17- Introduction to Biotechnology

EXTRA QUESTIONS

1. What is the difference between the growth of plants and animals?

➢ 1. The growth of animals happens over a specific life, whereas growth of plants occurs throughout their whole life.
2. Growth of the plants occurs in specific parts of their body and uniform growth occurs throughout the body of an animal.

2. Why can we not see our organs like the heart, blood vessels and intestines?

➢ These all organs are inside of our body so we cannot see them.

3. Why growth of the plants occurs in specific parts only?

➢ Plants being sedentary, most of their tissues are of the type that gives support. There are dead cells in some tissues and these do not need much attention. Growth of the plants occurs in specific parts of their body where the tissues contain dividing cells.

4. What is the function of cuticle?

➢ The epidermis of the stem and leaves is covered by a waxy layer of 'cuticle' due to which water in the underlying parts is retained.

5. Which components bring about important processes in the living organisms?

- The important processes in the living organisms are brought about by cells and group of cells called as tissues.

6. Which is the smallest structural and functional unit of the body of living organisms?
- Cells are the smallest structural and functional unit of the body of living organisms

7. Which type of muscle is the diaphragm of the respiratory system?
- The diaphragm of the respiratory system is made up of skeletal muscle

8. Why are epithelial tissues said to be simple tissues?
- Epithelial tissues are said to be simple tissues because they are made up of same kind of cells and nearly have same function.

9. Can bones be folded?
- Bones cannot be folded because they are hard but not flexible. So bones cannot be folded

10. Which other industries can be developed as an extension of the of plant nursery business?

- Other industries like tourism business, flower business, honey production, production of medicines and agritourism can be developed as an extension of plant nursery business

11. Are the structures and functions of the bodies of plants and animals same?

- The structure and functions of the bodies of plants and animals are different. Plants cannot move from one place to another. But plants can produce their own food and do not have different systems. Animals can move from one place to another and cannot produce their own food but they have different systems for different functions

12. What is meant by 'White Revolution'?

- It was a step taken by the Indian Government to develop and help the dairy industry sustain itself economically, while providing employment to the poor farmers. Its pioneer was Verghese Kurien.
  Due to this many benefits happened, like:
  1. Due to white revolution, animal husbandry developed
  2. Farmers started getting financial benefits
  3. Due to imports of milk related products outside country, the foreign exchange of India increased
  4. Every person started getting milk for essential growth of body

13. Why guard cells are present around the stomata?

- 1. Plants give out water in the form of vapor through the stomata on their leaves
  2. Transpiration occurs through these stomata
  3. These cells control the opening and closing of stomata
  4. That is why guard cells are present around stomata

14. Stratified epithelium tissue prevents the wearing of organs

- 1. This tissue is in the outer layer of skin
  2. A stratified epithelium consists of several stacked layers of cells
  3. The function of this tissue is to prevent the wearing of organs
  4. Because of the stacked layers the wearing of organs is prevented

15. Bones are extremely strong.

- 1. Bones are included in the type of connective tissue
  2. The structure in bones is made up of compound of calcium and phosphate
  3. Bone cells are deeply embedded in the base so the bones are extremely strong

16. Cactus can withstand external dry environments

- In the external environment the plant cover is thick. The water content is low as the outer covering is dry. The cells of this plant secrete a liquid like wax. This prevents evaporation. The thick covering on the plant protects against water loss, shock and other parasitic fungi. That is why they can withstand in extreme dry conditions.

17. Action in response to a stimulus occurs in most animals

- Cells of the nervous tissue are specially made to become excited and to conduct that excitation form one part of body to other. Many nerve cells are bound together with the help of connective tissue to form a nerve and the network of nerves is spread all through the body. Hence, because of this in most animals, action in response to a stimulus occurs due to the integrated functioning of nervous tissue and muscular tissue

18. Write down which genetically modified species are used in your area

- Maize: MON 810, MON 863
  Potato: Amflora
  Rice: Golden Rice
  Soybean: Vistive Gold
  Tomato: Vaishali
  Cotton: BT cotton

19. The same tree has 2-3 different colored flowers of the same species. Is this possible? Explain

- The use of genetic engineering and tissue culture can be used to decide the color of the flowers. By altering the artificial genetic changes we can have flowers of any colors

