

**Roll No.**

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

*Signature of Invigilators*

1. \_\_\_\_\_
  2. \_\_\_\_\_

1417

## PAPER-II

## Question Booklet Series

X

## Question Booklet No.

(Identical with OMR  
Answer Sheet Number)

**Subject Code : 14**

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 get 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) Verify whether the Question Booklet No. is identical with OMR Answer Sheet No.; if not, the full set to be replaced.
    - (iv) After this verification is over, the Question Booklet Series and Question Booklet Number should be entered on the OMR Sheet.
  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) (C) (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 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 Black Ball point pen.**
  11. **Use of any calculator or mobile phone etc. is strictly prohibited.**
  12. **There are no negative marks for incorrect answers.**

[Please Turn Over]



## LIFE SCIENCES

## PAPER II

- 1.** Teichoic acid is composed of repetitive units of  
 (A) N-acetyl glucosamine  
 (B) Ribitol phosphate  
 (C) Glucose-6-phosphate  
 (D) Glucosamine
- 2.** Which one of the following statements is *not* correct for immune response cells?  
 (A) Macrophages and dendrite cells are developed from monocytes.  
 (B) T and B cells participate directly in the adaptive immune response.  
 (C) Polymorphonuclear leukocytes (PMNs) actively produce antibodies.  
 (D) Neutrophils are phagocytes.
- 3.** Which of the following glycoproteins on the membrane of HIV binds to CD4 molecules on the surface of T cell?  
 (A) gp 120  
 (B) gp 41  
 (C) gp 411  
 (D) gp 1200
- 4.** A population of positively selected thymocytes that does not bind avidly to MHC or MHC-self peptide complexes produces  
 (A) Cytotoxic T cells or helper T cells  
 (B) MHC class I protein  
 (C) MHC class II protein  
 (D) Carcinoembryonic membrane
- 5.** What happens when ‘loss of function’ mutation occurs in ‘*tra*’ and *tra-z* genes of *Drosophila*?  
 (A) Both XX and XY embryo will die.  
 (B) Only XX embryo will develop as male.  
 (C) Only XY embryo will develop as male.  
 (D) Both XX and XY embryo will develop as male.
- 6.** During anaphase, chromatids move poleward due to  
 (A) Polymerization of kinetochore microtubules.  
 (B) Depolymerization of kinetochore microtubules.  
 (C) Depolymerization of the polar spindle fibres.  
 (D) Formation of actin filaments.
- 7.** In 1984, Bhopal gas tragedy was caused due to leakage of  
 (A) Sodium monoxide  
 (B) Sodium thiocyanate  
 (C) Potassium isocyanate  
 (D) Methyl isocyanate
- 8.** Which of the following statements is correct about the structure of double-stranded DNA?  
 (A) A = G; C = T  
 (B) A + T = G + C  
 (C) A/C = G/T = 1  
 (D) A/T = G/C = 1
- 9.** Anticodon is an unpaired triplet of bases in an exposed position of  
 (A) m-RNA  
 (B) t-RNA  
 (C) r-RNA  
 (D) s-RNA
- 10.** Rubisco  
 (A) Catalyses the carboxylation of CO<sub>2</sub> to ribulose 1,5-bisphosphate  
 (B) Initiates photorespiration when the CO<sub>2</sub>/O<sub>2</sub> ratio is low  
 (C) Both (A) and (B)  
 (D) Catalyses the reduction of two molecules of PGAL to form glucose

