Sample Paper 6

Biology (044)

Class XII Session 2022-23

Time: 3 Hours **Max. Marks: 70**

General Instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. Section—A has 16 questions of 1 mark each; Section—B has 5 questions of 2 marks each; Section—C has 7 questions of 3 marks each: Section—D has 2 case-based questions of 4 marks each; and Section—E has 3 questions of 5 marks each.
4. There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
5. Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION - A

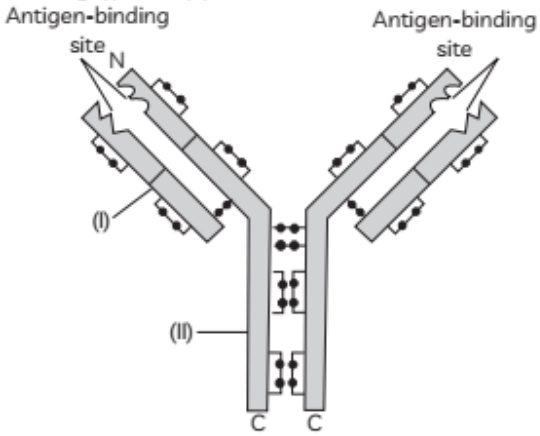
16 Marks

1. A plant in which dichogamy is found:

(a) *Commelina* (b) *Opuntia*

(c) *Cauliflower* (d) *Oxalis* 1

2. Identify (I) and (II):



	(I)	(II)
(a)	Heavy chain	Light chain
(b)	Light chain	Heavy chain
(c)	Disulphide bond	Heavy chain
(d)	Antigen binding site	Fab region

1

3. ..... is the prevention of large scale loss of biological integrity.

(a) Biopatent (b) Biopiracy

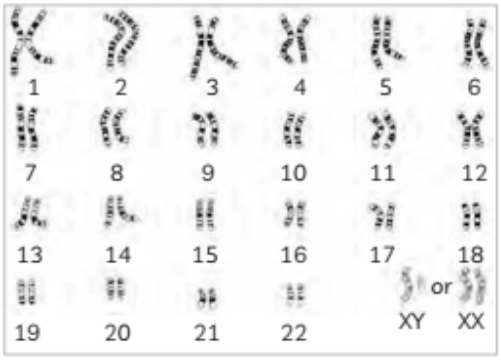
(c) Bioprospecting (d) Biosafety 1

4. Pollination agents of chiropteriphily is:

(a) Insects (b) Birds

(c) Bats (d) Water 1

5. Which arrangement is shown in the following figure?



(a) Inversion (b) Locus

(c) Karyotype (d) Mapping 1

6. Which of the following statement is incorrect for the DNA?

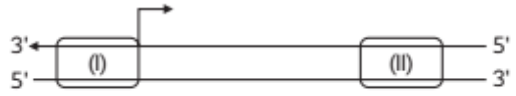
(a) DNA is less reactive

(b) DNA is structurally more stable.

(c) Presence of guanine confers the additional stability to DNA.

(d) DNA is preferred for storage of genetic information. 1

7. Name the parts (I) and (II)



(a)	Promoter	Non-coding strand
(b)	Structural	Coding strand
(c)	Promotor	Structural gene
(d)	Promoter	Coding strand

1

8. The storage of material in the form of seeds is one of the mostly widespread and valuable ..... approaches to conservation.

(a) In-site (b) Ex-situ

(c) Cyropreserving (d) Germplasmic 1

9. Which of the following is true for C-peptide in human insulin?

(a) It helps in getting insulin assembled into a mature form.

(b) It is present in mature form of insulin

(c) It is a polypeptide hormone

(d) None of the above. 1

10. Identify the incorrect statements for human genome project.

(I) Total number of genes are 40,000

(II) Human genome contains 3164.7 million nucleotide base.

(III) Functions of only 20% of the discovered genes are unknown.

(IV) Repeated sequences make up very large portion of the human genome.

