Class-XII Session 2022-23
Subject - Biology (044)
Sample Question Paper - 24
With Solution

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Ch. No.	Title	Marks Per Unit	Section-A (1 marks)	Section-B (2 marks)	Section-C (3 marks)	Section-D (4 marks)	Section-E (5 marks)	Total Marks
			MCQ & A/R Ques. No.	VSA Ques. No.	SA Ques. No.	Case based Ques. No.	LA Ques. No.	
1	Reproduction in organisms	16	1(Q15)					1
2	Sexual Reproduction in Flowering Plants		1(Q13)		1(Q27)			4
3	Human Reproduction			1(Q21)			1(Q31)	7
4	Reproductive Health		2(Q3, 7)	1(Q17)				4
5	Principles of Inheritance and Variation	20	2(Q8, 4)		1(Q22)	1(Q29)		9
6	Molecular Basis of Inheritance		1(Q11)	1(Q20)	1(Q23)			6
7	Evolution		2(Q2, 12)		1(Q28)			5
8	Human Health and Disease	12			1(Q24)		1(Q32)	8
9	Strategies for enhancement in food production		1(Q14)					1
10	Microbes in Human Welfare		1(Q1)	1(Q18)				3
11	Biotechnology-Principles and Processes	12	2(Q5, 9)		1(Q25)			5
12	Biotechnology and its Application		2(Q6, 10)	1(Q19)	1(Q26)			7
13	Organisms and Populations	10						0
14	Ecosystem		1(Q16)					1
15	Biodiversity and conservation					1(Q30)	1(Q33)	9
16	Environmental issues							0
	Total Marks (Total Questions)		16(16)	10(5)	21(7)	8(2)	15(3)	70(33)

NOTE: The number given inside the bracket denotes question number, ask in the sample paper, while the number given outside the bracket are the number of questions from that particular chapter.

Time Allowed : 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

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

2. The Finches of Galapogas islands provide an evidence in favour of:
(a) biogeographical evolution (b) special creation
(c) evolution due to mutation (d) retrogressive evolution

3. Which of the following birth control measures can be considered as the safest?
(a) the rhythm method (b) the use of physical barriers
(c) temination of unwanted pregnancy (d) sterilization techniques

4. Gene with multiple phenotypic effect known as
(a) hypostatic gene (b) duplicate genes
(c) pleiotropic genes (d) complementary gene

5. Which of the following has the ability to transform normal cells into cancerous cells in animals ?
(a) Agrobacterium tumefaciens (b) Retroviruses
(c) DNA-viruses (d) Plasmids

6. The protein -1 antitrypsin is used for the treatment of
(a) cancer (b) rheumatoid arthritis
(c) Alzheimer's disease (d) emphysema

7. Tubectomy is a method of sterilization in which
(a) small part of the fallopian tube is removed or tied up.
(b) ovaries are removed surgically.
(c) small part of vas deferens is removed or tied up.
(d) uterus is removed surgically.

8. In XO type of sex determination
(a) females produce two different types of gametes.
(b) males produce two different types of gametes.
(c) females produce gametes with Y chromosomes.
(d) males produce single type of gametes.

9. When restriction enzymes cut the strand of DNA a little away from the centre of the palindrome sites between the same two base of opposite strands, it produces
(a) sticky end (b) blunt end
(c) flush end (d) non cohesive end

10. The transgenic animals are those which have
(a) foreign DNA in some cells. (b) foreign DNA in all of their cells.
(c) foreign RNA in all of their cells. (d) both (a) and (c)

11. Methyl guanosine triphosphate is added at 5' end of hn-RNA in a process of
(a) tailing (b) splicing
(c) capping (d) None of these

12. The key concepts of Darwinian Theory of Evolution is/are:
(a) Branching descent (b) Natural selection
(c) Convergent evolution (d) Both (a) and (b)

Directions: Q.No. 13–16: 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.

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13. **Assertion:** If pollen mother cells have 42 chromosomes, the pollen has only 21 chromosomes.
Reason: Pollens are formed after meiosis from pollen mother cell.

14. **Assertion:** A major advantage of tissue culture is protoplast fusion.
Reason: A hybrid is formed by the fusion of naked protoplasts of two plants.

15. **Assertion:** Organisms that reproduce by binary fission are immortal.
Reason: Such organisms have special kind of reproduction capability.

16. **Assertion:** Pyramid of energy may be upright or inverted.
Reason: Only 10% of energy goes to next trophic level.