- 11.** Which of the following enzymes forms a Schiff base with sedoheptulose-7-phosphate (S7P)?
- Transketolase
  - Amylase
  - Dihydrolipoyl transacetylase
  - Transaldolase
- 12.** The neuropeptide Y (NPY)/agouti-related peptide (AgRP) releasing neurons in the arcuate nucleus of hypothalamus are inhibited by
- RBP4
  - Resistin
  - SOCS (Suppressors of cytokine signaling) proteins
  - Leptin
- 13.** In C<sub>4</sub> pathway, CO<sub>2</sub> is concentrated in the mesophyll cells and transported to the bundle-sheath cells for entry into the Calvin cycle as
- Pyruvate
  - Phosphoglycerate
  - Enediolate
  - Malate
- 14.** Bacterial reproduction by binary fission involves the formation of a ring-like structure at the centre of the cell which is known as
- Fairy ring
  - Annual ring
  - FtsZ-ring
  - Balbiani ring
- 15.** Which of the following proteins facilitates basolateral transport of Fe<sup>2+</sup> in enterocytes?
- Transferrin
  - Hephaestin (Hp)
  - Divalent Metal Transporter 1 (DMT1)
  - Hemosiderin
- 16.** Bean protein contains an abundance of lysine but is deficient in
- Methionine
  - Leucine
  - Cysteine
  - Tryptophan
- 17.** The hormone resistin promotes the insulin resistance. From which of the following cells resistin is produced?
- Lymphocytes
  - Neutrophil
  - Adipocytes
  - β-cells of Islets of Langerhans
- 18.** The water potential and osmotic potential of pure water are
- Zero and 100
  - 100 and zero
  - 100 and 200
  - Zero and zero
- 19.** Which of the following factors resists a mated female mosquito from further mating?
- Ecdysone
  - Saliva
  - Matrone
  - Juvenile hormone
- 20.** Match *List I* with *List II* and choose the correct answer from the codes given below:
- | <i>List I</i>     | <i>List II</i>                  |
|-------------------|---------------------------------|
| Vitamin           | Deficiency disease              |
| a. B <sub>1</sub> | i. Pellagra                     |
| b. B <sub>3</sub> | ii. Wernicke-Korsakoff syndrome |
| c. B <sub>5</sub> | iii. Mental disorder            |
| d. B <sub>6</sub> | iv. Achromotrichia              |
- Codes :*
- |     | a   | b  | c   | d   |
|-----|-----|----|-----|-----|
| (A) | ii  | i  | iv  | iii |
| (B) | ii  | iv | i   | iii |
| (C) | i   | ii | iii | iv  |
| (D) | iii | i  | ii  | iv  |

- 21.** The protein somatomedin C is also known as  
 (A) Platelet-derived growth factor  
 (B) Insulin-like growth factor I  
 (C) Colony stimulating factor  
 (D) Vascular endothelial growth factor
- 22.** The inheritance of extranuclear genes that follows the rules different from those of nuclear genes is due to  
 (A) Involvement of meiotic segregation.  
 (B) Lack of commonness in uniparental inheritance.  
 (C) Ability of mapping of extranuclear genes in chromosomes.  
 (D) Persistence of phenotype even after nuclear substitution.
- 23.** In lac operon regulation, when *E.coli* is grown in a medium containing both glucose and lactose, it would be found that  
 (A) Both CAP and lac repressor are bound to DNA.  
 (B) Neither CAP nor lac repressor are bound to DNA.  
 (C) Lac repressor is bound to the DNA but the CAP is not.  
 (D) CAP is bound to the DNA but the lac repressor is not.
- 24.** Which of the following bacterial genomes was sequenced first?  
 (A) *Escherichia coli*  
 (B) *Streptococcus pneumoniae*  
 (C) *Haemophilus influenzae*  
 (D) *Streptococcus thermophilus*
- 25.** Identify the mismatch.  
 (A) Alkaline phosphatase      (1) Remove phosphate group present  
 (B) DNA polymerase I      (2) Nick translation  
 (C) S1 nuclease      (3) Cleaves only single-stranded DNA  
 (D) DNase 1      (4) Cleaves only double-stranded DNA
- 26.** There are 14 highly homologous GLUT proteins meant for cellular glucose transport encoded by human genome. They characteristically contain  
 (A)  $\beta$ -barrel structure  
 (B) 12-membrane spanning  $\alpha$ -helices  
 (C) Amino acids those can cause hydrophobic interaction with glucose  
 (D) Multiple ancestral sources
- 27.** Which of the following combinations of histones with the DNA form the nucleosome core?  
 (A) H<sub>1</sub>, H<sub>2</sub>A, H<sub>3</sub>, H<sub>4</sub>  
 (B) H<sub>1</sub>, H<sub>2</sub>B, H<sub>3</sub>, H<sub>4</sub>  
 (C) H<sub>1</sub>, H<sub>3</sub>, H<sub>4</sub>, H<sub>5</sub>  
 (D) H<sub>2</sub>A, H<sub>2</sub>B, H<sub>3</sub>, H<sub>4</sub>
- 28.** In Eukaryotes, the replication of lagging strand occurs when  
 (A) Polymerase ' $\epsilon$ ' catalyses the replication.  
 (B) Polymerase ' $\beta$ ' completes the replication.  
 (C) Polymerase ' $\gamma$ ' interacts with protein PCNA to complete the replication.  
 (D) Polymerase ' $\delta$ ' interacts with PCNA and RFC to complete the replication.
- 29.** A mutation that changes a base pair in a gene, but the altered codon in the mRNA specifies the same amino acid in the protein is termed as  
 (A) Missense mutation  
 (B) Nonsense mutation  
 (C) Silent mutation  
 (D) Frame shift mutation
- 30.** Protamines, present in fish sperm and involved in higher level of chromatin organisation, are rich in  
 (A) Lysine  
 (B) Methionine  
 (C) Arginine  
 (D) Tryptophan