(a) (I) and (III) (b) (II) and (IV)

(c) (I) and (II) (d) (II) and (III) 1

11. Match the items given in Column I with those in Column II and select the correct option given below:

Column (I)		Column (II)	
(A)	Proliferative Phase	(i)	Breakdown of endometrial lining
(B)	Secretory Phase	(ii)	Follicular Phase
(C)	Menstruation	(iii)	Luteal Phase

Options:

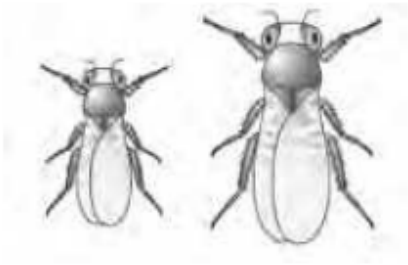
(a) (A)-(iii), (B)-(ii), (C)-(i)

(b) (A)-(i), (B)-(iii), (C)-(ii)

(c) (A)-(iii), (B)-(i), (C)-(ii)

(d) (A)-(ii), (B)-(iii), (C)-(i) 1

12. Rekha wants to perform experiments on inheritance using *Drosophila melanogaster*. But she is confused between male and female. The image shown here is of *Drosophila melanogaster*.



Which of the following is correct for 'X' and 'Y'?

(a) X-Male, Y-Female

(b) X-Female, Y-Male

(c) X-Male, Y-Male

(d) X-Female, Y-Female 1

Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

(a) Both A and R are true and R is the correct explanation of A.

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

(c) A is true but R is false.

(d) A is false but R is true.

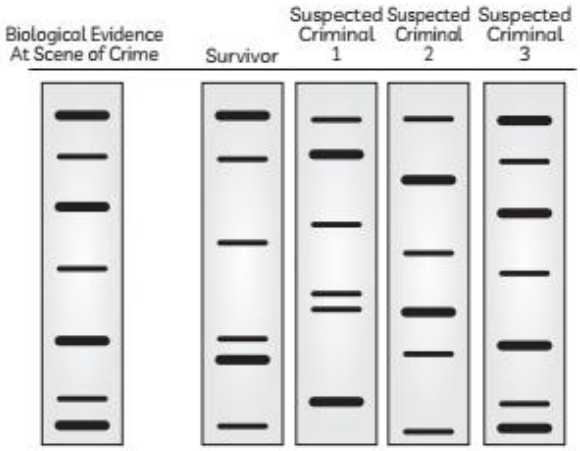
13. Assertion (A): The blastocyst merge with and burrow into the endometrium.

Reason (R): It secretes digestive enzymes that eat away the endometrial lining at the site of implanation. 1

14. Assertion (A): DNA is a better genetic material.

Reason (R): DNA is more reactive and structurally more stable as compared to RNA. 1

15. DNA fingerprinting is a unique type of fingerprinting because there is no known way to alter it because it is constant throughout the body. More than 79 cases in India have been resolved using this method, including significant cases involving Dhanu and Shivarasan, the alleged attacker of the late Prime Minister Shri. Rajiv Gandhi, the Tandori case, the murder of Madhumati, etc.



Assertion (A): DNA fingerprinting involves identifying differences in some specific regions in DNA sequences called as repetive DNA.

Reason (R): In these sequences, a small stetch of DNA is not repeted many times. 1

16. Assertion (A): Intensely lactating mother generally do not conceive.

Reason (R): Suppression of fertilization is the cause of this. 1

SECTION - B

10 Marks

17. (A) State some major risks of alcoholism.

(B) Name any two narcotics obtained from the plant shown here.

OR

Write the symptoms and treatment of any disease caused by:

(A) Protozoa

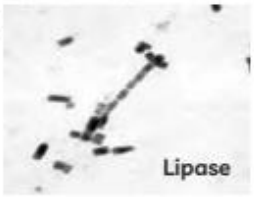
(B) Helminthes 2

18. (A) Shikha was playing in her garden. Suddenly a snake arrived and gave her bite. What type of injection is given to the patients in case of snakebites? Explain.