SECTION-B

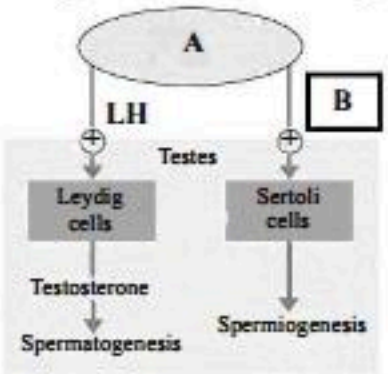
17. Suggest and explain the assisted reproductive techniques which will help a couple to have children, where the female had a blockage in the fallopian tube and the male partner had a low sperm count.

18. Secondary treatment of the sewage is also called Biological treatment. Justify the statement and explain the process.

19. How is 'Rosie' considered different from a normal cow? Explain.

20. List 2 goals of Human Genome Project?

21. (a) How is 'oogenesis' markedly different from 'spermatogenesis' with respect to the growth till puberty in the humans?
(b) Identify A and B with reference to gametogenesis in humans in the given flow chart.

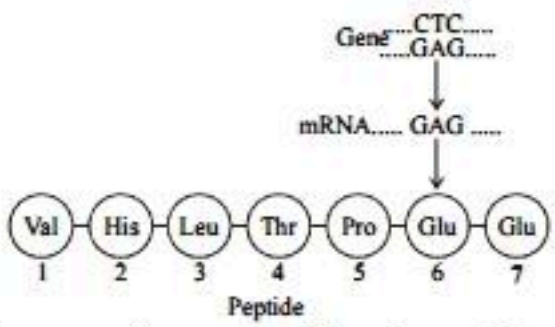


SECTION-C

22. What is the inheritance pattern observed in the size of starch grains and seed shape of *Pisum sativum*? Work out the monohybrid cross showing the above traits.

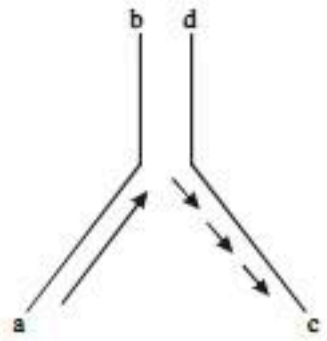
OR

Given below is the representation of amino acid composition of the relevant translated portion of β-chain of haemoglobin, related to the shape of human red blood cells.



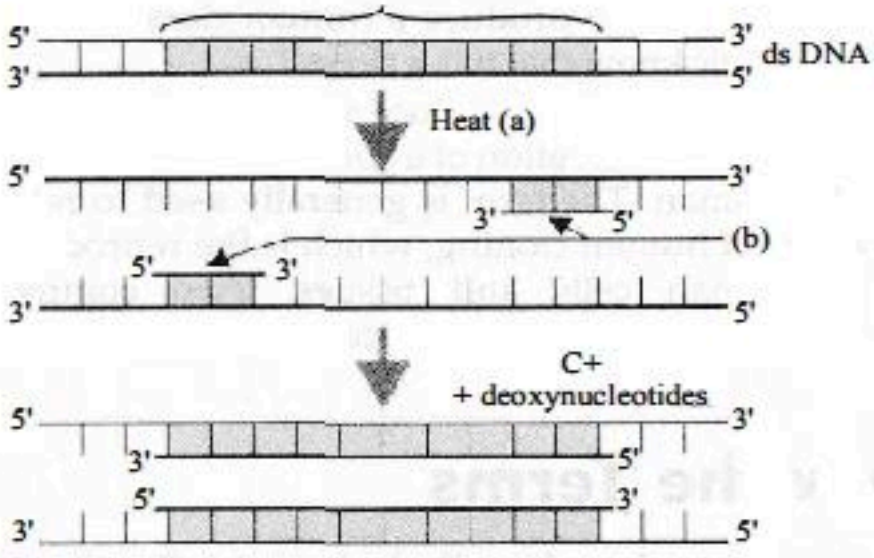
(a) Is this representation indicating a normal human or a sufferer from certain genetic disease? Give reason in support of your answer.
(b) What difference would be noticed in the phenotype of the normal and the sufferer related to this gene?
(c) Who are likely to suffer more from the defect related to the gene represented – the males, the females or both males and females equally? And why?

23. (a) If the sequence of the coding strand in transcription unit is,
5'—ATGCATGCATGCATGCATGCATGCATG—3'
write down the sequence of mRNA.
(b) How is repetitive/satellite DNA separated from bulk genomic DNA for various genetic experiments?
(c) Mention the polarity of DNA strands a-b & c-d shown in the replicating fork given below.



24. In October 2012, it was a headline that 80 yrs old, Yash Raj chopra (who was an Indian films director; script writer and film producer) died at Lilawati hospital, Mumbai because of Dengue fever.
(a) Name the pathogen and vector of Dengue fever.
(b) Mention another name of Dengu fever.
(c) What are the diference between malaraia and Dengue fever?

