

Signature of Invigilators

Roll No.

□	□	□	□	□
---	---	---	---	---

(In figures as in Admit Card)

LIFE SCIENCE

Paper III

Roll No.

(In words)

J—0402

Name of Areas/Section (if any)

Time Allowed : 2½ Hours]

[Maximum Marks : 200

Instructions for the Candidates

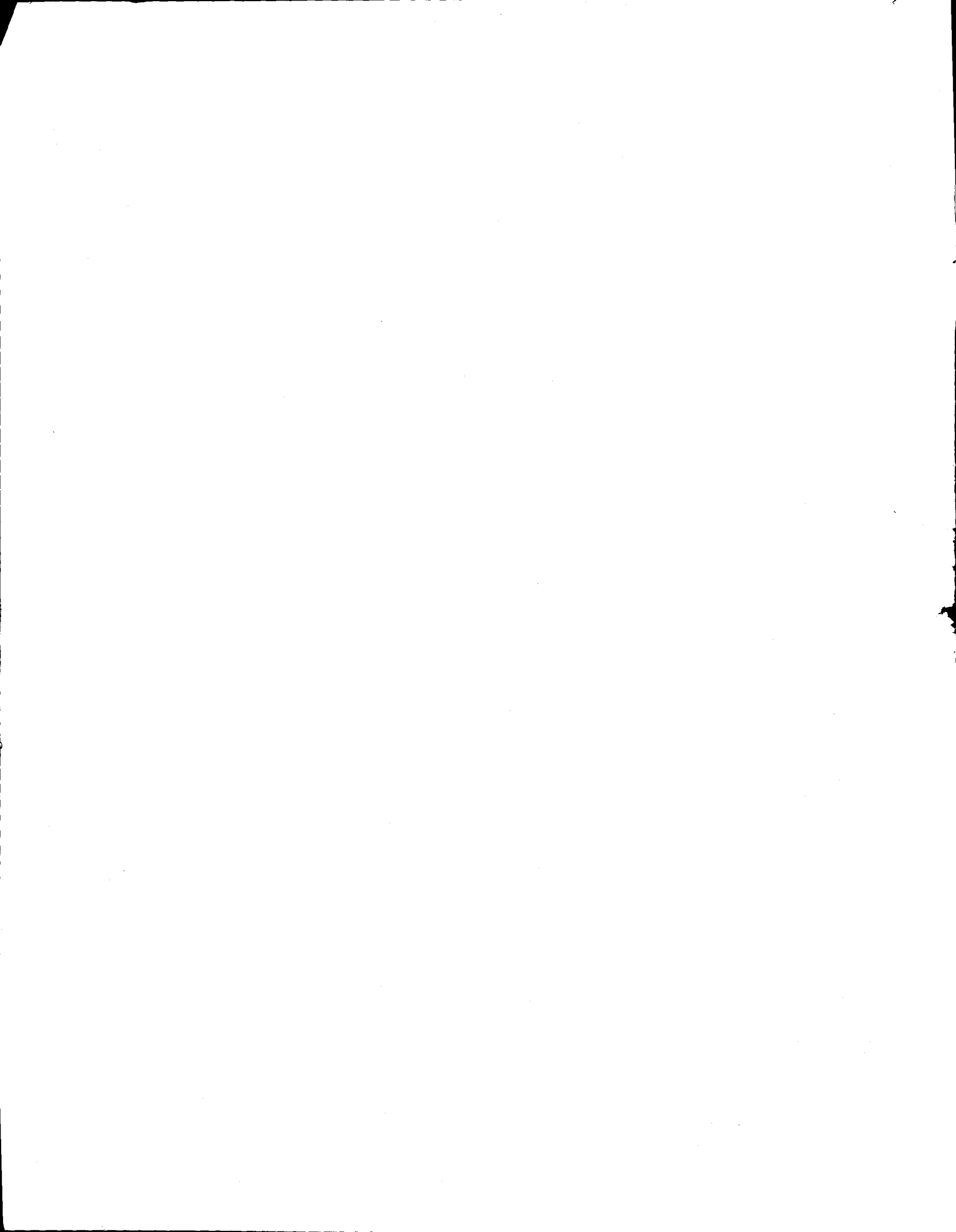
FOR OFFICE USE ONLY Marks Obtained

1. Write your Roll number in the space provided on the top of this page.
2. Write name of your Elective/Section if any.
3. Answer to short answer/essay type questions are to be written in the space provided below each question or after the questions in test booklet itself. No additional sheets are to be used.
4. Read instructions given inside carefully.
5. Last page is attached at the end of the test booklet for rough work.
6. If you write your name or put any special mark on any part of the test booklet which may disclose in any way your identity, you will render yourself liable to disqualification.
7. Use of any calculator is prohibited.
8. There is no negative marking.
9. You should return the test booklet to the invigilator at the end of the examination and should not carry any paper outside the examination hall.

