Bihar Board Class 12 Biology Question Paper 2016

Biology – 2015

Class – XII

Time: 3 Hours 15 Minutes **Total Marks: 70**

Section-I (Objective type Question)

The following Question Nos. 1 to 28 there is only one correct answer against each question. For each question, mark the correct option on the answer sheet: 28 x 1 =28

1. When offspring is formed by single parent when it is called as
   (A) Sexual reproduction (B) a sexual reproduction
   (C) both (A) and (B) (D) Internal fertilization
   ANS: (B) a sexual reproduction

2. Reproduction by 'budding' occurs in
   (A) Yeast (B) paramecium (C) penicillium (D) all of these
   ANS: (A) Yeast

3. What is the number of chromosomes present in human gametes?
   (A) 21 (B) 23 (C) 44 (D) 46
   ANS: (B) 23

4. Oviparous are
   (A) hen (B) snake (C) crocodile (D) All of these
   ANS: (D) All of these

5. Diploid are
   (A) Ovum (B) Pollen
   (C) both (A) and (B) (D) zygote
   ANS: (D) zygote

6. Aril is edible in which of the following fruits?
   (A) Myristivca (B) Litchi (C) Annona (D) all of these
   ANS: (B) Litchi

7. Source of Eco RI enzyme is
   (A) Bam HI (B) E. coli
   (C) both (A) and (B) (D) Hind III
   ANS: (B) E.coli

8. Indicator of SO_2 pollution is
   (A) algae (B) lichen (C) fungi (D) all of these
   ANS: (B) Lichen

9. T-lymphocytes originate from
   (A) Bone-marrow (B) stomach (C) thymus (D) liver
   ANS: (A) Bone-marrow

10. Honey is made by
    (A) Male honeybee (B) Queen honeybee
    (C) worker honeybee (D) both (A) and (B)
    ANS: (C) worker honeybee

11. Semen is frozen in
    (A) Liquid nitrogen (B) refrigerator
    (C) ice (D) all of these
    ANS: (B) refrigerator

12. Which disease is found in hen?
    (A) Smut (B) Cholera
    (C) both (A) and (B) (D) Ranikhet
    ANS: (B) Cholera

13. Fusogen of protoplast culture is
    (A) Liquid nitrogen (B) PEG
    (C) Lactic acid (D) all of these
    ANS: (B) PEG

14. Oncology is study of
    (A) Cancer (B) oncogenes
    (C) both (A) and (B) (D) virus
    ANS: (A) Cancer

15. The flour of Idli and Dosa is made by the use of which microbe?

(A) Bacteria (B) Lactobacillus (C) Virus (D) Yeast

ANS: (A) Bacteria

16. Ti-plasmid is found in
(A) Agrobacterium tumifaciens (B) E.coli

(C) B.coli (D) all of these

ANS: (A) Agrobacterium tumifaciens

17. Agarose is extracted from
(A) Sea weeds (B) maize

(C) cycas (D) none of these

ANS: (A) Sea weeds

18. Sexually transmitted disease is
(A) Measles (B) T.B. (C) gonorrhea (D) typhoid

ANS:(C) gonorrhea

19. How many codons are present in inheritance codon?
(A) 4 (B) 16 (C) 32 (D) 64

ANS: (D) 64

20. A person suffering from color blindness cannot recognise
(A) Red and yellow colours (B) red and green colours

(C) blue and green colours (D) none of these

ANS:(B) red and green colours

21. Operon model was proposed by
(A) Watson and Crick (B) Nirenberg

(C) Jacob and Monad (D) none of these

ANS: (C) Jacob and Monad

22. Acidna is
(A) Connecting link (B) vestigial organ

(C) extinct link (D) none of these

ANS:(A) Connecting link

23. Which one of the following is insectivorous plant?
(A) Drosera (B) Nepenthes

(C) Both (A) and (B) (D) Hydrilla

ANS: (C) Both (A) and (B)

24. Regulation is spermatogenesis is done by
(A) Oestrogen (B) L.H. (C) androgen (D) none of these

ANS: (B) L.H.

