DNA

(B) ds DNA

(C) ss RNA

(D) ds RNA

19. Pleiotrophy occurs when a gene has

(A) complementary gene elsewhere

(B) a small effect on one trait

(C) reversible effects on the phenotype depending on age

(D) many effects on the phenotype

20. Chromosomal banding and somatic cell hybridization are two useful techniques for

(A) haploid mapping

(B) diploid mapping

(C) assigning antosomal alleles to a specific chromosome

(D) understanding mechanism of recombination

21. Which one of the following syndrome-karyotype matches is incorrect?

(A) Cri-du-chat-Syndrome - 46, XX or XY, $5p^-$

(B) Edward Syndrome - 47, XX or XY + 18

(C) Down Syndrome - 47, XX or XY + 21

(D) Klinefelter Syndrome - 46, XXY

22. PCR mutagenesis is a simple method for generating:

(A) Transposon mutagenesis

(B) Insertional mutagenesis

(C) Directed mutagenesis

(D) Site-directed mutagenesis

23. Choose the correct statement.

(A) Methylation of lysine 4 or histone 3 represses transcription.

(B) Most of the methylated cytosine are present in CpG sequence, with up to 80% of the cytosine in the CpG.

(C) Methylation of the CpG sequence enhances the regulatory protein from binding their target sequence.

(D) Z DNA can he destabilized by methylation.

24. Which one of the following is responsible for speciation?

(A) Natural selection

(B) Mutation

(C) Reproductive isolation

(D) Random mating

25. The technique by which the rate of molecular change to deduce the time of divergence between two species or two taxa in the geologic history is referred as

(A) Molecular matrix

(B) Molecular clock

(C) Genetic drift analysis

(D) Molecular diversity analysis

26. Environmentally induced morphological variations resulting in better survival of an organism is said to be

(A) Phenotypic probability

(B) Phenotypic plasticity

(C) Phenotypic disability

(D) Phenotypic originality

27. House sparrows that were killed in a severe snowstorm were found to have wings either markedly longer or shorter than the mean. The alive example has resulted from the process of

(A) Disruptive selection

(B) Directional selection

(C) Strangulated selection

(D) Stabilizing selection

28. Cytochrome oxidase gene of mtDNA used in phylogenetic study is termed as

(A) Bar body sequencing

(B) Bar councilling profile

(C) Transgenic studies

(D) Bar coding process

29. The maintenance of the sickle cell allele in human population in Central Africa is an example of

(A) Gene flow

(B) Heterozygous advantage

(C) Genetic drift

(D) Non random mating

30. RNA is marked as the first living molecule due to its

(A) Property of coding

(B) Enzymatic activity

(C) Absence of deoxyribose in prebiotic condition

(D) High propensity of polymerization

31. Evidences available from tortoises and finches of Galapago islands demonstrate the evolutionary process of

(A) Adaptive radiation
(B) Artificial selection
(C) Pangenesis
(D) Inheritance of acquired character

32. Which factor among the following is not responsible for altering the level of allelic frequency?

(A) Random mating
(B) Differential mutation rate
(C) Meiotic drive
(D) Natural selection

33. Which one among the following is not a short term selection in action?

(A) Rabbits' resistance to myxoma virus in Australia
(B) Bacterial resistance to antibiotics
(C) Altruistic behaviour of honey bee
(D) Pesticide resistance in insect pests

34. Which of the following was the objective of signing the 'Montreal Protocol'?

(A) Protection of wild life
(B) Protection of ozone layer
(C) Control over the use of insecticide
(D) Control of noise pollution

35. A specialist species has a

(A) wider niche and high efficiency of niche utilization.
(B) narrower niche and high efficiency of niche utilization.
(C) wider niche and low efficiency of niche utilization.
(D) narrower niche and low efficiency of niche utilization.

36. At which stage of sewage treatment, decomposer microorganisms are involved to digest organic matter?

(A) Primary treatment
(B) Secondary treatment
(C) Tertiary treatment
(D) Advanced treatment

37. Which of the following is a method of predicting the likelihood that a species will persist in a particular environment?

(A) Source-sink analysis
(B) Minimum viable population size
(C) Population dynamic analysis
(D) Population viability analysis

38. Which one of the following microorganisms is best used in biohydrometallurgy?

(A) *Streptococcus lactis*
(B) *Acidithiobacillus ferrooxidans*
(C) *Pseudomonas fluorescens*
(D) *Claviceps purpurea*

39. All are used for the preparation of microbial insecticides except

(A) *Bacillus thuringiensis*
(B) *Bacillus popilliae*
(C) *Bacillus sphaericus*
(D) *Bacillus megaterium*

40. Genealogy is the study of

(A) classification based on genes
(B) ancestral relationships and lineages
(C) relationships based on common morphological characters
(D) characters of an organism in relation to its environment

41. A specimen which is a duplicate of the holotype collected from same place at the same time by the same person is

(A) Lectotype
(B) Paratype
(C) Isotype
(D) Neotype

42. Two opposite forces operate in the growth and development of every population. One of them is related to the ability to reproduce at a given time. The force opposite to it is called

(A) Fenundity
(B) Mortality
(C) Environmental festistances
(D) Biotic potential

43. Which of the following would not qualify as an ecosystem service?

(A) Rain fall to earth
(B) Squirrels burying acorns
(C) Leaves falling on a forest floor
(D) Blowfly larvae infesting a deer carcass

44. Which one mentioned below indicates the differentiating diversity between habitats or communities and express the rate of change in number of species per unit change in habitat or species turn over across an environmental gradient?

(A) α – diversity
(B) β – diversity
(C) γ – diversity
(D) Simpson's index

45. The botanical name *Malus malus* is rejected because it is a

(A) Autonym
(B) Homonym
(C) Tautonym
(D) Basionym

46. Occurrence of pollinia in Asclepiadaceae and Orchidaceae is an example of

(A) Parallelism
(B) Homology
(C) Convergence
(D) Reversal

47. Which of the following types of sieve-tube plastids is confined to the Caryophyllales?

(A) S-type
(B) P I type
(C) P IV type
(D) P III type

48. Which of the following characters is considered a major evidence in favour of inclusion of *Paeonia* in a separate family Paeoniaceae?

(A) Unique embryogeny
(B) Peculiar embryo sac
(C) Pollen aggregation
(D) Exalbuminous seeds

49. Which of the following has the lightest wood?

(A) *Bombax ceiba*
(B) *Aeschynomene aspera*
(C) *Cedrella toona*
(D) *Lagerstroemia indica*

50. Betacyanin and betaxanthin pigments are present in many families of which of the following orders?

(A) Malvales
(B) Liliales
(C) Euphorbiales
(D) Caryophyllales

ROUGH WORK