

Signature of Invigilators

Roll No.

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(In figures as in Admit Card)

1. ....

## LIFE SCIENCE

2. ....

### Paper II

Roll No. ....

(In words)

**J—0402**

Name of the Areas/Section (if any) .....

Time Allowed : 75 Minutes]

[Maximum Marks : 100

#### Instructions for the Candidates

1. Write your Roll Number in the space provided on the top of this page.
2. This paper consists of *fifty (50)* multiple choice type questions. All questions are compulsory.
3. 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 A question should entirely be contained within the corresponding square.

Correct method  Wrong Method  or

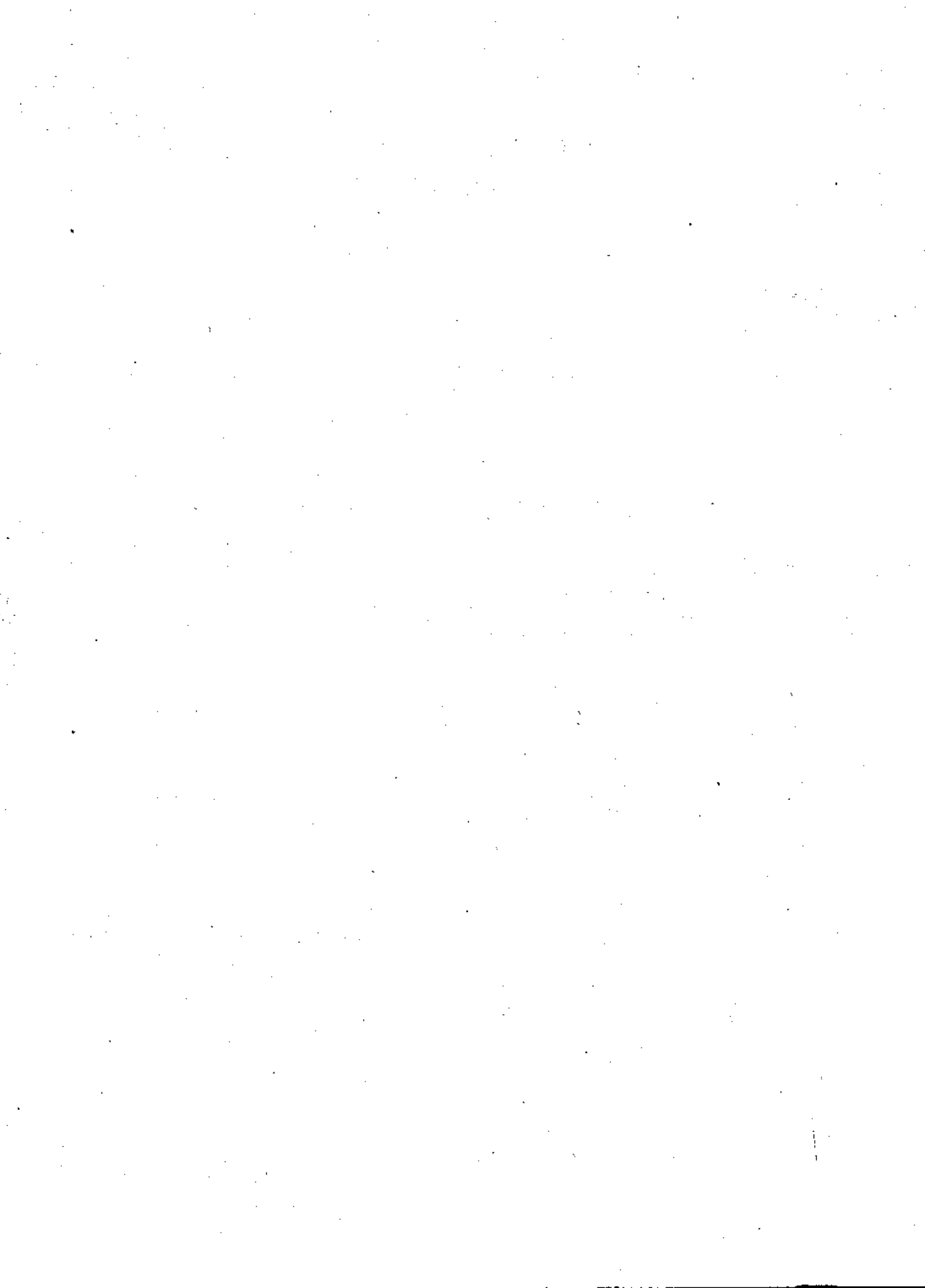
4. Your responses to the items for this paper are to be indicated on the ICR Answer Sheet under paper II only
5. Read instructions given inside carefully.
6. One sheet is attached at the end of the booklet for rough work.
7. You should return the test booklet to the invigilator at the end of paper and should not carry any paper with you outside the examination hall.