Question Number	Marks Obtained	Question Number	Marks Obtained	Question Number	Marks Obtained
1		26		51	
2		27		52	
3		28		53	
4		29		54	
5		30		55	
6		31		56	
7		32		57	
8		33		58	
9		34		59	
10		35		60	
11		36			
12		37			
13		38			
14		39			
15		40			
16		41			
17		42			
18		43			
19		44			
20		45			
21		46			
22		47			
23		48			
24		49			
25		50			

- પરીક્ષાર્થીઓ માટેની સૂચનાઓ :
1. આ પાનાની ટોચમાં દર્શાવેલી જગ્યામાં તમારો રોલ નંબર લખો.
 2. જો કોઈ વિકલ્પ/વિભાગ પસંદ કર્યા હોય તો તે યોગ્ય જગ્યાએ દર્શાવો.
 3. ટુંકા પ્રશ્નો/નિબંધ વિષેના જવાબો એ પ્રશ્નની નીચે અગર બાજુમાં આપેલી જગ્યામાં લખો. વધારાના કોઈ પાનાનો ઉપયોગ કરશો નહીં.
 4. અંદર આપેલી સૂચનાઓ કાળજીપૂર્વક વાંચો .
 5. બુક્લેટની પાછળ આપેલું છેલ્લું પાનું રફ કામ માટે છે.
 6. બુક્લેટ કોઈપણ ઠેકાણે તમારું નામ કે કોઈ ચોક્કસ સંજ્ઞા કરવી નહીં કે જે તમારી ઓળખ પૂરી પાડે. આ તમને પરીક્ષા માટે ગેરલાયક ઠેરવશે.
 7. કેલ્ક્યુલેટર નો ઉપયોગ કરાશે નહીં.
 8. નકારાત્મક માર્કીંગ નથી.
 9. પરીક્ષા સમય પૂરો થઈ ગયા પછી આ બુક્લેટ જે તે નીરીક્ષકને સોંપી દેવી. કોઈપણ પેપર પરીક્ષા રૂમની બહાર લઈ જવું નહીં.

Total Marks Obtained.....
Signature of the co-ordinator.....
(Evaluation)



LIFE SCIENCE

PAPER-III

Note :— (a) Answer any 20 questions out of the given 60 questions.

(b) All questions carry equal marks.

(c) Answer each question in about 200 words (2 pages).

1. Discuss uptake and functions of Calcium and Phosphorus in plants.
2. Examine the role of Gibberellic acid in seed germination.
3. Discuss growth correlations in Plants.
4. What are the various theories to explain senescence in plants ?
5. Discuss conventional methods employed by the plant breeder for any cross-pollinated crop.
6. Give an account of fibre-yielding plants of Gujarat.
7. Mention practical applications of male-sterility in plants.
8. Discuss the architecture of shoot apex in angiosperms.
9. Examine in brief fructifications found in fungi.
10. Discuss the importance of systematics in plant taxonomy.
11. Evolutionary biologists prefer cladistics to phenetics for animal taxonomy. Comment.
12. Present the different views on mass-extinctions of dinosaurs.
13. Explain the mechanism of digestion and absorption of fat in mammals.
14. Trace the propagation of stimulus along the motor path leading to contraction of a skeletal muscle.
15. Point out differences, if any, between primary and secondary inductions during development. Support your answer with suitable examples.
16. Discuss the significance of meiotic arrest during oogenesis.
17. Briefly review the physiological adaptations for life at high altitude.
18. What are the major differences in the life cycle of *Plasmodium vivax* and *Plasmodium falciparum* ? Comment on the significance of sickle cell RBCs in malaria.
19. Illustrate the various mechanisms by which insects develop resistance to insecticides.

