12th STD

PUBLIC EXAM - MARCH 2025

PART - III

ZOOLOGY

Reg. No.

TIME ALLOWED : 3.00 HOURS] (with Answers) [MAXIMUM MARKS : 70

Instructions : (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART - I

Note : (i) Answer **all** the questions. **(15 × 1 = 15)**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. A person is injured and got swelling. The swelling, due to the infection of tissue is an example of:
   (a) Phagocytosis (b) Mechanical barrier
   (c) Inflammation (d) Physiological barrier

2. The first codon to be deciphered was _____ which codes for _____.
   (a) UUU, Phenylalanine (b) AAA, Proline
   (c) TTT, Arginine (d) GGG, Alanine

3. Find out the wrongly matched pair.
   (a) Klinefelter's Syndrome - XXY Female
   (b) Down's Syndrome - Trisomy-21
   (c) Turner's Syndrome - XO Female
   (d) Patau's Syndrome - Trisomy-13

4. The Neanderthal man had the brain capacity of :
   (a) 900 cc (b) 650-800 cc (c) 1400 cc (d) 1200 cc

5. Which one of the following groups includes sexually transmitted diseases caused by bacteria only?
   (a) Syphilis, gonorrhoea and trichomoniasis (b) Syphilis, gonorrhoea and candidiasis
   (c) Syphilis, trichomoniasis and pediculosis (d) Syphilis, chlamydiasis and gonorrhoea

6. ELISA is mainly used for :
   (a) Selecting animals having desired traits (b) Detection of mutations
   (c) Selecting plants having desired traits (d) Detection of pathogens

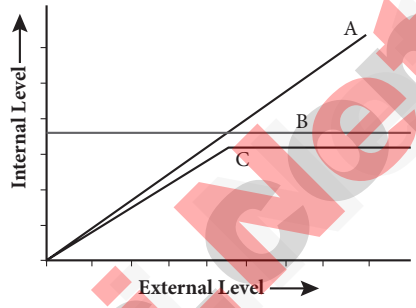
7. The most important hormone in initiating and maintaining lactation after birth is :
   (a) Prolactin (b) Oestrogen (c) Oxytocin (d) FSH

8. **Assertion** : The Environmental conditions of the tropics are favourable for speciation and diversity of organisms.

   Reason : The climate seasons, temperature, humidity and photoperiod are more or less stable and congenial.

(a) Assertion is true, but Reason is false.
(b) Both Assertion and Reason are true and Reason explains Assertion correctly.
(c) Both Assertion and Reason are false.
(d) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

9. The figure given below is a diagrammatic representation of response of organisms to abiotic factors. What do A, B and C represent respectively?



S. No	A	B	C
(a)	Partial Regulator	Regulator	Conformer
(b)	Conformer	Regulator	Partial Regulator
(c)	Regulator	Conformer	Partial Regulator
(d)	Regulator	Partial Regulator	Conformer

10. The mode of sexual reproduction in bacteria is by :
(a) Conjugation (b) Formation of gametes
(c) Zoospore formation (d) Endospore formation

11. The headquarters of the National Biodiversity Authority is situated in _____.
(a) Delhi (b) Mumbai (c) Kolkata (d) Chennai

12. The clusters of gene with related functions are called as _____.
(a) Recons (b) Mutons (c) Operons (d) Cistrons

13. Which of the following micro-organisms is used for production of citric acid in industries?
(a) Aspergillus niger (b) Lactobacillus bulgaris
(c) Rhizopus nigricans (d) Penicillium citrinum

14. The 'thickness' of Stratospheric Ozone layer is measured in :
(a) Melson units (b) Sieverts units (c) Beaufort scale (d) Dobson units

15. Haemozoin is :
(a) A toxin from Plasmodium species (b) A precursor of haemoglobin
(c) A toxin from Haemophilus species (d) A toxin from Streptococcus

PART - II

Note : Answer **any six** questions. Question No. **24** is Compulsory. **(6 × 2 = 12)**

16. What is ectopic pregnancy?
17. Draw and mention the parts of a spermatozoan.
18. Give any two applications of DNA finger printing.
19. List out the major gases seems to be found in the primitive earth.
20. Rearrange the descent in human evolution.
Australopithecus → Homo erectus → Homo sapiens → Ramapithecus → Homo habilis.
21. How does Saliva act in body defence?
22. Give any two bioactive molecules produced by microbes and state their uses.
23. What is Acclimatisation?
24. Differentiate Natality and Mortality.