#### પરીક્ષાર્થીઓ માટેની સૂચનાઓ :

1. આ પાનાની ટોચમાં દર્શાવેલી જગ્યામાં તમારો રોલ નંબર લખો.
2. આ પ્રશ્નપત્રમાં કુલ પચાસ (50) બહુવિકલ્પીય ઉત્તરો ધરાવતા પ્રશ્નો આપેલા છે. સર્વો પ્રશ્ન અનિવાર્ય છે.
3. પ્રત્યેક પ્રશ્ન વધુમાં વધુ ચાર બહુવૈકલ્પિક ઉત્તરો ધરાવે છે. જે (A), (B), (C) અને (D) વડે દર્શાવવામાં આવ્યા છે. પ્રશ્નનો ઉત્તર કેપીટલ સંજ્ઞા વડે આપવાનો રહેશે. ઉત્તરની સંજ્ઞા આપેલ જાનામાં બરાબર સમાઈ જાય તે રીતે લખવાની રહેશે.

ખરી રીત :  ખોટી રીત :  ,

4. આ પ્રશ્નપત્રના જવાબ આપેલ ICR Answer Sheet ના Paper II વિભાગની નીચે આપેલ જાનાઓમાં આપવાના રહેશે.
5. અંદર આપેલ સૂચનાઓ કાળજીપૂર્વક વાંચો.
6. આ બુકલેટની પાછળ આપેલું પાનું રફ કામ માટે છે.
7. પરીક્ષા સમય પૂરો થઈ ગયા પછી આ બુકલેટ જે તે નીરીક્ષકને સોંપી દેવી. કોઈપણ પેપર પરીક્ષા રૂમની બહાર લઈ જવું નહીં.



## LIFE SCIENCE

### PAPER II

*Note* :— This paper contains *fifty (50)* multiple-choice questions, each question carrying *two (2)* marks. Attempt *all* the questions.

1. Identify the component which does not participate in cytoskeletal functions :
  - (A) Actin
  - (B) Chromatin
  - (C) Microtubules
  - (D) Microfilaments
2. Centrosome is :
  - (A) A nuclear structure of animal cell
  - (B) Cytoplasmic structure of animal cell
  - (C) Cytoplasmic structure of both plant and animal cell
  - (D) Cytoplasmic structure of plant cell
3. Molecules present in/or associated with tight junctions include all the following *except* :
  - (A) Connexin
  - (B) Occludin and Claudin
  - (C) Zo-1, Zo-2, Zo-3
  - (D) Cytoskeletal linking proteins and actin
4. The following are true of S phase, *except* :
  - (A) Cells will not leave S-phase until DNA has been completely replicated
  - (B) It can be studied through fusion with cells in other stages
  - (C) It represents an opportunity to label a cell with radioactive nucleotides
  - (D) Replication is initiated solely by nuclear events
5. B cells can express on their surface :
  - (A) membrane Ig M and Ig D at the same time
  - (B) both types of light chain
  - (C) secretory component
  - (D) Ig G that can bind several different unrelated antigens