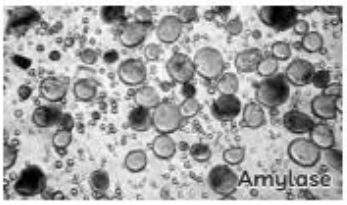
(B) What type of immunization is provided by this injection? 2

19. Give the function of the following enzymes.

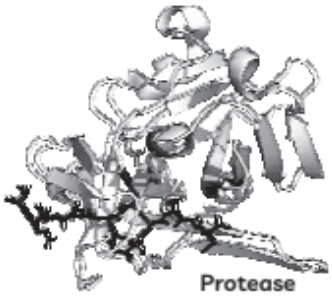
(A)



(B)



(C)



2

20. Define founder effect. 2

21. (A) Give any one difference between gene and cell cloning.

(B) Define elution. 2

SECTION - C

21 Marks

22. What relationship exists between the following pairs?

(A) Splint bones in horse

(B) Sweet potato and potato

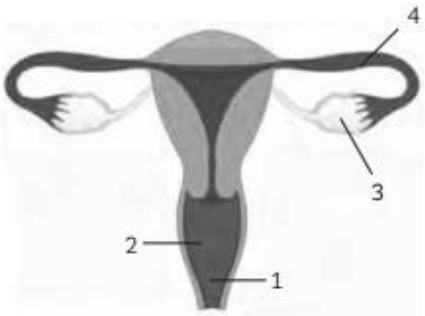
(C) Ornithorhyncus and Tachyglossus

3

23. (A) State any four functions of gel electrophoresis technique in genetic engineering.

(B) Which scientist was given the nobel price for the development of PCR techniques? 3

24. The figure represents the female reproductive system:



(A) Identify the name of each label.

(B) Which structure produces the female gamete?

(C) What is the name of the process through which female gamete is produced? 3

25. (A) Abbreviate the following:

(i) CBD

(ii) WSSD

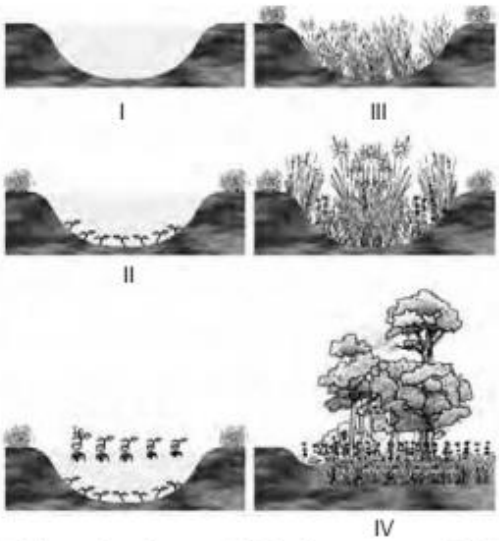
(B) Why genetic variation is important in the plant of *Rauwolfia Vomitoria?*

OR

(A) How many plant and animal species did the IUCN describe in 2004? What does Robert May define as global species diversity?

(B) "Species diversity of plants is much less than that of animals." Why? 3

26.



(A) What is the technical term used for succession in a pond?

(B) Label the stages I to IV.

(C) Elaborate secondary succession 3

27. (A) Explain the statement "10 kg of deer meat is equivalent to 1 kg of lion's flesh" in terms of energy transfer in the ecosystem. Give an example.

(B) An imperfect ecosystem: what is it? Provide an appropriate example. 3

28. (A) State any four differences between oogenesis and spermatogenesis.

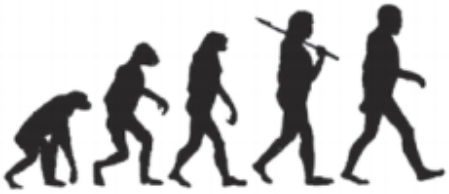
(B) State any two reasons for a statuary ban on amniocentesis. 3

SECTION - D

8 Marks

(Q. No. 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.)