PART - III

Note : Answer **any six** questions. Question No. **33** is Compulsory. **(6 × 3 = 18)**

25. Differentiate Fission and Fragmentation with suitable examples.
26. Give the expansion for the following.
    (1) Z I F T (2) I C S I (3) I U T
27. What is criss-cross inheritance? Give example.
28. If the coding sequence in a transcription unit is written as follows:
    5'TGCATGCATGCATGCATGCATGCATGC 3'
    Write down the nucleotide sequence of mRNA.
29. Complete the following table :

Diseases	Causative agent	Site of infections
Mumps		
Chicken pox		
Dengue fever		

30. What is bioremediation? Mention their types.
31. Gene Therapy is an attempt to correct a Genetic defect by providing a normal gene into the individual. By this, the function can be restored.
    An alternate method could be to provide gene product known as enzyme replacement therapy, which would also restore the function. Which in your opinion is a better option? Give reasons for your answer.
32. How many HOTSPOTS are there in INDIA? Name them.
33. What is meant by agrochemicals? Mention any 2 (Two) effects of over usage of agrochemicals.

PART - IV

Note : Answer **all** the questions. **(5 × 5 = 25)**

34. (a) Explain the structure of the Human ovary. **(OR)**
    (b) Explain the genetic basis of ABO Blood grouping in man.
35. (a) Write about incompatibility of Rh factor and how it can be prevented? **(OR)**
    (b) Explain the three level of impact of extinction of species.
36. (a) Mention any five salient features of Human Genome Project. **(OR)**
    (b) Suggest some ways to prevent drug and alcohol abuse.
37. (a) Explain the structure of immunoglobulin with suitable diagram. **(OR)**
    (b) List the adaptations seen in terrestrial animals.
38. (a) Differentiate between r-selected and k-selected species. **(OR)**
    (b) Write short notes on :
    (i) Protected areas
    (ii) Wild life sanctuaries
    (iii) WWF

ANSWERS

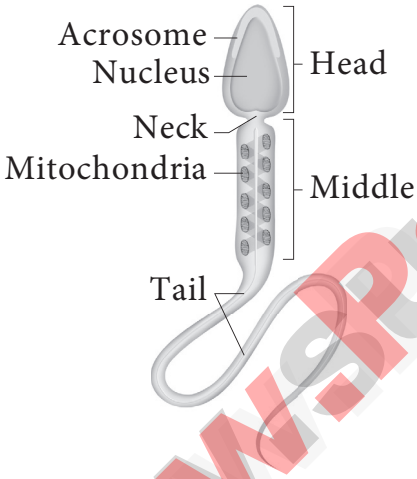
PART - I

1. (c) Inflammation
2. (a) UUU, Phenylalanine
3. (a) Klinefelter's Syndrome - XXY Female
4. (c) 1400 cc
5. (d) Syphilis, chlamydiasis and gonorrhoea
6. (d) Detection of pathogens
7. (a) Prolactin
8. (b) Both Assertion and Reason are true and Reason explains Assertion correctly.
9. (b) A - Conformer, B - Regulator, C - Partial Regulator
10. (a) Conjugation
11. (d) Chennai
12. (c) Operons
13. (a) Aspergillus niger
14. (d) Dobson units
15. (a) A toxin from Plasmodium species

PART - II

16. (i) If the fertilised ovum is implanted outside the uterus it results in ectopic pregnancy.
    (ii) The growth of the embryo may cause internal bleeding, infection and in some cases even death due to rupture of the fallopian tube.

17.



18. **Application of DNA finger printing :**
    (i) Forensic analysis : It can be used in the identification of a person involved in criminal activities, for settling paternity of maternity disputes, and in determining relationships for immigration purposes.
    (ii) Pedigree analysis : Inheritance pattern of genes through generations and for detecting inherited diseases.

19. The primitive Earth had no proper atmosphere, but consisted of ammonia, methane, hydrogen and water vapour.

20. Ramapithecus → Australopithecus → Homo habilis → Homo erectus →Homo sapiens

21. Lysozyme present in saliva acts as an antibacterial agent and cleaves the bacterial cell wall.

22. 1. Cyclosporin A 2. Statins are the bioactive molecules

Cyclosporin A :

(i) It is an Immunosuppressant molecule.

