Class: XII
SESSION : 2022-2023
SUBJECT: BIOLOGY (044)
SAMPLE QUESTION PAPER - 5
with SOLUTION

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. Match Column-I with Column-II and select the correct option using the codes given below: **[1]**

Column-I	Column-II
(A) Citric acid	(i) Trichoderma
(B) Cyclosporine-A	(ii) Clostridium
(C) Statins	(iii) Aspergillus
(D) Butyric acid	(iv) Monascus

Codes:

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

2. In some plants, the female gamete develops into an embryo without fertilization. This phenomenon is known as: **[1]**

a) Parthenogenesis
b) Autogamy
c) Syngamy
d) Parthenocarpy

3. Which of the following bacterium is associated with the production of bio insecticide? **[1]**

a) Bacillus thuringiensis
b) Agrobacterium
c) Bacillus subtilis
d) Azotobacter

4. Homeostasis is: [1]

a) Maintaining a constant external environment

b) Both Maintaining a constant internal environment and Maintaining a constant external environment

c) Maintaining circulation of blood

d) Maintaining a constant internal environment

5. Match the animals given in column I with their location in column II: [1]

Column I	Column II
(a) Dodo	(i) Africa
(b) Quagga	(ii) Russia
(c) Thylacine	(iii) Mauritius
(d) Stellar's sea cow	(iv) Australia

Choose the correct match from the following:

a) (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

b) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

c) (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)

d) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

6. Plotting of specific genes on the chromosome is known as: [1]

a) Chromosome map/linkage map/genetic map

b) Chromosome map only

c) Linkage map only

d) Genetic map only

7. In the 28 day of human ovarian cycle, the ovulation takes place typically on: [1]

a) Day 20 of the cycle

b) Day 28 of the cycle

c) Day 10 of the cycle

d) Day 14 of the cycle

8. An embryo sac of a typical angiosperm consist of: [1]

a) Egg, synergids, polar nuclei and antipodal cell

b) Egg, synergids, central cell and polar nuclei only

c) Egg, synergids and secondary cell only

d) Egg, synergids and antipodal cell only

9. The codon AUG is directed to a suitable position on the 30 S ribosomal subunit by: [1]

a) RNA polymerase-D

b) Shine-Dalgarno sequences

c) All of these

d) Consensus sequences

10. The sequence of structural gene in lac operon concept is: [1]

a) lac Z, lac Y, lac A
b) lac Y, lac Z, lac A
c) lac A, lac Z, lac Y
d) lac A, lac Y, lac Z

11. The cutting out of separated bands of DNA from the agars gel is called: [1]

a) Elution
b) Polymerisation
c) Electrophoresis
d) Annealing

12. **Assertion (A):** A geneticist crossed two plants, he got 50% tall and 50% dwarf progenies. [1]
Reason (R): It follows Mendelian law and one of the parent plant might be heterozygous.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but 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. Citric acid is produced by: [1]

a) Acetobacter suboxydans
b) Spergillus niger
c) Candida utilis
d) Aspergillus fumigatus

14. **Assertion (A):** New world and old world monkeys are alike. [1]
Reason (R): Old world monkeys are closer to man.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

15. **Assertion (A):** Stool test is done to detect giardiasis. [1]
Reason (R): Giardia is enteric flagellate protozoan.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

16. **Assertion:** Sequences in DNA fragments in HGP were arranged based on some overlapping regions present in them. [1]
Reason: Alignment of these sequences was humanly not possible. Therefore, specialized computer-based programmes were developed.

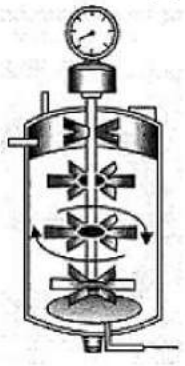
a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

Section B

17. Name the type of bioreactor shown. Write the purpose for which it is used. **[2]**



18. Why is Drosophila male fly referred to as heterogametic? **[2]**

19. What way the advent of the birth control pill have resulted in an increase in STDs? **[2]**

20. Why is it important to feed the new born babies on colostrums? **[2]**

21. Why is predation required in a community of different organisms? **[2]**

OR

Name the types of interactions found amongst species of a community?