6. Diversity of possible antibodies produced by a cell is increased by each of the following, *except* :
- (A) Combination of differentially spliced light and heavy chains
  - (B) Imprecise splicing of gene regions
  - (C) Mixing of paternal and maternal light chains
  - (D) Selection of different V-J-D regions
7. Chimeric bcr-abl oncogene results in :
- (A) Myelogenous leukemia
  - (B) Xeroderma pigmentosa
  - (C) Retinoblastoma
  - (D) Bloom's syndrome
8. Name the weakest stabilizing energy bond :
- (A) Van der Waals forces
  - (B) Hydrophobic interactions
  - (C) Hydrogen bond
  - (D) Ionic interactions
9. Which statement about pKa is *incorrect* ?
- (A) pKa is the pH at which concentration of protonated and unprotonated form of an amino acid are equal
  - (B) pKa is a constant and independent of temperature
  - (C) buffering capacity with respect to both  $H^+$  and  $OH^-$  is higher at pKa
  - (D) the higher the pKa the less acid the substance
10. Which of the following statements is incorrect ?
- (A) 20 different codons represent the genetic code
  - (B) tryptophan and methionine are encoded by just one codon
  - (C) every nucleotide triplet encodes an amino acid
  - (D) the third position in a codon is highly variable
11. A competitive inhibitor :
- (A) resembles substrate
  - (B) increases  $K_m$  for substrate
  - (C) acts irreversibly
  - (D) denatures enzyme
12. Without cofactor of an enzyme :
- (A) the catalysis is zero
  - (B) the catalysis is decreased
  - (C) the catalysis proceeds via different route
  - (D) the enzyme is denatured

13. Lectins are :
- (A) only found in plants
  - (B) are able to recognise specific sugar residue
  - (C) are found in animal but not in plant cells
  - (D) are latex producing enzymes
14. Structure of glycogen includes :
- (A)  $\alpha$  1, 4 glycosidic linkage between glucose residues
  - (B)  $\beta$  1, 4 glycosidic linkage between glucose residues
  - (C)  $\beta$  1, 4 and  $\alpha$  1, 6 glycosidic linkages between glucose residues
  - (D)  $\alpha$  1, 4 and  $\alpha$  1, 6 glycosidic linkages between glucose residues
15. Sildenafil citrate, a popular male potency pill works by acting on a pathway involving one of the following :
- (A) cAMP
  - (B) Prostaglandins
  - (C) Nitric oxide
  - (D) Testosterone
16. Vitamin B<sub>1</sub> (thiamin) :
- (A) increases haemoglobin in RBC
  - (B) plays important role as co-enzyme
  - (C) is useful in regulation of blood sugar
  - (D) deficiency causes scurvy
17. Facilitated diffusion :
- (A) is independent of concentration gradient
  - (B) requires energy in the form of ATP
  - (C) depends upon the size and shape of molecule
  - (D) requires protein as a carrier
18. Animal tissues that synthesise hormones are closely associated with, and sometimes resemble, cells of the :
- (A) Immune system
  - (B) Embryonic mesoderm
  - (C) Circulatory system
  - (D) Nervous system

19. The main function of nor-epinephrine is to increase :
- (A) Blood pressure                      (B) Urine production  
(C) Cellular respiration              (D) The release of epinephrine
20. Which of the following vegetarian meals will supply all essential aminoacids in about the correct proportion for synthesizing human proteins ?
- (A) Spinach and beans                  (B) Corn and rice  
(C) Beans and rice                      (D) Peas and beans
21. The female equivalent of the glans of the penis is the :
- (A) Vestibule                              (B) Hymen  
(C) Baculum                                (D) Clitoris
22. A woman without dimples marries a man who has dimples and is known to be heterozygous for the trait. What is the chance, that their first child will have dimples ?
- (A) One in four                            (B) One in two  
(C) Three out of four                  (D) It is uncertain
23. A test cross-distinguishes between :
- (A) two homozygous forms  
(B) a homozygous dominant and heterozygous  
(C) two heterozygous forms  
(D) a homozygous recessive and a heterozygous
24. Bacterial insertion elements :
- (A) Contain flanking direct repeats  
(B) Contain internal inverted repeats  
(C) Encode transposes  
(D) Encode reverse transcriptase

25. Repair of damaged DNA :
- (A) does not occur spontaneously because of the nature of chemical bonds in DNA
  - (B) does not occur during normal replication of DNA
  - (C) does not require excision and resynthesis of affected regions
  - (D) requires all of the above
26. Lethal mutations can be recovered in haploid organisms if they are :
- (A) Dominant
  - (B) Recessive
  - (C) Conditional
  - (D) None of these
27. When DNA from a wild and a mutant strain are reannealed, homologous regions pair normally but, mutant regions bubble; this process, which also can be used to map location of the mutant gene is known as :
- (A) Denaturation
  - (B) Heteroduplex
  - (C) Hybridoma
  - (D) Restriction endonuclease
28. The classical example of genetic disorder resulting due to trinucleotide repeat sequences is :
- (A) Huntington's disease
  - (B) Parkinson's disease
  - (C) Leukemia
  - (D) Alzheimer's disease
29. In natural selection :
- (A) The genetic composition of the population changes at random over time
  - (B) New mutations are generated over time
  - (C) All individuals in a population are equally likely to contribute offsprings to the next generation
  - (D) Individuals that possess particular heritable characteristics survive and reproduce at a higher rate than other individuals

