

SAMPLE Question Paper 8

(Questions-Answers)*

BIOLOGY

A Highly Simulated Practice Question Paper for
CBSE Class XII Examination

Time : 3 hrs

Max. Marks : 70

* General Instructions

1. All questions are compulsory.
2. The question paper has four sections: Section A, Section B, Section C and Section D. There are 33 questions in the question paper.
3. Section-A has 14 questions of 1 mark each and 2 case-based questions. Section-B has 9 questions of 2 marks each. Section-C has 5 questions of 3 marks each and Section-D 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 labelled diagrams should be drawn.

SECTION A

(7 Mark)

1. Why does *hnRNA* undergo splicing? Where does splicing occur in the cell?
2. What is apospory?
3. State which human chromosome has the maximum genes and which has the least.
4. What are true-breeding lines that are used to study inheritance pattern of traits in plants?
5. Name the organism in which ZZ/ZW type of sex-determination is seen.
6. Pea flowers produce assured seed sets. Give a reason.
7. How many nucleotide bases are present in human genome?
8. What is resonance imaging used in cancer detection?
9. How is Roquefort cheese made?
10. Write about the first clinical case in which gene therapy was used.

* You are advised to attempt this sample paper without referring the explanations given here. However, cross check your explanations with the explanations given at the end of paper after you complete the paper.

Direction (Q. Nos. 11-14)

In each of the following questions, a statement of Assertion (A) is given followed by corresponding statement of Reason (R). Of the statements, mark the correct answer as

- (a) If both A and R are true and R is the correct explanation of A
- (b) If both A and R are true, but R is not the correct explanation of A
- (c) If A is true, but R is false
- (d) If both A and R are false

11. Assertion (A) Broadly utilitarian arguments say that we should conserve biodiversity because biodiversity plays a major role in many ecosystem services that nature provides.

Reason (R) Exploration of molecular, genetic and species level diversity to obtain the products of economic importance is included under broadly utilitarian category.

12. Assertion (A) Human insulin can be produced in bacterial cells using biotechnology.

Reason (R) To produce human insulin the A, B and C-polypeptides of the human insulin are produced separately in the bacterial cells, extracted and combined by creating disulphide bonds.

Or

Assertion (A) *E. coli* having pBR322 with DNA insert at *Bam* HI site cannot grow in medium containing tetracycline.

Reason (R) Recognition site for *Bam* HI is present in tet^R region of pBR322.

13. Assertion (A) Females homozygous for genes on the X-chromosomes do not express a trait more markedly than do hemizygous males.

Reason (R) Dosage compensation mechanism accounts for effective dosage genes in males and females.

14. Assertion (A) *t*RNA recognises its corresponding codon in *m*RNA.

Reason (R) For each codon, there is an individual RNA.

15. Direction Read the following and answer any **four** questions from 15(i) to 15(v) given below

Cancer is the name given to a collection of related diseases. In all types of cancer, some of the body's cells begin to divide without stopping and spread into surrounding tissues. Cancer can start almost anywhere in the human body, which is made up of trillions of cells. Normally, human cells grow and divide to form new cells as the body needs them. When cells grow old or become damaged, they die and new cells take their place. When cancer develops, however this orderly process breaks down. Detection of cancer is a multistage process. Often, the patient will go to a doctor because of some symptoms or other. The final cancer diagnosis is based on a pathologists opinion.

- (i) The characteristic of cancer is
 - (a) all viruses are oncogenic
 - (b) all tumours are cancers
 - (c) cancerous cells show property of contact inhibition
 - (d) cancer cells show metastasis
- (ii) Which of the following techniques is used to detect the cancer of internal organs?
 - (a) Magnetic Resonance Imaging (MRI)
 - (b) Radiography (X-ray)
 - (c) Computed Tomography (CT scan)
 - (d) All of the above
- (iii) Cancer cells are more easily damaged by radiation than normal cells because they are
 - (a) starved of mutation
 - (b) undergoing rapid division
 - (c) different in structure
 - (d) non-dividing
- (iv) Treatment and detection of cancer can be done by
 - (a) radiography
 - (b) chemotherapy
 - (c) surgery
 - (d) All of these
- (v) **Assertion** (A) Cancer cells are virtually immortal until the body in which they reside dies.

Reason (R) Cancer is caused by the damage to genes regulation of the cell division cycle.