29. *The origin of life occupies a very important place in the study of the evolution. Its liminal location between life and non-life poses special challenges to researchers who study this subject. Current approaches in studying the origin and evolution of early life are reductive: they either reduce the domain of non-life to the domain of life or vice versa. This contribution seeks to provide a perspective that would avoid reductionism of any kind. Its goal is to outline a frame that would include both domains and their respective evolutions as its particular cases. The study examines the main theoretical perspectives on the origin and evolution of early life and provides a constructive critique of these perspectives. An objective view requires viewing an object or a phenomenon from all available points of view. The goal of this contribution is not to prove the current perspectives wrong and to deny their achievements. It seeks to provide an angle that would be sufficiently wide and would allow synthesizing current perspectives for a comprehensive and objective interpretation of the origin and evolution of early life. In other words, it seeks to outline a frame for an objective view that will help understand life's place within the universe.*



(A) About how many years ago life originated? 1

(B) Origin of autotropism is done after origin of eukaryotes. State true or false. 1

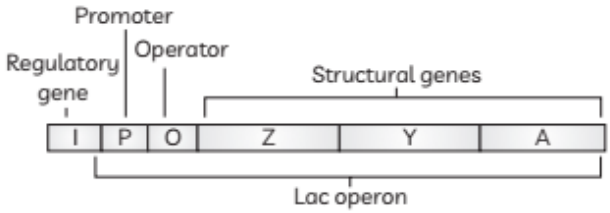
(C) (i) Name the phenomenon by which rapid speciation takes place.

(ii) What on the early earth supplied the energy for a biotic synthesis?

OR

In the past, life was thought to have developed from the inorganic atmosphere of the earth, but this is no longer the case. Describe two causes. 2

30. *Genetic information must be transferred from a polymer of nucleotides to a polymer of amino acids as part of the translation process. Genetic code refers to the correspondence between the order of amino acids in a polypeptide and the nucleotide sequence of DNA or mRNA. George Gamow proposed that the code should consist of three nucleotides in order to encode all 20 amino acids.*



(A) Differentiate between cistron and muton. 1

(B) Name any two nations where international rice genome sequencing project develop. 1

(C) Write the function of Z, Y, A in the figure.

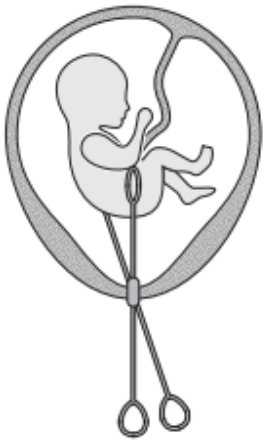
OR

When will the transcription of these genes stop? State how does the repressor molecule gets inactivated? 2

SECTION - E

15 Marks

31. The figure given below represents an activity which was banned before 1971 and considered criminalized under Section 312 of the Indian Penal Code. But in the year 1971, it was legalized in India under a certain act with some strict conditions.



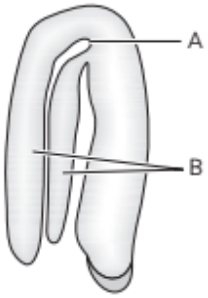
(A) Name the activity represented in the given figure. Also write the name of the act that legalized this activity in India.

(B) Explain briefly about the act passed by government of India in 1971.

(C) How human beings misuse this activity? State it by giving two points.

OR

Structure shown represents a dicot embryo:



(A) Give the components (i) and (ii) in their respective labels and functions.

