

# LIFE SCIENCE

Name & Signature of the Invigilator

PAPER-III

ICR Answer Sheet No. :

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OCT-14/04

Roll No. :

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Roll Number in words : .....

Time : 2.30 Hours]

No. of Printed Pages : 20

[Maximum Marks : 150

## Instructions for the Candidates

1. Write your Roll Number in the space provided on the top of this page.
2. This paper consists of **Seventy five (75)** multiple choice type questions. **All** questions are compulsory.
3. 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 :
  - (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 and do not accept an 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 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.
  - (iii) 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.
4. 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 

<b>A</b>
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 Wrong method 

<b>A</b>
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 OR 

<b>A</b>
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5. Your responses to the items for this paper are to be indicated on the ICR Answer Sheet under Paper III only.
6. Read instructions given inside carefully.
7. Rough work is to be done in the end of the booklet only.
8. 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.
9. Use black ball point pen.
10. Use of any Calculators or log tables or any other electronic devices is prohibited.
11. There shall be no negative marking.
12. In case of any discrepancy in Gujarati and English version of questions the English version should be taken as final.

## પરીક્ષાર્થીઓ માટે સૂચનાઓ :

1. આ પાનાની ટોચમાં દર્શાવેલી જગ્યામાં તમારો રોલનંબર લખો.
2. આ પ્રશ્નપત્રમાં બહુવૈકલ્પિક ઉત્તરો ધરાવતા કુલ પંચોતેર (૭૫) પ્રશ્નો આપેલા છે. બધા જ પ્રશ્નો ફરજિયાત છે.
3. પરીક્ષાની શરૂઆતમાં ઉમેદવારને પ્રશ્નપુસ્તિકા આપવામાં આવશે. પ્રથમ પ મિનિટ દરમિયાન, ઉમેદવારે પ્રશ્નપુસ્તિકા ખોલી અને ફરજિયાતપણે નીચે મુજબ પરીક્ષણ કરવું.
  - (i) પ્રશ્નપુસ્તિકાનો વપરાશ કરવા માટે આ કવર પેજની ધાર પર આપેલ સીલ ફાડી નાખો. કોઈપણ સંજોગોમાં સીલ સ્ટીકર વગરની કે ખુલ્લી પ્રશ્નપુસ્તિકા સ્વીકારશો નહીં.
  - (ii) કવર પૃષ્ઠ પર છપાયેલ નિર્દેશાનુસાર પ્રશ્નપુસ્તિકાના પ્રશ્નો પૂઠી અને સંખ્યાને બરાબર ચકાસી લો. ખામીયુક્ત પ્રશ્નપુસ્તિકા કે જેમાં પૂઠી/પ્રશ્નો ઓછા હોય, બે વાર છપાયા હોય, અનુક્રમમાં અથવા કોઈ અન્ય ફરક હોય અર્થાત કોઈપણ કારણે ખામીયુક્ત પ્રશ્નપુસ્તિકા સ્વીકારવી નહીં. અને જો ખામીયુક્ત પ્રશ્નપુસ્તિકા મળી હોય તો નિરીક્ષક પાસેથી તુરંત જ બીજી સારી પ્રશ્નપુસ્તિકા મેળવી લેવી. આ માટે ઉમેદવારને પાંચ મિનિટનો સમયગાળો આપવામાં આવશે. પછીથી, પ્રશ્નપુસ્તિકા બદલવામાં આવશે નહીં કે કોઈ વધારાનો સમય પણ આપવામાં આવશે નહીં.
  - (iii) આ ચકાસણી સમાપ્ત થાયપછી, ટેસ્ટ પુસ્તિકા નંબર ICR જવાબ પત્રકમાં લખવો અને ICR જવાબ પત્રક નંબર પ્રશ્નપુસ્તિકા પર લખવો.
4. પ્રત્યેક પ્રશ્ન માટે ચાર ઉત્તર વિકલ્પ (A), (B), (C) અને (D) આપવામાં આવેલ છે. પસંદગીનો જવાબ માત્ર અંગ્રેજી કેપીટલ મૂળાક્ષર દ્વારા જ આપવો. પસંદ કરેલ અંગ્રેજી કેપીટલ અક્ષર આપેલ ખાનામાં સંપૂર્ણ રીતે સમાઈ જાય તે રીતે લખવો.