25. A schematic representation of polymerase chain reaction (PCR) upto extension stage is given below. Observe the steps of technique and answer the questions that follows.



(a) Name the process 'a'. What will happen if this step is missed?
(b) Identify 'b'.
(c) Identify 'c' and mention its importance in PCR.

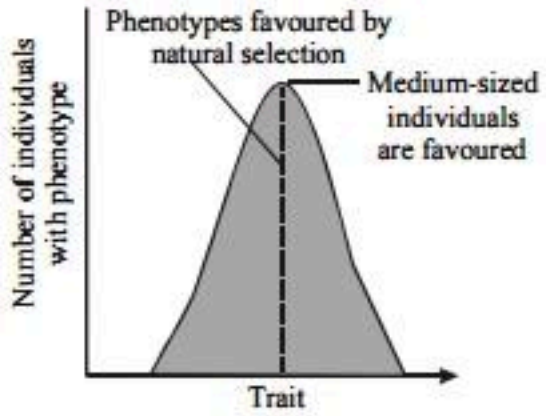
26. (a) Write the function of *cry* I Ac gene.
(b) What happens when *Meloidogyne incognita* consumes cells with RNAi gene?

OR

(a) Why do prokaryotes possess restriction enzyme while eukaryotes do not have? Explain.
(b) What is the significance of adding proteases at the time of isolation of genetic material (DNA)?
(c) Why is *A. tumefaciens* a good cloning vector? Explain.

27. With a neat diagram explain the 7-celled, 8-nucleate nature of the female gametophyte.

28. (i) Write Hardy-Weinberg principle.
(ii) Explain the three different ways the natural selection can affect the frequency of a heritable trait in a population shown in the graph given below.



SECTION-D

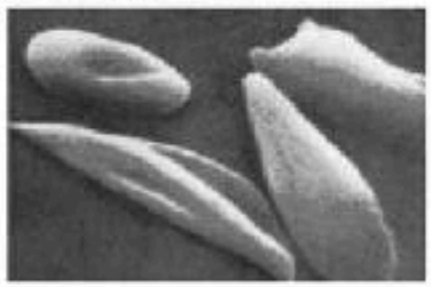
29. Read the following and answer any four questions from 29(i) to 29 (iv) given below:

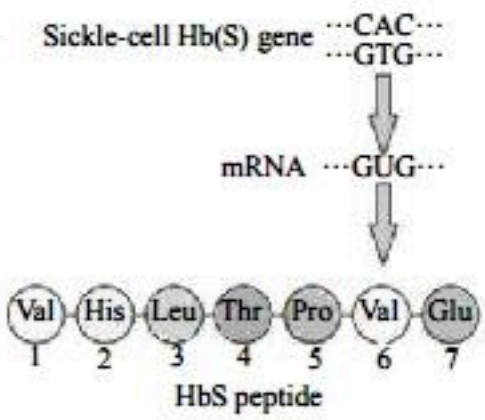
Sickle-cell anaemia:

It is an autosome linked recessive trait that can be transmitted from parents to the offspring when both the partners are carrier for the gene (or heterozygous). The disease is controlled by a single pair of allele, HbA and HbS. Out of the three possible genotypes only homozygous individuals for HbS (HbSHbS) show the diseased phenotype. Heterozygous (HbAHbS) individuals appear apparently unaffected but they are carrier of the disease as there is 50 per cent probability of transmission of the mutant gene to the progeny, thus exhibiting sickle-cell trait. The defect is caused by the substitution of Glutamic acid (Glu) by Valine (Val) at the sixth position of the beta globin chain of the haemoglobin molecule. The substitution of amino acid in the globin protein results due to the single base substitution at the sixth codon of the beta globin gene from GAG to GUG. The mutant haemoglobin molecule undergoes polymerisation under low oxygen tension causing the change in the shape of the RBC from biconcave disc to elongated sickle like structure.

(i) Normal red blood cells last about 120 days, but red blood cells affected by sickle cell disease last only 60 days. Following statement is true or false ?

(ii) Which of the following is true for given diagram?





(a) A-'Autosomal dominant
(b) B-'Glutamic acid
(c) B-'Valine
(d) It is caused due to bacteria

(iii) How sickle-cell anaemia caused ?

(iv) Which amino acid substitution is responsible for causing sickle cell anemia ?

