



CLASS: XII

TIME: 3 hrs

**Section A**

1. (d) 1%  
**Explanation:**  
1%
2. (d) Culture medium  
**Explanation:**  
In vitro fertilization technique involves fertilization outside the body in culture media followed by embryo transfer in fallopian tube or uterus.
3. (b) Keeping animals in zoological parks  
**Explanation:**  
Keeping animals in zoological parks helps in the conservation of captured animals, it does not cause their extinction.
4. (a) Infertility  
**Explanation:**  
The inability to conceive even after two years of unprotected sexual co-habitation is called infertility. This may be due to not functioning of the male or female reproductive system properly.
5. (b) Biodiversity and traditional knowledge  
**Explanation:**  
Most industrialized nations are rich financially but poor in biodiversity and traditional knowledge. Biodiversity and traditional knowledge related to bio-resources are can be exploited to develop modern applications.
6. (d) Trichoderma  
**Explanation:**  
Trichoderma
7. (b) Two X and one Y  
**Explanation:**  
Two X and one Y
8. (c) Some amino acids as glycine and alanine  
**Explanation:**  
In Urey and Miller's experiment, the product formed after the continuous sparking in the mixture of gases at high temperature were some amino acids like glycine and alanine. Sugar and nitrogenous base were also obtained from the same set up by some other scientist.
9. (b) Ecosystem services

**Explanation:**

The products of ecosystem processes are called as ecosystem services. Ecosystem services includes purification of air and water by forests and soil formation as well as nutrient cycles.

10.

(d) Haemophilia and red green colour blindness

**Explanation:**

Haemophilia and red-green colour blindness both are a sex-linked recessive gene on X chromosome. Body height is an example of polygenic inheritance. Rhesus blood group is based on the presence or absence of Rh-protein on the surface of RBC, phenylketonuria (PKU) is a recessive autosomal variation.

11. (a) Coagulation and partial digestion of milk proteins.

**Explanation:**

Coagulation and partial digestion of milk proteins.

12.

(c) B - denaturation at a temperature of about 98°C separating the two DNA strands.

**Explanation:**

B - denaturation at a temperature of about 98°C separating the two DNA strands.

13.

(b) Both A and R are true but R is not the correct explanation of A.

**Explanation:**

Both A and R are true but R is not the correct explanation of A.

14.

(c) A is true but R is false.

**Explanation:**

A is true but R is false.

15.

(c) A is true but R is false.

**Explanation:**

A is true but R is false.

16.

(c) A is true but R is false.

**Explanation:**

When plants and animals become extinct on a large scale over relatively short span of time, such episodes are called mass extinctions. Mass extinctions of dinosaurs took place about sixty million years ago. The time during which irridium rich soils were deposited in the earth is around 60 million years ago. Metal irridium is rare on earth. This metal is present in meteorites in large quantities. Therefore, it is now obvious that a comet or a meteorite hit the earth at that time. It has also been suggested that mass extinctions might have occurred due to **global cooling**.

**Section B**

17. Human growth hormone (HGH) is very useful to children born with hypopituitarism which is a form of dwarfism caused by under secretion of HGH by the anterior pituitary gland. It also helps in the healing of injuries. The gene for HGH is introduced in the plasmid of bacterium *E.coli*. This recombinant *E. coli* bacterium secretes Human growth hormone which is used for treating hypopituitarism.

18. 1 - RNA polymerase; 2 - hn; 3 -m; 4 - poly A tail.

19. A - Chasmogamous flower

B - Cleistogamous flower

Cleistogamous flower produces assured seed set.

20. A-Spermatogonium

B-Primary spermatocyte

C-Secondary spermatocyte

D-Spermatid

E-Spermatozoa

F-Sertoli cell

21. (I) Streptokinase is used to dissolve blood clots that have formed in the blood vessels. It is used immediately after symptoms of a heart attack occur to improve patient survival. This medicine may also be used to treat blood clots in the lungs (pulmonary embolism) and in the legs (deep venous thrombosis).

(ii) Lactic acid is used as a food preservative, curing agent, and flavoring agent. It is an ingredient in processed foods and is used as a decontaminant during meat processing.

(iii) Ethanol fermentation, also called alcoholic fermentation, is a biological process which converts sugars such as glucose, fructose, and sucrose into cellular energy, producing ethanol and carbon dioxide as a side-effect.

OR

a. **Humoral Immune response**

Elicited / Carried out by B-lymphocytes, which produce antibodies in the blood in response to a pathogen.