- (a) If both A and R are true and R is the correct explanation of A
- (b) If both A and R are true, but R is not the correct explanation of A
- (c) If A is true, but R is false
- (d) If both A and R are false

16. **Direction** Read the following and answer any **four** questions from 16(i) to 16(v) given below

Parturition or childbirth is the process of delivering the baby and placenta from the uterus to the vagina to the outside world. Also called labour and delivery. Parturition comes from the Latin *Parturine*, 'to be ready to bear young' and is related to *partus*, the past participle of *parere*, 'to produce'. A typical pregnancy lasts 40 weeks from the first day of your Last Menstrual Period (LMP) to the birth of the baby (parturition). It is divided into three stages called trimesters, first trimester, second trimester and third trimester. The foetus undergoes many changes throughout maturation.

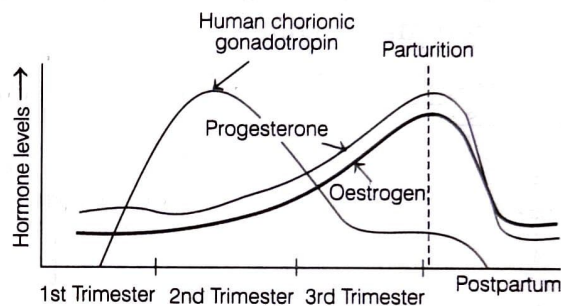
- (i) Parturition is induced by
 - (a) neural mechanism
 - (b) endocrine mechanism
 - (c) neuroendocrine mechanism
 - (d) hormonal mechanism
- (ii) Signals for parturition originate from
 - (a) both placenta as well as fully developed foetus
 - (b) oxytocin released from maternal pituitary
 - (c) placenta
 - (d) fully developed foetus
- (iii) Which of the following hormones is responsible for both the milk ejection reflex and foetal-ejection reflex?

- (a) Oestrogen
- (b) Prolactin
- (c) Oxytocin
- (d) Relaxin

(iv) Identify the correct sequence in which the various stages of parturition take place.

- (a) Shedding of placenta → Dilation of cervix → Delivery of baby
- (b) Dilation of the cervix → Shedding of placenta → Delivery of baby
- (c) Dilation of the cervix → Delivery of the baby → Shedding of placenta
- (d) None of the above

(v)



The following statements are drawn as conclusions from the above data.

- (i) High level of HCG stimulates the synthesis of oestrogen and progesterone.
 - (ii) High level of hCG stimulates the thickening of endometrium.
 - (iii) The level of oestrogen and progesterone becomes high during pregnancy.
- Choose from above the correct conclusions.
- (a) I and II (b) II and III
 - (c) I and III (d) I, II and III

SECTION B

(2 Marks)

17. Restriction endonucleases cut the DNA at specific sites containing palindromic nucleotide sequences. What are palindromes? Relate with the help of an example.

Or 'ELISA test is based on the principle of antigen-antibody interaction'. Comment on the above statement.

- 18. A person is suffering from ascariasis. Mention its symptoms and mode of transmission.
- 19. What do you understand by allergies?
- 20. How does histone acquire positive charge?
- 21. Differentiate between introns and exons.
- 22. What makes the *Nucleopolyhedrovirus* a desirable biological control agent?

23. State any two secondary lymphoid organs in human body and write the function of any of them.

Or What do you understand by passive immunisation?