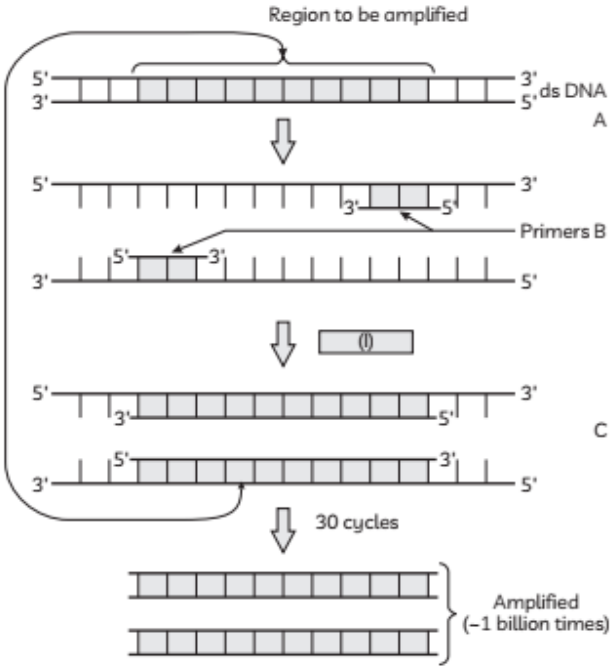
(B) Explain the development of dicot embryo. 5

32. Recombinant DNA is a type of synthetic DNA that is created by fusing or inserting one or more DNA strands, mixing DNA sequences from other species, or DNA sequences that do not often occur together, according to your requirements.

(A) State the applications of genetic engineering in industries.

(B) Name any six restriction site in pBR322.

OR



(A) Label the part (I).

(B) What is the function of DNA polymerase?

(C) What is a primer and what is the general length of primers?

(D) Why does the PCR product need to be purified following amplification? 5

33. (A) Kabir's mother took him to a local health centre and she was advised to get all the necessary vaccination done for him. She doesn't know anything about vaccination. Help her understand the principle and the process of vaccination. How does it impart immunity to a child against a particular disease?

(B) Differentiate between active and passive immunity giving one example of each.

OR

(A) Draw the flowchart of stages in biogas production.

(B) During sewage treatment, the primary effluent is agitated and aerated in large tanks. Why? 5

SOLUTION

SECTION - A

1. *(a) Commelina*

Explanation: Maturation of pollens and stigma of a flower at different times is said to be dichogamy. It is a device to avoid self-pollination.

2. *(b) (I): Light chain; (II): Heavy chain*

Explanation: Each heavy chain's N-terminus joins with a light chain to produce an antigen-binding domain. The two antigen-binding domains that make up the "Y" arms are present. They are referred to as "fragment antigen-binding" domains (Fab).

3. *(d) Biosafety*

Explanation: A framework known as "biosafety" outlines the use of certain procedures, instruction, safety gear, and specifically constructed structures to safeguard the environment, the community, and workers against unintended exposure to infectious pathogens and toxic substances.

4. *(c) Bats*

Explanation: Pollination by insects are called entomophily. Pollination by birds are called ornithophily. Pollination by water is called hydrophily.

5. *(c) Karyotype*

Explanation: The arrangement and visual appearance of the chromosomes in the cell nuclei of an organism or species is called karyotype.

6. *(c) Presence of guanine confers the additional stability to DNA.*

Explanation: Presence of thymine in place of uracil confers the additional stability to DNA.

7. *(d) (I): Promoter; (II): Coding strand*

Explanation: This region of the gene is called the transcription unit. There is the promoter region which is the start site of transcription.

There is a structural gene. There are two strands. The 5'→3' is the coding strand and the 3'→5' is the template strand.

There is a termination sequence which terminates the process of transcription.

8. *(b) Ex-situ*

Explanation: Plant species ex situ collections are kept in reserve for research, reintroduction, and restoration while serving as a safeguard against extinction in the wild. Seed bank is one of the best approaches of ex-situ as conservation.

9. *(a) It helps in getting insulin assembled into a mature form.*

Explanation: The proinsulin molecule's C-peptide, a 31-aminoacid polypeptide, joins the A and B-chains of insulin. Additionally known as a linking peptide. It is crucial for the production of insulin, which is necessary for controlling blood sugar.

10. *(a) (I) and (III)*

Explanation: Total number of genes are 30,000 and functions of over 50% of the discovered genes are unknown.