20. Why do slim persons feel colder in winter than those who are obese?

- Obese individuals have a thick layer of fatty connective tissue on their body. This layer provides energy to the body and provides insulation. In a thin person, this layer of connective tissue is less. So it is not heat insulated. As a result, thinner or slim people feel colder

21. Recognize the relationship between the first two words and write the next word:

1. Simple tissue: Meristematic tissue of plants:: _____ : Xylem and phloem of plants

- **Complex Tissue**

2. Cuboidal epithelium: Cells are cuboidal:: _____ : cells bears minute hair-like processes

- **Ciliated Epithelium**

3. Apical meristem: Increases the length of the root and stem:: Intercalary meristem: _____

- **Growth of leaves**

4. Inner surface of respiratory tract: Ciliated Epithelium:: Tubules of kidney: _____

- **Cuboidal Epithelium**

5. Glandular Epithelium: Secretion of sweat::_____: secretion of saliva

➢ **Cuboidal Epithelium**

6. Muscular tissue: Movement:: Nervous tissue:_____

➢ **Stimuli**

22. Write the names

1. Storage of fats

➢ **Adipose tissue**

2. Dead cells in Xylem

➢ **Tracheid, vessels and xylem fibers-dead cells**

3. Layers

➢ **Leghorn, Minorca, Ancona, Lehman**

4. Tissue in inner surface of mouth

➢ **Squamous Epithelium**

5. Tissue which increases the length of the root and stem

➢ **Apical meristem**

6. Joins two bones to each other

➢ **Tendons**

7. Supports internal organs

➢ **Areolar tissue**

23. Write the difference between Striated Muscles and Non-Striated Muscles

Striated Muscles	Non-Striated Muscles
They are found attached to skeleton	They are found in walls of internal organs
Muscle cells are long, cylindrical	Muscle cells are short, spindle-shaped
They are called voluntary muscles	They are called involuntary muscles
There are stripes on each side	It has no stripes

24. Write the difference between Simple tissue and Complex tissue

Simple tissue	Complex tissue
Simple tissues are made up of only one type of cells	Complex tissues are made up of more than one type of cells
These are living cells with intercellular cavities	They are made up of thick-walled and dead cells
The main task is to fill in the blanks and support the plant	The main function is to carry water and minerals from bottom to top
Ex. Meristematic tissue of plants	Ex. Xylem and phloem of plants

25. Write the difference between growth in plants and growth in animals

Growth in plants	Growth in animals
Growth in plants occurs due to Meristem Tissue	Animals don't have Meristem Tissue

Growth in plants occurs at certain places only	Growth in animals occurs throughout their body
Growth in plants occurs throughout their life	Growth in animals occurs up to certain period only

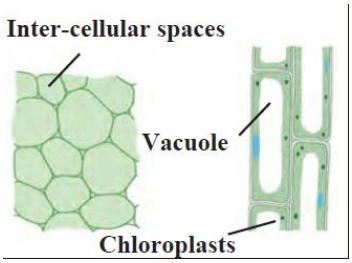
26. Write the difference between Cartilage and Bones

Cartilage	**Bones**
They are found in nose, ear, larynx, trachea	They are found throughout the body
Cartilage cells are supported by fibrous, flexible jelly-like ground substance	Bones are made up of made up of calcium phosphate embedded in solid ground substance
Lubricates the surfaces of bones, gives support and shape to organs	Supports and protects different organs, helps in movement

27. Write the types of simple permanent tissues

➢ There are three types of simple permanent tissues

1. Parenchyma:-

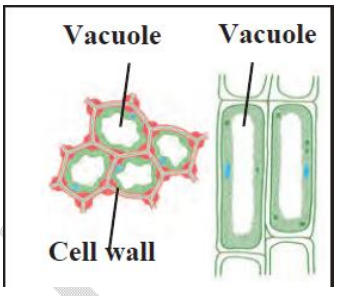


Structure of Cells: The cells are having thin cell wall and intercellular spaces. The cells are mainly living cells

Location: They are found in roots, stem, leaves, flowers and seeds

Function: Support, storage of food and filling vacant spaces are the main functions

Sub-types: Chlorenchyma: Leaves, performs photosynthesis.