24. Describe an endosperm formed in a plant after triple fusion.

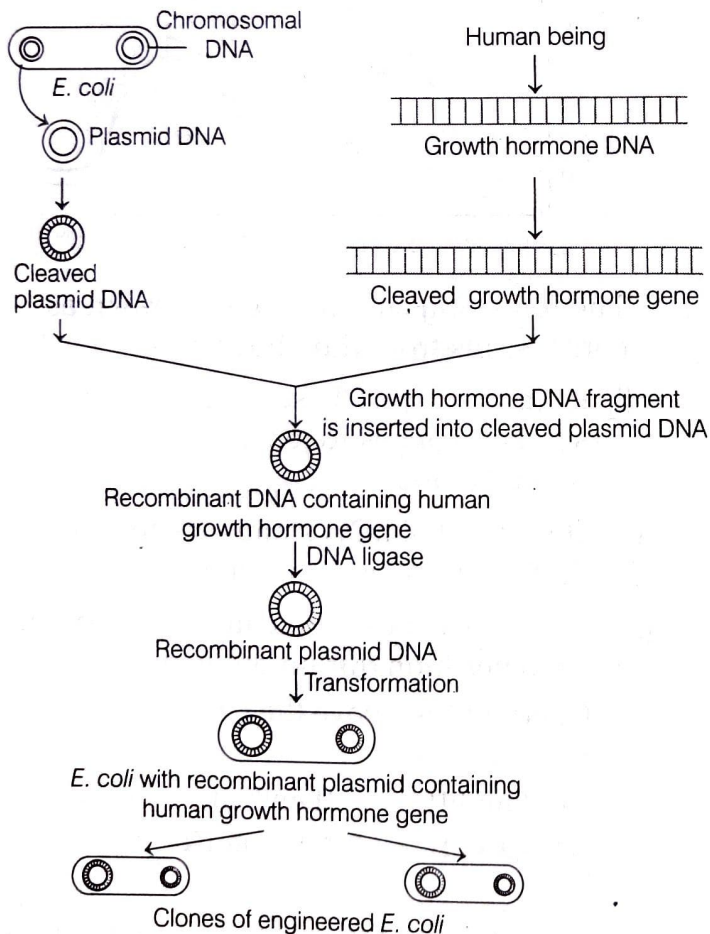
25. Assess how the sequencing of human genome has opened new windows for the treatment of various genetic disorders.

SECTION C

(3 Marks)

26. Differentiate between geitonogamy and xenogamy in plants. Which one between the two will lead to inbreeding depression and why?

27. The figure below represents the process of cloning and expression of human gene into *E. coli*.



- (i) Which enzyme has been used to cleave both the plasmid DNA and the growth hormone DNA?
- (ii) State the function of the enzyme DNA ligase.
- (iii) How can the transformed cell be detected?

Or

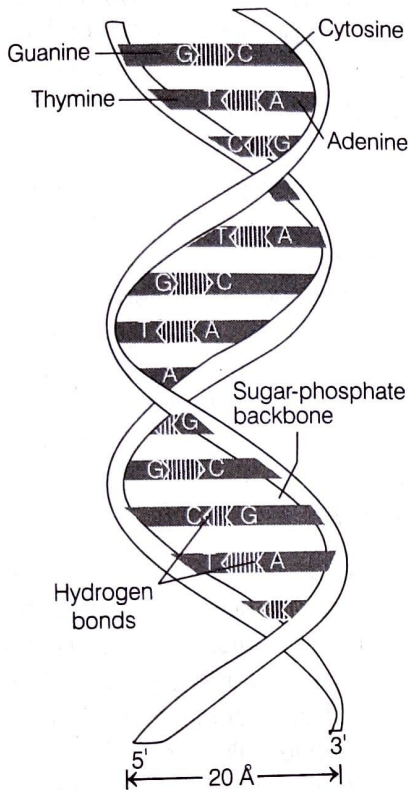
Describe the various applications of recombinant DNA technology in varied fields.

28. How do organisms cope up with stressful external environmental conditions, which are localised or of short duration?
29. What is coextinction in relation to biodiversity loss? Also mention other factors which together with coextinction form evil quartet responsible for the loss of biodiversity.
30. Give reason for the following.
- (i) Amniocentesis for sex-determination has been banned in India.
- (ii) Awareness about sex related aspects helps to improve health of people.
- (iii) Placenta is also considered as an endocrine gland.

SECTION D

(5 Marks)

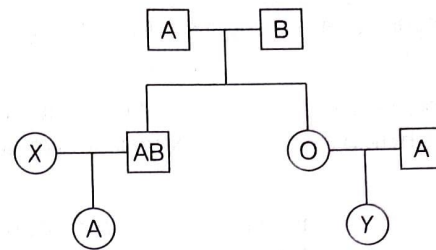
31. Study the figure given below of the DNA structure and answer the questions that follows.



- (i) Who gave the model of DNA given above.
- (ii) According to you, which property of DNA double helix led to hypothesise semiconservative mode of DNA replication? Explain.
- (iii) When does the experimental proof of the hypothesis of semiconservative mode of DNA replication came into existence?

Or

Study the given pedigree chart showing the pattern of blood group inheritance in a family.



- (i) Give the genotype of the following
 - (a) Parents
 - (b) The individual 'X' in second generation
 - (ii) State the possible blood groups of the individual 'Y' in third generation.
 - (iii) How does the inheritance of this blood group explain codominance?
32. If a desired gene is to be identified in an organism for some specific purpose, explain the process of
- (i) Cutting the desired gene at specific location.
 - (ii) Synthesis of multiple copies of this desired gene mentioning all required steps.