25. In human blood group AB,
(A) antibodies are present (B) antibodies are absent
(C) antibody *a* is present (D) antibody *b* is present

ANS:(B) antibodies are absent

26. Which vitamin is present in Golden rice?
(A) Vitamin A (B) Vitamin B_{12} (C) Vitamin C (D) Vitamin D

ANS:(A) Vitamin A

27. Mendel proposed
(A) Law of linkage (B) 10% energy law
(C) laws of inheritance (D) none of these

ANS: (C) Law of inheritance

28. Which one of the following is helpful in the improvement of soil?
(A) Insecticide (B) Bio-fertilizer (C) Yeast (D) All of these

ANS: (B) bio-fertilizer

Section-II : (Non-Objective Type Question)

Question Nos. 1 to 11 are of short answer type. Each question carries 2 marks.
11x2=22

Short Answer Type Questions

1. Write a note in brief about sexual reproduction in organisms.
ANS:A sexual reproduction is mode of reproduction in which new individuals develop from a single parent with or without gamete formation which does not involve fusion of sex cells and results into the formation of genetically similar offsprings to one another and also their parent. e.g.,
A sexual reproduction occurs by means of Binary fission or multiple fissions or plasmotomy , or budding or spore formation of fragmentation or regeneration.

2. Describe oestrus cycle and menstrua cycle.
ANS: Oestrus Cycle and Menstrual Cycle: The females of placental mammals exhibits cyclical changes in the activities of ovaries and accessory ducts as well as hormones

during the reproductive phase however in non-primates mammals like cows, sheep, rats, deer, tiger etc, such cyclical changes occurs during reproduction are oestrus cycle where as in primates e.g. monkeys, apes and humans it is called menstrual cycle.

3. Write Mendel's law based on monohybrid cross.
   ANS: Following are the Mendel's law based on monohybrid cross: (i) Law of dominance and (ii) Law od segregation.

4. Differentiate between DNA and RNA.
   ANS: Following are the differences between RNA & DNA : (i) RNA has Ribose sugar where as DNA has deovy ribose sugar. (ii) RNA contains Uracil nitrogenous base while in DNA Uracil is replaced by thymine.

5. Write in brief about chemical evolution.
   ANS: The theory of chemical evolution of life was given by A.I. oparin and JBS Haldane. According to this theory life originated on early through physio-chemical processes of atoms combining to form molecule, molecules from inorganic and organic compound and organic compound interacts to form macro molecules which organized to form the first living systems or cell and from this cells complex living things evolve.

6. Write in brief how disease spreads.
   ANS: There are two main pathways of spreading disease. These are : The causative agent transferred to a healthy person through direct contact e.g. (i) Ringworm etc. (ii) The causative agent spreads through a vector e.g. Malaria Kala zars through inoculation or through food & drink or through sexual route e.g. Aids etc.

7. Write in brief about Poultry farm management.
   ANS:The Poultry farm management involve: (i) construction of ventilated and wire-neted poultry shed length wise from east to west outside a residential area for keeping poultry birds. (ii) Protection from rats, snakes, cats and dogs is provided. (iii) poultry shed is provided with electricity running water, resting place for birds, (iv)birds are vaccinated. (v) Food for poultry bird includes inferior quality of grain, is rice-bran, wheat bran, oil cake, vitamins, salt and minerals.

8. Define plasmid. Describe the structure and utility of the plasmids.
   ANS: Plasimids are small extranuclear circular DNAs that carry extra chromosomal genes in bacteria and some fungi. E.g. pBR 322, pUC-18. Plasmids are 2700 bp long and have features like ori (origin of replication) selectable marker and cloning site.

9. Write the benefits of transgenic animals.
   ANS:(i) Normal physiology and development: Transgenic animals help the human to study the regulation of gene functions and how they affect the normal functions of the

body and its development e.g., study of complex the factors involved in growth such as insulin-like growth factor.