30. Read the following and answer any four questions from 30(i) to 30(iv) given below:

***In situ* conservation-**

In situ conservation is identified for maximum protection certain 'biodiversity hotspots' regions with very high levels of species richness and high degree of endemism (that is, species confined to that region and not found anywhere else). Initially 25 biodiversity hotspots were identified but subsequently nine more have been added to the list, bringing the total number of biodiversity hotspots in the world to 34. These hotspots are also regions of accelerated habitat loss. Three of these hotspots - Western Ghats and Sri Lanka, Indo-Burma and Himalaya - cover our country's exceptionally high biodiversity regions. Although all the biodiversity hotspots put together cover less than 2 percent of the earth's land area, the number of species they collectively harbour is extremely high and strict protection of these hotspots could reduce the ongoing mass extinctions by almost 30 per cent. In India, ecologically unique and biodiversity-rich regions are legally protected as biosphere reserves, national parks and sanctuaries. India now has 14 biosphere reserves, 90 national parks and 448 wildlife sanctuaries. India has also a history of religious and cultural traditions that emphasised protection of nature. In many cultures, tracts of forest were set aside, and all the trees and wildlife within were venerated and given total protection. Such sacred groves are found in Khasi and Jaintia Hills in Meghalaya, Aravalli Hills of Rajasthan, Western Ghat regions of Karnataka and Maharashtra and the Sarguja, Chanda and Bastar areas of Madhya Pradesh. In Meghalaya, the sacred groves are the last refuges for a large number of rare and threatened plants.

(i) Which is the most effective means of conserving biodiversity?
(ii) What are useful in scared groves ?
(iii) _____ is one of the most prevalent hotspots of biodiversity in India
(iv) _____ is not generally seen in biodiversity hotspots.

SECTION-E

31. (a) Explain the events taking place at the time of fertilisation of an ovum in a human female.
(b) Trace the development of the zygote up to its implantation in the uterus.
(c) Name and draw a labelled sectional view of the embryonic stage that gets implanted.

32. (a) Cancer is one of the most dreaded diseases of humans. Explain 'Contact inhibition' and 'Metastasis' with respect to the disease.
(b) Name the groups of genes which have been identified in normal cells that could lead to cancer and how they do so?
(c) Name any two techniques which are useful to detect cancers of internal organs.
(d) Why are cancer patients often given α-interferon as part of the treatment?

OR

What are biofertilizers ? Explain with examples.

33. What are Hot Spot of Biodiversity ? List out some of the names of Hot– Spots of Indian Biodiversity.

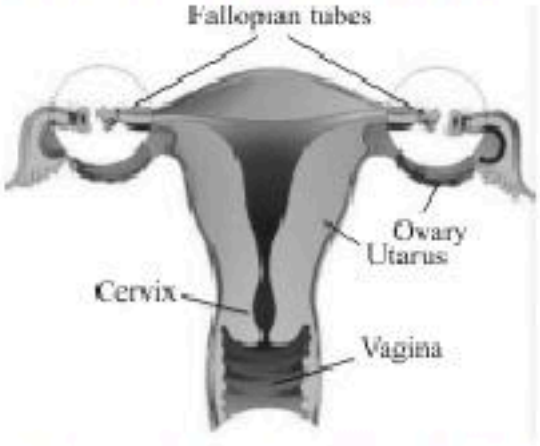
OR

How introduction of exotic species threaten biodiversity. Write comment on *Lantana camara* species and *Water hyacinth*.

Solutions

SAMPLE PAPER-8

1. (c) Aspergillus niger is used for the production of citric acid in industries. Citric acid is the most important organic acid and is extensively used in food and pharmaceutical industries. It is produced mainly by submerged fermentation using Aspergillus niger or Candida sp. from different sources of carbohydrates, such as molasses and starch based media. (1 mark)
2. (a) The Finches of Galapagos islands provide an example of biogeographical evolution. Biogeography is the study of the distribution of life forms over geographical areas. It not only provides significant inferential evidence for evolution and common descent, but also provides what creationists like to denyis possible in evolution. (1 mark)
3. (d) Sterilization techniques can be considered as the safest birth control measures. It provides a permanent and sure birth control. It is called vasectomy in male and tubectomy in female. (1 mark)
4. (c) (1 mark)
5. (b) Retrovirus is a virus composed of RNA. Retroviruses have an enzyme, called reverse transcriptase that gives them the unique property of transcribing their RNA into DNA after entering a cell. The retroviral DNA can then integrate into the chromosomal DNA of the host cell, to be expressed there. Most retroviruses can cause cancer also. (1 mark)
6. (d) Emphysema is a condition in which the air sacs of the lungs are damaged and enlarged, causing breathlessness. The protein alpha - 1 antitrypsin is used to treat the emphysema. Alpha - 1 antitrypsin is a protein made by cells in the liver and passes out into the bloodstream and can travel to the lungs. Its main function is to protect the lungs from damage caused by other types of proteins. (1 mark)
7. (a) Tubectomy also referred to as tubal sterilization is a surgical procedure done on women as a permanent method of contraception. In this method fallopian tubes are blocked so that the ova or eggs are prevented from travelling to the uterus from the ovary. This prevents any future pregnancies to occur after the surgical procedure.