Or

'Cloning and expression of a recombinant gene or DNA is an essential part of recombinant DNA technology'. Justify the given statement with the help of a diagram.

33. Give the significance of predation in nature in detail.

Or

- (i) Draw the three different types of age pyramids for human populations.
- (ii) How does the age pyramid for human population helps in planning for future policies?

EXPLANATIONS

1. *hnRNA* undergoes splicing to remove introns and joins exons. Splicing occurs in the nucleus of the cell. (1)
2. Apospory refers to the process of formation of gametophyte directly from sporophyte without meiosis. (1)
3. Chromosome 1 has 2968 genes, i.e. maximum genes and chromosome Y has 231 genes, i.e. minimum genes in human. (1)
4. True-breeding lines are those plants which has undergone continuous self-pollination and shows stable trait inheritance and expression for several generations. (1)
5. ZZ/ZW type of sex-determination is observed in peacock (i.e. birds), where male is homogametic and female is heterogametic. (1)
6. Pea flowers produce assured seed sets because they have cleistogamous flowers, which undergo natural self-pollination. (1)
7. The human genome contains 3146.7 million nucleotide bases. (1)
8. Resonance imaging involves the use of non-ionising radiation and strong magnetic field to detect pathological and physiological changes in living tissues. (1)
9. Roquefort cheese is made by the ripening the cheese with fungi *Penicillium roqueforti* to obtain a specific flavour. It is the best known cheese made from sheep's milk. (1)
10. The first clinical gene therapy was given to a 4-year-old girl with ADA (Adenosine Deaminase) deficiency in 1990, due to the deletion of the gene coding for ADA. (1)
11. (c) The broadly utilitarian arguments for conserving biodiversity implies that biodiversity plays a major role in many ecosystem services that nature provides, e.g. replenishing O₂ of atmosphere by plants, nutrient cycling, aesthetic value, etc. Bioprospecting (i.e. exploring molecular, genetic and species level diversity for products of economic importance) is included under narrowly utilitarian category, which is concerned with the countless direct economic benefits obtained from nature. Thus, A is true, but R is false. (1)
12. (c) Transgenic bacteria have been produced that translate the constituting polypeptide chains of human insulin. These polypeptides can be extracted from the bacterial cells and combined by creating disulphide bonds to produce human insulin. In humans, insulin is produced as a prohormone with three polypeptides A, B and C. After processing, the C-peptide is removed and mature insulin is formed. When transgenic bacteria are used, instead of producing extra stretch of C-peptide, only A and B polypeptides are produced and then linked to produce mature insulin directly. Thus, A is true, but R is false. (1)

Or

(a) pBR322 has recognition sites for several commonly used restriction enzymes. Recognition site for *Bam*HI is present in tet^R region, i.e. responsible for tetracycline resistance. When an insert is added at the *Bam*HI recognition site, the gene for tetracycline resistance becomes non-functional and the recombinant bacteria with plasmid pBR322 that has DNA insert at *Bam*HI lose tetracycline resistance. Thus, both A and R are true and R is the correct explanation of A. (1)
13. (a) Females have two X-chromosomes and males have only one X chromosome. Thus, a dosage compensation mechanism must be present through which the effective dosage of genes of the two sexes is made equal. This is achieved by inactivation of one X-chromosome in females which gets condensed and become heteropycnotic. Since only one X-chromosome is required for normal metabolism in the cells of females, the other X-chromosome has the capability of being heterochromatic in some cells and euchromatic in others. Therefore, dosage compensation regulates the enzyme level of males and females. Thus, both A and R are true and R is the correct explanation of A. (1)
14. (c) *tRNA* has an anticodon loop which has 7 bases, out of which three bases form anticodon for recognising and attaching to the codon of *mRNA*. Since, there are 61 codons specifying amino acids, the cell should contain 61 different *tRNA* molecules, each with a different anticodon. The number of *tRNA* molecule types discovered is much less than 61. This implies that the anticodons of some *tRNAs* read more than one codon on *mRNA*. Thus, A is true, but R is false. (1)
15. (i) (d) Cancer cells show metastasis. (1)
(ii) (d) MRI, X-ray and CT scan, all are the techniques used to detect the cancer of internal organs. (1)
(iii) (b) Cancer is caused by the loss of control over cell's reproductive capacity. They undergo rapid division and therefore they are more easily damaged by radiations than normal cells. (1)