**Cell mediated immune response**

Elicited / Carried out by T-lymphocytes, which help the B-cells to produce antibodies/or destroy pathogen by themselves.

b. Patient are put under immunosuppressant to prevent T-cells from recognising foreign tissue / graft as 'non self' and prevent rejection.

### Section C

22. i. A - Replication of DNA

B - Transcription

C - Translation

ii. Central dogma states that the genetic information flows from DNA to RNA and then to proteins. In some viruses the flow of information is reversed in direction, i.e. from RNA to DNA.

It is called reverse transcription.

23. A record of inheritance of certain genetic traits for two or more generations presented in the form of a diagram or family tree is called pedigree. Analysis of traits in a several generation of a family is called as pedigree analysis. It is employed in case of human beings and domesticated animals.

**Importance:**

i. In human genetics, pedigree study provides a strong tool which is utilised to trace the inheritance of a specific trait, abnormality or disease.

ii. It is useful for the genetic counsellors to advice in tending couples about the possibility of having children with genetic defects like haemophilia, colour blindness, alkaptonuria, thalassemia and sickle all anaemic.

24. - Commensalism

- As egrets move, the cattle stir up and flush out from the vegetation the insects which otherwise might be difficult for the egrets to find and catch. Thus, the egrets are benefited while the cattle are neither benefited nor harmed.

25. • **Name of biochemical/molecular diagnostic tests for viruses:**

▪ **ELISA** - Enzyme-Linked Immunosorbent Assay

▪ **PCR** - Polymerase Chain Reaction

• **Principle of ELISA** - It is based on antigen-antibody interaction. Infection by a pathogen can be detected by the presence of antigens or by detecting the antibodies synthesized against the pathogen.

In situ conservation	Ex situ conservation
1. It means conservation on site. An endangered species is protected in its natural habitat by maintaining the habitat itself and defending the species from predators and poachers.	1. It means off site conservation. An endangered species is protected by removing it from the threatened habitat and placing it under the care of humans.
2. This approach emphasizes on the protection of total ecosystem.	2. This approach restricts to the protection of genetic resources at population and species level.

3. This approach includes methods of protection like establishing hot spots, national parks, wildlife sanctuaries and biosphere reserves.

3. It is done through live collections of animals and plants in zoos, botanical gardens, seed banks, etc.

OR

Biodiversity refers to the totality of genes, species and ecosystems of a region. Biodiversity differs from place to place. As there is continuous loss of biodiversity due to the increasing human population, resources consumption, industrialization, urbanization and pollution, hence, it is important to conserve it. The basic reason for concern is that biodiversity is being lost even before it attains its size. Loss of biodiversity would check the evolutionary capability of biota to cope-up with environmental loss/changes.

27. Life is estimated to have appeared 500 million years after the formation of earth i.e. almost 4 billion years ago. The estimate is based on the fact that the rocks of the earliest era (Archaean) are about 4.3 billion years old and contain no recognizable fossils while the rocks of the next era (Proterozoic) are about 1600 million years old and contain fossils. This observation indicates that evolution had proceeded quite far, and major groups of prokaryotes had appeared before the Proterozoic era started. First cellular form of life is considered to have appeared on earth about 2000 million years ago.

28. a. The primary immune response can be described as the first response of our body system to a newly introduced foreign agent, while the secondary immune response is defined as an intensified immune response to this previously exposed antigen. The primary and secondary immune responses are carried out with the help of two special types of lymphocytes, the B-lymphocytes and the T-lymphocytes.

**B-lymphocytes:** These produce an army of proteins in response to pathogens in the blood. These are called antibodies. The different types of antibodies secreted are IgA, IgG, IgE, and IgM. This response by the immune system is also called the humoral immune response.

**T-lymphocytes:** These mediate cell-mediated immunity (CMI). The cell-mediated immune response is responsible for graft rejection.

b. The **main difference** between primary and secondary immune response is that **primary immune response occurs in response to the primary contact with the antigen whereas secondary immune response occurs in response to the second and subsequent exposure to the same antigen.**

In a primary immune response, naive B cells are stimulated by antigen, become activated, and differentiate into antibody-secreting cells that produce antibodies specific for the eliciting antigen. A secondary immune response is elicited when the same antigen stimulates memory B cells, leading to the production of greater quantities of specific antibodies that are produced in the primary response.

#### Section D

29. a. Sertoli cells in seminiferous tubule, induces release of some factors which induce spermiogenesis.

