BIOLOGY – FULL SYLLABUS
MOCK TEST PAPER - 1
CBSE BOARD CLASS – XII (2025-26)

Maximum Marks : 70 ***Time : 3 Hours***

General Instructions :

(i) All questions are compulsory.

(ii) The question paper has five sections and 33 questions. All questions are compulsory.

(iii) 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.

(iv) 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.

(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION - A

1. Which of the following is the most widely accepted method of contraception in India at present?
(a) Cervical caps (b) Tubectomy (c) Diaphragms (d) Intra uterine devices

2. Match column I with column II and select the correct option from the codes given below.

	Column I		**Column II**
A.	Fertilisation	(i)	Morula
B.	Cleavage	(ii)	Vagina
C.	Blastocyst	(iii)	Ampulla of oviduct
D.	Parturition	(iv)	Uterine wall

(a) A-(iv), B-(i), C-(ii), D-(iii) (b) A-(ii), B-(i), C-(iv), D-(iii)
(c) A-(ii), B-(i), C-(iii), D-(iv) (d) A-(iii), B-(i), C-(iv), D-(ii)

3. Which one of the following codons codes for the same information as UGC?
(a) UGU (b) UGA (c) UAG (d) UGG

4. The Hardy-Weinberg principle cannot operate if
(a) the population is very large
(b) frequent mutations occur in the population
(c) the population has no chance of interaction with other populations
(d) free interbreeding occurs among all members of the population.

5. In higher vertebrates, the immune system can distinguish self-cells and non-self. If this property is lost due to genetic abnormality and it attacks self-cells, then it leads to
(a) autoimmune disease (b) active immunity
(c) allergic response (d) graft rejection.

6. Select the correct option regarding a disease with its causal organism where haemozoin is released by the repture of RBCs.

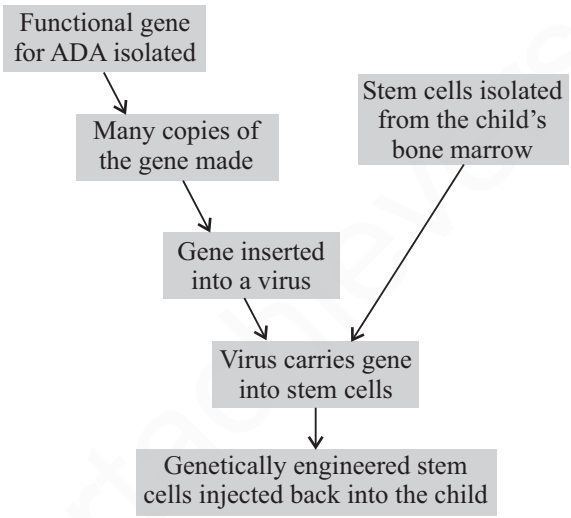
(a) Amoebiasis, *Plasmodium vivax*
(b) Malaria, Rhinovirus
(c) Malaria, *Plasmodium falciparum*
(d) Pneumonia, *Haemophilus influenzae*

7. Which among these are produced by distillation of fermented broth?

(i) Whisky
(ii) Wine
(iii) Beer
(iv) Rum
(v) Brandy

(a) (ii) and (iii) only
(b) (i) and (ii) only
(c) (iii) and (v) only
(d) (i), (iv) and (v) only

8. Children with Severe Combined Immunodeficiency Disorder (SCID) cannot produce many types of white blood cells that fight infections. This is because they do not have the functional gene to make the enzyme Adenosine Deaminase (ADA). Some children with SCID have been treated with stem cells as shown in the given flow chart.



Why are stem cells used in this treatment?

(a) Stem cells are capable of dividing for long periods to generate replacements for cells that are unable to produce ADA.
(b) The stem cells used here belong to the child and there will be no triggering of immune response.
(c) Stem cells are unspecialised and can differentiate to specialised cell types such as white blood cells to fight infection.
(d) All of these

9. When an exotic species was introduced in an area, what may be the most probable effect?

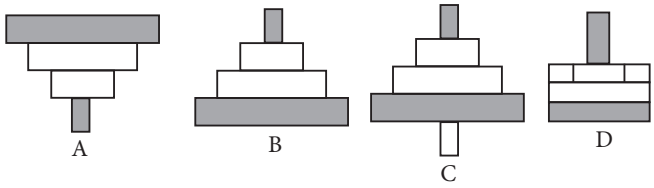
A. The population of native species may decrease to very low level due to invasive alien species.
B. Introduced species may achieve highest population density due to lack of predation.
C. Species develop favourable mutations.
D. New species evolved due to different environment.