(iv) (d) Treatment and detection of cancer can be done by radiography, chemotherapy and surgery. (1)

(v) (b) Cancer is caused by damage to genes regulation of the cell division cycle. It is an uncontrolled proliferation of the cells. These cancerous cells become immortal because of the breakdown the cell growth and differentiation regulatory mechanisms and the loss of a property called contact inhibition. Thus, both A and R are true, but R is not the correct explanation of A. (1)

16. (i) (c) The process of delivery of the foetus (childbirth) is called parturition. It induced by neuroendocrine mechanism. (1)

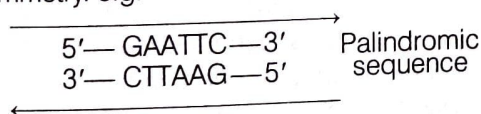
(ii) (a) The signals for parturition originate from the fully developed foetus and also from the placenta which induces mild uterine contractions called foetal-ejection reflex. (1)

(iii) (c) Oxytocin hormone is responsible for both the milk ejection reflex and foetal-ejection reflex. (1)

(iv) (c) The correct sequence in which the various stages of parturition takes place
Dilation of the cervix → Delivery of the baby → Shedding of placenta (1)

(v) (c) Statements I and II are correct. Statements II is incorrect as high levels of oestrogen stimulates the thickening of the endometrium. (1)

17. The palindromes in DNA are base pair sequences that are same when read forward (left to right) or backward (right to left) from a central axis of symmetry. e.g.



Eco RI cuts the DNA between bases G and A only in the given sequence. (2)

Or

ELISA (Enzyme Linked Immuno Sorbent Assay) is based on the ability of antibodies to couple with enzymes to produce enzymatically active immunological conjugates after reacting with a chromogenic substrate.

Thus, the test can detect the presence of antigens like proteins and glycoproteins and antibodies in the serum of a patient. (2)

18. **Symptoms** The symptoms of disease ascariasis are
 • Intestinal bleeding • Muscular pain
 • Anaemia • High fever (1)
Mode of Transmission Its transmission occurs through faecal-oral route. The eggs of pathogen infest

the soil, water and plant via contaminated faecal matter. (1)

19. Allergies refer to exaggerated response of immune system to certain agents in the environment. Allergy causing agents in environment are called allergens. Allergic reaction in the body produces symptoms like sneezing, watery eyes, running nose and difficulty in breathing, etc. Allergies are caused due to the release of histamine and serotonin like chemicals from the mast cells. (2)

20. A nucleosome is found in the nucleus of the cell. It contains histone proteins acquiring positive charge depending upon the abundance of amino acid residues, i.e. lysine and arginines, with charged side chains. Both these amino acids carry positive charges in their side chains. (2)

21. Differences between introns and exons are as follows

Introns	Exons
Regions of a gene which do not form part of mRNA.	Regions of a gene which become part of mRNA.
Removed during the processing of hnRNA.	Kept intact in hnRNA.
Non-coding sequences.	Coding sequences.

(2)

22. *Nucleopolyhedrovirus*, a genus of baculovirus is useful in controlling many insects and other arthropods. They are species specific narrow spectrum bioinsecticides with no side effects on plants, mammals, birds, fish and non-target insects. Therefore, they serve as an important component of integrated pest management programme in dealing with ecological sensitive areas. These properties are useful in organic farming. (2)

23. The secondary lymphoid organs include spleen, tonsils and lymph nodes. Secondary lymphoid organs provide the site for interaction of lymphocytes with the antigen which then proliferate to become effector cells. (2)

Or

In case of requirement of quick immune response like tetanus infection, preformed antibodies are injected into the patient.

Even in the cases of snake bite, preformed antibodies or antitoxin is injected. This is called passive immunisation. (2)

24. Endosperm is a food laden tissue which is meant for nourishing the embryo in seed plants. In gymnosperms, it represents the female gametophyte. In angiosperms, the endosperm is a special tissue

which is formed as a result of triple fusion of a male gamete with two polar nuclei of the central cell. (2)

25. The sequencing of human genome has helped in enhancing the basic understanding of genetics and immunity to various disorders. Various genes that cause genetic disorders were identified with the help of this project.