Section C

22. Differentiate between the action of LH in males and females. **[3]**

23. Microbes play a dual role when used for sewage treatment as they not only help to retrieve usable water but also generate fuel. Write in points how this happens. **[3]**

24. While finalising an alliance between his son and Rita, Mr Ram was curious to know what was Rita's blood group. Nobody was interested in their blood groups since their horoscopes matched. Mr Ram was adamant in wanting to know the blood groups before finalising. The senior people got annoyed. Then Rita stood up and gave the reasons. Mr Ram was happy and the marriage date was finalised. **[3]**

    i. Mr Ram's refusal to accept only horoscopes shows certain values. What are they?

    ii. What effect on the foetus may be expected if the father has A+ and the mother O+ blood groups?

    iii. What is the possible remedy in case of an Rh factor incompatibility between the foetus and mother's blood?

25. Give three hypothesis for explaining why tropics show greatest levels of species richness. **[3]**

26. a. Define an ecosystem. Give a few instances of an ecosystem. **[3]**

b. Explain the term pyramid of biomass.

27. Draw L.S. of an embryo of grass and label its parts. **[3]**

OR

Name the cell that develops into the embryo sac and explain how this cell leads to the formation of embryo sac. Also mention the role played by the various cells of the embryo sac.

28. Name two new techniques for determining the condition of the foetus. **[3]**

Section D

29. **Read the text carefully and answer the questions:** **[4]**

In 1952, Alfred Hershey and Martha Chase took an effort to find the genetic material in organisms. Their experiments **led to an unequivocal proof to DNA as genetic material**.

Hershey and Chases's experiments:

(i) Name the kind of virus they worked with and why?

(ii) Why did they use two types of culture media to grow viruses in? Explain.

(iii) What was the need for using a blender and later a centrifuge during their experiments?

OR

State the conclusion drawn by them after the experiments.

30. **Read the text carefully and answer the questions:** **[4]**

Diabetes is a hyperglycaemic metabolic disorder resulting from insufficient production of insulin, with consequent metabolic dysfunctions of four types, and affecting more than 415 million people, it is a forefront public health peril globally.

Escherichia coli remains the best bacterium prototype for rDNA experiments. Cleavage of the signal polypeptide in Islets of Langerhans produced preproinsulin yields proinsulin, the enzymatic removal of the link chain in which gives Human insulin (humulin); a 51 amino-acids polypeptide of mass 5808Da. In 1978, humulin was first produced in Escherichia coli, eliminating zoonotic cross-transfer/autoimmune-diseases risk. It is also more economical. The manufacturing process can be from separate A and B polypeptide chains, or from proinsulin. An amino acid sequencer manufactures the sequences, which are cloned onto a plasmid. The bacteria are transferred, and placed in fermentation tanks. The

insulin molecules are stored in inclusion bodies, and solubilisation (by chemicals and enzymes) and refolding yield the final insulin.

(i) How was insulin prepared traditionally?

(ii) What are the shortcomings of insulin earlier obtained from slaughtered animals?

(iii) Name the company and process of preparation of insulin?

OR

What is the difference between proinsulin and insulin structurally?

Section E

31. Describe in detail the role of biotechnology in diagnosis of diseases. **[5]**

OR

Pesticidal crystal proteins (Cry) are endotoxins produced by Bacillus thuringiensis, and form crystal structures (thus the name "cry" proteins, short for crystal). Cry toxins have specific activities against insect species of the orders Lepidoptera (moths and butterflies), Diptera (flies and mosquitoes), Coleoptera (beetles), Hymenoptera (wasps, bees, ants and sawflies) and nematodes. When insects ingest toxin crystals, the alkaline pH of their digestive tract denatures the insoluble crystals, making them soluble and thus amenable to being cut with proteases found in the insect gut, which liberate the cry toxin from the crystal. The Cry toxin is then inserted into the insect gut cell membrane, paralyzing the digestive tract and forming a pore. The insect stops eating and starves to death; live Bt bacteria may also colonize the insect which can contribute to death.

i. Give the scientific name of the soil bacterium which produces crystal (Cry) proteins.

ii. How are these proteins useful in agriculture?

iii. What do the different written terms **Cry** and **cry** represent respectively?

32. What are the methods of cancer detection? Describe the common approaches for the treatment of cancer. **[5]**

OR

Cancer refers to any one of a large number of diseases characterized by the development of abnormal cells that divide uncontrollably and have the ability to infiltrate and destroy normal body tissue. Cancer often has the ability to spread throughout your body. Cancer is the second-leading cause of death in the world.

Answer the following with respect to Cancer.