(ii) It is produced from the fungus Trichoderma polysporum.

USES :

(i) Used in organ transplantation.

(ii) It is also used for its anti-inflammatory, anti-fungal and anti-parasitic properties.

Statins :

(i) It is a bioactive molecule.

(ii) It is produced by the yeast Monascus purpureus.

USES :

(i) Used to lower blood cholesterol levels.

(ii) Inhibiting the enzyme which is responsible for the synthesis of cholesterol.

23. Animals are known to modify their response to environmental changes (stress) in reasonably short time spans. This is known as Acclimatization.

24.

No.	Natality	Mortality
1.	Natality rate expressed in crude birth rate number of organisms born per female per unit time.	Mortality is the population decline factor and is opposite to natality.
2.	Birth rate (b) = $\frac{\text{No. of birth per unit time}}{\text{Average population}}$	Death rate (d) = $\frac{\text{No.of deaths per unit time}}{\text{Average population}}$

PART - III

25.

Fission	Fragmentation
Fission is the division of the parent body into two or more identical daughter individuals.	In fragmentation, the parent body breaks into fragments (pieces) and each of the fragments has the potential to develop into a new individual.

26. (1) Zygote Intra-Fallopian Transfer
(2) Intra-Cytoplasmic Sperm Injection
(3) Intra Uterine Transfer

27. (i) It is the transmission of a gene from mother to son or father to daughter. The character is inherited to the second generation through the carrier of first generation.
(ii) E.g. Colour blind trait is inherited from the male parent to this grandson through carrier daughter.

28. Sequence of mRNA for the given coding unit 3'ACGUACGUACGUACGUACGUACGUACG 5'

29.

Diseases	Causative agent	Site of infections
Mumps	Mumps virus	Salivary glands
Chicken pox	Varicella Zoster virus	Respiratory tract, skin and nervous system
Dengue fever	Dengue virus or Flavi virus	Skin and blood

30. (i) The use of naturally occurring or genetically engineered microorganisms to reduce or degrade pollutants is called bioremediation.
(ii) Bioremediation is less expensive and more sustainable than other remediations available.
(iii) It is grouped into insitu bioremediation and ex situ bioremediation.

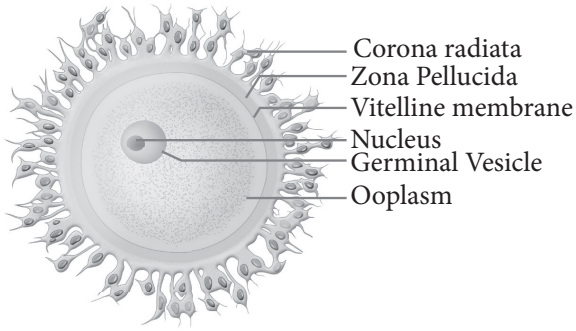
31. (i) Gene therapy is a better option because if the gene is replaced, it will be a stable and permanent corrective therapy. The new gene replaced will code for the proper enzyme and help the affected person to overcome the disease.
(ii) In case of enzyme replacement therapy it will only be a temporary solution and involves injection of the enzyme to the patient has to be done periodically.

32. There are 4 hotspots in India are
(a) Himalaya (The entire Indian Himalayan region)
(b) Western Ghats
(c) **Indo-Burma :** Includes entire North-eastern India, except Assam and Andaman group of Islands (And Myanmar, Thailand, Vietnam, Laos, Cambodia and Southern China)
(d) **Sundalands :** Includes Nicobar group of Islands (and Indonesia, Malaysia, Singapore, Brunei, Philippines).

33. Chemicals which are used in agriculture for growth of plants and pest control are called agrochemicals or agrichemicals.
Overuse of agrochemicals have been observed to generate residues that cause nutrient imbalance. In addition,
(i) May kill beneficial bacteria and soil organisms.
(ii) Affect aquatic animals and their productivity.

PART - IV

34. **(a)** (i) Human ovum is non-cleidoic, alecithal and microscopic in nature.
(ii) Its cytoplasm is called Ooplasm contains a large nucleus called the germinal vesicle.
(iii) The ovum is surrounded by three coverings namely an inner thin transparent vitelline membrane, middle thick zona pellucida and outer thick coat of follicular cells called corona radiata.
(iv) Between the vitelline membrane and zona pellucida is a narrow perivitelline space.