- 31.** The homeologous pairing between genomes of wheat and alien chromosomes is suppressed largely
- By the activity of Ph1 gene in the long arm of chromosome 5B.
  - By the activity of Ph1 gene in the long arm of chromosome 5D.
  - By the activity of Ph1 gene in the long arm of chromosome 5A.
  - By the activity of Ph mutants of wheat.
- 32.** Oparin and his associates prepared coacervate droplets using
- Gum arabic and phospholipid
  - Gum arabic and histone
  - Gum arabic and glycolipid
  - Gum arabic and oligosaccharide
- 33.** The difference in the number of amino acid residues in cytochrome C between chimpanzee and human is
- 10
  - 9
  - 1
  - 0
- 34.** Which population qualifies the concept of Hardy-Weinberg equilibrium?
- Peripheral population
  - Punctuated equilibrium population
  - Panmictic population
  - Parapatric population
- 35.** Select the primary natural host of *Antherea proylei* which produces Tasar Silk.
- Terminalia arjuna*
  - Quercus serrata*
  - Ricinus communis*
  - Morus alba*
- 36.** Biological method for clean-up of contaminated soil and groundwater is called as
- Biosorption
  - Biomagnification
  - Bioremediation
  - Biorestoration
- 37.** Which of the following organisms can carry out the reaction,  $\text{NO}_2^- + \frac{1}{2}\text{O}_2 \rightarrow \text{NO}_3^- + \text{energy}$ ?
- Nitrosomonas*
  - Nitrosococcus*
  - Micrococcus*
  - Nitrobacter*
- 38.** Which among the bee species produces maximum quantity of honey per hive?
- Apis cerana indica*
  - Apis dorsata*
  - Apis florea*
  - Apis mellifera*
- 39.** Which one of the following statements is *incorrect* for anammox bacteria?
- They oxidize ammonia under strict aerobic condition.
  - Ammonia is oxidized with nitrite as the electron acceptor to yield nitrogen gas.
  - Brocadia anammoxidans* is the first anammox organism discovered.
  - The anammox reaction occurs within a membrane enclosed anammoxosome.
- 40.** Mario Molina's research group discovered the ClOOCl mechanism that operates in the
- Polar ozone hole
  - Summer dust storm
  - Atlantic hurricane
  - Urban photochemical smog formation

- 41.** Neritic zone refers to
- Regions of pond environment where land masses extend outwards as a projected land.
  - Regions of land submerged in water reservoirs.
  - Regions surrounding a river bank.
  - Regions of marine environments where land masses extend outwards as a continental shelf.
- 42.** Which insect acts as a good indicator of aquatic pollution?
- May fly
  - Agnatic beetle
  - Giant water bug
  - Pond skater
- 43.** In which trophic relation an inversion of the pyramid of number takes place?
- Host-parasite
  - Prey-predator
  - Producer-herbivore
  - Phytoplanktons-aquatic herbivores
- 44.** Which of the following mosquito species is used as a biological control agent against *Aedes*?
- Mansonia indiana*
  - Culex quinquefasciatus*
  - Anopheles barbirostris*
  - Toxorhynchites splendens*
- 45.** From which of the following plants pyrethrum is obtained?
- Croton tiglium*
  - Derris elliptica*
  - Chrysanthemum cinerariifolium*
  - Quassia amara*
- 46.** During cryopreservation to minimize the risks of lethal changes within the cells, the most common cryoprotective agent added to the cells is
- 6-aminohexanoic acid
  - Dithiothreitol
  - Dinitrophenol
  - Dimethyl sulfoxide
- 47.** A population in a continuous population range that remains isolated from the main core to acquire the genetic basis of reproductive isolation is known as
- Punctuated equilibrium
  - Phyletic species
  - Parapatric species
  - Peripatric species
- 48.** Biodiversity Act of India was adopted by parliament in the year
- 1992
  - 1996
  - 2000
  - 2002
- 49.** Which one of the following is most important in speciation?
- Geographic isolation
  - Reproductive isolation
  - Ethological isolation
  - Ecological isolation
- 50.** A PCR technique which is used to reduce nonspecific binding of products due to the amplification of unexpected primer binding site is called
- Nested PCR
  - RT – PCR
  - LM – PCR
  - (B) and (C)

*1417-II*

X-8

**ROUGH WORK**