(a) A and B are correct.
(b) A, C and D are correct.
(c) C and D are correct.
(d) B, C and D are correct.

10. Tight one-to one relationship between plant and pollinator is found in

(a) fig and wasp
(b) fungus and roots of *Pinus*
(c) *Anabaena* and *Azolla*
(d) all of these.

11. Which of the following representations shows the pyramid of numbers in a forest ecosystem?



(a) D (b) A (c) B (d) C

12. Which one of the following fish is being illegally introduced for aquaculture purposes and is posing a threat to the indigenous catfishes of Indian rivers?

(a) *Clarias gariepinus* (b) Nile perch

(c) *Clarias batrachus* (d) *Protopterus*

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 : All copulation lead to fertilisation and pregnancy.

Reason : Simultaneous transport of sperm and ovum in ampullary region results in fertilisation.

14. Assertion : Mendel conducted artificial pollination experiments for his genetic studies using true-breeding pea lines.

Reason : A true-breeding line shows the stable trait inheritance and expression for several generations.

15. Assertion : *Agrobacterium tumefaciens* is the causative agent of crown gall disease of dicots.

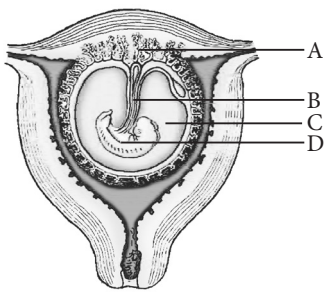
Reason : *Agrobacterium tumefaciens* transforms normal cell into tumour by inserting T-DNA.

16. Assertion : A population growing in a habitat with limited resources shows initially a lag phase, followed by phases of acceleration and deceleration and finally an asymptote, when the population density reaches the carrying capacity.

Reason : In Verhulst-Pearl Logistic growth, plot of N (population density) at time (t) results in a sigmoid curve.

SECTION - B

17. The following figure shows a fetus within the uterus. On the basis of the given figure, answer the questions that follow.



(i) In the given figure, identify the correct part among A, B, C and D that acts as a temporary endocrine gland and substantiate your answer. Why is it also called the functional junction?

(ii) Mention the role of B in the development of the embryo.

18. In *Pisum sativum*, the pod colour may be green (G) or yellow (g). What percentage of offsprings with green pod colour trait would be obtained in a cross of Gg × Gg?

19. (a) What precaution(s) would you recommend to a patient requiring repeated blood transfusion?

(b) If the advise is not followed by the patient, there is an apprehension that the patient might contract a disease that would destroy the immune system of his/her body. Explain with the help of schematic diagram only how the immune system would get affected and destroyed.

20. What are recombinant proteins? How do bioreactors help in their production?

21. Construct a pyramid of biomass starting with phytoplanktons. Label 3 trophic levels. Is the pyramid upright or inverted. Give reason.

OR

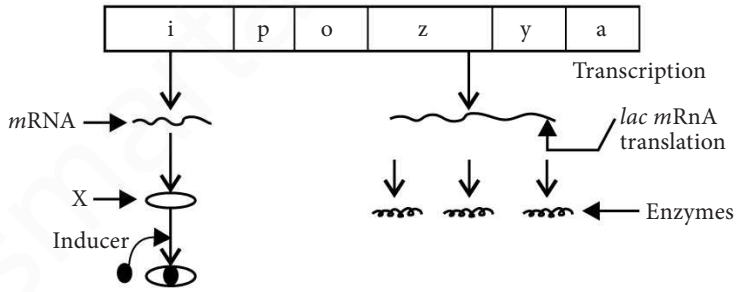
Construct an ideal pyramid of energy when 1,00,000 joules of sunlight is available. Label all its trophic levels.

SECTION - C

22. When does the corpus luteum degenerate? Explain the immediate consequences of its degeneration in human female.

23. Describe the development of endosperm in coconut.

24. Refer to the given figure of *lac* operon and answer the following questions.



(a) Name the molecule 'X' synthesised by '*i*' gene. How does this molecule get inactivated?

(b) Which one of the structural genes codes for β-galactosidase?