(OR)

(b) ABO system of blood grouping in humans is based on the chemical difference due to the presence of antigens on the surface of the RBC and epithelial cells as follows:

Blood group	Antigen
A	Presence of A antigen
B	Presence of B antigen
O	Absence of A and B antigen
AB	Presence of A and B antigen

(i) Three autosomal alleles located on chromosome 9 are concerned with determination of blood group in any person.

(ii) The gene controlling blood type is labelled as 'L' or I. The gene (isoagglutination) I exists in three allelic forms I^A, I^B and I^o

(iii) I^A specifies A antigen, I^B allele determined B antigen and I^o allele specifies no antigen.

(iv) Each allele (I^A and I^B) produces a transferase enzyme. I^A allele produces N-acetyl galactose transferase and can add N-acetyl galactosamine (NAG).

(v) I^B allele encodes for the enzyme galactose transferase that adds galactose to the precursor (i.e. H substances).

(vi) In the case of I°/I° allele, no terminal transferase enzyme is produced and therefore called **"null"** allele and hence cannot add NAG or galactose to the precursor.

(vii) A child receives one of three alleles from each parent giving rise to six positive genotypes and four possible blood type (phenotypes)

Genotypes	Phenotype
I^AI^A I^AI°	A group
I^BI^B I^BI°	B group
I^A I^B	AB group
I° I°	O group

Genetic basis of the human ABO blood groups

Genotype	ABO blood group phenotype	Antigens present on red blood cell	Antibodies present in blood plasma
I^AI^A	Type A	A	Anti -B
I^AI°	Type A	A	Anti -B
I^BI^B	Type B	B	Anti -A
I^BI°	Type B	B	Anti -A
I^AI^B	Type AB	A and B	Neither Anti - A nor Anti-B
$I^\circ I^\circ$	Type O	Neither A nor B	Anti -A and anti -B

35. **(a)** (i) Rh incompatibility has great significance in child birth. If a woman is Rh negative and the man is Rh positive, the foetus may be Rh positive having inherited the factor from its father.

(ii) The Rh negative mother becomes sensitized by carrying Rh positive foetus within her body.

(iii) Due to damage of blood vessels, during child birth, the mother's immune system recognizes the Rh antigens and gets sensitized. The sensitized mother produces Rh antibodies.

(iv) This causes haemolysis of foetal RBCs resulting in haemolytic jaundice and anaemia. This condition is known as Erythoblastosis foetalis or Haemolytic disease of the new born (HDN).

Prevention of incompatibility of Rh factor :

If the mother is Rh negative and foetus is Rh positive, anti D antibodies should be administered to the mother at 28th and 34th week of gestation as a prophylactic measure. If the Rh negative mother delivers Rh positive child then anti D antibodies should be administered to the mother soon after delivery. This develops passive immunity and prevents the formation of anti D antibodies in the mothers blood by destroying the Rh foetal RBC before the mother's immune system is sensitized.

(OR)

(b) The impact of extinction can be considered at three levels.

(i) **Species extinction :** Eliminates an entire species, by an environmental event E.g. Flood etc., or by biological event.

(ii) **Mass extinction :**

(a) Eliminates half or more species in a region or ecosystem. E.g. volcanic eruption.

(b) Five major mass extinction that occurred since the Cambrian period. This mass extinction is often referred to as K-T extinction.

(iii) **Global extinction :** Eliminates most of the species on a large scale or larger taxonomic groups in the continent or the Earth. E.g. Snow ball Earth and extinction following elevation in CO_2 levels. Extinction events opens up new habitats and so can facilitate the radiation of organisms that survived the mass extinction.

36. **(a)** (i) The human genome contains 3 billion nucleotide bases.

(ii) An average gene consists of 3000 bases, the largest known human gene being dystrophin with 2.4 million bases.

(iii) Genes are distributed over 24 chromosomes. Chromosome 19 has the highest gene density.

(iv) The chromosomal organization of human genes shows diversity.

(v) Approximately 30,000 genes are present in human genome and almost 99.9 nucleotide bases are exactly the same in all people.

(OR)

(b) **Prevention and control :** It is practically possible to prevent some one from using drugs and alcohol. Here are some ways that help to prevent drug and alcohol abuse.