11. *(d) (A)-(ii), (B)-(iii), (C)-(i)*

Explanation: In proliferative phase, the follicles start developing, called follicular phase. Secretory phase is also called as luteal phase mainly controlled by progesterone secreted

by corpus luteum. Menstruation involves breakdown of overgrown endometrial lining.

12. *(a) X-Male, Y-Female*

Explanation: 'X' represents male fruit fly while 'Y' represents female fruit fly. Fruit fly is the common name of *Drosophila melanogaster*.

Related Theory

➥ *Morgan used the tiny Drosophila melanogaster fruit flies, which have been found to be excellent for such research of inheritance. They could be raised in the lab on basic synthetic medium.*

13. *(a) Both A and R are true and R is the correct explanation of A.*

Explanation: The sperm and egg combine during fertilisation to form a zygote in one of the fallopian tubes. The zygote then passes through the fallopian tube and develops into a morula. A blastocyst develops from the morula once it enters the uterus. The blastocyst then undergoes implantation, in which it burrows into the uterine lining. At the site of implantation, it secretes digestive enzymes that consume the endometrial lining.

14. *(c) A is true but R is false*

Explanation: DNA is a better genetic material because DNA is less reactive and structurally more stable as compared to RNA.

15. *(c) A is true but R is false*

Explanation: DNA fingerprinting involves identifying differences in some specific regions in DNA sequences called as repetive DNA because in these sequences, a small stetch of DNA is repeated many times.

16. *(c) A is true but R is false*

Explanation: Intensely lactating mother generally do not conceive due to the suppression of gonadotropins.

SECTION - B

17. (A) Cardiovascular problems, liver cirrhosis, cancer, brain damage, vitamin deficiencies etc.

(B) Charas and ganja

OR

(A) Disease caused by protozoa is malaria. Symptoms are high chill fever every other day. Treatment are prevention of infection by the use of mosquito nets, preventive drugs and control of vector.

(B) Disease caused by heminthes is ascariasis. Symptoms are headache, fever, vomiting, pains. Treatment are applying proper sanitary habits.

18. (A) The injection given to patients in case of snake bites conatins performed antibodies against the venom of snake.

(B) This type of immunization is called passive immunization. Artificial passive immunity is a condition where performed antibodies are injected directly into the body. It offers a prompt immune response. When a patient has been bitten by a snake, the injection contains antibodies that have been tested for snake venom.

19. (A) Lipases are used in detergent formulations and are helpful in removing oily stains used from the laundry.

(B) Amylases are used in preparation of sizing agents in textile and paper industry.

(C) Proteases are used in clarification of fruit juices.

20. In terms of genetics, the founder effect is the decrease in genomic variety that happens when a small number of people separates from a larger population. The ensuing new subpopulation will eventually resemble the original tiny, isolated group in terms of genotypes and physical features, which may differ greatly from the original bigger population. A founder effect may also account for why some genetic disorders are more prevalent in various subsets of the population. A founder effect may occasionally contribute to the development of new species.

21. (A)

Gene cloning	Cell cloning
It is a technique to obtain clones or identical clones of particular DNA molecule.	It is a group of genetically identical cells having descended from a single cell is obtained by RDT.

(B) Elution is the procedure for removing DNA from a gel sample. The isolated DNA fragments are further dyed and used to other methods, including DNA fingerprinting, *etc.*

SECTION - C

22. (A) Vestigial organs: Vestigial organs are bodily tissues, organs, or cells that are no longer functional in the same way they were in the trait's ancestor. They helped to explain adaptation since they validated evolution.

(B) Analogous organs: Organs with similar functions but differing anatomical structures are referred to as analogous organs. They are involved in convergent evolution. Convergent evolution is a type of evolution in which different species evolve on their own to accomplish a similar goal.

(C) Connecting links: A connecting link between two systematic classes of species is an intermediate or transitional state. It bears characters common to both these groups on either side of its position. Thus it represents an evolutionary line.

23. (A) (1) They cut DNA into many fragments.

(2) They link together newly joined fragmnents of DNA.

(3) They make millions of copies of a specific segment of DNA.