(c) When will the transcription of this gene stop?

25. Explain convergent evolution taking one example for plants.

26. (a) The barriers in the innate immunity are given in the following table. Identify A, B, C, and D.

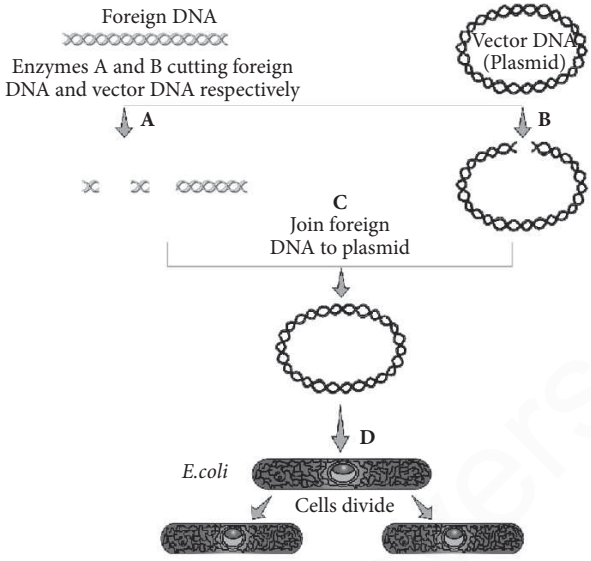
	Type of barrier	**Barrier**
(i)	A	Skin, Mucous membrane
(ii)	Physiological	B, in the eye
(iii)	Cytokine	C
(iv)	Cellular	WBC, D

(b) Why sharing of injection needles between two individuals is not recommended?

OR

Write the scientific names of the causal organisms of amoebiasis, elephantiasis and ringworm in humans. Mention the body parts affected by them.

27. (a) Identify A, B, C and D in the flow chart given below that represents the process of recombinant DNA technology.



(b) State the role of C in biotechnology.

28. Explain, giving one example, how co-extinction is one of the causes of loss of biodiversity. List the three other causes also (without description).

SECTION - D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. Mendelism has certain limitations. Each trait controlled by atleast two alleles is not universally applicable. There are few exceptions to law of dominance which was discovered after Mendel. Incomplete dominance and codominance are such examples.

	Pattern of inheritance	**Monohybrid F_1 phenotypic expression**
(i)	Codominance	**X**
(ii)	**Y**	The progeny resembled only one of the parents.
(iii)	Incomplete dominance	**Z**

(a) Identify X, Y and Z in the given table.

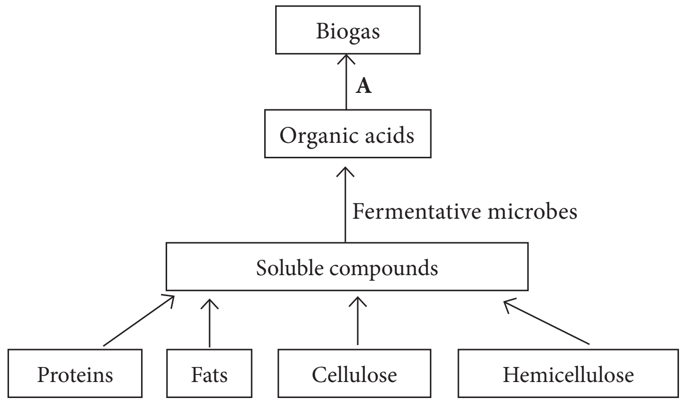
OR

Give one example where Y pattern of inheritance is seen.

(b) Discuss inheritance pattern of ABO blood groups shown by humans.

(c) Name the pattern of inheritance shown by flower colour of snapdragon. Explain with the help of cross upto F_2 generation.

30. Villagers in a place near Chambur started planning to make power supply for agricultural purposes from cow dung. They have started a biogas plant for the purpose. Study the given flow chart for biogas production and answer the following questions.



(a) Name the group of bacteria (A) responsible for biogas production.
(b) What is the composition of biogas?
(c) How the bacteria responsible for biogas production is useful to cattle?

OR

Why biogas production is more common in rural areas?

SECTION - E

31. Mention the role of gonadotropins in menstrual cycle. On what day of the menstrual cycle do the gonadotropins reach a peak?