More than 1200 genes are responsible for common human cardiovascular diseases, endocrine diseases (like diabetes), neurological disorders (like Alzheimer's disease), cancers and many more. These diseases can now be treated easily because the information is available about the particular gene responsible for a disease. (2)

26. Differences between geitonogamy and xenogamy are as follows

Geitonogamy	Xenogamy
It is the transfer of pollen grains from the anther to the stigma of different flowers of same plants.	It is the transfer of pollen grains from the anther to the stigma of different flowers of a different plants.
The pollen grains are genetically similar to the plant.	The pollen grains are genetically different from the plant.

(2)

Geitonogamy will lead to inbreeding depression because the pollen grains are genetically similar resulting into inbreeding. Continuous inbreeding reduces the fertility of plant, thus leading to inbreeding depression. (1)

27. (i) The enzyme used for cleaving both plasmid DNA and growth hormone DNA is restriction endonuclease.
- (ii) The function of the enzyme DNA ligase is to join two nucleotides and repair broken DNA. These enzymes join the complementary DNA strands.
- (iii) Insertional inactivation is the phenomenon in which recombinants and non-recombinants can be differentiated on the basis of colour production in the presence of a chromogenic substrate. ($\frac{1}{2} \times 6$)

Or

Various applications of recombinant DNA technology are as follows

- (a) It is used to correct gene defects which cause hereditary diseases through gene therapy.
- (b) It is used to detect HIV infection using ELISA.
- (c) It is used in agriculture to produce genetically modified organisms such as *Flavr Savr* tomatoes, golden rice, *Bt* cotton, etc. These are either nutritionally enriched or resistant to pests, worms, etc.

- (d) It is used to produce genetically engineered insulin.
- (e) It helps to solve many paternity and criminal cases through DNA fingerprinting. (3)

28. Organisms either migrate or suspend their metabolic activities when conditions are stressful for short duration. In such conditions, organisms display following habits

- (i) Moving away from stressful habitat to more favourable area and return to their habitat when stressful period is over. For example, birds from Siberia and other cold countries migrate to Bharatpur sanctuary of Rajasthan during winters.
- (ii) Hibernation (frogs) or aestivation (snails) or undergo diapause (zooplanktons).
- (iii) Thick-walled spores are formed in stressful conditions and they germinate on the arrival of suitable conditions, e.g. bacteria, fungi and lower groups of plants. (3)

29. **Coextinction** When a species becomes extinct, the plant and animal species associated with it in an obligatory manner, also become extinct. For example, if the host species becomes extinct, all those parasites exclusively found on it will also become extinct. In plant pollinator mutualism, extinction of one results in the extinction of the other.

Other factors of evil quartet which are responsible for the biodiversity loss are as follows

- (i) Overexploitation
- (ii) Alien species invasion
- (iii) Loss and fragmentation of habitat (3)

30. (i) The ban on amniocentesis is absolutely necessary. This technique was developed for prenatal diagnosis of chromosomal abnormalities in foetus.

Unfortunately, the process is being misused to identify the sex of foetus carried by women. In case of a female foetus, many orthodox couples opt for the medical termination of pregnancy. This has created an imbalance in sex ratio in India. (1)

- (ii) Awareness about sex related aspects will reduce the unhealthy reproductive practices. People will become aware of STDs, their transmission, symptoms, prevention, etc. (1)
- (iii) Placenta releases various hormones like oestrogen, progesterone, hCG, hPL, relaxin, etc., during pregnancy. Thus, also called endocrine gland. (1)

31. (i) Watson and Crick discovered the double helical model of DNA with the help of Rosalind Franklin X-ray diffraction data. (1)

(ii) Watson and Crick observed that the nitrogenous bases form complementary pairs between the two polynucleotide chains of DNA. Based on the X-ray diffraction data, they proposed that double helix of DNA has two chains having sugar phosphate on the outside and nitrogen bases on the inner side.

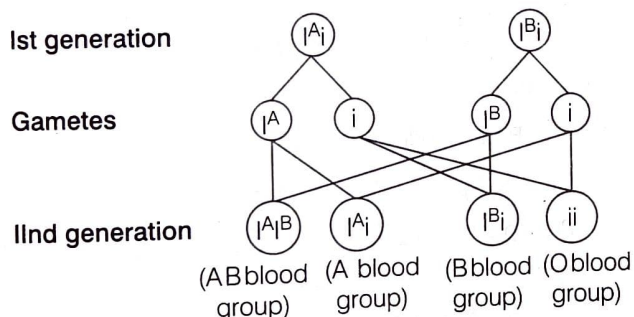
Further, they proposed that two chains have antiparallel polarity, i.e. if one chain has 5'-3' orientation, the other has 3'-5'. The two chains are twisted helically.