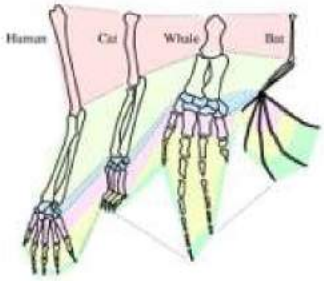
i. How does a cancerous cell differ from a normal cell?

ii. Benign tumor is less dangerous than malignant tumor. Why?

iii. Describe causes of cancer. **OR**

iv. Mention two methods of treatment of the disease.

33. Observe the diagram and answer the following question with reference to evolution: **[5]**



i. Name the type of organs that are illustrated in the above diagram.

ii. Which type of evolution is represented by the above diagram?

iii. Give one example of homologous structures in plants.

OR

Write the Oparin and Haldane's hypothesis about the origin of life on Earth. How does meteorite analysis favour this hypothesis?

SOLUTION

Section A

1. **(b)** (A) - (iii), (B) - (i), (C) - (iv), (D) - (ii)
   Explanation: (A) - (iii), (B) - (i), (C) - (iv), (D) - (ii)
2. **(a)** Parthenogenesis
   Explanation: The phenomenon in which the female gamete develops into an embryo without fusing with the male gamete, that is in the absence of fertilization is called parthenogenesis.
3. **(a)** Bacillus thuringiensis
   Explanation: Bacillus thuringiensis
4. **(d)** Maintaining a constant internal environment
   Explanation: Maintaining a constant internal environment
5. **(d)** (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
   Explanation: Some examples of recent extinctions include the dodo (Mauritius), quagga (Africa), thylacine (Australia), Steller's Sea Cow (Russia), and three subspecies (Bali, Javan, Caspian) of the tiger.
6. **(a)** Chromosome map/linkage map/genetic map
   Explanation: Plotting of specific genes on the chromosome is known as a chromosome map or linkage map or genetic map. It shows the position of genes on the chromosome with respect to others.
7. **(d)** Day 14 of the cycle
   Explanation: The changes that the ovary and the uterus undergo during a menstrual cycle also brings about a change in the level of the pituitary and ovarian hormones such as the LH and FSH. Both attain a peak value in the middle of the cycle at about the 14th day that causes rupture of Graafian follicle and release of the ovum by the process of ovulation.
8. **(a)** Egg, synergids, polar nuclei and antipodal cell
   Explanation: Egg, synergids, polar nuclei and antipodal cell
9. **(b)** Shine-Dalgarno sequences
   Explanation: The codon AUG is directed to a suitable position on the 30S ribosomal subunit by Shine-Dalgarno sequences.
10. **(a)** lac Z, lac Y, lac A
    Explanation: In the lac operon concept, the sequence of arrangement of the structural gene is as lac Z, lac Y, and lac A. The z gene codes for beta-galactosidase. The y gene code for permease and a gene encodes a transacetylase.
11. **(a)** Elution
    Explanation: In gel-electrophoresis, the separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. This step is called elution.
12. **(a)** Both A and R are true and R is the correct explanation of A.
    Explanation: Both A and R are true and R is the correct explanation of A.
13. **(b)** Spergillus niger
    Explanation: Spergillus niger
14. **(d)** A is false but R is true.
    Explanation: The New world monkey's possess a flat nose with widely separated

and outwardly directed nostrils. Their tail is long, sensitive and prehensile for grasping the branches of trees, but their limbs cannot be used for grasping the branches of trees, because of non-opposable thumbs and mostly clawed digits. The Old world monkeys possess a narrow nose with closely placed and downwardly directed nostrils. Their tail is generally short and not prehensile, but their limbs having opposable thumbs and nailed digits, are well adapted for grasping. They are closer to man as they have better developed brain, smaller ear pinnae, sensitive finger tips, presence of both rods and cones in the retina of eyes, etc.

15. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: If a giardia infection is present, the parasite or its cysts can be seen when the stoolis looked at under a microscope. If giardiasis is suspected, an antigen test may be done on the stool or a sample of the fluid from the small intestine (duodenal contents). Giardia is a genus of anaerobic flagellated protozoan parasites of the phylum Sarcomastigophora that colonise and reproduce in the small intestines of several vertebrates, causing giardiasis.
16. **(b)** Assertion and reason both are correct statements but reason is not correct explanation for assertion.
Explanation: Assertion and reason both are correct statements but reason is not correct explanation for assertion.

