8. Cell Biology and Biotechnology

Q. Rewrite the following wrong statement after correction :

1. Changes in genes of the cells are brought about in non-genetic technique.

Ans : Non-genetic biotechnology involves use of either cell or tissue.

2. Gene from Bacillus thuringiensis is introduced into soyabean.

Ans : Gene from Bacillus thuringiensis is introduced with gene of cotton.

3. Earlier, Insulin was being collected from the pancreas of pigs.

Ans : Earlier, Insulin was being collected from the pancreas of horses.

4. Malaria arises due to genetic changes in hepatocytes.

Ans : Phenulketonuria(PKT) arises due to genetic changes in hepatocytes.

5. We do have any traditional that cures the diseases with the help of natural resources.

Ans : we have a great tradition of Ayurveda that cures the disease with the help of natural resources.

Q. Match the Pairs :

Column 'A'	Column 'B'
6. Interferon	i) Cleaning the oil spill
7. Factor vIII	ii) Hydrocarbons
8. Dr. Anand Mohan chakravati	iii) Viral infection
9. Pseudomonus	iv) Uranium and arsenic
10. Sunflower	v) Haemophilia
	vi) Green revolution in India

Ans : 6. Interferon = iii) Viral infection

7. Factor vIII = v) Haemophilia

8. Dr. Anand Mohan chakravati = i) Cleaning the oil spill

9. Pseudomonus = ii) Hydrocarbons

10. Sunflower = iv) Uranium and arsenic

Q. Find the odd one out :-

11. Green revolution, Industrial revolution, White revolution, Blue revolution.

Ans : Industrial revolution – All others are concerned with food.

12. DDT, Malathion, Chloropyriphos, Humus.

Ans : Humus. – All others are inecticides.

13. Sodium, Aluminium, potassium, Phosphorus.

Ans : Aluminium. – All others are essential elements for plant growth.

14. Diabetes, Anaemia, Leukqemia, Thalassemia.

Ans : Diabetes. – All others diseas involve reduction in the number of blood cells.

15. Drying, Salting, Cooking, Soaking with sugar.

Ans : Cooking – all others are food preservative methods.

Q. Identify and complete the following correlation. (1 M each)

16. Insulin : Diabetes : : Interleukin : ----------

Ans : Cancer.

17. Interferon : ---------- : : Eruthropoietin : Anaemia.

Ans : Viral infection.

18. ----------: Dwarfness : : factor VIII : Haemophilia

Ans : Somatostatin.

19. White revolution : Dairy : : Blue revolution : --------

Ans : Fishery.

20. White revolution : Increase in dairy production : : Green revolution : ----------

Ans : Increase in agricultural production or crop yield.

Q. Give definition / Give meanings: (1M each)

21. Stem cell :

Ans : The special cell having pluripotency and ability to divide and differentiate into new cells are called stem cells.

22. Cloning :

Ans : Production of replica of any cell or organ or entire organism through biotechnological process is called cloning.

23. Vaccines :

Ans : The ‘antigen’ containing material given to a person or animal to acquire either permanent or temporary immunity against a specific pathogen or disease is called a vaccine.

24. DNA fingerprint :

Ans : The nucleotide sequence present on the DNA of each person is unique just like the fingerprint, thus for establishing the identity of any person DNA can be analysed, this technique is known as DNA fingerprinting.

25. Green revolution :

Ans : All the methods applied for harvesting maximum yield from minimum land are collectively referred to as green revolution.

Q. Answer in one sentence (1M each)

26. What is cell?

Ans : The structural and functional unit of the body is called a cell.

27. What is tissue? What are the functions of tissue?

Ans : Tissue is a group of cells that performs a similar and definite function. Eg. The muscular tissues in the body perform contraction and extensions there by helping in locomotion.

28. What is biotechnology?

Ans : The techniques of bringing about improvements in living organisms by artificial genetic changes and by hybridization for the welfare of human beings is called biotechnology.

29. How are stem cells preserved?

Ans : The stem cell samples are carefully collected from umbilical cord blood, red bone marrow or early embryo and are preserved in small, sterile vials placed at-135 C to -190 C in liquid nitrogen.