સાચી રીત :



ખોટી રીત :



અથવા



5. આ પ્રશ્નપુસ્તિકાના પ્રશ્નોના જવાબ અલગથી આપવામાં આવેલ ICR જવાબ પત્રકમાં પેપર-૩ લખેલ વિભાગમાં જ લખવો.
6. અંદર આપેલ સૂચનાઓ ધ્યાનપૂર્વક વાંચો.
7. આ પ્રશ્નપુસ્તિકાની અંતે આપેલ પાનું રફ કામ માટે છે.
8. પરીક્ષા સમય પૂરો થઈ ગયા પછી ઓરીજનલ ICR જવાબ પત્રક જે તે નિરીક્ષકને ફરજિયાત સોંપી દેવું અને કોઈપણ સંજોગોમાં પરીક્ષાખંડની બહાર જઈ શકશો નહીં. પરીક્ષા પૂર્ણ થયા બાદ ઉમેદવાર પ્રશ્નપુસ્તિકા તથા ICR જવાબવહીની ડુપ્લિકેટ કોપી પોતાની સાથે લઈ જઈ શકે છે.
9. માત્ર કાળી પેન/કાળી બોલ પેન વાપરવી.
10. કેલ્ક્યુલેટર અને અન્ય ઈલેક્ટ્રોનિક યંત્રોનો ઉપયોગ કરવાની મનાઈ છે.
11. ખોટા જવાબ માટે નેગેટિવ ગુણાંકન પ્રથા નથી.
12. પ્રશ્નપુસ્તિકાના કોઈ પ્રશ્નમાં અનુવાદ અંગે કોઈ વિવાદ/મતભેદ જણાય તો અંગ્રેજી વર્ઝન યોગ્ય ગણાશે.



**LIFE SCIENCE**  
**PAPER - III**

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

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1. Which of the following decreases most rapidly with small increase in distance ?  
(A) van der Waals interactions      (B) Electrostatic interactions  
(C) Hydrogen bonding                (D) Hydrophobic interactions
  
2. Which of the following complex is *not* involved during electron transfer from NADH to oxygen ?  
(A) Complex I                              (B) Complex II  
(C) Complex III                             (D) Complex IV
  
3. Which of the following modifications is found in lysine present in proteins ?  
(A) Acetylation                             (B) Methylation  
(C) Phosphorylation                        (D) Hydroxylation
  
4. Which of the following pairs of polysaccharides has identical bonds ?  
(A) Cellulose and starch                  (B) Cellulose and glycogen  
(C) Glycogen and starch                  (D) Chitin and cellulose

5. Which of the following enzymes is *not* involved in the catabolism of fructose in liver of animals ?
- (A) Glyceraldehyde phosphate dehydrogenase
  - (B) Phosphofructokinase
  - (C) Phosphoglycerate kinase
  - (D) Enolase
6. Which of the following glycolytic enzyme is associated with mitochondria ?
- (A) Hexokinase
  - (B) Glucokinase
  - (C) Pyruvate kinase
  - (D) Enolase
7. Cystic fibrosis disease occurs due to which defective ion channel ?
- (A)  $\text{Na}^+$
  - (B)  $\text{Cl}^-$
  - (C)  $\text{Ca}^{++}$
  - (D)  $\text{H}^+$
8. Acidic pH in lysosomes is maintained by :
- (A) GTP dependent proton pump in membrane
  - (B) ATP dependent proton pump in membrane
  - (C) HCl in lysosome
  - (D) Acidic lysosomal enzymes

9. All are colourless plastids, *except* :

(A) Elaioplast

(B) Amyloplast

(C) Proteinoplast

(D) Rhodoplast

10. What is restriction point ?

(A) At which cell is prevented from entering through cell cycle

(B) At which cell becomes committed to proceed through cell cycle

(C) At which cell density is very high

(D) Both (A) and (B)

11. Which of these are most heterogeneous type of cytoskeletal elements ?

(A) Microtubules

(B) Microfilaments

(C) Intermediate filaments

(D) Both (A) and (C)