(1 mark)

8. (b) In 'XO' type of sex determination, males produce two different types of gametes, e.g., grasshopper where half of the sperms contain X-chromosomes while the other half lacking 'X' chromosomes or possessing 'O'. (1 mark)
9. (a) Sticky ends are also called cohesive ends. They easily form hydrogen bonds with their complementary counter parts. (1 mark)
10. (b) Transgenic animals are those animals which have had a foreign gene intentionally inserted into their genome. (1 mark)
11. (c) In capping, unusual nucleotide (methyl guanosine triphosphate) is added to 5' end of hn-RNA and forms cap. CCA segment is also added to t-RNA as terminal addition for specific function. (1 mark)
12. (a) Genetic drift is a random process that can lead to large changes in populations over a short period of time. Random drift is caused by recurring small population sizes, severe reductions in population size called "bottlenecks" and founder events where a new population starts from a small number of individuals. (1 mark)
    Crossing over which occurs during gamete formation results in genetic recombination. (1 mark)
    Mutations are random and directionless. (1 mark)
13. (a) Pollen mother cells undergo meiosis and produce pollen grains. The pollen grains have haploid number of chromosomes. (1 mark)
14. (a) An important technique of tissue culture, somatic hybridisation results in the production of somatic hybrid plants. Two different plant varieties each with a desirable character can be made to undergo protoplast fusion, which further can be grown into a new plant. (1 mark)
15. (b) In binary fission, the reproductive unit is comprised of the parent body as a whole, which gives rise to two daugther cells upon completion of the process. There are, however, no remnants and thus, the parent body cannot be said to be dead. The parent continues its life in the form of two daughter cells and hence, organisms undergoing binary fission are regarded immortal. (1 mark)
16. (d) Energy flow in the ecosystem is a unidirectional. There is a decline in the amount of energy passing from one trophic level to the next. Thus the pyramid of energy is always upright. According to Lindemann, only 10% of energy goes to next trophic level. (1 mark)
17. As the male partner is suffering from low sperm count, Intracytoplasmic sperm injection (ICSI) technique should be used to directly inject sperm into the ovum.
    (b) As the female partner is having blockage in the fallopian tube, *in vitro* fertilisation, followed by embryo transfer (ET) into the uterus IUT (intra uterine transfer) will help her to conceive. (1 + 1 marks)
18. • Secondary treatment is applied to the sewage which has undergone physical treatment. These are 2 steps in secondary treatment – aerobic digestion and anaerobic digestion. Both involves the action of microbes. Due to the involvement of living organisms, it is referred to as a biological treatment.
    • In the first step, the sewage is taken in an aerobic digestion tank and agitated strongly. This enables the growth of aerobic microbes present in it and results in the formation of flocs which are bacterial association with filaments of fungi. The flocs greatly reduce the biochemical oxygen demand, by digesting

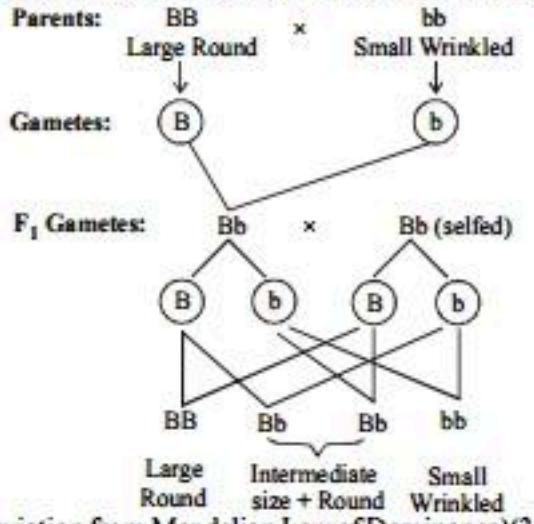
the organic matter present in it. In second step, after BOD is reduced, effluent is passed into settling tank where bacterial flocs sediment. The sediment now is called activated sludge. The small part of the sludge can be pumped into aeration tank and the remaining part into anaerobic sludge digester for anaerobic digestion by heterotrophic microbes like methanogens. This results in the production of biogas. (1 + 1 marks)

19. 'Rosie' is the first transgenic cow. The milk of this cow contained the human α-lactalbumin protein and is nutritionally a more balanced product for human babies than normal cow milk. (2 marks)