30. What are the sources of stem cells?

Ans : Stem cells are present in the umbilical cord of pregnant mother, in embryo, in red bone marrow, in adipose connective tissue of adult human beings and also in placenta.

31. What are the two types of stem cells based on the sources?

Ans : Stem cells are of two types, viz. As embryonic stem cells and adult stem cells depending upon their source.

32. Mention any one benefit of biotechnology to the agriculture.

Ans : Expenses on the pesticides are reduced due to use of GM Crops such as BT cotton.

33. Which are the organs that can be donated?

Ans : Organs such as eyes, heart, pancreas, liver, kidneys, skin, bones and lungs can be donated.

34. In which fields there is considerable progress due to biotechnological research?

Ans : There is considerable progress mainly in the field of agriculture and pharmacy due to biotechnology.

35. Which living organisms are used as bio fertilizers.

Ans : Bacteria like Rhizobium, Azotobac, Nastoc, Anabaena and plants like Azolla are used as a biofertilizer.

36. Which are the two main methods used in the animal husbandry?

Ans : The Two main methods used in animal husbandry are artificial insemination and embryo transfer.

37. What are the two important aspects of human health management?

Ans : Diagnosis and treatment of the diseases are two important aspects of the human health management.

38. Where is DNA fingerprinting research done in India?

Ans : DNA fingerprinting research is performed in center for DNA fingerprinting and diagnostics, Hyderabad.

39. What is white revolution?

Ans : Achieving the self-sufficiency in dairy business by performing various experiments for quality control, bringing about newer dairy products and their preservation and thus raising economic standards is called white revolution.

40. What is Blue revolution?

Ans : The aquaculture practices to increase the yield of edible aquatic organisms is called blue revolution.

Q. Answer the following question :-

41. Write comparative note on usefulness and harmfulness of biotechnology. (5M)

Ans : Biotechnology has proved to be useful in the field of agriculture, medicine, clean technology and industrial product.

- Due to various biotechnological experiments, the food production is increased substantially.
- The milk and milk products are now freely available people no longer die of hunger due to abundant food supply.
- The sophisticated vaccines have stopped the spread of epidemics.

- The diseases like diabetes can be controlled due to human insulin injection that can be manufactured by biotechnology.
- The problems of pollution control, solid waste management and fuels are partially tackled by biotechnological alternatives.
- Though all such positive aspects are there, the biotechnology also poses some problems. The genetic changes are breaking the principles of nature.
- By inserting humans genes in bacteria or virus, the products that are needed only for humans are produced.
- Human cloning is also a debatable issue. It will cause social and ethical problems. The new generations formed by cloning will have mothers but no fathers. If man tries o manipulate the genomes of other living organisms, it will cause disturbances in the natural balance. The long term effects of all such genetic manipulations can be disastrous. Thus according to some views, biotechnology can be dangerous too.

42. Write two uses of biotechnology related to human health. (2M)

Ans : Biotechnology is used to manufacture vaccines for controlling diseases.

- Different hormones such as insulin, somatotropin and somatostatin can be prepared in laboratories by using new bio-technological processes the clotting factors are also manufactured through such techniques.

43. Explain in brief DNA fingerprinting. Give two examples where this technique is used. (4M)

Ans : As the fingerprints are unique for every individual, similarly the nucleotide sequence in the DNA molecule is alos unique.

- By knowing this sequence, one can find out the identity of any person. Such technique to establish the identity of a person by taking into consideration the nucleotide sequence is called DNA finger printing.
- Its main use is in forensic sciences to confirm the identity of the criminal.
- Similarly, identity of parents in case of disputed parentage for any child can be understood by taking DNA fingerprints of both the parents and a child.

44. Which precautions will you take during spraying of pesticides? (4M)

Ans : Pesticides are toxic chemicals by using them indiscriminately, they contaminate the water, Soil And also crops.

- The D.D.T. chloropyriphos and malathian are very dangerous. They spread through the food chain causing bio magnification.
- Therefore, we shall not use such insecticides and pesticides. We shall use organic pesticides excessive use will be avoided.
- At the time of spraying, nose, eyes and skin will be covered and protected.
- Care will be taken not to allow children or domestic animals to come in contact with an pesticide.