This property of double helix model of DNA led them to hypothesise semiconservative mode of DNA replication, where the two strands separate and act as a template for the synthesis of new complementary strand. (3)

(iii) In 1958, Mathew Meselson and Franklin Stahl experimentally proved that DNA replicates semiconservatively. (1)

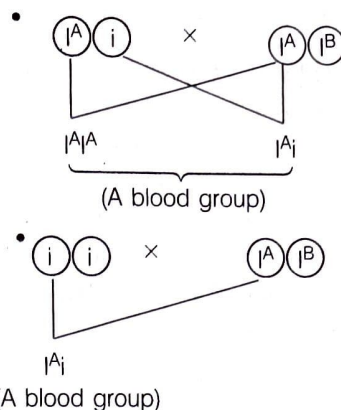
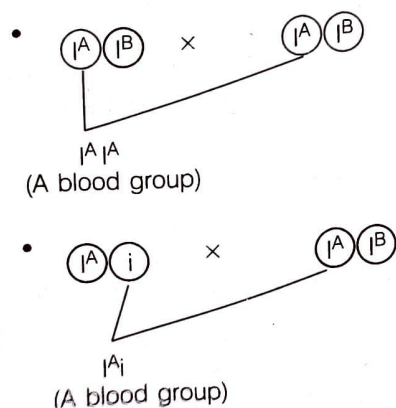
Or

(i) (a) Since, the offspring in the second generation have both 'AB' and 'O' blood types, the possible genotypes of the parents will be $I^A i$ and $I^B i$.



(b) The 'X' individual of second generation will have genotypes possibly of combinations $I^A I^B$ or $I^B i$ or $I^A i$ or ii because when it is crossed with an individual having 'AB' blood group, the offspring has 'A' blood group. The possible combinations are shown below. (2)

Only the desired genotype/phenotype of F_1 -generation is shown in the crosses given below



- (ii) Possible blood groups of individual 'Y' will be group A or O. Since, one of the parents has blood group O and the other has A blood group. (1)
- (iii) I^A and I^B when present together, show the phenomenon of codominance and express themselves in the presence of each other. In heterozygous condition, when both alternative alleles coexist, they show codominance. (1)

32. In order to identify a desired gene in an organism for some specific purpose, following steps are taken into account.

- (i) **Cutting of Desired Gene at Specific Location**
Digestion of DNA molecules can be performed by incubating purified DNA molecules with the restriction enzyme. This is done at optimal conditions specific for that enzyme. Agarose gel electrophoresis is used to check the progress of restriction enzyme digestion. (2)
- (ii) **Synthesis of Multiple Copies of the Desired Gene** This can be done by using PCR (Polymerase Chain Reaction). It is also known as *in vitro* replication of DNA. By using PCR, amplification of gene of interest can be easily done under three main steps, i.e.
- (a) **Denaturation** The dsDNA is denatured by using high temperature of 95°C for 15 sec. Each separated ssDNA now acts as a template for the further synthesis of DNA.
- (b) **Annealing** This can be done by using two sets of oligonucleotide primers. This step is performed at somewhat lower temperature (40-60°C) using Mg^{2+} as a cofactor for *Taq* polymerase and dNTPs depending upon the length and sequence of the primers.
- (c) **Extension** The thermostable enzyme, i.e. *Taq* polymerase is used in the reaction as it can tolerate the high temperature and can extend the primers by adding nucleotides complementary to the template. (3)

Or

The multiple identical copies of a specific template DNA can be produced by DNA cloning. It can be carried out by the use of a vector to carry specific foreign DNA fragment into the host cell.

