

LIFE SCIENCES

Name & Signature of the Invigilator

PAPER-III
SEPT/13/04

ICR Answer Sheet No. :

Roll No. :

Roll Number in words :




Time : 2.30 Minutes

No. of Printed Pages : 20

Maximum Marks : 150

Instructions for the Candidates

- Write your Roll Number in the space provided on the top of this page.
- This paper consists of Seventy five (75) multiple choice type questions. All questions are compulsory.
- At the commencement of examination, the question booklet will be given to candidate. In the first 5 minutes, candidate is requested to open the booklet and compulsorily examine it as below
 - 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 and do not accept an open booklet.
 - 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 five minutes. Afterwards, neither the question booklet will be replaced nor any extra time will be given.
 - After this verification is over, the test booklet number should be entered in the ICR answer sheet and the ICR Answer Sheet number should be entered on this test booklet.
- Each item has upto four alternative responses marked (A), (B), (C) and (D). The answer should be a capital letter for the selected option. The answer letter should entirely be contained within the corresponding square.

Correct method  Wrong method  OR 
- Your responses to the items for this paper are to be indicated on the ICR Answer Sheet under Paper III only.
- Read instructions given inside carefully.
- Rough work is to be done in the end of the booklet only.
- You have to return the original ICR Answer Sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the examination hall. You are, however, allowed to carry duplicate copy of ICR sheet and test booklet on conclusion of the examination.
- Use black ball point pen.
- Use of any Calculators or log tables or any other electronic devices is prohibited.
- There shall be no negative marking.
- In case of any discrepancy in Gujarati and English version of questions the English version should be taken as final.

પરીક્ષાની અંગે માટે સુચનાઓ :

- આ પાનાની ટોચમાં દર્શાવેલી જગ્યામાં તમારો રોલ નંબર લખો.
- આ પ્રશ્નપત્રમાં બહુવિકલ્પિક ઉત્તરો ધરાવતા કુલ પંચોતેર (૭૫) પ્રશ્નો આપેલા છે. બધા જ પ્રશ્નો કરજિયાત છે.
- પરીક્ષાની શરૂઆતમાં ઉમેદવારને પ્રશ્નપુસ્તિકા આપવામાં આવશે. પ્રથમ ૫ મિનિટ દરમિયાન, ઉમેદવારે પ્રશ્નપુસ્તિકા ખોલી અને કરજિયાતપણે નીચે મુજબ પરીક્ષણ કરવું.
 - પ્રશ્નપુસ્તિકાનો વપરાશ કરવા માટે આ કવર પેજની ધાર પર આપેલ સીલ ફાડી નાખો. કોઈપણ સંજોગોમાં સીલ સ્ટીકર વગરની કે ખુલ્લી પ્રશ્નપુસ્તિકા સ્વીકારશો નહીં.
 - કવર પૃષ્ઠ પર લખાયેલ નિર્દેશાનુસાર પ્રશ્નપુસ્તિકાના પ્રશ્નો પુસ્તક અને સંખ્યાને અરુદ્ધરે વજાગી લો. ખામીયુક્ત પ્રશ્નપુસ્તિકા કે જેમાં પૃષ્ઠો/પ્રશ્નો ગોટક હોય, અથવા લખાણ હોય, અનુક્રમમાં અથવા કોઈ અન્ય કસ્ટ હોય અથવા કોઈપણ કારણે ખામીયુક્ત પ્રશ્નપુસ્તિકા સ્વીકારવી નહીં. અને જે ખામીયુક્ત પ્રશ્નપુસ્તિકા મળી હોય તેો નિરીક્ષક પાસેથી તુરંત જ બીજા સારી પ્રશ્નપુસ્તિકા માંગવી લેવી. આ માટે ઉમેદવારને પાંચ મિનિટનો સમયગાળો આપવામાં આવશે. જાકીયો, પ્રશ્નપુસ્તિકા મદલવામાં આવશે નહીં કે કોઈ વધારાનો સમય પણ આપવામાં આવશે નહીં.
 - આ પચાસકડી સમયાંત આપવાથી, ટેસ્ટ પુસ્તિકા નંબર ઠીક જવાંબ પત્રકમાં લખવો અને ICR જવાબ પત્રક નંબર પ્રશ્નપુસ્તિકા પર લખવો.
- પ્રશ્નપ્રશ્ન માટે ચાર ઉત્તર વિકલ્પ (A), (B), (C) અને (D) આપવામાં આવેલ છે. પસંદગીનો જવાબ માત્ર અંગ્રેજી કેપીટલ મુલાકાત દ્વારા જ આપવો. પસંદ કરેલ અંગ્રેજી કેપીટલ અક્ષર આપેલ માનમાં સંપૂર્ણ રીતે સમાઈ જાય તે રીતે લખવો.