Aerenchyma: Helps aquatic plants, leaves and stem to float

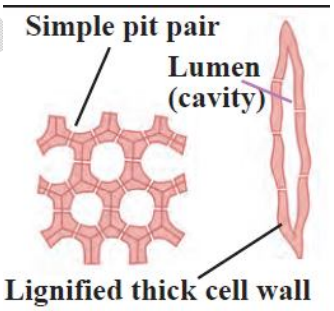
2. Collenchyma:-

Structure of Cells: The cells are elongated with thickened cell wall at corners due to cellulose and pectin

Location: At the base of leaf petiole, branches and stem

Function: Support and flexibility to various parts

3. Sclerenchyma:-



Structure of Cells: The cells are dead and fibrous cells with tapering ends and the cell wall contains lignin

Location: Stem, veins of leaves, hard coats of seeds, outer covering of coconut

Function: Give strength and rigidity to parts of the plants

28. Write the types of meristem tissue and describe them and also write their location and function

Meristem Tissue	Description	Location	Function
1. Apical meristem	thick cytoplasm, a conspicuous	At the tip of the root and stem	Increases the length of

	nucleus and a thin cell wall		the root and stem
2. Lateral meristem	Thin cell wall, conspicuous nucleus	Lateral sides of root and stem	Growth of branches, formation of leaves and flowers
3. Intercalary meristem	compactly packed together, thin cell wall and conspicuous nucleus	At the base of the petiole of leaves and of branches	Growth of branches, formation of leaves and flowers

29. What is the main difference between the growth of animals and plants? Why does the growth of a plant occur only at specific parts of the plant body?

- Animals grow only to the certain age. The growth is uniform in all the body parts and it takes place throughout the body. In animals, after reaching adulthood, growth in bones stops. Plants can grow to any period depending on its type. Perennial plants grow for indefinite period. The growth in plants is also restricted to only some parts and it does not take place uniformly in all the body parts.
- The tissue responsible for growth (meristematic tissue) is seen on in certain parts of the plant. Wherever this tissue is present, there growth of the plant takes place.

30. How to take care of cattle to get clean and high yield of milk

- A balanced diet i.e. which includes all constituents of food should be given to cattle. It must include fiber-rich coarse food, fodder, and sufficient water. The cattle-shed should be clean and dry with proper ventilation and a roof. Cattle should be regularly vaccinated

31. What is the objective of developing new breeds of chickens from Indian and foreign hybrids

- The objectives behind development of new hybrid varieties from a cross between Indian varieties like Aseel and exotic varieties like leghorn are as follows: to produce good quality chickens in large numbers, to develop the ability to withstand high temperature, to use by-products of agriculture as poultry feed, etc

32. Why are the cocoons transferred to boiling water before the pupa develops into an adult?

- Silk thread is very expensive. Also, if the thread is intact, it will give a better price. The silkworm cocoons around itself. And when its growth is complete, the same cell breaks and the insect come out. As a result, the silk thread can break into pieces. Therefore, if an insect is thrown into hot water before it bursts, it will die. The cocoon becomes loose and a long thread of silk is obtained. So the silk long thread is obtained by throwing the cell into boiling water and killing the worm

33. **'Rearing of sheep is a livestock'. Justify this statement**

- Along with agriculture, the farmer can make his progress by doing other agri-business. In this, sheep rearing is the business. There is no need to invest in this business after buying a sheep. Sheep do not need any external food. Sheep eat the leaves of the farm and also the grass. This eliminates the need to invest more in food. Sheep also clean the field. And from their urine you get the best fertilizer for agriculture. The sheep gives birth to two offspring in a year. It also gives good quality wool. That is why sheep are called livestock

34. Write a note on genetic engineering.

- With the help of this technique it has become possible to produce plants and animals bearing some new characteristics in addition to their natural ones.

  Genetically Modified Crops (GM crops) are being produced by introducing changes in DNA of natural crops.