(ii) Study of disease: The transgenic animals have been designed to serve as model for human disease so that investigation of new treatments for diseases is made. The several transgenic models exist for human diseases like cancer, cystic fibrosis, rheumatoid arthritis Alzheimer's.

(iii) Biological products: Many human diseases are controlled by the biological products. The transgenic animals which produce these products are introduced with DNA (or gene) which codes for a particular product say human protein (α- 1-antitrypsin) for treating emphysema. In 1997, the first transgenic cow, Rosie was produced, capable of secreting human protein enriched milk.

The milk contained the human alpha-lactalbumin and was nutritionally a more balanced product for human babies than cow milk.

(iv) Vaccine safety : The transgenic animals (mice) are predominantly used for testing of vaccine before they are used on human beings. Transgenic mice are to test the safety od polio vaccine.

(iv) Chemical safety testing: The transgenic animals are tested to study the sensitivity of the toxic substances, Toxicity testing in such animals help the man to obtain results in less time.

10. What are the forms of total population? Write in brief.

ANS: There are three distinct form of total population. These are: (i) Pre-reproductive population individual of this form are young and is will get entrance into the reproductive age after some time. (ii) Reproductive population individual are capable of introducing new members to the population (iii) post reproductive population individuals are order and unable to taking part in reproduction.

11. Write about hydrophytes, xerophytes and mesophytes with suitable examples.

ANS:(i) Hydrophytes: the plants that are living permanently immersed partially or completely in aquatic habitats are called hydrophytes e.g. hydrilla, vallisneria etc.

(ii) Xerophytes: Plants which are adapted to conditions of water scarcity and heat are called xerophytes. E.g. Opunita, Homocladium etc.

(iii) Mesophytes: The plants are able to grow in moderate environmental condition because they have no need to high heat/temperature or high water content. E.g. Mango trees etc.

Question Nos. 12 to 15 are of long answer type. Each question carries 5 marks

4x5=20

Long Answer Type Questions

12. Describe gastrulation and formation of germs layers with suitable diagrams.

Or, Show well labeled diagram of the structure of human sperm and write about its components in brief.

Q) Describe gastrulation and formation of germs layers with suitable diagrams.

ANS: Transformation of the blastocyst into the gastrula with primary germ layers by rearrangement of the cells is called gastrulation. Gastrulation involves cell movements that help to attain new shape and morphology of the embryo. These cell movements are called morphogenetic movements. In all the triploblastic animals, three germ layers namely ectoderm, mesoderm and endoderm, are formed by the morphogenetic movements.

Formation of embryonic Disc: The early blastocyst consists of inner cell mass and trophoblast. The cells of the inner cell mass differentiate in two layers around 8 days after fertilization, (a) The **hypoblast** (primitive endoderm). IT is a layer of columnar cells and (b) **epiblast(primitive ectoderm)** It is a layer of cuboidal cells. The cell of the hypoblast and epiblast together form a two layered **embryonic disc**.

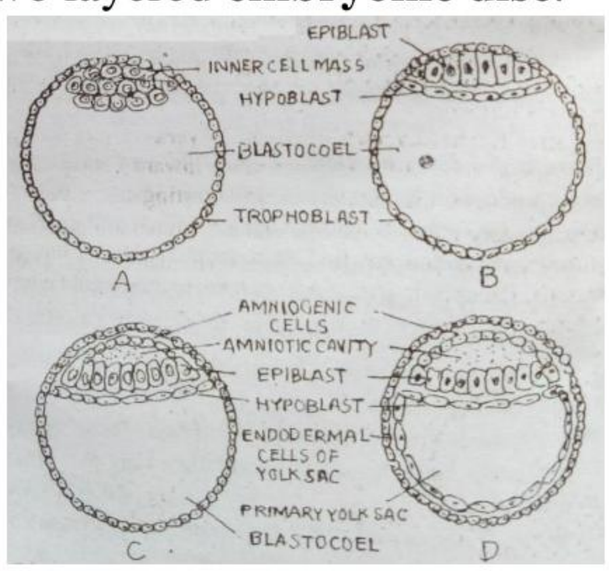

Fig: Diagrams showing formation of epiblast, hypoblast, amniotic cavity and yolk sac.