સાચી રીત :



ખોટી રીત :



અથવા



- આ પ્રશ્નપુસ્તિકાના પ્રશ્નોના જવાબ અલગથી આપવામાં આવેલ ICR જવાબ પત્રકમાં પેપર-૩ લખેલ વિભાગમાં જ લખવા.
- અંદર આપેલ સુચનાઓ ધ્યાનપૂર્વક વાંચો.
- આ પ્રશ્નપુસ્તિકાની અંગે આપેલ પાંચુ રૂઠું કામ માટે છે.
- પરીક્ષા સમય પૂરો થઈ ગયા પછી ઓરીકનક ICR જવાબ પત્રક જ ને નિરીક્ષકને ફરજિયાત સોંપી દેવું અને કોઈપણ સંજોગોમાં પરીક્ષાખંડની બહાર જઈ શકશે નહીં. પરીક્ષા પૂર્ણ થયા માત્ર ઉમેદવાર પ્રશ્નપુસ્તિકા તથા ICR જવાબપત્રની સુવિધેટ કેપી પોતાની સાથે લઈ જઈ શકે છે.
- માત્ર સાચી પેન/કાલી બોલ પેન વાપરવી.
- કેલક્યુલેટર અને અન્ય ઇલેક્ટ્રોનિક પત્રોનો ઉપયોગ કરવાની મનાઈ છે.
- ખોટા જવાબ માટે નેગેટિવ માર્કિંગનું પ્રમાણ નહીં.
- પ્રશ્નપુસ્તિકાના કોઈ પ્રશ્નમાં અનુવાદ અને કોઈ વિવાદ/મતભેદ જણાય તો અંગ્રેજી વર્ઝન યોગ્ય ગણાશે.

SEAL

செயல்பாட்டுத் திட்டம்
பாடப்புள்ளி
பகுதி

பாடப்புள்ளி
பகுதி

பகுதி

பாடப்புள்ளி
பகுதி

பாடப்புள்ளி
பகுதி

LIFE SCIENCES

PAPER - III

Note : This paper contains SEVENTY FIVE (75) Multiple-choice questions, each question carrying TWO (2) marks. Attempt All questions.

1. Which of the following modifications is found in the glutamate residue in protein ?
 - (A) Acetylation
 - (B) Methylation
 - (C) Carboxylation
 - (D) Phosphorylation

2. Which of the following statements is *correct* ?
 - (A) Solubility of proteins at isoelectric point is maximum
 - (B) Solubility of proteins at isoelectric point is minimum
 - (C) Solubility of proteins is independent of isoelectric point
 - (D) Solubility of proteins is dependent on their size

3. Which of the following statements is *false* ?
 - (A) All biological processes have negative ΔG°
 - (B) Biological processes with positive ΔG° can only occur upon coupling with another process with higher negative ΔG°
 - (C) ΔG° varies with the concentrations of biological constituents of the process
 - (D) ΔG° does not describe the energetics of biological process

4. Which of the following statements is *correct* ?
- (A) Cellulose is glucose polymer of α 1 - 4 linkage
 - (B) Starch is glucose polymer of β 1 - 4 linkage
 - (C) Amylopectin has large number of β 1 - 6 linkage
 - (D) Cellulose is glucose polymer of β 1 - 4 linkage
5. Which of the following enzymes have common proteins ?
- (A) Pyruvate carboxylase and PEP carboxylase
 - (B) Pyruvate carboxylase and acetyl CoA carboxylase
 - (C) Pyruvate dehydrogenase and 2-ketoglutarate dehydrogenase
 - (D) Phosphofructokinase and pyruvate kinase
6. Which of the following is *correct* for the B-DNA structure ?
- (A) Sugar pucker is 2' endo and glycoside bond is syn
 - (B) Sugar pucker is 3' endo and glycoside bond is syn
 - (C) Sugar pucker is 2' endo and glycoside bond is anti
 - (D) Sugar pucker is 3' endo and glycoside bond is anti
7. Which of the following molecules is least likely to cross a cellular membrane by simple diffusion ?
- (A) Carbon dioxide
 - (B) Nitrogen
 - (C) Oxygen
 - (D) Water