OR

Angiosperm flowers may be monoecious, cleistogamous or show self-incompatibility. Describe the characteristic features of each one of them and state which one of these flowers promotes inbreeding and outbreeding.

32. (a) What is a genetic code?
(b) Explain the following :
(i) Degenerate codon; (ii) Unambiguous codon; (iii) Initiator codon.

OR

Name and describe the technique that will help in solving a case of paternity dispute over the custody of a child by two different families.

33. (a) A recombinant vector with a gene of interest inserted within the gene of β-galactosidase enzyme, is introduced into a bacterium. Explain the method that would help in selection of recombinant colonies from non-recombinant ones.
(b) Why is this method of selection referred to as "insertional inactivation"?

OR

Rahul was having a debate with Rohan regarding the advantages and disadvantages of transgenic animals. Rahul viewed that the production of transgenic animals violates the integrity of species and animals suffer from cruelty so, it is unethical. On the other hand, Rohan emphasised the benefits that transgenic animals provide to the human race in various fields especially medicine.
(a) How do transgenic animals benefit humans?
(b) List the ethical issues related with the production of transgenic animals.

SOLUTIONS

1. (d) **2. (d)**

3. (a) : Both the codons UGC and UGU code for cystine amino acid. UAA, UGA and UAG are stop codons. UGG codes for tryptophan amino acid.

4. (b) : The Hardy-Weinberg principle says that allele frequencies in a population are stable and constant from generation to generation as long as:

- the population is large enough and changes in allele frequencies due to chance or accident are insignificant.
- mating occurs at random.
- mutation does not occur or if it does occur it must reach a state of equilibrium.
- all the members of the population survive and have equal reproductive rates.

5. (a) : Autoimmunity is a disorder of the body's defence mechanism in which an immune response is elicited against its own tissues, which are thereby damaged or destroyed. Autoimmunity may be caused due to genetic or environmental factors.

6. (c)

7. (d) : Hard liquors such as gin, whisky, sake, brandy and rum are obtained by distillation of fermented broth.

8. (d)

9. (a) : The population of native species may became very low due to introduction of invasive alien species. Increase in population of exotic species could be due to lack of predators.

10. (a) : In many species of fig trees, there is tight one-to-one relationship with pollinator species of wasp.

11. (d) : The representation of forest ecosystem in pyramid of numbers is always upright but spindle shaped because higher trophic level comprising of tertiary consumers is generally smaller than that of the lower trophic levels (*i.e.*, secondary consumer, than primary consumer and primary producer).
The pyramid of number in parasitic food chain is inverted in case of single tree producer which can provide nourishment to several herbivores such as birds which can further support larger population of ectoparasites.

12. (a) : *Clarias gariepinus,* the African catfish has been illegally introduced for aquaculture in India. It is threatening native catfish (*Clarias batrachus*) of Indian rivers.

13. (d) : All copulations do not lead to fertilisation and pregnancy.

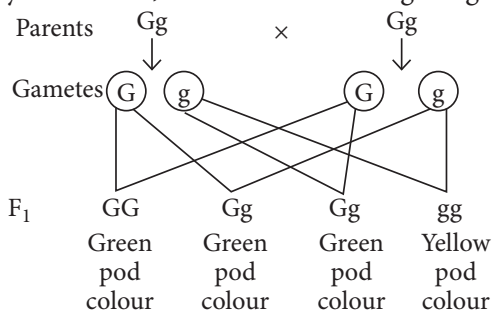
14. (a) : Mendel carried out hybridisation experiments on garden pea for many years. He performed various types of cross breeding and then allowed the offspring to self breed. All selected varieties used by him were pure lines of true breeding lines, *i.e.,* they produce offspring resembling the parents. These lines show the stable trait inheritance and expression for several generations making them suitable for genetic studies.

15. (a) : *Agrobacterium tumefaciens* is a rod shaped, Gram –ve soil bacterium which causes crown gall disease in over 140 species of dicots but it does not infect cereals. The bacterium contains tumour inducing plasmid (Ti plasmid) which integrates a segment of its DNA (T-DNA) into the DNA of its host plant thereby inducing formation of cancerous growth called crown gall tumour usually at graft or bud union, on roots and lower stem.