20. (i) Identification of 20,000-25,000 genes in human DNA.
(ii) Determination of sequence of 3 billion base pairs in human DNA.
(iii) Storing information to cure genetic diseases. (2 marks)

21. (a) Oogenesis is initiated at the embryonic stage. Spermatogenesis begins only at puberty.
(b) A is anterior pituitary which secretes two gonadotropins - luteinising hormone (LH) and follicle stimulating hormone (FSH) *i.e.*, B. (2 marks)

22. The starch synthesis in pea plant is controlled by a single gene. This gene in pea plant shows some degree of pleiotropy as it controls the shape of the seed and in addition the size of starch grain too.
This gene has two alleles B and b. The BB homozygotes produce large starch grains as compared to those produced by bb homozygotes. Mature homozygous BB seeds were round while bb seeds were wrinkled. The heterozygotes Bb form round seeds but the starch grains were of intermediate size. Thus if the size of starch grain is considered the Bb seeds show the phenomenon of incomplete dominance, but if seed shape is considered then allele B and b show dominant-recessive relationship.



(Deviation from Mendelian Law of Dominance)(3 marks)

OR

(a) This representation (Hb^A peptide) indicates a normal human, because the glutamic acid in the sixth position is not substituted by valine.
(b) The sufferer's RBCs become elongated and sickle shaped as compared to the normal biconcave RBCs.
(c) Both males and females are likely to suffer from the disease equally, as this is not a sex linked disease. It is an autosomal linked recessive trait. (3 marks)

23. (a) Coding strand has the same polarity and the sequence as RNA except thymine is present at the place of uracil. mRNA sequence is :
5' — AUGCAUGCAUGCAUGCAUGCAUGC AUGCAUG — 3'
(b) By density gradient centrifugation.
(c) Polarity of DNA strand a-b is 3' → 5' whereas DNA strand c-d has polarity 5' → 3'. (3 marks)

24. (a) Pathogen : *Flavi-ribo virus*
Vector : *Aedes aegypti*,(Tiger mosquito)
(b) Break - bone fever
(c)

Malaria	Dengue fever
It is a protozoan disease.	It is a viral disease.
Its vector is female *Anopheles* mosquitoes.	It's vector is *Aedes aegypti*.
Quinine, the oldest drug, and other drugs are also used for the treatment of	No vaccine for Dengue fever is available.

(3 marks)

25. (a) Denaturation process. During denaturation, reaction mixture is heated to separate double-stranded template into two single strands. If this step does not occur, next two steps of PCR *i.e.*, annealing and extension of primers will also not occur resulting in no amplification of DNA.
(b) Primers.
(c) *Taq* DNA polymerase.
It is a thermostable enzyme isolated from a thermophillic bacterium, *Thermus aquaticus*. This enzyme remains functional during high temperature required for denaturation of DNA. (3 marks)

26. (a) *CrylAc* is a toxin gene isolated from *Bacillus thuringiensis*. It codes for inactive protoxins against cotton bollworms. Once an insect ingests this inactive toxin, it is converted into an active form of toxin due to the alkaline pH of the gut which solubilises the crystals. The activated toxin binds to the surface of midgut epithelial cells and creates pores that cause cell swelling and lysis and eventually cause death of the insect.
(b) Cells with interfering RNA (RNAi) gene contain nematode-specific genes which produce both sense and anti-sense RNA. When *Meloidogyne incognita* consumes such cells, two RNAs being complementary to each other formed a double stranded (dsRNA) that initiates RNA interference and thus, silences the specific mRNA of the nematode. As a consequence, the parasite could not survive on cells expressing specific interfering RNA. (3 marks)

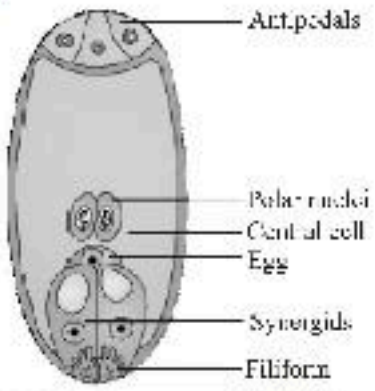
OR

(a) In prokaryotes, there is a restriction modification system. The restriction enzymes restrict the multiplication of foreign DNA, *e.g.*, bacteriophage in a bacterium. Thus, the presence of restriction enzymes provide defence and protection to the bacterium against attack of bacteriophages.
Such mechanism to restrict the growth of invading viruses is absent in eukaryotes.

(b) Role of proteases is to degrade the proteins present inside a cell (from which DNA is being isolated). If the proteins are not removed from DNA preparation then they could interfere with any downstream treatment of DNA (such action of restriction endonuclease, DNA ligase,etc.).