Now the cells of the trophoblast give rise to the mass of the cells called **extra-embryonic mesoderm**. The extraembryonic mesoderm is differentiated into outer somatopleuric extra-embryonic mesoderm and inner **splanchnopleuric extraembryonic mesoderm**. Both these layers enclose the **extraembryonic coelom**.

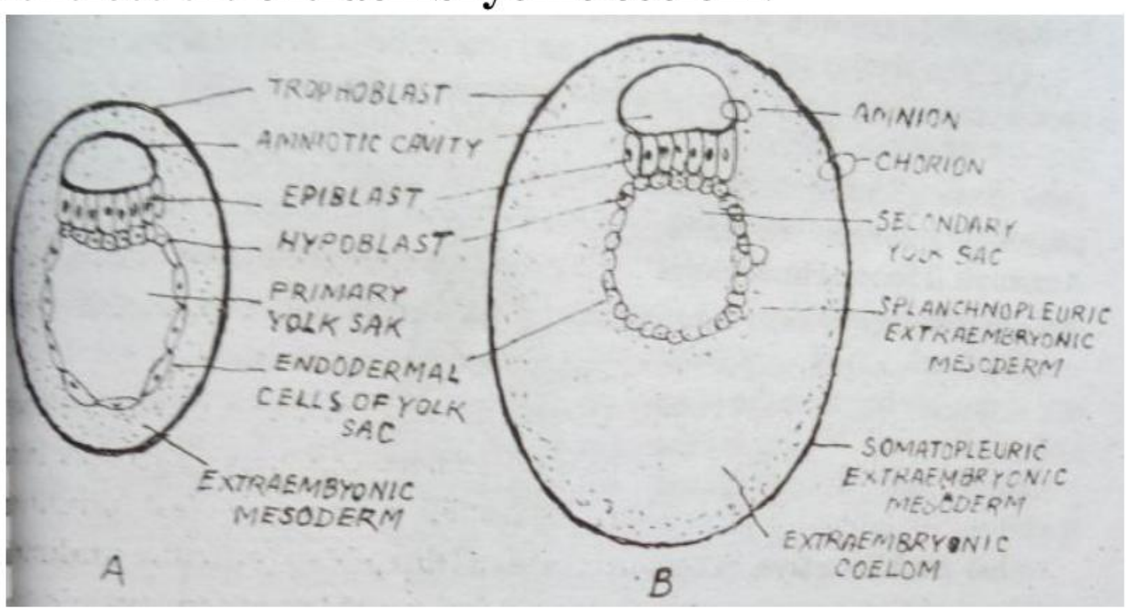

Fig: Diagrams Showing formation of extra-embryonic mesoderm and extra-embryonic coelom.

After some time a **primitive streak** (a faint groove on the dorsal surface of the epiblast) is formed.

Formation of Germ Layers/Embryonic Layers: After the formation of the primitive streak, cells of the epiblast move inward below the primitive streak and detach from the epiblast. This inverting movement is called **invagination**. (i) once the cells have

invaginated, some of them displace the hypoblast forming the **endoderm**. Endoderm develops first during embrunic development. (ii) other cells remain between the epiblast and newly formed endoderm forms the **mesoderm**. (iii) Cells remaining in the epiblast form ectoderm.