  In this, the properties we want can be changed in this breed

  Genetic engineering has a lot of advantages in agriculture and medical fields

1. **Agriculture field:** a. Genetically Modified Crops (GM crops) are being produced by introducing changes in DNA of natural crops

   b. It also increases production

   c. Some naturally occurring varieties cannot withstand environmental stresses like frequently changing temperature, wet and dry famines, changing climate, etc. However, GM crops can grow in any of such adverse conditions

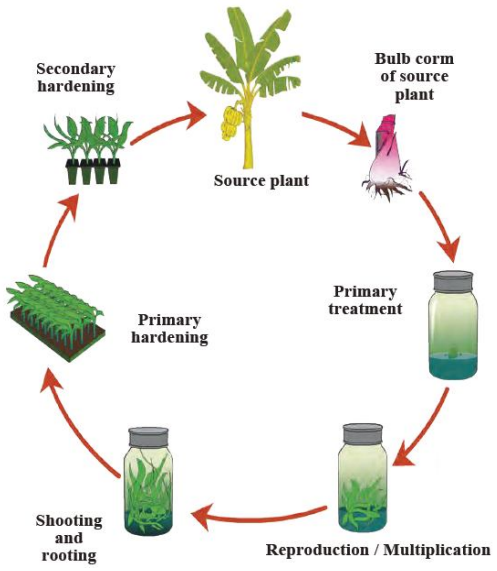
d. As GM crops are resistant to insect pests, pathogens, chemical weedicides, etc, the use of harmful chemicals like pesticides can be avoided

e. Due to use of seeds of GM crops, there is improvement in nutritive value and decrease in loss of crops.

2. **Medical field:** a. Genetic techniques are used in vaccine production.
b. Diagnosing congenital disease
c. Implants of the senses
d. To do research on cancer
e. Creating artificial skin
f. Preparation of cartilage etc.

35. Explain the concept of tissue culture. Also explain what is tissue?

➢ Tissues are groups of identical cells that come together to perform specific functions in the body. Tissue culture is the process by which a whole organism can be developed from a single cell or tissue. A liquid, solid or gel-like medium prepared from agar, which supplies nutrients and energy necessary for tissue culture is used in this technique. Improved crop varieties are produced using this technique



36. Write the applications of biotechnology in floriculture, nurseries and forestry

- 1. Tissue culture can be used to grow those plants on a large scale, which bear flowers, fruits of excellent quality

2. Fully grown plants can be produced in shorter durations

3. Plants can be grown on a large scale even if means of pollination or germinating seeds are not available. For example, orchids or pitcher plant do not germinate but these plants can easily be produced by means of tissue culture

4. In a bioreactor, cells can be grown in a more nutritive medium and protected from pathogens. Bioreactors are useful for producing plantlets on a very large scale

5. Large numbers of seedlings/plantlets can be produced in a short time using minimum
resources and materials.

6. Usually, plants produced by tissue culture and genetic modification techniques are
disease-free. Plantlets produced by tissue culture of the meristem are virus-free.

7. Embryos formed by conventional hybridization technique between two or more
varieties may not grow fully for some reasons. However, embryos produced by tissue
culture technique always complete their growth

8. Rare and endangered plants can be grown by tissue culture technique and can thus
be protected from extinction

37. Explain that multicellular life is made possible by tissues

- 1. High-level plants and animals have large numbers of cells.

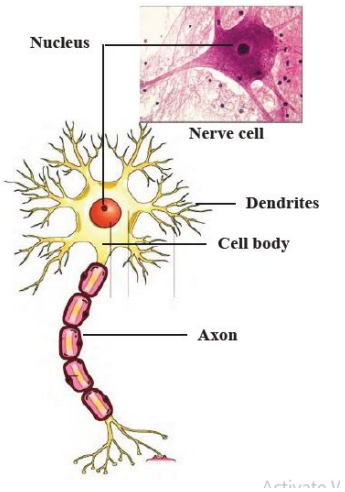
  2. Cells with specific groups perform specific functions. This group of cells is called tissue.

  3. Each tissue performs a specific type of function.

  4. Tissues cause division of function in multicellular organisms

  5. In plants, epidermis act as a protective layer. Xylem carries salts and water to different parts. In animals, connective tissues support the body. Muscle tissues support movement along with bones. Nerve tissues carry nerves throughout the body. That is why multicellular life is made possible by tissue function

38. Draw a labelled diagram of nerve cell. Also explain it in detail



- 1.The cell body which contents the cytoplasm and the nucleus is the main part of each nerve cell.