8. The number of nuclear pores on nuclear membrane depends on :
- (A) Size of a cell
 - (B) Transcriptional activity of a cell
 - (C) DNA content of a cell
 - (D) Size of a nucleus
9. The lowest level of chromosome organization is :
- (A) 30 nm fiber
 - (B) Nucleosome
 - (C) Solenoid
 - (D) Chromosomal loops
10. What effect would you expect if gene expression of lac operon is completely repressed ?
- (A) Cell will become more efficient in energy production
 - (B) Lactose will accumulate and become toxic
 - (C) Lactose will not be converted into inducer
 - (D) Lactose will be converted into glucose
11. Which specific protein is formed in G2 phase ?
- (A) Histone
 - (B) Polymerase
 - (C) Scaffold protein
 - (D) Condensin
12. Golgi apparatus is *not* found in :
- (A) Nerve cell
 - (B) RBC.
 - (C) Germ cell
 - (D) Gland cell

13. Which of the following is *true* for the separation of proteins by gel filtration chromatography ?
- (A) Proteins with low molecular weight comes out first
 - (B) Proteins with high molecular weight comes out first
 - (C) Proteins entrapped into the pores of the gel matrix comes out in the increasing order of size
 - (D) Proteins entrapped into the pores of the gel matrix comes out in the decreasing order of size
14. Which of the following bond(s) does *not* play a role in the folding of common polypeptides ?
- (A) Hydrogen bonds between side chains
 - (B) Hydrogen bonds between backbone
 - (C) Salt bridges
 - (D) Disulfide bonds
15. Which of the ϕ and ψ values of amino acid residues are sterically allowed according to Ramachandran plot ?
- (A) Both ϕ and ψ values are negative
 - (B) Both ϕ and ψ values are positive
 - (C) The value of ϕ is negative and ψ is positive
 - (D) The value of ϕ is positive and ψ is negative

16. Which of the following sequence of proteins is involved in the initiation of bacterial DNA replication ?
- (A) Dna A, Dam A, Gyrase, Primase
 - (B) Dam A, Dna A, Gyrase, Primase
 - (C) Gyrase, Dna A, Dam A, Primase
 - (D) Dna A, Gyrase, Dam A, Primase
17. Which of the following bacterial genes has a unique promotor region ?
- (A) Citrate synthase
 - (B) *t*RNA
 - (C) *r*RNA
 - (D) Flagellin
18. During the initiation of bacterial transcription the σ factor does *not* bind to :
- (A) -10 consensus sequence
 - (B) -35 consensus sequence
 - (C) The region between -35 and -10 consensus sequence
 - (D) UP element
19. Which of the following statements about a protective immune response to intracellular bacterial pathogens is *not true* ?
- (A) It involves an antibody response
 - (B) It involves a cell mediated immune response
 - (C) It may involve CTLs
 - (D) It may involve Th_1 type of cells

20. Cytokines that are the soluble mediators of immune response are :
- (A) produced by only T helper cells
 - (B) produced by only B cells
 - (C) produced by only macrophages
 - (D) produced by macrophages, B and T cells
21. The cell junction that is responsible for maintaining the polarity of epithelial cells is :
- (A) gap junctions
 - (B) desmosomes
 - (C) tight junctions
 - (D) hemidesmosomes
22. In G-protein coupled receptors, the subunit of G-protein that has GTPase function is the following :
- (A) $G\alpha$
 - (B) $G\beta$
 - (C) $G\alpha\beta$
 - (D) $G\gamma$
23. Conversion of a proto-oncogene to an oncogene that results in cancer may be considered as :
- (A) loss of function mutation
 - (B) gain of function mutation
 - (C) activation of gene
 - (D) inactivation of gene
24. Bacteria may use the following for entry into host cells, *except* :
- (A) TLR
 - (B) EGF-R
 - (C) Mannose receptor
 - (D) Scavenger receptor

25. Fate mapping with vital dye for amphibian eggs was done by :
- (A) Vogt, 1929 (B) Mangold, 1931
(C) Spemann, 1930 (D) Von Boer, 1927
26. Haploid nuclei are found in :
- (A) Microspores and microspore mother cell
(B) Microspore mother cell and megaspore mother cell
(C) Microspore mother cell and megaspore
(D) Megaspore and microspore
27. The complete meiotic division occurs exactly during somatogenesis between the stages of :
- (A) Resting and dividing spermatogonia
(B) Primary and secondary spermatocytes
(C) Primary spermatocyte to spermatid level
(D) Spermatid to sperm
28. Apical initials are present in :
- (A) Root and shoot apex (B) Shoot and leaf apex
(C) Bud apex (D) Leaf apex
29. Differentiation process in life cycle of animals is a/an :
- (A) Specialised state (B) Unspecialised state
(C) Common state (D) Uncommon state