OR

LH acts on Leydig cells, and stimulates the synthesis and secretion of androgens for spermatogenesis.

b. i. Spermatogonia  $\xrightarrow{\text{mitosis/differentiation}}$  Primary Spermatocyte  
ii. Primary Spermatocyte  $\xrightarrow{\text{meiosis I}}$  Secondary Spermatocyte  $\xrightarrow{\text{meiosis II}}$  Spermatid

c. Rete testis, vasa efferentia are the accessory ducts that the sperms travel through from seminiferous tubules to reach the epididymis

30. a. i. Sporozoites form in Human body.  
ii. gametocytes in female Anopheles mosquito.

b. 

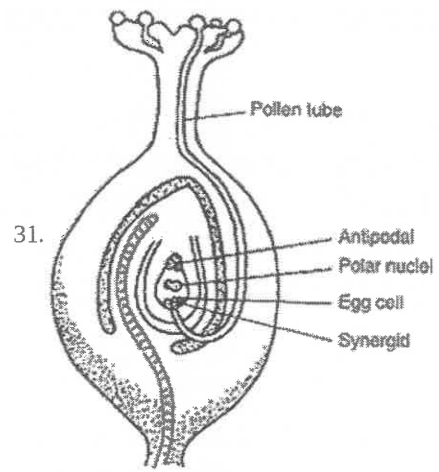
- The sporozoites after entering the body need to undergo asexual reproduction in liver and RBC
- RBC burst, released haemozoin which is responsible for chill and high fever recurring every 3-4 days.

OR

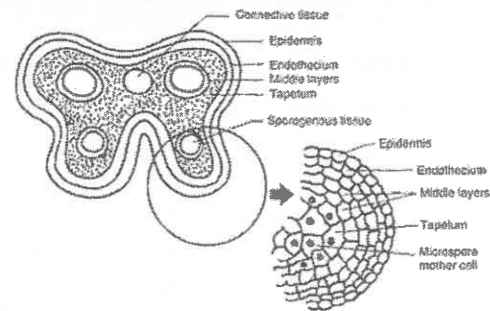
Gametocytes (male and female) enter female mosquito body via blood meal, fertilization in gut / stomach, sporozoites escape from the gut, and migrate into salivary glands (of mosquito)

c. Aedes, - dengue/chikungunya or Culex, - filariasis or elephantiasis

#### Section E



OR

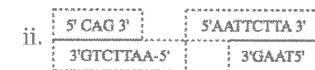


32. i. Satellite DNA or repetitive DNA These sequences normally do not code for any proteins. These sequence show high degree of polymorphism.
- ii. Steps carried out in the process of DNA fingerprinting technique are:
- isolation of DNA.
  - digestion of DNA by restriction endonucleases
  - separation of DNA fragments by electrophoresis
  - transferring (blotting) of separated DNA fragments to synthetic membranes such as nitrocellulose or nylon.
  - hybridization on using labelled VNTR probe.
  - detection of hybridized DNA fragments by autoradiography
- The applications of DNA fingerprinting technique are in Forensic science / determining population and genetic diversities / paternity test.

OR

During the process of translation in prokaryotes, amino acids are activated in the presence of ATP and they are linked to their aminoacylation of tRNA, as ribosome is the cellular factory for protein synthesis which exists as two subunits for the initiation and this small subunit of ribosome binds to mRNA at the start codon that is AUG. Then it is recognised by initiator t-RNA, large subunit has two sites for subsequent amino acids to bind to each other with a peptide bond. Then it proceeds towards the elongation process where charged tRNAs sequentially bind to the appropriate codon in mRNA, by forming complementary base pairs with the tRNA anticodon. Then ribosome moves codon by codon along with the m-RNA, and amino acids are added one by one, at the end, a release factor binds to the stop codon which can be UAA / UAG / UGA for terminating the translation.

33. i. EcoRI



- iii. These are named sticky ends, because they form hydrogen bonds with their complementary cut parts.

OR

Polymerase Chain Reaction (PCR) is a technique to obtaining multiple copies of a gene of interest in vitro. This technique amplifies DNA through a simple enzymatic reaction. This technique was developed by Kary Mullis in 1965.

The basic requirements of a PCR are the following:

- DNA template
- Primers
- Enzyme-Taq polymerase

Amplification of recombinant DNA gene is done using Polymerase Chain Reaction (PCR). It is carried out in the following steps:

- i. **Denaturation** - The double-stranded DNA is denatured by applying high temperature of 95°C for 15 seconds. Each separated strand acts as a template.
- ii. **Annealing** - Two sets of primers are added, which anneal to the 3' end of each separated strand.
- iii. **Extension** - DNA polymerase extends the primers by adding nucleotides complementary to the template provided in the reaction. Taq polymerase is used in the reaction, which can tolerate heat. All these steps are repeated many times to get several copies of the desired DNA.