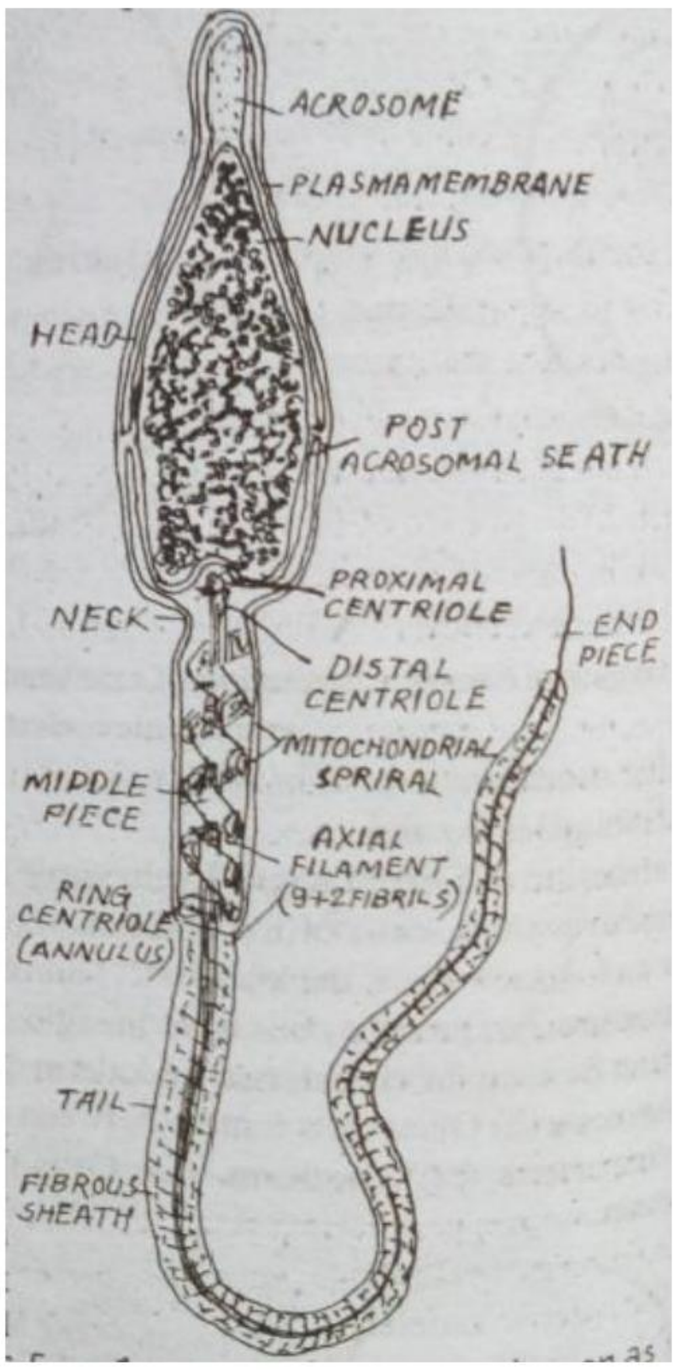

Fig: Formation of primitive streak and three germ layers.

Thus three germ layers, namely endoderm, mesoderm and ectoderm formed which give rise to all the tissues and organs of the body.

OR

Q12a) Show well labeled diagram of the structure of human sperm and write about its components in brief.

ANS: The sperms are microscopic and motile cells, A typical mammalian sperm consists of a head, neck, middle piece and tail.

(i) **Head:** It contains anterior small acrosome and posterior large nucleus. Acrosoma is formed from golgi body of the spermatid.

(ii) **Neck:** It is very short and is present between the head and middle piece. It contains the proximal centriole towards the nucleus.

(iii) **Middle piece:** The middle piece of human sperm contains the mitochondria coiled mitochondrial spiral. At the end of the middle piece there is a ring centriole(annulus) with unknown function. Posterior half nucleus, neck and middle piece of sperm are covered by a sheath called manchette.

(iv) **Tail:** In its most part called main piece, the axial filament is surrounded by a thin layer of cytoplasm. The part behind the main piece is call end piece which consists of naked filament alone.