  2. Numerous, small, branched fibres called dendrites arise from the cell body.

  3. One of the fibres, however, is extremely long. It is called as the axon.

  4. The length of a nerve cell may even be up to one meter

  5. Many nerve cells are bound together with the help of connective tissue to form a nerve

  6. Nervous tissue is present in the brain, spinal cord and the network of nerves spread all through the body

7. In most animals, action in response to a stimules occurs due to the integrated functioning of nervous tissue and muscular tissue

39. Write in detail about Sericulture business.

- The silk industry is an industry with huge potential for agricultural employment. The state of Karnataka has a network of these industries. The silk industry provides year-round employment.Silkworms (moths) are reared for production of silk. Bombyx mori is the most commonly used variety for this purpose. The life cycle of the silk moth consists of four stages, namely egg, larva, pupa and adult.Thousands of eggs deposited by female oths are incubated artificially to shorte the incubation period

  Larvae hatching out of eggs are released on mulberry plants. Larvae are nourished by feeding on mulberry leaves. After feeding for 3 – 4 days, larvae move to branches of mulberry plant. The silk thread is formed from the secretion of their salivary glands. Larvae spin this thread around themselves to form a cocoon. The cocoon may be spherical in shape

  Ten days before the pupa turns into an adult, all the cocoons are transferred into boiling water. due to the boiling water, the pupa dies in the cocoon and silk fibres become loose. These fibres are unwound, processed and reeled. Various kinds of fabric is woven from silk threads

40. Write in detail about agro-complementary occupations.

- India is an agricultural country. Agriculture is the main occupation here but the business that supports and complements agriculture is

known as agro-complementary occupations. This business can be used by farmers to earn more income

1. Animal husbandry: In this, cows, buffaloes, goats etc. are reared for milk production. You can also get good quality manure from their excrement. Bulls are also kept for agricultural labor

2. Poultry Farming: Rearing of egg and meat yielding chickens is called poultry farming. The chickens that are raised for eggs are called layers and the chickens raised for meat are called as broilers. From this business farmers can get good profits

3. Sericulture: Silkworms (moths) are reared for production of silk. In the silk industry, processed yarn is obtained from the silk fibers found in the industry and various fabrics are made from it

41. Write in your own words about Agro-tourism.

- Agr-tourism is a part of rural tourism. Tired of the stressful life in the city, the urban people come to the village for a few days to relax. With this approach we can develop agri-tourism. In this, a place where farming is going on, an agrobusiness related place can be developed for tourism

Following things should be included in agro tourism

1. Mango, chikoo (sapota), guava, coconut, custard apple and some other regional fruit trees.
2. Shade giving local or exotic attractive plants.
3. Ornamental and flowering plants.
4. Butterfly garden.
5. Medicinal plant garden.
6. Organic vegetables and fruits.

7. If possible we can sell honey
8. Also we can sell organic jaggery
9. We can keep fresh sugarcane juice for the tourists
10. We can also keep some games for children like swimming tanks and other games

In this way, people will get more information about agro tourism and also farmers will also be benefitted

42. Write in detail about Meristem tissue.

- 1.As meristematic tissue is present in specific parts of a plant, growth occurs in those parts only.

  2. Cells of meristematic tissue contain thick cytoplasm, a conspicuous nucleus and a thin cell wall and are compactly packed together.

  3. Vacuoles are usually absent in these cells.

  4. These cells are highly active.

  5. To bring about plant growth is the main function of meristematic tissue.

  6. According to the location, meristematic tissue is of three types as; Apical meristem,Intercalary meristem and Lateral meristem

43. Write in detail about Striated Muscles.

- 1. Muscle cells are long, cylindrical, multinucleate and have no branches.

  2. Structure: There are alternate dark and light bands on these muscles

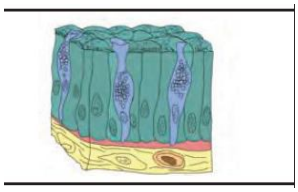
  3. they are attached to bones, they are also called skeletal muscles.

4. They move as per our will, hence they are called voluntary muscles.

5. These muscles bring about movements of arms and legs, running, speaking, etc.

44. With the help of an detailed diagram explain Epithelial tissue. Also write in detail about Columnar epithelium and Glandular epithelium.