12. Membrane which covers the vacuole is called :

(A) Plasmalemma

(B) Cell membrane

(C) Tonoplast

(D) Epithelial membrane

13. Coiled coil structure of  $\alpha$ -keratin in animal hair is due to :
- (A) Disulfide bonds
  - (B) Hydrophobic interactions of side chains of amino acid residues
  - (C) Hydrogen bonds
  - (D) Salt bridges
14. The ABC excinuclease is essential in :
- (A) base excision repair
  - (B) methyl directed repair
  - (C) mismatch repair
  - (D) nucleotide excision repair
15. Which of the following combinations of techniques is used in 2-dimensional electrophoresis ?
- (A) Native gel electrophoresis followed by electrophoresis in the presence of urea
  - (B) Isoelectric focussing followed by SDS-PAGE
  - (C) SDS-PAGE followed by Isoelectric focussing
  - (D) Isoelectric focussing followed by native gel electrophoresis

16. Which of the following is *correct* for DNA replication ?
- (A) All the replicons in mammals undergo initiation of replication simultaneously
  - (B) The rate of replication in eukaryotes is shorter than that of bacterial cells
  - (C) Mammalian genome requires minimum 6 hours for replication to be completed
  - (D) The replicon size is bigger in yeast compared to animal cells
17. Which of the following enzymes has the highest polymerisation rate ?
- (A) Bacterial DNA polymerase-III
  - (B) Bacterial RNA polymerase
  - (C) T<sub>4</sub> RNA polymerase
  - (D) T<sub>7</sub> RNA polymerase
18. Which of the following processes does *not* involve hairpin RNA ?
- (A) Transcription attenuation of *trp* operon
  - (B) Rho dependent transcription termination
  - (C) Rho independent transcription termination
  - (D) Processes that involve riboswitches

19. Which one of these is not a function of macrophage ?
- (A) Phagocytosis
  - (B) Antigen presentation to B cells
  - (C) Porin mediated killing
  - (D) Producing cytokines
20. Monoclonal antibodies that are very commonly used in diagnostic tests are :
- (A) Produced by B cell hybridomas
  - (B) Produced by T cell hybridomas
  - (C) Produced by plasma cells
  - (D) Produced by monocytes
21. Which of the following is *not* a component of the extracellular matrix ?
- (A) Proteoglycans
  - (B) Glycosaminoglycans
  - (C) Profilin
  - (D) Collagen
22. Small G-proteins which are frequently part of signal transduction pathways are activated by :
- (A) Guanosine
  - (B) GTP
  - (C) GDP
  - (D) GMP



23. Which of the following is a tumor suppressor gene ?
- (A) myc (B) ras  
(C) GPCR (D) p53
24. Cholera toxin causes diarrhoea because of :
- (A) it interferes with signal transduction  
(B) it causes pores in epithelial cells  
(C) it kills epithelial cells  
(D) Both (A) and (B)
25. What acts as an inductor in animal embryonic development ?
- (A) Chordamesoderm (B) Mesoderm  
(C) Ectomesoderm (D) Endomesoderm
26. Micropyle in seed helps for the entry of :
- (A) Pollen tube (B) Male gamete  
(C) Air (D) Water
27. Which of these is required for successful metamorphosis ?
- (A) Iodine (B) Chlorine  
(C) Fluorine (D) Bromine

28. The major hormone that controls the process of metamorphosis in amphibian larvae is :
- (A) Growth hormone (B) Prolactin  
(C) Gonadotropin (D) Thyroxine
29. During floral development the apical meristem of *Arabidopsis* appears as :
- (A) Dome shaped (B) Cylindrical  
(C) Convex (D) Flat
30. In sex reversal cases of humans, which part of 'Y' chromosome is translocated to 'X' ?
- (A) P arm (B) Q arm  
(C) Centromere (D) SRY
31. In certain members of the Araceae, the process of pollination is facilitated by :
- (A) Alternative oxidase (B) Root nodules  
(C) Abscission of leaves (D) Loss of leaf colour
32. The synthetic auxin dicamba is :
- (A) Indole-3-butyric acid  
(B) 2, 4-dichlorophenoxyacetic acid  
(C) 2-methoxy-3, 6-dichlorobenzoic acid  
(D) 2, 4-dicambium acid