(4) Separate fragments by their length and electrical charges.

(B) Kary Mullis

24. (A) (1) Vagina

(2) Cervix

(3) Ovary

(4) Fallopian tube

(B) The ovaries produce the egg cells, called the ova or oocytes.

(C) The development of female gametes in animals is known as oogenesis. Meiosis, including meiotic recombination, takes place in the diploid primary oocyte throughout this phase to create the haploid ovum.

25. (A) (i) The Convention on Biological Diversity

(ii) World Summit on Sustainable Development

(B) Genetic variation is important in the plant of *Rauwolfia Vomitoria* because the genetic variation affects the production of the drug principle reserpine in the medicinal plant of *Rauwolfia Vomitoria*.

OR

(A) IUCN (2004) has provided information on somewhat more than 1.5 million plant and animal species. The number of species in the world is estimated by Robert May to be around 7 million.

(B) Because most animals have neurological systems that regulate and coordinate their different behaviours, the species diversity of plants is far lower than that of animals. Additionally, they have receptors that can pick up environmental cues; some of these reactions are adaptive and enable an organism's survival in dynamic environments.

26. (A) Hydrosere

(B) I-Phytoplankton

II-Submerged free floating plant stage

III-Red swamp stage

IV-Scrub stage

(C) Secondary succession is a type of ecological succession (the development of an ecological structure within a biological community) in which plants and animals recolonize a habitat following a significant disturbance, such as a devastating flood, wildfire, landslide, lava flow, or human activity (such as farming or building construction).

27. (A) The 10% law governs the transfer of food energy from lower to higher trophic levels. Only 10% of total energy is said to be transferred from one trophic level to another, according to the 10% law. The remainder of the energy is lost. A lion consumes deer (lower trophic level). Therefore, only 1 kg of lion's flesh will result from 10 kg of deer meat. Deer meat contains additional food energy, but it is wasted and lost.

(B) Both biotic and abiotic elements are found in an ecosystem. The term "biotic factor" refers to all biological things, whereas "abiotic components" refers to things like light, air, water, temperature, humidity, etc. Incomplete ecosystems, such as the profundal and benthic zones in an aquatic ecosystem, result from the absence or restricted availability of any component (either abiotic or biotic).

28. (A)

Oogenesis	Spermatogenesis
Occurs in ovary	Occurs in testes
Spermatogonia multiples to form primary spermatocytes.	Oogonia multiplies to form primary oocyte
No polar body is formed	Polar bodies are formed
Secondary spermatocytes divide to form two spermatids	Secondary oocyte divides to form one ootid and done polar body.

(B) (1) This technique was misused by knowing as sex.

(2) It was baned to avoid female faeticide.

SECTION - D

29. (A) On Earth, life originated about 3.8 billion years ago.

(B) False. Origin of autotropism is done just before origin of eukaryotes.

(C) (i) Genetic drift

(ii) Very high temperature due to lightening or UV–rays provided energy for a biotic synthesis.

OR

Life cannot be originated in the present day atmosphere because:

(1) The temperature of present day atmosphere is much less than that of primitive atmosphere.

(2) The present day atmosphere is oxidizing & not reducing due to presence of oxygen.

30. (A) Cistron is the continuous segment of DNA which specifies one polypeptide chain. and muton is the smallest length of DNA capable of giving rise to new form by mutation.

(B) France and Brazil

(C) Z gives beta-galactosidase enzyme, Y gives permease enzyme and A gives transacetylase enzyme.

OR

Transcription will stop in the absence of inducer.

The repressor molecule gets inactivated in the presence of inducer.

SECTION - E

31. (A) Government of India legalised MTP but with some strict conditions to avoid its misuse. The Abortion is the activity represented in the given figure. It was criminalized under Section 312 of the Indian Penal Code, 1860, describing it as intentionally "causing miscarriage." The Medical Termination of Pregnancy Act legalized this activity in India under some strict conditions.