➢ Protective coverings in the animal body are called epithelial tissues.

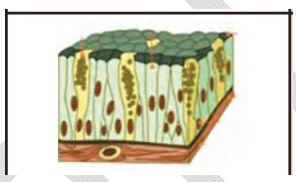


Cells in this tissue are closely packed and form continuous layers. Any material that enters the body first encounters epithelial tissue

1. **Columnar epithelium:** They are located in the inner surface (mucosa) of intestine, alimentary canal

They are column-like tall cells. Upper free surface bears folds made of these cells at places of absorption.

Their function is secretion of digestive juice, absorption of nutrients



2. Glandular epithelium: They are located in the inner layer of skin

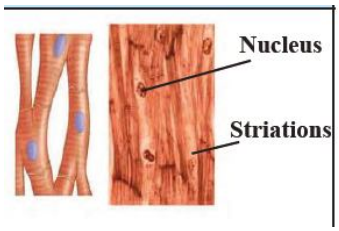
The cells contain vesicles packed with secretory material

Their function is to secreate sweat, oil (sebum) and mucus, etc

45. With the help of labelled diagram, explain Cardiac muscles

➢ 1. Muscle fibres and muscular tissues are formed from special type of contractile proteins due to which this contraction and relaxation is

possible. Muscular tissues are made up of the long cells of muscle fibres. Muscular movement occurs due to contraction and relaxation of the contractile proteins in these cells.



2. This is a type of muscular tissue. These muscles cells are cylindrical, uninucleate and branched

3. The structure of these cells is dark and light bands are present. The heart is made of these muscles. Their movements are not under the control of our will. They contract and relax rhythmically

4. The function of these muscles is contraction and relaxation of the heart

46. What is meant by white revolution? Who was its pioneer? What benefits did it bring?

- White Revolution is the dairy industry. Varghese Kurien was the father of the White Revolution in India. This industry is related to animal husbandry. This includes increasing milk production by taking care of livestock in all possible ways and processing and maintaining excess milk.

India ranks first in the world in milk production and dairy industry

Benefits: 1. Family level business started globally due to the white revolution

2. The creation of dairy farms has created milk storage facilities and the business has grown rapidly globally

3. Increased demand for milk led to industrialization of the dairy industry

4. The milk was evaluated by its quality

5. The method of pasteurization of milk was started

6. Due to the convenience of transporting milk, it started fetching good prices in the city

7. The breeding of milk cow also started

8. Due to the automation of milk production machinery, pathogenic infection in milk was avoided

9. Dairy business and India are leading the way in planning for collection, distribution and processing of milk

47. What is meant by connective tissue?

- Blood transports the substances in the body. It consists of plasma and blood cells. It is a type of connective tissue. The tissues which join different parts of the body are called connective tissues. Connective tissue cells are loosely arranged. There is ground substance in the free spaces in between the cells. The ground substance is solid, liquid or jelly – like in different types of connective tissues.

48. Write a note on bone tissue.

- It is a type of connective tissue. It supports and protects different organs, helps in movement. A specific structure of skeleton is extending throughout the body. They are made up of Osteocytes embedded in solid ground substance which are made up of calcium phosphate. Because of bones the human body gets a particular shape

49. Write a note on Blood and also its functions.

- Blood is a type of complex tissue. It consists of cells of different types, colors and shapes mixed together. So blood is a complex tissue type. It is the connective tissue that connects the various parts of the body. The cellular structure of these tissues is cellular and is dependent on the space between them. These bases are solid, jelly-like or water-like liquids.
    - Blood is part of the connective tissue
    - Blood is found in the closed circulatory system.
    - Blood contains red blood cells, leukocytes and platelets as well as fluid bases
    - The main function of the blood is to carry oxygen from one part of the body to another
    - Blood also carries nutrients absorbed from food
    - Blood carries hormones
    - Blood is the body that carries excreted substances

50. Which are Indian breed cows? What are their characteristics?

- 1) The indian breed cows are sahilwal, sindhi, air, lal kandhari, Devni, khillari, Dangi, etc.
  2) Total milk production of these cows is in large amount.