33. ABA biosynthesis occurs in :
- (A) Mitochondria (B) Chloroplast  
(C) Endoplasmic reticulum (D) Ribosomes
34. Native phytochrome is a soluble protein with a molecular mass of about ..... kDa.
- (A) 150 (B) 250  
(C) 350 (D) 450
35. Among the  $C_3$ ,  $C_4$  and CAM plants, the transpiration ratio (based on water loss and  $CO_2$  fixed) is maximum in ..... plants.
- (A)  $C_3$  (B)  $C_4$   
(C) CAM (D) Algae
36. The release of secondary metabolites by one plant that has an effect on neighbouring plants is known as :
- (A) Allopathy (B) Homeopathy  
(C) Hypnopathy (D) Allelopathy
37. Fibrous astrocytes of neuroglia is involved in the process of :
- (A) Sclerosis (B) Prolection  
(C) Phagocytosis (D) Cancerogenesis

38. The sequence of bones present in the internal ear from tympanum is :
- (A) Incus—Malleus—Stapes
  - (B) Malleus—Incus—Stapes
  - (C) Stapes—Malleus—Incus
  - (D) Malleus—Stapes—Incus
39. Progesterone and estrogen ratio is essential for :
- (A) Implantation
  - (B) Fertilization
  - (C) Ovulation
  - (D) Leutinization
40. Which of the following best describes an artery ?
- (A) Carries blood away from the heart
  - (B) Carries oxygenated blood
  - (C) Carries valves
  - (D) Has thin walls
41. The condition in which the levels of ADH decreased is :
- (A) Acromegaly
  - (B) Diabetes mellitus
  - (C) Diabetes insipidus
  - (D) Cushing syndrome
42. Haemoerythrin pigment is found in :
- (A) Human and Rabbit
  - (B) Brachiopod and Annelid
  - (C) Rabbit and Sipunculid
  - (D) Annelid and Human

43. The  $F_1$  progeny of a rice plant is intermediate in size.  $F_1$  progeny were allowed to self pollinate and the resulting  $F_2$  progeny were also intermediate in size but following a normal distribution. This would suggest :
- (A) Complete dominance (B) Incomplete dominance  
(C) Monogenic trait (D) Polygenic trait
44. If 83 individuals are homozygous for the recessive trait eyeless and 67 of those individuals are eyeless, then this is an example of :
- (A) Incomplete dominance (B) Expressivity  
(C) Incomplete penetrance (D) Complete penetrance
45. When two bacteria join together so that one can give the other a copy of some of its genetic information. This process is called :
- (A) Transduction (B) Translocation  
(C) Transformation (D) Conjugation
46. QTL analysis is used to :
- (A) Determine which genes are expressed at a developmental stage  
(B) Map genes in bacterial virus  
(C) Identify RNA polymerase binding sites  
(D) Identify chromosome regions associated with a complex trait in a genetic cross
47. The percentage of recombination equals a distance between the loci of :
- (A) 20 map units (B) 200 map units  
(C) 2 centimorgans (D) 200 centimorgans

48. Which of these diseases is a zoonotic disease ?
- (A) Rabies (B) Smallpox  
(C) Diarrhoea (D) Cholera
49. Diatoms belongs to phylum .....
- (A) Protozoa (B) Mollusca  
(C) Urochordata (D) Aschelminthes
50. The cyanobacterium *Nostoc* has a genome size of 6400 kilo bases and 6500 genes and the plant plastids, derived from cynophycan ancestors have :
- (A) Same number of bases and genes  
(B) About 2000 kilo bases and 2100 genes  
(C) About 1520 kilo bases and 1600 genes  
(D) About 120 kilo bases and 120 genes
51. When holotype is lost or destroyed, a specimen collected by original author is mode holotype, then it is known as :
- (A) Neotype (B) Lectotype  
(C) Paratype (D) Syntype
52. Charles Darwin coined the term :
- (A) Natural selection (B) Mutation  
(C) Linkage (D) Embryonic evolution

53. Most of the disease causing bacteria are resistant to antibiotics as they undergo :
- (A) Adaptation (B) Selection  
(C) Migration (D) Mutation
54. The amount of biomass which can be sustained under steady state condition of an ecosystem is termed as :
- (A) Primary productivity (B) System homeostasis  
(C) Sustainable yield (D) Carrying capacity
55. For large population sizes, the *t*-distribution approaches :
- (A) Normal distribution (B) Poisson distribution  
(C) Binomial distribution (D) Chi-square distribution
56. One of the following in biogeochemical cycles has most been involved in biological fixation.
- (A) Oxygen (B) Carbon  
(C) Nitrogen (D) Phosphorus
57. The term benthos refers to communities which grow, attached on :
- (A) The bark of trees (B) Submerged plants  
(C) Bottom of water body (D) Submerged roots

