12th STD

PUBLIC EXAM - MARCH 2025
PART - III
BIOLOGY

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 - II
BIO-ZOOLOGY (35 Marks)
SECTION - 1

Note : (i) Answer **all** the questions **(8 × 1 = 8)**

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

1. The maximum reproductive capacity of an organism under optimum environmental conditions is called _____.
   (a) Biotic potential (b) Carrying capacity
   (c) Capacitation (d) Environmental resistance

2. Meselson and Stahl's experiment proved _____.
   (a) DNA is the genetic material (b) Transduction
   (c) Semi conservative nature of DNA replication
   (d) Transformation

3. **Assertion (A)** : Head of the sperm consists of Acrosome and Mitochondria.
   Reason (R) : Acrosome contains spiral rows of Mitochondria.
   (a) **(A)** is true. **(R)** is false.
   (b) **(A)** and **(R)** are true. **(R)** is the correct explanation of **(A)**.
   (c) Both **(A)** and **(R)** are false
   (d) **(A)** and **(R)** are true. **(R)** is not the correct explanation of **(A)**.

4. Which of the following rule is used to calculate the number of Barr bodies in a cell?
   (a) N – 1 Rule (b) Allen's Rule (c) N + 1 Rule (d) Jordan's Rule

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

6. In which mode of reproduction, variations are seen?
   (a) Asexual (b) Parthenogenesis (c) Sexual (d) Both (a) and (b)

7. Read the given **Statements** and select the correct option :

Statement 1 : Diaphragms, cervical caps and vaults are made of rubber and are inserted into the female reproductive tract to cover the cervix before coitus.

Statement 2 : They are chemical barriers of conception and are reusable.

(a) **Statement 1** is correct but **Statement 2** is incorrect.

(b) Both **Statements 1** and **2** are correct and **Statement 2** is the correct explanation of **Statement 1**.

(c) Both **Statements 1** and **2** are incorrect.

(d) Both **Statements 1** and **2** are correct but **Statement 2** is not the correct explanation of **Statement 1**.

8. PCR proceeds in three distinct steps governed by temperature, they are in order of :

(a) Primer Annealing, Synthesis, Denaturation
(b) Denaturation, Primer Annealing, Synthesis
(c) Denaturation, Synthesis, Primer Annealing
(d) Synthesis, Primer Annealing, Denaturation

Section - 2

Note : Answer **any four** of the following questions. **(4 × 2 = 8)**

9. What is mass extinction?
10. Differentiate Complete parthenogenesis from Incomplete parthenogenesis.
11. Expand the following : (a) Z I F T (b) I C SI
12. State any two salient features of Human Genome project.
13. What are homologous organs? Give an example.
14. What is pre-pro insulin?

Section - 3

Note : Answer a**ny three** questions. Q. No. **19** is **compulsory.** **(3 × 3 = 9)**

15. What is inhibin? State its functions.
16. What are the symptoms of phenylketonuria?
17. Mention any three main objectives to Darwinism.
18. List any three adaptations seen in terrestrial animals.
19. Which test is highly sensitive and can detect antigens in the range of nanogram? Mention the added advantages it possesses.

Section - 4

Note : Answer **all** the questions. **(2 × 5 = 10)**

20. (a) Give a schematic representation of gametogenesis in humans.

(OR)

(b) Differentiate active immunity from passive immunity.

21. (a) What is the technique used for settling parental dispute? What are the steps involved in this technique?

(OR)

(b) List all the wastes that you generate, at home, school or during your trip to other places. Could you very easily reduce the generation of these wastes? Which would be difficult or rather impossible to reduce?

ANSWERS

SECTION - 1

1. (a) Biotic potential
2. (c) Semi conservative nature of DNA replication
3. (c) Both **(A)** and **(R)** are false.
4. (a) N – 1 Rule
5. (a) Aspergillus niger
6. (c) Sexual
7. (a) **Statement 1** is correct but **Statement 2** is incorrect.
8. (b) Denaturation, Primer Annealing, Synthesis

SECTION - 2

9. **Mass Extinction :** The earth has experienced quite a few mass extinctions due to environmental catastrophes. A mass extinction occurred about 225 million years ago during the Permian, where 90% of shallow water marine invertebrates disappeared.

10.

Complete parthenogenesis	Incomplete parthenogenesis
Complete parthenogenesis is the only form of reproduction in certain animals and there is no biparental sexual reproduction. There are no male organisms and so, such individuals are represented by females only.	Incomplete parthenogenesis is found in some animals in which both sexual reproduction and parthenogenesis occurs.

11. (a) **Z I F T :** Zygote Intra-Fallopian Transfer
    (b) **I C S I :** Intra-Cytoplasmic Sperm Injection

12. **Salient features of Human Genome Project :**
    (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.

13. Structures which are similar in origin but perform different functions are called homologous structure. **E.g.** Fore limbs of terrestrial vertebrates bird, bat, whale, horse, and human.

14. The polypeptide chains are synthesized as a precursor called pre-pro insulin, which contains A and B segments linked by a third chain (C) and preceded by a leader sequence.

SECTION - 3

15. **Inhibin** is a hormone secreted by the sertoli cells in the stratified epithelium of the seminiferous tubule in the testis.
    Function : It is involved in the negative feedback control of sperm production.

16. **Symptoms of Phenylketonuria :**
    (i) Severe mental retardation
    (ii) Light pigmentation of skin and hair.
    (iii) Phenylpyruvic acid is excreted in the urine.