16. (b)

17. (i) Part labelled as A is placenta. It acts as an endocrine tissue and produces several hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens, progestogens, etc. It is also called the functional junction because it facilitates the supply of oxygen and nutrients to the embryo and removes carbon dioxide and excretory or waste materials produced by the embryo.
(ii) The labelled part B is umbilical cord. Placenta is connected to the embryo through an umbilical cord which helps in the transport of substances to and from the embryo.

18. In *Pisum sativum,* green pod colour is dominant over yellow. Thus, the cross between Gg × Gg will be:

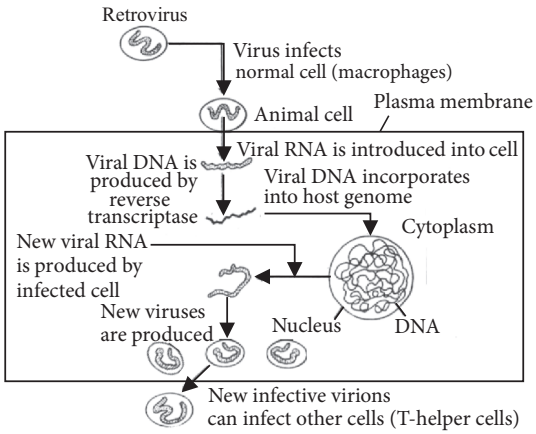


Genotype : GG : Gg : gg
1 : 2 : 1

Phenotype : Green pod colour : Yellow pod colour
3 : 1

Thus, 75% of offsprings will produce green pod colour.

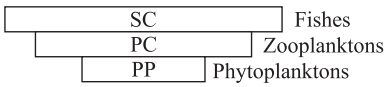
19. (a) If a patient requires repeated blood transfusion, it should be ensured that donor's blood has been screened for HIV and the syringes used should be new and disposable.
(b) If the patient does not follow these precautions, then he/she might get infected with HIV which causes AIDS (Acquired Immuno Deficiency Syndrome).
AIDS is a disorder of cell mediated immune system of the body. There is a reduction in the number of helper T-cells which stimulate antibody production by B-cells. This results in the loss of natural defence of the body against viral infection.



Thus, the immune system gets hampered due to the action of AIDS virus on T-lymphocytes and macrophages.

20. Recombinant protein is a protein obtained by introducing recombinant DNA into a heterologous host and causing it to produce the gene product.
Bioreactors are vessels in which raw materials are biologically converted into specific products. A bioreactor provides the optimal conditions for achieving the desired product by providing optimum growth conditions (temperature, pH, substrate, salts, vitamins, oxygen). To maintain a higher yield, optimum temperature must be maintained and suitable pH must be provided.

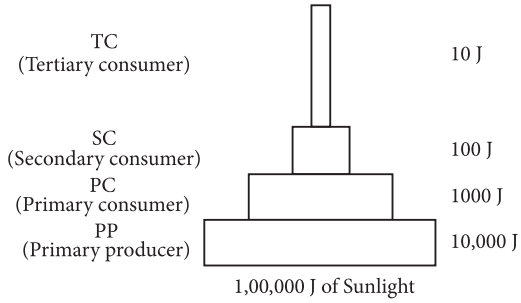
21. Pyramid of biomass starting with phytoplanktons will be for an aquatic ecosystem. It can be drawn as follows:



The pyramid of biomass in aquatic ecosystem is generally inverted because the biomass of fishes far exceeds that of phytoplanktons.

OR

An ideal pyramid of energy with primary producers when 100000 J of sunlight available is shown below:



22. In the absence of fertilisation, the corpus luteum degenerates. Degeneration of the corpus luteum leads to decrease in the production of progesterone. As progesterone is needed for the maintenance of the endometrium, its reduction leads to disintegration of endometrium thus causing menstruation.

23. In *Cocos nucifera* (coconut), the coconut water represents free-nuclear endosperm and the surrounding kernel represents the cellular endosperm. The primary endosperm nucleus (PEN) first undergoes a number of free nuclear divisions without wall formation to form a large number of free nuclei (free nuclear endosperm). When the fruit is about 50 mm long, the embryo sac gets filled with a clear fluid in which float numerous nuclei of various sizes. At a later stage (about 100 mm long fruit), the suspension shows, in addition to free nuclei, several cells each enclosing a variable number of nuclei. Gradually these cells and free nuclei start settling at the periphery of the cavity, and layers of cellular endosperm start appearing. This forms the coconut meat. The quantity of the cellular endosperm increases further by divisions of the cells.