Fig: A Mammalian spermatozoon as seen under electron microscope

13. Define linkage and linkage group. Discuss the effect of linkage and its importance

ANS: Linkage: Linkage is the phenomenon of certain genes staying together during inheritance through generations without any change or separation due to their being present on the same chromosome. It was Morgan(1910) who clearly proved and defined linkage on the basis of his breeding experiments in fruitfly *Drosophila melanogaster*. In 1911, Morgan Castle proposed **chromosome theory of linkage**. It states that

(i) **Linked genes occur in the same chromosome**
(ii) They lie in a linear sequence in the chromosome.
(iii) There is tendency to maintain the parental combination of genes except for occasional crossovers.
(iv) Strength of the linkage between two genes is inversely proportional to the distance between the two, i.e. two linked genes show higher frequency of crossing over if the distance between them is higher and lower frequency if the distance is small.

1. **Complete Linkage :** The genes located in the same chromosome do not separate and are inherited together over the generations due to the absence of crossing over. Complete linkage allows the combination of parental traits to be inherited as such. It is rare but has been reported in male *Drosophila* and some other heterogametic organisms.
2. **Incomplete Linkage:** Genes present in the same chromosome have a tendency to separate due to the crossing over and hence produce recombinant progeny besides the parental type. The number of recombinant individuals is usually less than the number expected in the independent assortment. In independent assortment all the four types (two parental types and two

recombinant types) are each 25%. In case of linkage, each of the two parental types is more than 25% while each of the recombinant types is less than 25%.

Linkage Groups: A linkage group is linearly arranged group of linked genes which are normally inherited together for crossing over. It corresponds to a chromosome which bears a linear sequence of genes linked and inherited together. Because the two homologous chromosomes possess either similar or allelic genes on the same loci, they constitute the same linkage group. Therefore, the number of linkage groups present in the individual corresponds to number of chromosomes in its one genome (all chromosomes if haploid of homologous pairs if diploid). It is known as principle of limitation of linkage groups. Fruitfly (Drosophila melanogaster) has four linkage groups (4 pairs of chromosomes), human beings 23 linkage groups (23 pairs of chromosomes).

Importance: (i) The number of linkage groups is equivalent to number of chromosomes present in the genome. It proves that genes are present on the chromosomes. (ii) Linkage prevents or reduces the incidence of recombination so that specific varietal of racial characters are retained over the generations. (iii) It is highly useful for maintaining the good characters of the newly developed variety. (iv) Linkage is the biggest headache for breeders because it does not allow them to freely bring all the desirable traits in one variety. (v) It dilutes the use of desirable traits if undesirableones are also present on the same linkage group. E.g., low binning and naked seeds or fuzzy seeds and high ginning in American cotton. (vi) **Marker genes** or genes which express their effect in early growth can indicate the effect of the linked gene which is to express late, e.g., wavy lamina and larger panicle if Millet.

OR

Q13a) What do you understand by an ecosystem? Describe the structure and components of ecosystems.

ANS: Organisms and environment are two non-separable factors. Organisms interact with each other and also with the physical conditions that are present in their habitats.
"The organisms and the physical features of the habitat form an ecological complex or more briefly an ecosystem." (Clarke, 1954).
The concept of ecosystem was first put forth by A.G. Tansley (1935). Ecosystem is the major ecological unit. It has both structure and functions. The structure is related to species diversity. The more complex is the structure the greater is the diversity of the species in the ecosystem. The functions of ecosystem are related to the flow of energy and cycling of materials through structural components of the ecosystem.

According to Woodbury (1954), ecosystem is a complex in which habitat, plants and animals are considered as one interesting unit, the materials and energy of one passing in and out of the others.