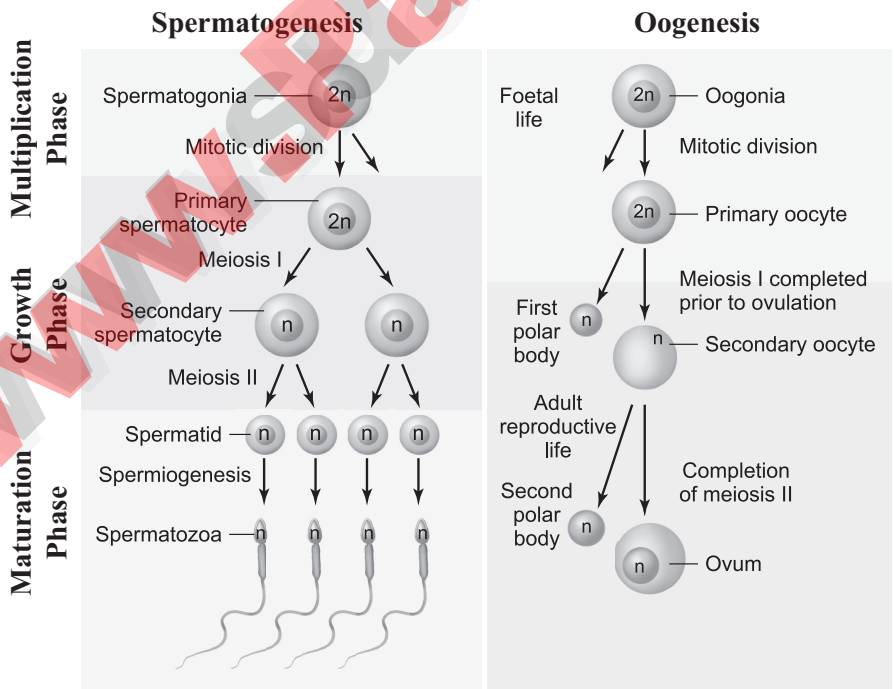
17. **Main Objections to Darwinism :**
    (i) Darwin failed to explain the mechanism of variation.
    (ii) Darwinism explains the survival of the fittest but not the arrival of the fittest.
    (iii) He focused on small fluctuating variations that are mostly non-heritable.

18. **Adaptations seen in terrestrial animals :**
    (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.

19. ELISA is highly sensitive and can detect antigens in the range of nanogram.
    (i) Simple procedure.
    (ii) High specificity and sensitivity, because of an antigen–antibody reaction.
    (iii) High efficiency, as simultaneous analyses can be performed without complicated sample pre treatment.

SECTION - 4

20. (a) **Schematic representation of gametogenesis in humans**



(OR)

(b)

No.	Active Immunity	Passive Immunity
i.	Active immunity is produced actively by host's immune system.	Passive immunity is received passively and there is no active host participation.
ii.	It is produced due to contact with pathogen or by its antigen.	It is produced due to anti bodies obtained from outside.
iii.	It is durable and effective in protection.	It is transient and less effective.
iv.	Immunological memory is present.	No memory.
v.	Booster effect on subsequent dose is possible.	Subsequent dose is less effective.

21. (a) DNA finger printing is useful in solving parental disputes.

Steps in DNA Finger printing :

(i) **Extraction of DNA :** Starts with obtaining a sample of DNA from blood, semen, vaginal fluids, hair roots, teeth, bones, etc.,

(ii) **Polymerase chain reaction (PCR) :** In many situations, there is only a small amount of DNA available for DNA fingerprinting. If needed many copies of the DNA can be produced by PCR (DNA amplification).

(iii) **Fragmenting DNA :** DNA is treated with restriction enzymes to cut the DNA into smaller fragments.

(iv) **Separation of DNA by electrophoresis :** During electrophoresis, DNA fragments are separated into bands of different sizes and the bands are sieved out of the agarose gel using a nylon membrane (chemicals that allow for it to break the hydrogen bonds of DNA so there are single strands).

(v) **Denaturing DNA :** The DNA on gels is denatured by using alkaline chemicals or by heating.

(vi) **Blotting :** The DNA band pattern in the gel is transferred to a thin nylon membrane placed over the 'size fractionated DNA strand' by Southern blotting.

(vii) **Using probes to identify specific DNA :** A radioactive probe (DNA labeled with a radioactive substance) is added to the DNA bands. The probe attaches by base pairing to those restriction fragments that are complementary to its sequence. The probes can also be prepared by using either 'fluorescent substance' or 'radioactive isotopes'.

(viii) **Hybridization with probe :** After the probe hybridizes and the excess probe washed off, a photographic film is placed on the membrane containing 'DNA hybrids'.

(ix) **Exposure on film to make a genetic / DNA Fingerprint :** The radioactive label exposes the film to form an image (image of bands) corresponding to specific DNA bands. The thick and thin dark bands form a pattern of bars which constitutes a genetic fingerprint.

(OR)

(b)

No	Place	Waste generated	Mode of reduction
i.	**Home:** Kitchen	a) Vegetable/Fruit/Food waste	They can be composted to form manure.
		b) e-waste	a) Reduce usage b) Recycle through e-waste recycling units
		c) Paper waste	a) Recycling units b) Reuse waste paper as much as possible
		d) **Used items:** Cup boards, Old washing machines and old fridge	Recycling units
ii.	**School**	a) Stationary waste/Paper waste	Segregate and sent to recycling unit
		b) e-waste	Recycling units
		c) Garden waste	Can be composted
iii.	**Trips**	a) Plastic cups / Water bottles / Plates	• Avoid plastic usage • Use ecofriendly plates / cups • Throw waste in garbage dry meant for the same in hotels / trains / public places.

If Judiciously planned, we can reduce usage of non-biodegradable materials especially plastics.