(c) *Agrobacterium tumefaciens* is a soil bacterium, which causes crown gall disease in many dicot plants. It is able to deliver a piece of DNA known as T-DNA, to transform the normal cells into tumour cells and direct these tumour cells to produce the chemical required by the pathogen.
The tumour inducing (Ti) plasmid of *A. tumefaciens* has now been modified into a cloning vector, which is no more pathogenic to the plants but still deliver genes of interest into a variety of plants. So, it is cosnidered a good cloning vector for plants. (3 marks)

27. Chalazal end



Embryo sac (or female gametophyte) is formed by three successive mitotic divisions that take place in the nucleus of megaspore.
The nucleus of the functional megaspore divides meiotically to form two nuclei which move to the opposite poles, forming the 2-nucleate embryo sac. Two more sequential mitotic nuclear divisions result in the formation of the 4-nucleate and later the 8-nucleate stages of the embryo sac. After the 8-nucleate stage, cell walls are laid down leading to the organisation of the typical female gametophyte or embryo sac. Six of the eight nuclei are grouped together at micropylar and chalazal end and form the egg apparatus and antipodals respectively. The large central cell left over with two polar nuclei. Thus, a typical female gametophyte consists of 7 cells with 8 nucleus.
The central cell is the largest cell of the embryo sac. It has a highly vacuolate cytoplasm which is rich in reserve food and golgi bodies. In the middle, the cell contain two polar nuclei which often fuse to form a single diploid secondary or fusion nucleus. Thus all the cells of the embryo sac are haploid except the central cell which becomes diploid due to fusion of polar nuclei. (1 + 2 marks)

28. (i) According to Hardy-Weinberg principle, the gene pool in a population remains constant. It means, the allele frequencies in a population are stable and constant from generation to generation. This biological phenomenon is called genetic equilibrium.

(ii) Natural selection can lead to stabilisation (in which more individuals acquire mean character value), directional change (more individuals acquire value other than the mean character value) or disruption (more individuals acquire peripheral character value at both ends of the distribution curve). (1½ + 1½ marks)

29. (i) Normal red blood cells do last about 120 days, but sickle cells last only 10 to 20 days. The bone marrow, which makes red blood cells, can't keep up with the rate that the sickle cell blood cells die. This leads to anemia–a lower than normal number of red blood cells in the body.

(ii) (c)

(iii) Sickle-cell anaemia is controlled by a single pair of allele, HbA and HbS.

(iv) Glutamic acid is substituted by valine in the α-globin chain at the sixth position. (1 + 1 + 1 + 1 marks)

30. (i) Preserve habitats.

(ii) Scared groves are useful in conserving endangered and rare species.

(iii) Western Ghats.

(iv) Lesser interspecific competition. (1 + 1 + 1 + 1 marks)

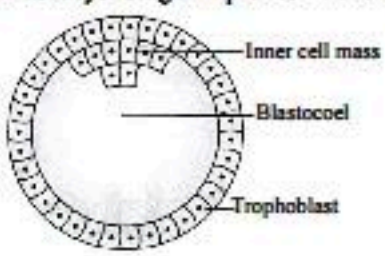
31. (a) Fertilisation occurs in human beings in ampullary-isthmic junction of the fallopian tube. During this,

- A sperm contacts with zona pellucida layer of the ovum. It induces changes in the membrane that blocks the entry of additional sperms.
- Acrosome in head part of sperms helps to digest the zona pellucida and plasma membrane of the ovum (secondary oocyte) and sperm's nucleus enters into the cytoplasm.
- Entry of sperm induces the completion of second meiotic division of the secondary oocyte. It leads to the formation of a second polar body and a large ootid.
- Nucleus of the sperm fuses with the nucleus of ootid to form a diploid zygote.

(b) Development of zygote up to implantation

- Cleavage division (mitotic) starts in zygote as it moves through the isthmus of fallopian tube towards the uterus.
- This division results into 2, 4, 8 and 16 daughter cells called blastomeres.
- The embryo with 8-16 blastomeres is called morula.
- Morula continues to divide and transforms into blastocyst as it moves further towards the uterus.
- Blastomeres in the blastocyst are arranged into an outer layer called trophoblast and inner group of cells attached to trophoblast called inner cell mass.
- Trophoblast layer then gets attached to the endometrium and the inner cell mass gets differentiated as the embryo.
- After attachment the uterine cells divide rapidly and cover the blastocyst. It leads to blastocyst's embedding in the endometrium of the uterus. This is called implantation.

(c) Blastocyst stage implants in the uterus.