Section B

17.
    - Simple stirred tank bioreactor.
    - It is used to produce large quantities of products where large volumes (100 - 1000) litres of culture can be processed.
18. Heterogametic sex (digametic sex) refers to the sex of a species in which the sex chromosomes are not the same.
Drosophila male fly contains two heteromorphic sex chromosomes i.e. XY, therefore they are referred to as heterogametic.
19. The advent of the birth control pill makes it unnecessary to use other means of contraception, particularly the condom. Thus STDs are more readily transmitted during sexual activity.
20. The milk produced during the initial few days of lactation is called colostrums which contains several antibodies (mainly Ig A), that provide passive immunity to the new born baby.
21. - They help in maintaining species diversity in a community, by reducing the intensity of competition.
- They keep the prey population under control
- It acts as a conduit for energy transfer across trophic levels.

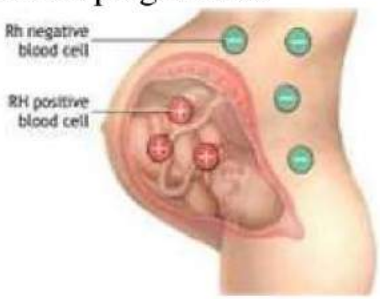
OR

- **Predation**: predation is a biological interaction where a predator (an organism that is hunting) feeds on its prey (the organism that is attacked).
- **Parasitism**: parasitism is a non-mutual relationship between species, where one species, the parasite, benefits at the expense of the other, the host.
- **Commensalism:** Commensalism is a class of relationships between two organisms where one organism benefits from the other without affecting it.

- **Mutualism**: Mutualism is the way two organisms of different species exist in a relationship in which each individual benefits from the activity of the other.
- **Competition:** Competition is an interaction between organisms or species in which both the organisms or species are harmed. Limited supply of at least one resource (such as food, water, and territory) used by both can be a factor.

Section C

22. In male LH is called ICSH which stimulates the leydig cells of the testes to secrete testosterone hormone.
    In females LH promotes ovulation and controls the formation of corpus luteum after ovulation.
23. Heterotrophic microbes naturally present in sewage are used. Vigorous growth of aerobic microbes as flocs use up organic matter in effluent and reduce BOD of waste water. Other kinds of bacteria grow in it anaerobically and digest the bacteria and fungi called flocs. As they digest flocs, as mixture of $CH_4, H_2S \, and \, CO_2$ (biogas) are evolved which can be used as a fuel.
24. i. Mr Ram was not orthodox, he had a modern and scientific outlook.
    ii. If the mother carries a foetus having A blood group, it acts as an antigen to the mother's blood. The mother accordingly develops antibodies against the foetus. Severity is observed in the subsequent issue where the child may be born with anaemia and jaundice.
    iii. Today, when a woman with the potential to develop Rh incompatibility is pregnant, doctors administer a series of two Rh immune-globulin shots during her first pregnancy. The first shot is given around the 28th week of pregnancy and the second within 72 hours after giving birth. Rh immune-globulin acts like a vaccine, preventing the mother's body from producing any potentially dangerous Rh antibodies that can cause serious complications in the newborn or complicate any future pregnancies.

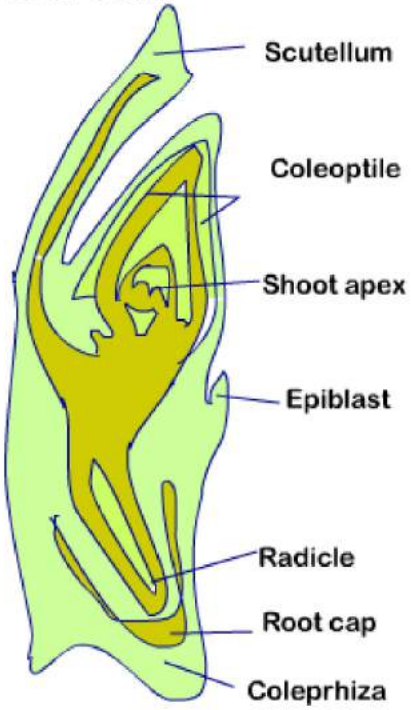


25. Biodiversity is not uniformly distributed throughout the world. Polar regions have very little biodiversity whereas South America has the greatest biodiversity on the earth. There are many hypothesis for higher biodiversity in tropics:
    1. There are no unfavourable seasons or harsh climatic conditions in tropics. Continued favourable environmental condition has helped tropical organisms to flourish more.
    2. There is more solar energy available in the tropics due to which productivity is higher and this contribute to greater diversity in both plants and animal species.
    3. The tropical environment is older than other types of habitats. This has provided more time for the evolution of greater number of plants and animals.
26. a. An ecosystem may be defined as a structural and functional unit of the biosphere, comprising living organisms and their non-living environment that interact by

means of the food chain and Chemical Cycles resulting in energy flow, biotic diversity and material cycling to form a stable, self-supporting system. Few instances of an ecosystem are an ocean pond, edge of pond, river, streams, a lake, a grassland, a desert, a village, a forest etc.