1. **Effectively dealing with peer pressure :** The biggest reason for teens to start on drugs is due to their friends / peer groups imposing pressure on them. Hence, it is important to have a better group of friends to avoid such harmful drugs and alcohol.
2. **Seeking help from parents and peers :** Help from parents and peer group should be sought immediately so that they can be guided appropriately. Help may even be sought from close and trusted friends.
3. **Education and counselling :** Education and counselling create positive attitude to deal with many problems and to accept disappointments in life.
4. **Looking for danger signs :** Teachers and parents need to look for sign that indicate tendency to go in for addiction.
5. **Seeking professional and medical assistance :** Assistance is available in the form of highly qualified psychologists, psychiatrists and de-addiction and rehabilitation programmes to help individuals to overcome their problems.

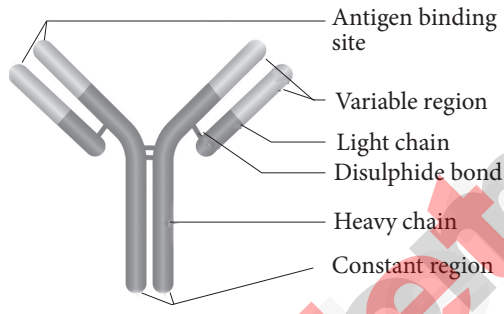
37. **(a)** (i) An antibody molecule is Y shaped structure.

(ii) It comprises of 4 polypeptide chains, two identical light chains (L) of molecular weight 25,000 Da (approximately 214 amino acids)

(iii) Two identical heavy chains (H) of molecular weight 50,000 Da (approximately 450 amino acids).

(iv) The polypeptide chains are linked together by di-sulphide (S-S) bonds.

(v) One light chain is attached to each heavy chain.



Structure of immunoglobulin

(vi) Two heavy chains are attached to each other to form a Y shaped structure. Hence, an antibody is represented by $H_2 L_2$.

(vii) Each chain (L and H) has two terminals. They are C - terminal (Carboxyl) and amino or N-terminal.

(viii) Each chain (L and H) has two regions.

(ix) They have variable (V) region at one end and a much larger constant (C) region at the other end.

(OR)

(b) (i) Earthworms, land planarians secrete a mucus coating to maintain a moist situation for burrowing, coiling, respiration, etc.

(ii) Arthropods have an external covering over the respiratory surfaces and well-developed tracheal systems.

(iii) In vertebrate skin, there are many cellular layers besides the well protected respiratory surfaces that help in preventing loss of water.

(iv) Some animals obtain their water requirement from food as partial replacement of water lost through excretion.

(v) Birds make nests and breed before the rainy season as there is availability of abundant food. But during drought birds rarely reproduce.

38. **(a)**

No.	R selected species	K selected species
1.	Smaller sized organisms.	Larger sized organisms.
2.	Produce many offspring.	Produce few offspring.
3.	Mature early.	Late maturity with extended parental care.
4.	Short life expectancy.	Long life expectancy.
5.	Each individual reproduces only once or few times in their life time.	Can reproduce more than once in lifetime.

(OR)

(b) (i) Protected Areas:

(a) These are biogeographical areas where biological diversity along with natural and cultural resources is protected, maintained and managed through legal measures.

(b) Protected areas include

1. National parks,
2. Wild life sanctuaries
3. Community reserves and biosphere reserves.

(ii) Wild Life Sanctuaries :

(a) Any area other than the area comprised with any reserve forest or the territorial waters can be notified by the State Government to constitute as a sanctuary if such area is of adequate ecological, faunal, floral, geomorphological, natural or zoological significance.

(b) This is for the purpose of protecting, endangered factual species.

(c) Sanctuaries are tracts of land where wild animals and fauna can take refuge without being hunted or poached.

(d) Eg. Periyar wild life sanctuary in Kerala.

(iii) WWF :

(a) World Wild Fund for Nature (WWF) It is an international non-governmental charitable trust founded in 1961, with headquarters at Gland, Vaud, Switzerland.

(b) It aims at wildness preservation and the reduction of human impact on the environment.

(c) It was formerly named the World Wildlife Fund.

(d) The living planet report is being published every two years by WWF since 1998.

(e) To ensure that the value of nature is reflected in decision made by individuals, communities, governments and businesses.