58. Replacement of existing communities by any external condition is termed as :
- (A) Primary succession                      (B) Secondary succession  
(C) Tertiary succession                      (D) Ecological succession
59. What bio-geographical realm does India belong to ?
- (A) Neotropical                                  (B) Nearctic  
(C) Tropical                                      (D) Oriental
60. In the context of evolution of man, the term Australopithecins refers to :
- (A) *Homo sapiens*                              (B) *Homo erectus*  
(C) *Homo habilis*                              (D) Southern apes
61. During the prebiotic origin of life which chemical played an important role in formation of nucleotides especially guanosine :
- (A)  $\text{CH}_4$     (B) HCN  
(C)  $\text{NH}_3$     (D)  $\text{CO}_2$
62. Among the following which molecule till now is not synthesized by mimicking the pre-biotic environment :
- (A) Ribose    (B) Ascorbate  
(C) Purines    (D)  $\alpha$ -amino acids



63. The appropriate unit for defining and measuring genifo-variation is :
- (A) Cell (B) Individual  
(C) Population (D) Community
64. Microorganisms produce different polysaccharides which of the following is produced by *Aureobasidium* :
- (A) Xanthan (B) Pullulan  
(C) Dextran (D) Curdlan
65. In enzyme linked immunosorbent assay which is a very common diagnostic technique the following is not true :
- (A) The enzyme should have a high turnover number  
(B) Hydrogen peroxide when used for HRPO does not give a coloured product  
(C) The enzyme is conjugated to an antibody  
(D) The detergent used in washing step is an ionic detergent
66. Organic matter is a renewable resource of biofuels. Which of the following is an example of gaseous biofuel ?
- (A) Butane (B) Butanol  
(C) Methanol (D) Methane

67. Phytoremediation of metals can be enhanced by pretreatment of plant material with :
- (A) Acid (B) Alkali  
(C) Salts (D) Sugars
68. Bt cotton which is used for increased cotton productivity is .....
- (A) Derived by cross-pollinating Bt with cotton  
(B) Derived by modifying cotton plant with a gene from a bacterium  
(C) Derived by treating cotton seeds with a toxin  
(D) Derived by infecting cotton plant with a bacterium
69. Complementation analysis which is a genetic test helps us to :
- (A) Determination of two mutations are on the same gene  
(B) Whether one of the parents is homozygous for dominant allele  
(C) Whether one of the parents is homozygous for the recessive allele  
(D) Whether the parents are heterozygous
70. In ion-exchange chromatography proteins that are bound can be selectively removed by all except one of the following :
- (A) Change in pH  
(B) Change in salt concentration  
(C) Change in both pH and salt concentration  
(D) Ligand

71. Western blotting technique that is used as a diagnostic test does not use the following :
- (A) a dye for detecting proteins
  - (B) horse radish peroxidase
  - (C) a source for nascent oxygen
  - (D) an oxidisable substrate
72. Which of the following equations gives 95% confidence limits ?
- (A)  $\bar{X} \pm 1 \text{ SD}$
  - (B)  $\bar{X} \pm 1.96 \text{ SD}$
  - (C)  $\bar{X} \pm 2.58 \text{ SD}$
  - (D)  $\bar{X} \pm 0.5 \text{ SD}$
73. When an anerobic organism is grown in the presence of radio labelled ( $^{14}\text{C}$ ) pyruvate, the label will appear in :
- (A) Acetaldehyde
  - (B) Succinate
  - (C) Citrate
  - (D) Oxaloacetate
74. The smallest object that the unaided human eye can resolve, is about the size of :
- (A) 0.1 mm
  - (B) 50  $\mu\text{m}$
  - (C) 10  $\mu\text{m}$
  - (D) 1 nm
75. The expanded form of PET is :
- (A) Positron examining technique
  - (B) Positron enhancing technique
  - (C) Physical emission technique
  - (D) Positron emission tomography

**ROUGH WORK**

**SEAL**