30. The main difference between necrosis and apoptosis is *not* :
- (A) Vesicular traffic (B) DNA fragmentation
(C) No change in cellular organelle (D) Apoptotic bodies
31. In senescent leaves, the first in the breakdown pathway of chlorophyll is :
- (A) Removal of magnesium (B) Opening of porphyrin structure
(C) Removal of phytol chain (D) Modification of tetrapyrrole
32. The reaction centre chlorophyll of photosystem I absorbs maximally at
in its reduced state.
- (A) 680 nm (B) 870 nm
(C) 620 nm (D) 700 nm
33. The regulation of the distribution of fixed carbon into various metabolic pathways is known as :
- (A) Distribution (B) Allocation
(C) Division (D) Gradation
34. A high Respiratory Quotient (RQ) value is indicative of :
- (A) Absence of respiration (B) Aerobic respiration
(C) Anaerobic respiration (D) Inhibition of respiration
35. Phototropins, the photoreceptors for phototropic bending in seedlings are :
- (A) Terpenes (B) Flavoproteins
(C) Lipids (D) Alkaloids

36. The only plant growth hormone that has been transported partly is :
- (A) Auxin (B) Abscisic acid
(C) Gibberellic acid (D) Ethylene
37. The process of differentiation of spermatozoa from a spermatid is known as :
- (A) Spermeiogenesis (B) Spermatogenesis
(C) Spermiation (D) Spermatolysis
38. Classic haemophilia is due to deficit of :
- (A) Factor IV (B) Factor VIII
(C) Factor IX (D) Factor XI
39. Inhibitory neurotransmitter is :
- (A) Ach (B) Dopamine
(C) Serotonin (D) GABA
40. Function of portal veins is to deliver :
- (A) Releasing hormones (B) insulin
(C) Octapeptides (D) Neurotransmitters
41. The type of placenta in human is :
- (A) Chorial (B) Desmochorial
(C) Haemochorial (D) Syndesmochorial

42. Example for ureotelic animals are :
- (A) Protozoan, Echinoderm, Fish
 - (B) Amphibian, Arthropod, Fish
 - (C) Amphibian, Fish, Protozoan
 - (D) Fish, Amphibian, Mammal
43. In a test-cross of a pea plant heterozygous for the recessive allele, wrinkled, what fraction of the progeny would be wrinkled ?
- (A) one third
 - (B) one half
 - (C) one fourth
 - (D) three fourth
44. Two genes A and B are 10 cm apart. What percentage of the progeny will be *aabb* when a cross is made between two individuals both with the genotype $\frac{AB}{a\ b}$?
- (A) ~10%
 - (B) ~20%
 - (C) ~40%
 - (D) ~80%
45. The process by which a bacterial cell picks up exogenous pieces of DNA directly from the media and incorporates it into its genome is called :
- (A) conjugation
 - (B) transduction
 - (C) transformation
 - (D) translocation

46. A lod score is :
- (A) measure of genetic diversity in a population
 - (B) measure of interference of one crossover with another
 - (C) measure of the number of human chromosomes in a hybrid cell
 - (D) measure of the probability of linkage between two loci
47. Which of the following diseases can be described as a genetic disease where the mutation originates in somatic cells ?
- (A) Huntington's disease
 - (B) Cystic fibrosis
 - (C) Cancer
 - (D) Sickle-cell anemia
48. Classification of which animals depends on the characteristics of the cytoskeleton present :
- (A) Porifera
 - (B) Platyhelminths
 - (C) Urochordata
 - (D) Fishes
49. The disease "Elephantiasis" is caused by :
- (A) Wuchereria
 - (B) Ascaris
 - (C) Fasciola
 - (D) Schistosoma
50. APG classification is essentially :
- (1) Cladistics
 - (2) Molecular taxonomy
 - (3) Numerical taxonomy
 - (4) Phylogenic in nature
- (A) (1)
 - (B) (1) + (2)
 - (C) (1) + (2) + (3)
 - (D) (1) + (2) + (4)

51. Symbiosis type of association between animals can be seen in :
- (A) Hermit crab and Sea anemone
 - (B) Hermit crab and Sycon
 - (C) Sea anemone and Unio
 - (D) Unio and Sycon
52. Polymorphism is seen mainly in the phylum of :
- (A) Coelenterata
 - (B) Annelida
 - (C) Arthropoda
 - (D) Porifera
53. According to nomenclatural type method Angiosperms should be correctly named as :
- (A) Embryophyta
 - (B) Maganoliophyta
 - (C) Spermatophyta
 - (D) Magnoliopsida
54. A food chain always starts with :
- (A) Nitrogen fixation
 - (B) Respiration
 - (C) Photosynthesis
 - (D) Decay
55. Which one of the following is the *correct* food chain ?
- (A) Algae — Daphnia — Dragonfly nymph — Newt — Grass snake
 - (B) Daphnia — Dragonfly nymph — Newt — Algae — Grass snake
 - (C) Grass snake — Newt — Dragonfly nymph — Daphnia — Algae
 - (D) Newt — Grass snake — Dragonfly nymph — Algae — Daphnia