b. **Pyramid of biomass** may be defined as a graphic representation of the biomass at different trophic levels in a food chain in an ecosystem. It may be upright as in case of the terrestrial food chain or maybe inverted as in case of marine/aquatic food chain.

27.



Embryo in Monocot Seed

OR

Megaspore mother cell. It undergoes meiosis to form 7 celled 8-nucleate stage embryo sac. Nucleus of megaspore mother cell undergoes mitosis and two cells move to opposite poles. Two successive mitotic divisions form an 8 nucleate embryo sac cells formation takes place after nuclear divisions. Three cells group together at micropylar end, egg apparatus with an egg cell and two synergids. Three cells group at chalazal end and two nuclei move to centre. Roles of various cells:

1. Polar nuclei fuses with a male gamete to form triploid endosperm. (Triple fusion)
2. Egg cell fuses with male gamete to form zygote.
3. Synergids guides the pollen tube.

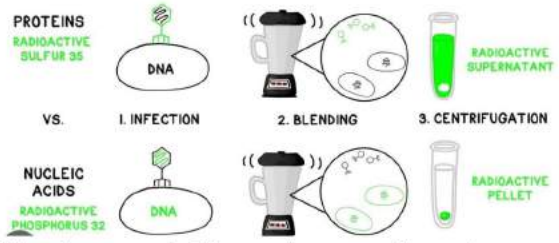
28. i. Chorionic villus sampling (CVS): Sloughed off foetal cells are sucked into a catheter passed through the cervix without injuring the foetus. This provides a mass of rapidly dividing foetal cells for detection of any chromosomal disorders.

ii. Ultrasound imaging or sonography technique uses high-frequency sound waves ranging between 1 to 15 MHz frequency. This technique is totally harmless, non-invasive and it does not use any ionic radiations.

Section D

29. **Read the text carefully and answer the questions:**

In 1952, Alfred Hershey and Martha Chase took an effort to find the genetic material in organisms. Their experiments **led to an unequivocal proof to DNA as genetic material**.



Hershey and Chases's experiments:

(i) They worked with bacteriophage, i.e. viruses that infect bacteria. These viruses were used because during infection they transfer their genetic material into bacteria.

(ii) They used two types of culture media, containing ^{35}S and ^{32}P, so as to compare that which one out of DNA and proteins gets transferred from virus to bacteria and act as genetic material.

(iii) A blender and centrifuge were used to open up the bacterial cells and viral particles, so, that genetic material could be visualised.

OR

They concluded that DNA is the genetic material that is passed from virus to bacteria.

30. **Read the text carefully and answer the questions:**

Diabetes is a hyperglycaemic metabolic disorder resulting from insufficient production of insulin, with consequent metabolic dysfunctions of four types, and affecting more than 415 million people, it is a forefront public health peril globally. Escherichia coli remains the best bacterium prototype for rDNA experiments. Cleavage of the signal polypeptide in Islets of Langerhans produced preproinsulin yields proinsulin, the enzymatic removal of the link chain in which gives Human insulin (humulin); a 51 amino-acids polypeptide of mass 5808Da. In 1978, humulin was first produced in Escherichia coli, eliminating zoonotic cross-transfer/autoimmune-diseases risk. It is also more economical. The manufacturing process can be from separate A and B polypeptide chains, or from proinsulin. An amino acid sequencer manufactures the sequences, which are cloned onto a plasmid. The bacteria are transferred, and placed in fermentation tanks. The insulin molecules are stored in inclusion bodies, and solubilisation (by chemicals and enzymes) and refolding yield the final insulin.

(i) From slaughtered cattle and pigs.

(ii) Insufficient in quantity and containing antigens which can cause allergies.

(iii) Eli Lily & by r-DNA technology.

OR

Proinsulin has an extra C-peptide which is absent in insulin.