(4 marks)

32. (a) Contact inhibition: Normal cells have the property of contact inhibition *i.e.*, their growth is stopped after coming in contact with other cells. But the cancer cells do not have this property of contact inhibition. They unlike normal cells divide continuously (uncontrolled cell division) and give rise to a mass of cells called tumour.
Metastasis: It is the property exhibited by the cancerous cells by which these cells get sloughed off from the tumour and move to distant sites through body fluids and initiate the formation of new tumours by dividing actively.

(b) Many genes called proto oncogenes or cellular oncogenes have been identified in normal cells which when activated under certain conditions lead to the oncogenic transformation of normal cells causing cancer.

(c) X Rays (Radiography), CT (computerised tomography), MRI and biopsy are useful in detecting cancers of internal organs.

(d) Tumor cells avoid detection and destruction by immune system. Therefore, the patients are given substances called biological response modifiers such as α-interferon. The cancer patients are often given α-interferons as a part of treatment becuase it activates their immune system and helps in destroying tumour. (5 marks)

OR

Chemical fertilizers like NPK are used in agriculture to increase the fertility of soil and thereby increase the productivity. But the harmful effects of chemical fertilizers have compelled us to look out for an alternative source of fertilizers of biological origin. These fertilizers are called biofertilizers. They also increase the fertility of soil and are economic and ecofriendly. The sources of biofertilizers are bacteria, fungi and cyanobacteria.

(i) Bacteria – Symbiotic nitrogen fixing bacteria *Rhizobium leguminosarium* lives symbiotically in the root nodules of leguminous plants and fix atmospheric N_2 increasing soil fertility. Free-living N_2 fixing bacteria are *Azospirillum* and *Azotobacter*.

(ii) Fungi – Fungi form symbiotic associations with higher plants called mycorrhiza, e.g., *Glomus*. The fungal partner of this association absorbs phosphorus from soil and passes it to plants. It plays a significant role in phosphate nutrition of plants.

(iii) Cyanobacteria – Free-living nitrogen fixing cyanobacteria are *Nostoc*, *Anabaena*, *Oscillatoria* etc. *Azolla-Anabaena* symbiotic system is the main biofertilizer used in rice fields. Now a days a large number of biofertilizers are available in the market. (5 marks)

33. Hot spots are those regions of rich biodiversity which have been declared sensitive due to direct or indirect interference of human activities. Norman Myers was the first to develop hot spots concept in 1988 to designate priority areas for *In situ* conservation. The two main criteria for determining a hot spot are –

(i) Number of endemic species, and

(ii) Degree of threat in terms of habitat loss.

Twenty five terrestrial hot spots have been identified throughout the world. Of these, two are located in India and neighbouring countries. These two hot spots are Western Ghats/ Sri Lanka and Indo-Burma region (covering the Eastern Himalayas). Similarly, hot spots of Indian biodiversity are described in Table.

	Hot - spot	Threatened due to
1.	Aravalli hills	Mining activities (habitat destruction) and population pressure.
2.	Chilka lake	Exploitation of fish and ship farming.
3.	Dal lake	Exploitation of aquatic life and human development.
4.	Doon valley	Mining activities.
5.	Gir forests	Population pressure.
6.	Himalayas	Population pressure and habitat alteration.
7.	Kodai lake	Massive tourist invasion, destruction of aquatic life.
8.	Little Rann of Kutch	Loss of wildlife.
9	Nilgiri hills	Tea and coffee plantation, urbanization and tourist-invasion.
10.	Shivalik hills	Mining activities.

(5 marks)

OR

Introduction of Exotic Species

Intentional of chance introduction of exotic species into new islands or countries by man adversely affects the native species. It surely increases competition for food and space, but may also degrade or destroy habitats, and introduce diseases and parasites. For example, rabbits and goats introduced into Pacific and Indian ocean islands are destroying the habitats of many native plants, reptiles and birds. Introduction of the exotic *Claries gasipinus* into our rivers lead to a near total loss of *Claries bacterachus*, our local species. Introduction of American cockroach, *Periplaneta americana*, into India with food ships is fast replacing the native oriental cockroach, *Blatta orientalis*. The exotic fish trout (*Salmon*) and bass are endangering many fish species in U.S.A. In U.S.A. , the chestnut tree has been devastated by a fungus (blight) introduced from China.
Lantana camara is strongly competing with native species. It has spread in many forests in different parts of the country. Similarly, water hyacinth *(Eichhornia)* is threatening the existing aquatic life in ponds and lakes etc. particularly in tropical countries including India as it clogs the stagnant water bodies very fast. Likewise, *Parthenium* (carrot grass) is an exotic weed which grows very rapidly and has adversely affected the proliferation of endemic species in forests. (5 marks)