The mechanism of cloning and transfer of a gene for human growth hormone into *E. coli* is diagrammatically represented below

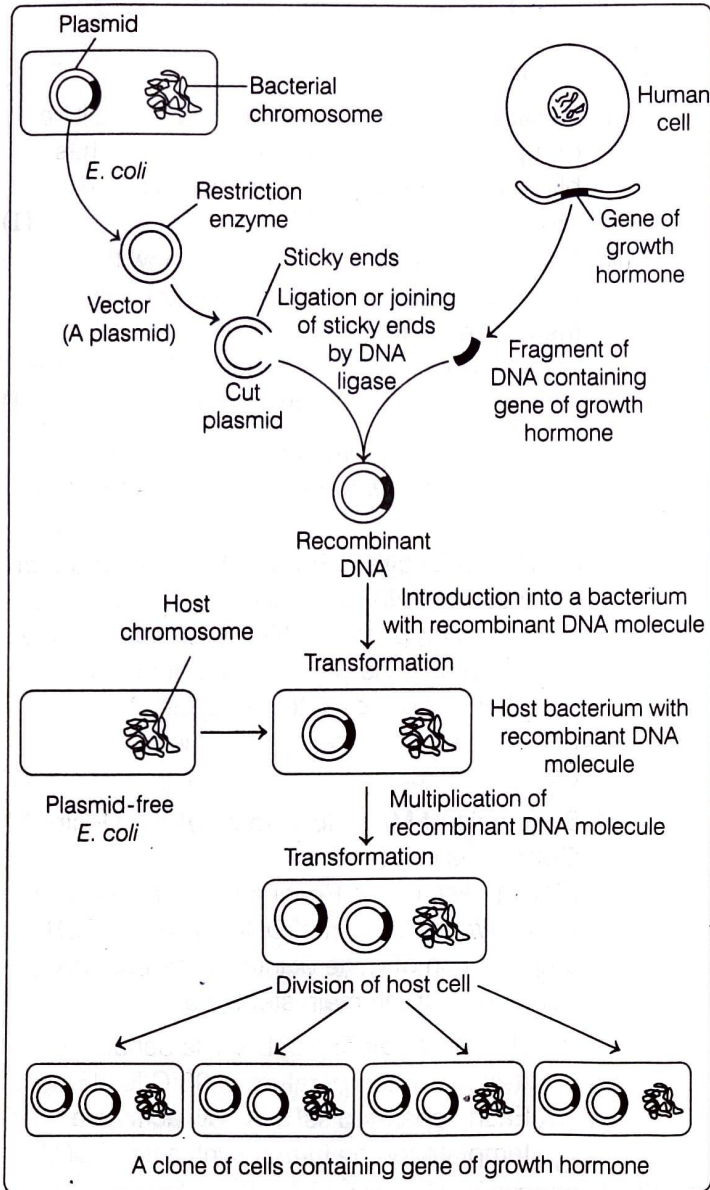


Diagram showing steps involved in cloning and expression of a growth hormone gene into *E. coli*

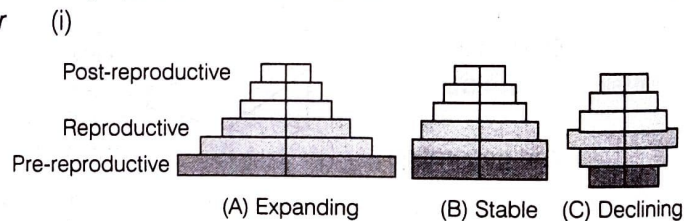
(5)

33. Significances of predation in nature are as follows

- (i) **Control of Prey Population** In the absence of predators, prey species could achieve very high population densities and cause instability. So, besides acting as conduits for energy transfer across trophic levels. The predator keeps the population of the prey under check, so that an equilibrium is maintained. The prey also maintains its optimum activity and efficiency since only weak and sick individuals are removed by the predators.
- (ii) **Biological Control of Weeds and Pests** It is largely based on predator prey relation. When certain exotic species are introduced into a geographical area, they become invasive and start spreading fast in the absence of natural predators, e.g. *Opuntia* turned out to be a serious weed in Australia. It was brought under control when its natural herbivore *Cactoblastis* was introduced.
- (iii) **Maintenance of Species Diversity** Predators help in maintaining species diversity in a community by reducing the intensity of competition among competing prey species.
- (iv) **Vegetation** Predation helps in the growth of vegetation all over the globe by restricting the population of herbivores.

(5)

Or



Representation of three kind of age-pyramids for human populations (1+1+1)

- (ii) A policy maker works on population projection to assess future demand of food, water, energy as well as health and reproductive age. The age-pyramids reflect several possible scenarios of future of fertility and mortality. At given point of time, the expanding age-pyramids for human population has more pre-reproductive and reproductive population and less post-reproductive population. Thus, this type of age pyramids helps the policy makers to plan future economic growth of the country.

(2)