(B) In 1971 restrictions that are imposed are important to keep a check on indiscriminate and illegal female foeticides as the rate of female foeticides is very high in India. Also according to this act, MTPs are safe during the first trimester (12 weeks) of pregnancy whereas second trimester abortions are much riskier as the foetus becomes more associated with the maternal tissue.

(C) Misuse of MTPs are:

(1) The human beings first illegally determine the sex of the unborn child and if the foetus is found to be female, it is usually followed by MTP.

(2) Unfortunately, most of the MTPs are performed illegally by unqualified people which is unsafe as well as fatal.

OR

(A) (i) Plumule: To form shoot system

(ii) Cotyledons: Storage of food

(B) Embryogenesis is the process by which an embryo develops from a zygote.

A diploid zygote is created when a male gamete and an egg cell fuse together during fertilisation. The zygote becomes enclosed by a wall and changes into a cospore.

The oospore divides transversely to produce two cells, one a small apical or terminal cell that faces the chalaza of the embryo sac and the other a big basal cell that faces the micropyle. Proembryo is the name for this two-celled structure. To create the multicellular suspensor structure, the basal cell or suspensor initial goes through

several transverse divisions. The embryo is propelled toward the endosper by the suspensor.

32. (A) (1) It includes synthesizing of substances of commercial importance in pharmacy.
(2) In includes the production of proteins from waste
(3) In includes the production of biodiesel from waste.

(B) Hind III, BamH I, EcoR I, Pvu II, Pst I, Cla I

OR

(A) DNA polymerase(Taq Polymerase)

(B) DNA polymerases' major function is to efficiently and properly duplicate the genome in order to maintain the genetic code and guarantee that it is faithfully passed down through the generations.

(C) It is widely agreed upon that PCR primers should be between 18 and 22 bp in length. This length is just right for good specificity while yet being manageable for primers to bind to the template with ease at annealing temperature.

(D) It is usually essential to purify the DNA from a PCR reaction before using it, which makes it easier to get rid of the enzymes, nucleotides, primers, and buffer materials.

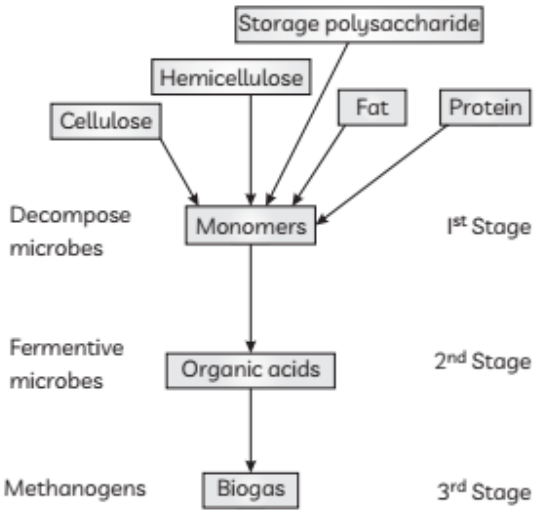
33. (A) The principle of immunisation or vaccination is based on the property of 'memory' of the immune system. In vaccination, a preparation of antigenic proteins of pathogen or inactivated/ weakened pathogen (vaccine) are introduced into the body. The antibodies produced in the body against these antigens would neutralise the pathogenic agents during actual infection. The vaccines also generate memory B- and T-cells that recognise the pathogen quickly on subsequent exposure and overwhelm the invaders with a massive production of antibodies.

(B) Active immunity: When a host is exposed to antigens, which may be in the form of living or dead microbes or other proteins, antibodies are produced in the host body. This type of immunity is called active immunity. Active immunity is slow and takes time to give its full effective response.

Passive immunity: When ready-made antibodies are directly given to protect the body against foreign agents, it is called passive immunity. It elicits a faster response.

OR

(A)



Stages in Biogas Production

(B) First effluent collected after the primary treatment of sewage is fed into the sizable aeration tanks during secondary treatment. A mechanical agitator stirs the effluent, and air is poured into it. The aerobic microorganisms multiply extremely as a result.