All ecosystems consist of the following basic components:

1. Abiotic components
2. Biotic components

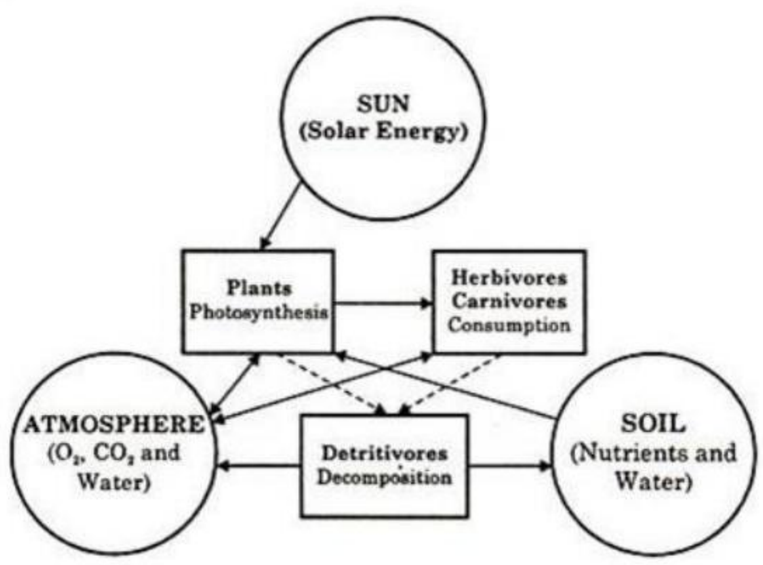

Fig: Relationships within an Ecosystem

1. **Abiotic Components:** Ecological relationships are manifested in physicochemical environment. Abiotic component of ecosystem includes basic inorganic elements and compounds, such as soil, water, oxygen, calcium carbonates, phosphates and a variety of organic compounds (by-products of organic activities or death).
   It also includes such physical factors and ingredients as moisture, wind currents and solar radiation. Radiant energy of sun is the only significant energy source for any ecosystem. The amount of non-living components, such as carbon, phosphorus, nitrogen, etc. that are present at any given time is known as standing state or standing quantity.
2. **Biotic Components:** The biotic components include all living organisms present in the environmental system.

14. What do you understand by 'micro-propagation'? Write the methods involved with suitable diagram.

ANS: Micropropagation is the tissue culture technique used for rapid vegetative multiplication of ornamental plants and fruit trees by using small sized explants. Because of minute size of the propagulas in the culture, the propagation technique is named as **micropropagation**. This method of tissue culture produces several plants. Each of these plants will be genetically identical plants developed from any part of a plant by tissue culture/micropropagation are called **somaclones**. The members of a single somaclones have the same genotype. This micropropagation is also known as somaclonal propagation.

There are four steps in micropropagation method. These are:

(i) **Initiation of Culture:** from an explant like shoot tip on a suitable nuitable medium.

(ii) **Shoot formation:** multiple shoots formation from the cultured explant.

(iii) **Rooting of shoots**: rooting of *in vitro* developed shoots.

(iv) **Transplantation**: the hardening of tissue culture raised plants and subsequent transplantation to the field.

Advantages of Micropropagation. There are as follows:

1) It helps in rapid multiplication of plants

2) A large number of plantlets are obtained within a short period and from a small space.

3) Plants are obtained throughout the year under controlled conditions independent of seasons.

4) Sterile plants or plants which cannot maintain their characters by sexual reproduction are multiplied by this method.

5) It is an easy, safe and economical method for plant propagation.

6) In case of ornamentals, tissue culture plants give better growth, more flowers and less fall-out.

7) Genetically similar plants (somoclones) are formed by this method. Therefore, desirable characters (genetope) and desired sex of superior variety are kept constant for many generations.

8) The rare plant and endangered species are multiplied by this method such plants are saved.

OR

Q14a) What are the methods for improving milk production and quality of milk in a dairy farm?

ANS: for increasing milk production from cattle/cow the common method of breeding of cattle, are described below:

Selection: Mature cattle having more than 3 years of age should be used for breeding.

Methods of breeding: There are two methods of cattle breeding: Natural breeding and Artificial insemination

1. **Natural breeding:** It may be random or controlled.
   Heat: The oestrus (heat period) is the female lasts for 12-24 hours. The average gestation period for the cow is 280 days.