56. In an aquatic ecosystem, the depth to which light penetrates is called :
- (A) Aphotic (B) Photic
(C) Euphotic (D) Non-photoc
57. Biomass produced by plants in oceans accounts for :
- (A) 85% (B) 75%
(C) 65% (D) 58%
58. Species diversity is higher in ecosystem experiencing :
- (A) No disturbance (B) Moderate disturbance
(C) High disturbance (D) Drastic disturbance
59. Who is the author of the book 'Origin of Species' ?
- (A) Mendel (B) Lamarck
(C) Darwin (D) Weisman
60. The organ which was once functional and well developed in an organism's evolutionary past but has become reduced or non-functional now is called :
- (A) Homodogous organ (B) Analogous organ
(C) Primordial organ (D) Vestigial organ
61. Cenozoic era refers to the age of :
- (A) Invertebrates (B) Fishes
(C) Birds (D) Mammals

62. The oldest microfossil found so far of age 3.5 billion years ago is :
- (A) Cyanobacteria (B) Coacervates
(C) Eobionts (D) Microspheres
63. Which of the following times was marked by the largest mass extinction of life in the history of earth ?
- (A) The end of Devonian
(B) The end of Cretaceous
(C) The end of Permian
(D) The end of Triassic
64. A clinical isolate of *Pseudomonas* is resistant to penicillins. Which of the following can be used to overcome the resistance ?
- (A) β -glucanase inhibitor
(B) β -glucosidase inhibitor
(C) β -lactamase inhibitor
(D) β -galactosidase inhibitor
65. B-lymphocytes that are responsible for producing antibodies do so :
- (A) Only after exposure to the corresponding antigen
(B) Even before exposure to the corresponding antigen
(C) Only after it interacts with an antigen presenting cell
(D) When (A) and (C) take place

66. Microorganisms are diverse as regards to their ability to produce metabolites. Which of the following is a source of microbial cellulose ?
- (A) *Acetobacter xyloxylicum*
 - (B) *Acetobacter diazotrophicus*
 - (C) *Azotobacter chroococcum*
 - (D) *Aeromonas maltophilia*
67. Rhizoremediation of pollutants is based on microorganisms associated with :
- (A) Bulk soil
 - (B) Root soil
 - (C) Spherosphere
 - (D) Phyllosphere
68. The first attempt at gene therapy in humans was using the following gene to overcome SCID :
- (A) gene for adenosine deaminase
 - (B) gene for tyrosinase
 - (C) gene for recombinase
 - (D) recombination activating gene
69. Which of the following may be used as a component of biosensor based on O₂ consumption ?
- (A) glucose oxidase
 - (B) superoxide dismutase
 - (C) catalase
 - (D) (A) and (C)

70. The molecular mass of a protein determined by gel filtration is 120 kDa. When its mass is determined by SDS-PAGE with and without β -mercaptoethanol, it is only 60 kDa. What is the most probable explanation for these observations ?
- (A) Protein is a dimer in which two identical chains are cross-linked by disulfide bond(s)
 - (B) Protein is a monomer of molecular mass 60 kDa but it is excluded from the gel matrix due to strong repulsion between the gel matrix and the protein
 - (C) Protein is a monomer but it is nicked into half its size by SDS
 - (D) Protein is most likely to be composed of two subunits having identical molecular mass
71. The following statement about radio immuno assay technique is *not true* :
- (A) It is based on antigen-antibody interaction
 - (B) The enzyme is radio labelled
 - (C) The antigen is radio labelled
 - (D) It is a competitive assay
72. Which of the following pictorial representations enable us to study relationship between variables ?
- (A) Histogram
 - (B) Pie-chart
 - (C) Bar diagram
 - (D) Linear diagram

73. In the experiments conducted by Meselson and Stahl for demonstrating semi-conservative nature of DNA replication, the following isotope was used :

(A) ^{15}N

(B) ^{14}C

(C) ^3H

(D) ^{32}P

74. Mechanical fixation in microscopy involves the use of :

(A) coagulant fixative

(B) non-coagulant fixative

(C) both (A) and (B)

(D) liquid nitrogen

75. Which of these techniques can be used for single cell recording ?

(A) CAT

(B) Patch clamp technique

(C) fMRI technique

(D) ECG

ROUGH WORK

SEAL