45. Write a short note on vaccination. (4M)

Ans : Vaccination is the administering of vaccine. Vaccine is the 'antigen', given to a person or even to animal for acquiring immunity against particular pathogens or diseases.

- In olden days, vaccines were prepared with the help of completely or partially killed pathogens. But this method causes some inconveniences some persons were allergic to such raw vaccines or they contracted the same disease through such vaccines .
- Hence in recent times the vaccines are produced by using biotechnology.
- These vaccines are artificial which are synthesized in the laboratories.

- The antigen is produced with the help of gene of the pathogen. Such vaccine becomes safe for administering.
- These antigenic proteins are injected to people to make their immune systems strong. This process of vaccination is absolutely safe. The vaccines are more thermo stable and active for a long period of time.

46. What is organ transplant? (4M)

Ans : Various organs in the human body either become less efficient or completely functionless due to various reasons like aging, accidents, infections, disorders etc.

- Life of such person becomes difficult or even fatality may occur under such conditions.
- However, if a person gets the necessary organ under such conditions, its life can be saved.
- Availability of done is an important requirement in organ transplantation. Each person has a pair of kidneys.
- As the process of excertion can occur with the help of single kidney, person can donate another one.
- Similarly, skin from certain parts of the body can also be donated.
- Various factors like blood group, diseases, disorders, age etc. of the donor and recipient need to be paid attention during transplantation.

- However, other organs can not be donated during life time organs like liver, heart, eyes can be donated after death only.
- This has led to the emergence of concepts like posthumous (after death) donation of body and organs.

47. In which various fields, the bio technology has been useful? (2M)

Ans : Biotechnology can be used in the fields of agriculture, horticulture, medical field, diagnosis of disease etc. Biotechnology is used in the production of cash crops, improvement in varieties of cash crops, increase in abilities of plants to with stand environment stresses vaccine production, early diagnosis of congenital diseases, organ transplant, cancer research, production of artificial skin, cartilage, etc. in laboratories. It includes the technique of genetic engineering and tissue culture.

48. Which products produced through biotechnology do you use in your daily life? (4M)

Ans : The simplest use of biotechnology that we practice at home is making curd and buttermilk.

- The primary type of biotechnology is used in the process of fermentation while making food stuffs, like bread, idli-dosa, dhokla etc.

- Now days, different types of cheese, paneer, yoghurt, energy drinks etc are produced with the help of biotechnology.
- Seedless grapes, papaya and watermelons are available in the market these days.
- Violet cabbage, yellow capsicum and exotic vegetables used for salad are also biotechnology product.
- The vaccines, antibiotics and the injections of human insulin are in regular use in many households.

49. Explain the importance of fruit processing in human life? (4M)

Ans : Fruits are perishable food stuff. They are spoilt soon if not consumed immediately.

- Hence For storage and usage for a long term, their preservation is absolutely essential.
- For year-long use of the fruits they are dried, salted, packed in air tight containers, used for preparing jams and jellies or condensed into pulps or syrups. Beverages, pickles, sauce, and various other products made from the fruits are largely used by us.
- The preserved products also fetch financial benefits.
- In national and international markets, Indian fruits like mangoes are in great demand. We can get foreign

currency through exports of fruits and fruit products. The local horticulturists get good benefit from their orchards.

- Processed fruit products also gives vitamins and minerals that help in maintaining good health.
- Thus the fruit processing is important for the human life.

50. Explain the importance of medicinal plants. (4M)

Ans : In Ayurveda practices, the natural remedies were used. Since India had great biodiversity and traditional knowledge of herbal medicinal uses, therefore, people dependent on such medicinal plants.

- In olden days, such herbs were collected by roaming in the jungles.
- Such important medicinal herbs are now cultivated with care.
- In entire world people have understood the importance of holy basil (tulsi), adulsa, Jyesthamadh, etc.
- In some of allopathic medicines too, the plant extracts are used.
- Medicines made form harmful chemicals have side effects and are not safe to be used unless there is medical supervision. Therefore, world wide herbal remedies are gaining more popularity.