24. (a) The molecule 'X' is repressor. It gets inactivated when lactose (inducer) binds with it.
(b) *z*-gene codes for β-galactosidase.
(c) Transcription of the gene stops when lactose is absent and thus repressor is free to bind with the operator.

25. Convergent evolution refers to the development of similar adaptive functional structures in unrelated group of organisms. It is also called adaptive convergence. *E.g.*, sweet potato (root modification) and potato (stem modification). Both look alike and perform the same function of food storage but are different in origin.

26. (a) A – Physical
B – Lysozyme
C – Interferon
D – Natural killer cells

(b) Sharing of injection needles between two individuals can transmit various diseases like AIDS and hepatitis B, as these diseases are transmitted *via* blood and semen.

OR

Amoebiasis is caused by *Entamoeba histolytica* and mainly affects large intestine of human.
Elephantiasis is caused by *Wuchereria bancrofti* and mainly affects lower limbs.
Ringworm is caused by *Trichophyton* and affects skin, hair and nails.

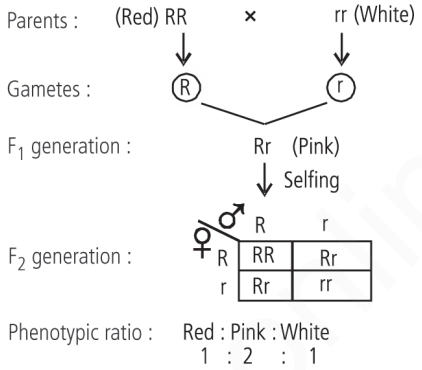
27. (a) In the given figure showing process of recombinant DNA technology, labelled parts A, B, C and D respectively represents restriction endonuclease, restriction endonuclease, DNA ligase and transformation respectively.
(b) DNA ligases (Label C) are also called genetic gum. They join two individual fragments of double stranded DNA by forming phosphodiester bonds between them thus, help in sealing of DNA fragments. Therefore, acts as molecular glue. The enzyme used most often is T_4 DNA ligase.

28. Co-extinction means that when a species become extinct, the plant and animal species associated with it in an obligatory relation also become extinct. For example, the case of a co-evolved plant-pollinator mutualism like in *Pronuba yuccaselles* and *Yucca* where extinction of one invariably leads to the extinction of the other.
The three other causes of biodiversity loss are:
(i) Habitat loss and fragmentation
(ii) Over-exploitation
(iii) Alien species invasion.

29. (a) X-Both the forms of a trait are equally expressed in F_1 generation.
Y-Dominance
Z-Phenotypic expression of F_1 generation is somewhat intermediate between the two parental forms of a trait.

OR

Dominance(Y) is seen when true breeding tall pea plant is crossed with true breeding dwarf pea plant.
(b) ABO blood group in humans show following patterns of inheritance:
(i) Dominance : The alleles I^A and I^B both are dominant over allele *i* as I^A and I^B form antigen A and antigen B respectively but *i* does not form any antigen.
(ii) Codominance : Both the alleles I^A and I^B are codominant as both of them are able to express themselves in the presence of each other in blood group AB (I^AI^B) by forming antigens A and B.
(iii) Multiple allelism : It is the phenomenon of occurrence of a gene in more than two allelic forms on the same locus. The ABO blood groups in humans are determined by three different allelic forms I^A, I^B and *i*.
(c) Inheritance of flower colour in snapdragon is a good example of incomplete dominance.



30. (a) Methanogens or A (*e.g.*, *Methanobacterium*) grow anaerobically on celllosic material and produce large amount of methane along with CO_2 and H_2.
(b) Biogas is a mixture of gases, composed mainly of methane alongwith carbon dioxide and hydrogen.
(c) Methanogens are also present in rumen of cattle. These bacteria help in the breakdown of cellulose present in food of cattle and thus, play important role in nutrition of cattle.

OR

The excrete of cattle (dung) is rich in methanogen bacteria which is required for biogas production. Cattle dung is available in large quantities in rural areas, so, biogas plants are more often built in rural areas.