Section E

31. Nowadays, biotechnology is contributing a lot to medicines both in the diagnosis of diseases and in the development of pharmaceutical products. Its main purpose is to

identify the genes whose mutations cause genetic diseases. All diseases involve changes in gene expression within the affected cells and within the patient's immune system. By comparing gene expression in healthy and diseased cells, biotechnologists may identify genes which are turned on or off in particular diseases.

i. **Polymerase chain reaction (PCR):** It is a technique by which any piece of DNA can be copied many times in a short Period. If the source of DNA is impure it can be amplified by using PCR technique. Amplification makes DNA identification much easier. For example, the sequence of HIV from DNA has known its amplification by PCR can help to detect HIV, DNA in blood or tissue samples. DNA from single embryonic cells is amplified by PCR for rapid prenatal (before birth) diagnosis of genetic disorders. DNA technology can help to identify individuals with genetic disorders before the appearance of symptoms or carriers of potentially harmful recessive alleles.

ii. **Pharmaceutical Products:** With the help of genetic engineering, the gene for the desired protein is transferred into bacteria or yeast and a large number of proteins can be produced in short time or the gene is directly inserted inside the host cells to avoid purifications. Some pharmaceutical products like:
   a. Hormones
   b. Immunomodulation
   c. Antisense nucleic acids
   d. Genetically engineered proteins
   e. Interferons

iii. **Gene therapy:** It may help scientists to replace the defective genes with normal genes. This new system of medicine is called gene therapy.

OR

i. Soil bacterium - *Bacillus thuringiensis* produces crystal (Cry) proteins.

ii. This protein acts as a toxin for insects. If gene for'Cry', protein is incorporated into crop plants they will develop resistant to the insects and pests.

iii. 'Cry' is used for Cry protein and 'cry' is used to denote gene which encodes for 'Cry' protein.

32. Following are the methods of cancer detection:

Biopsy: In this process, a small fragment of the suspicious tissue is extracted, cut into thin sections, is stained and examined under a microscope (histopathological studies) by a pathologist. This helps in determining any abnormality in the cells.

Blood Test and Bone Marrow Test: These tests show increased levels of cell count. This helps the doctor to diagnose the problem. Imagery Technique: X-ray, CT scan, and MRI help in diagnosing the cancer of internal organs.

Apart from the above-mentioned techniques; antibodies against cancer-specific antigens and molecular biotechnology are also used in certain cases.

Common approaches to treatment involve surgery, radiotherapy, and immunotherapy:

i. Surgery: This involves the removal of the tumor through surgery.

ii. Radiotherapy: In radiotherapy, tumor cells are irradiated lethally, taking proper care of the normal tissues surrounding the tumor mass.

iii. Immunotherapy: This involves the use of alpha-interferon so that some stubborn cancer cells can be destroyed by chemotherapeutic drugs.

OR

i. In normal cells, growth and differentiation are highly controlled and regulated (contact inhibition). The cancerous cells have lost the property of contact inhibition, hence continue to divide giving rise to masses of cells (tumors).

ii. The benign tumor remains confined in the organ affected as it is enclosed in a connective tissue sheath and does not enter the metastatic stage.

iii. Cancer may be caused due to carcinogens which are physical (X-rays, gamma rays and UV rays), chemicals (Nicotine, Aflatoxin, Cadmium oxide, Asbestos) and biological (viral oncogenes and proto-oncogenes).

iv. Surgery, radiotherapy, Chemotherapy, immunotherapy by using biological response modifiers like α-interferons.

33. i. Homologous Structures.

ii. Divergent evolution; the same structures developed along with the different directions due to adaptations to different needs.

iii. Thorns of Bougainvillea and tendrils of Cucurbita.

OR

Oparin of Russia and Haldane of England proposed the theory that the first form of life could have come from pre-existing non-living organic molecules (e.g. RNA, protein, etc.) and that formation of life was preceded by chemical evolution (the formation of diverse organic molecules from inorganic constituents) under high temperature, volcanic storms and reducing atmosphere containing CH_4, NH_3, etc. In 1953, S.L. Miller created similar conditions on a laboratory scale. He created electric discharge in a closed flask containing CH_4, H_2, NH_3 and water vapor at 8000 C. He observed the formation of amino acids. In similar experiments others observed, formation of sugars, nitrogen bases, pigment and fats.

Analysis of meteorite content revealed similar compounds which indicated that similar processes are occurring elsewhere in space. It helped in accepting the chemical evolution theory.