30. The organisms with the longest evolutionary history are :
- (A) Prokaryotes (B) Eukaryotes  
(C) Photosynthesizers (D) Plants and animals
31. Two large populations of a species found in nearby but different environments are observed to become genetically more similar over a period of time. Which evolutionary mechanism is the most likely cause of such trend ?
- (A) Gene flow (B) Non-random mating  
(C) Natural selection (D) Genetic drift
32. The studies of homology hit method suggest the origin of nucleus from :
- (A) Symbiosis of archeo and eubacterium  
(B) Symbiosis of eubacterium and virus  
(C) eubacterium alone  
(D) None of the above
33. Photorespiration can be easily detected in :
- (A) Wheat (B) Maize  
(C) Peanut (D) Gram
34. Gibberellic acid cannot :
- (A) Replace low temperature requirement  
(B) Promote bolting in rosettes  
(C) Inhibit flowering in LDP  
(D) Break seed dormancy
35. Cytochrome sequences are commonly used to study the :
- (A) Phyletic inter-relationship (B) Criminological incidences  
(C) DNA finger printing (D) Genomics
36. Which of the following can contribute to the formation of a desert ?
- (A) winds that pass over warm ocean currents  
(B) rain shadow  
(C) cool, dry air that sinks towards earth at about 30 degrees latitude  
(D) both (B) and (C)



37. A population that is growing exponentially increases :
- (A) by a constant number each generation
  - (B) by the same number of individuals each generation
  - (C) by increase in some years and decrease in other years
  - (D) none of the above
38. A directional process of species replacement over a period of time in a community is called :
- (A) Global climate change
  - (B) Competition
  - (C) Succession
  - (D) Community change
39. In all ecosystems, what type of organisms consume 50 percent or more NPP ?
- (A) Herbivores
  - (B) Producers
  - (C) Carnivores
  - (D) Decomposers
40. The process by which microbes bring about alteration of pesticides without deriving any carbon and energy is called :
- (A) Co-metabolism
  - (B) Co-catabolism
  - (C) Co-oxidation
  - (D) Co-anabolism
41. BOD of waste water represents a measure of :
- (A) Soluble oxygen
  - (B) Biologically oxidizable organic matter
  - (C) Total oxidizable carbon
  - (D) (B) and (C)
42. Which of the following occurs during final treatment of the effluent from a sewage treatment plant ?
- (A) Anaerobic digestion
  - (B) Reverse osmosis
  - (C) Drying and incineration
  - (D) Chlorination

43. Which of the following is *not* a level in Linnaean hierarchy ?  
 (A) Class (B) Group  
 (C) Species (D) Phylum
44. The most powerful tool being studied by systematists today is :  
 (A) Behaviour (B) Organs  
 (C) Cell (D) DNA
45. The known species of insect number is in the :  
 (A) Hundreds (B) Thousands  
 (C) Millions (D) Billions
46. A favourable relationship in which only one organism is benefitted is :  
 (A) Symbiosis (B) Parasitism  
 (C) Commensalism (D) Mutualism
47. Biodiversity can be best defined by :  
 (A) Species, genome, habitat (B) Species, phyla, families  
 (C) Species, genera, families (D) Species, genome, varieties
48. Species most vulnerable to extinction from human activities are those with :  
 (A) low carrying capacities (B) high population growth  
 (C) large niches (D) many natural predators
49. Efficiency of using water in plants is better in :  
 (A) CAM (B) C<sub>3</sub>  
 (C) C<sub>4</sub> (D) All of these
50. Maximum growth in plants is observed during the following phase :  
 (A) log (B) lag  
 (C) senescence (D) plateau

## ROUGH WORK

**ROUGH WORK**

SEAL