31. LH and FSH secreted by pituitary gland are called gonadotropins. The secretion of FSH and LH increases gradually during the follicular phase and stimulates the development of follicles as well as secretion of estrogens by the growing follicles. Both gonadotropins reach a peak level in the middle of the cycle (14th day). LH surge induces rupture of Graafian follicle and thereby the release of ovum (ovulation). This ovulatory phase is followed by luteal phase during which LH stimulates the remaining cells of the Graafian follicle to transform into corpus luteum which secretes large amounts of progesterone needed for maintenance of endometrium. In the absence of fertilisation, LH production gets reduced leading to degeneration of corpus luteum. This causes disintegration of endometrium leading to menstruation.

OR

Monoecious flowers are bisexual, *i.e.*, they bear both male and female reproductive organs on the same plant, *e.g.*, maize.

Cleistogamous flowers are those flowers which do not open at all. These flowers are bisexual and remain closed causing self pollination. In cleistogamous flowers, the anthers dehisce inside closed flowers. Growth of style brings the pollen grains in contact with stigma. Pollination and seed setting are assured. Pollinators are not required, *e.g.*, *Commelina benghalensis,* balsam.

Self incompatibility is inability of pollen of a plant to fertilise the pistil of the same plant, *e.g.*, *Primula.*

Monoecious and cleistogamous flowers promote inbreeding whereas self incompatibility in plants promotes outbreeding.

32. (a) The relationship between the sequence of amino acids in a polypeptide and nucleotide sequence of DNA or *m*RNA is called genetic code.

(b) (i) Degenerate codon : More than one codons code for a single amino acid. In degenerate codons, generally the first two nitrogen bases are similar while the third one is different. *E.g.*, UUU and UUC code for phenylalanine.

(ii) Unambiguous codon : Codons that specify only one amino acid and not any other. *E.g.*, AUG codes for methionine.

(iii) Initiator codons : The start codon is the first codon of mRNA transcript. It initiates the process of translation. *E.g.*, AUG.

OR

DNA fingerprinting technology is a technique of determining nucleotide sequences of certain portion of DNA which are unique to each individual. DNA fingerprints can be prepared from extremely minute amounts of blood, semen, hair bulb or certain other cells of the body. The major steps are as follows :

(i) DNA is extracted from the cells. It is cut into fragments with the help of restriction enzymes. The fragments of DNA also contain VNTRs (Variable Number Tandem Repeats) which vary in number from person to person.

(ii) DNA fragments are separated by passing through gel electrophoresis.

(iii) Separated DNA sequences are transferred from gel onto a nitrocellulose or nylon membrane.

(iv) Radioactive DNA probes complementary to VNTRs are poured over the nylon membrane. Some of them bind with VNTRs (Southern Blotting).

(v) X-ray film is exposed to the nylon sheet which gives dark bands at the probe sites. Thus, hybridised fragments are detected by autoradiography. The dark bands on X-ray film represent the DNA fingerprints (DNA profiles).

33. (a) Insertional inactivation refers to the process where insertion of *r*DNA within the coding sequence of an enzyme causes its inactivation. The non-recombinants having intact functional gene, *e.g.* β-galactosidase produce blue colour with chromogenic substrate but when *r*DNA is inserted within the coding sequence of enzyme β-galactosidase, recombinants do not produce any colour. Hence, recombinants can be easily differentiated from non-recombinants due to insertional inactivation.

(b) In this method, insertion of recombinant DNA in the coding sequence of enzyme β-galactosidase causes its inactivation, hence named insertional inactivation.

OR

(a) Benefits derived from transgenic animals are as follows:

(i) They produce useful biological products, that can be created by introduction of portion of gene, which codes for a particular product such as human protein (α-1- antitrypsin) from transgenic sheep is used to treat emphysema.

(ii) Transgenic mice are being developed for use in testing the safety of vaccine before they are used for humans.

(iii) They carry genes which make them more sensitive to toxic substances than non-transgenic animals. They are then exposed to toxic substances and the effects are studied.

(iv) Transgenic animals can be specifically designed to allow the study of how genes are regulated and how they affect the normal functions of the body and its development, e.g., study of complex factors involved in growth such as insulin-like growth factor.

(v) Many transgenic animals are designed to increase our understanding of how genes contribute to the development of disease. Today transgenic models exist for many human diseases such as cancer, cystic fibrosis, rheumatoid arthritis and Alzheimer's.

(b) The ethical issues concerned with the production of transgenic animals include:

(i) Use of animals in biotechnology causes great suffering to them.

(ii) It is disrespectful to living beings, and only exploits them for the benefit of human beings.