2. **Artificial Insemination (AI):** It involves the insemination of the semen of superior bulls of exotic or indigenous breeds into the native cows. The inseminating pipette is carefully inserted into the cervix through vagina. The semen should be deposited either *deep in the cervix or at the beginning of the body of the uterus*. Semen from

desired bull located at the distant places can be used. The spread of certain diseases can be controlled by this method.

Artificial insemination was first introduced in India at Indian veterinary Research Institute, Izatnagar, near Bareilly, Uttar Pradesh.

Super ovulation and embryo Transplantation: Generally one ovum is released from each ovary at the time of ovulation. But by hormone injection, more ova can be produced from the ovary. After artificial insemination 4-10 embryos are collected at a time. Then each embryo is transplanted into a surrogate mother "carrier cow". At very low temperature fetuses can be reserved for several days.

Breeds of Cattle: The cattle breeds are classified into three groups.

(i) **Milch Breeds:** The cows of these breeds are good milk producing, however, bullocks are poor quality.

(ii) **Drought Breeds:** the bullocks of these breeds are good working but cows are poor milk producers.

(iii) **Generally utility Breeds (Dual purpose Breeds):** The cows of these breeds are good milk producers and the bullocks are good draught animals. There are intermediate between milch and drought breeds.

New Breeds.

(1) **Karan Swiss:** This breed has been evolved at the National Dairy Research Institute, Karnal in Haryana, by breeding the Sahiwal cows with the semen of Brown Swiss Bulls imported from U.S.A.

(2) **Sunandini:** This breed originated in Kerala by crossing the local nondescript cattle with Jersy, Brown Swiss and Holstein-Friesian breeds.

(3) **Karan Fries:** The breed has got its origin at the National Diary Research institute Karnal, out of crossing between Tharparkar and Holstein-Friesian

Q15) What do you understand by conservation? Describe the methods how biological resources are conserved.

ANS: Conservation means to save or protect or to conserve something for the future needs. Conservation is the preservation or efficient using of resources (in an efficient or ethical manner), or the conservation of various quantities under physical laws. Human should conserve biodiversity because of its benefit for example services and biological resources which are essential to live our life on earth. However, it also provides spiritual benefits as well as social benefit.

Biological Resources

A biological resource means any product that is harvested from nature is the part of biological resources. These resources come under several categories such as medicine, food, wood products, fibers etc. For example under one category i.e., Food more than

7,000 species of plants are involved, although we dependent mainly on only 12 major crops for food.

For Medicinal field human population is dependent on plants. It is true that in the developed country, many of our medicines are produced by chemicals in pharmaceutical companies, but the original formulas come from plants. For example, aspirin is comes from willows, opiate which is a pain relievers is derived from poppies and quinine which is used for the treatment of malaria produced by the Cinchona tree.

Fibers which is used for ropes, clothing, webbing, netting, sacking, and other materials are obtained by plants mainly for example cotton plants, Agave plants (sisal), flax plants (linen), Corchorus plants (jute), bamboo, palms and Agave plants (sisal)

OR

Q15 Write short notes on the following:
(A) Restriction enzymes
(B) Causes, symptoms and control of cholera
ANS:

(A) **Restriction enzymes:** This enzyme recognise specific palindromic sequences of DNA and cut it in such a way that leaves single strands on both side. These are known as sticky ends. This enzyme is used in genetic engineering in making strands on both sides. These known as sticky end. This enzyme is used in genes engineering in making recombinant DNA.

(B) **Causes, symptoms and control of cholera:** The causative agent or pathogen of cholera is vibrio cholera.

Modes of transmission: Faecal Oral route. Causes of John Snow was the first to demonstrate that cholera is transmitted by contaminated water.
Signs and Symptoms: The patient starts passing stools frequently, which are white like rice water, and gets repeated vomiting. The disease can be diagnosed by the microscopic examination of the stool or the vomit where the typical comma-shaped cholera vibrio can be seen.
Control and Treatment: Cholera can be controlled by applying personal hygiene and avoiding taking infected drinks and food. Rapid replacement of the electrolytes is needed by oral rehydration therapy. Drugs tetracycline and chloramphenicol are used.