20. Describe the practice of sericulture and discuss its commercial importance.
21. Differentiate between the following with appropriate examples
 - (a) Glycoproteins
 - (b) Glycosaminoglycans
 - (c) Peptidoglycan
 - (d) Glycolipids.
22. With appropriate examples, explain how thermodynamically unfavourable reactions are brought about in a biological system.
23. Define K_m , K_{cat} , turnover number, K_i and V_{max} .
24. Describe the mechanism by which NADH produced by glycolysis is able to feed electrons into the TCA cycle.
25. How is fatty acid metabolism regulated? Name the key enzymes and factors regulating the same.
26. In a liver cell, glucose can be utilized by HMP as well as Glycolytic pathways. Explain the procedure which will permit you to identify the proportion of glucose carbon flux passing through both the pathways.
27. Explain the terms "leucine zipper proteins" and "helix turn helix motif proteins". What are their functions?
28. Enumerate the means by which generation of different second messengers is achieved through G-proteins. Give appropriate examples of each.
29. (a) What are cytochromes? How is cytochrome oxidase different from the rest?
(b) What are the two different ways by which cytochrome oxidase contributes to proton gradient?
30. What do you understand by allosteric control of enzyme activity? How will you differentiate between an allosteric and non-allosteric enzyme? What are V class and K class of effectors?
31. Discuss the various important parameters to be considered in designing a fermentor/bioreactor.
32. With the help of flow-sheet diagram, explain the fermentation process for aminoglycoside antibiotic. How is the same recovered and purified?

33. Explain what is meant by balanced, exponential and synchronous growth in bacteria. Discuss the significance of each in bacterial physiology.
34. Giving suitable examples, describe different types of microbial associations found in soil. How do these associations help in organic matter degradation in soil ?
35. List the indicator organisms used to assess the potability of water. Justify their selection.
36. Discuss different classes of restriction endonuclease. Which class of endonuclease is preferred in producing recombinant DNA molecules ? Why ?
37. Describe in detail the molecular basis for regulation of lysogeny in phage lambda.
38. Give an account of peptidoglycan structure in bacteria and list the steps involved in its biosynthesis. Indicate the sites of action of Penicillin and Lysozyme.
39. Discuss in detail the mechanism of regulation of nitrogenase expression, subject to O₂/combined N₂ in K-pneumoniae.
40. Who first demonstrated transformation in bacteria and in which organism was it reported ? Point out the main differences between natural transformation observed in Haemophilus and induced transformation found in *E. coli*.
41. How does the deficiency of Folic acid and/or Vit. B₁₂ result in megaloblastic anemia ? Explain.
42. Define mutation. Describe molecular basis of mutagenesis by UV radiation and nitrosoguanidine (NTG).
43. Name different macromolecules of extracellular matrix and give their functions.
44. Give the experimental evidences in support of C-value paradox.
45. What unique features of water make it an universal solvent ? Explain.
46. Briefly discuss the importance of wet lands.
47. "Antigen presenting cells represent indispensable components of cell mediated immunity." Elaborate.
48. What are monoclonal antibodies ? Why are these preferred over polyclonal antibodies ? Describe the strategies used for production of monoclonal antibodies.

49. What is a microsatellite DNA ? What role do these sequences play in human diseases ? How has their occurrence proved useful in human genetics.
50. What is meant by fidelity of DNA replication ? How does SOS repair transgress this ?
51. Define genetic code and discuss in brief its main features. Describe two types of experiments used to decipher the genetic code.
52. What is common about the structure of bacterial repressors and eukaryotic transcription factors and discuss how both interact with DNA ?
53. Discuss the significance of heterochromatization in cell functions.
54. What is thalassemia ? Explain cause and effects of different types of thalassemia. How can genetic counselling help to prevent this ?
55. Write the principle and applications of any *two* of the following techniques :
 - (i) Cytophotometry;
 - (ii) Transmission Electron Microscopy;
 - (iii) Atomic absorption spectroscopy;
 - (iv) Protoplast culture and its applications.
56. Describe the applications of NMR spectroscopy in elucidating the structure of biomolecules.
57. Select the method you would use for the following. Justify the selection and give the principle involved in any *one* :
 - (i) Two proteins with an identical molecular weight.
 - (ii) A single step separation with very high specificity.
58. Currently there is lot of hue and cry about Bt. cotton. What do you know about Bt. cotton ? Comment on the concept of terminator technology and based on this discuss advantages and disadvantages of the use of Bt. cotton.
59. What is RFLP ? Giving suitable examples discuss how this technique is used to identify any specific gene.
60. Give the application of the following statistical methods in biological studies :
 - (i) Probability;
 - (ii) Test of significance using student's '*t*'-test.