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CBSE Class 12 Biology
Important Questions
Chapter 1
Reproduction in Organisms

1 Marks Questions

1. Offsprings produced by asexual reproduction are referred to as clones. Why?

Ans. Because offsprings produced by Asexual reproduction is morphologically and genetically identical to parent.

2. Name the most invasive aquatic plant weed which is called as Terror of Bengal.

Ans. Water hyacinth (Eichornia)

3. How does Zygote usually differ from Zoospore in terms of ploidy?

Ans. Zygote diploid, zoospore haploid.

4. Mention the main difference between the offspring produced by asexual reproduction and progeny produced by sexual reproduction.

Ans. Offspring produced by asexual reproduction are genetically similar while progeny produced by sexual reproduction exhibit genetic variation.

5. Which characteristic property of Bryophyllum is exploited by gardeners and farmers?

Ans. Adventitious bud arising from margin of the leaf.

6. What represents the life span of an organism?

Ans. The period from the birth to the natural death of an organism represents its life span.

7. Which individuals can be termed as clones?

Ans. The individuals who are morphologically and genetically identical are called clones.

8. How do the following organisms reproduce: Paramoecium and Penicillium?

Ans. a) Paramoecium reproduces by the process of binary fission.

b) Penicillium reproduces with the help of asexual structures called conidia.

9. State the function of a vegetative propagule.

Ans. The vegetative propagules are the asexual vegetative structures of the plant that are capable of giving rise to a new plant.

10. How will you grow a banana and a ginger plant?

Ans. The rhizomes of a banana and a ginger are used to propagate new plantlets.

2 Marks Questions

1. Higher organism have resorted to sexual reproduction inspite of its complexity.

Why?

Ans. Because of variations, gene pool, Vigour and Vitality and Parental care.

2. Tapeworms posses both male and female reproductive organs. What is the name given to such organism? Give two more examples of such organisms.

Ans. Hermaphrodite; Examples : Earthworm, Leech.

3. Study the relationship between first two words and suggest a suitable word for fourth place.

- (a) Male flower : Stamens :: Female Flower :
- (b) Birds : oviparous :: Primates :
- (c) Chlamydomonas : Zoospores :: Penicilium :
- (d) Ginger : Rhizome :: Agave :

Ans. (a) Carpel (b) Viviparous

(c) Conidia (d) Bulbil

4. Bryophytes and Pteridophytes produce a large number of male gametes but relatively very few female gametes. Why?

Ans. Because male gamete need medium (water) to reach egg/female gamete. A large number of the male gametes fail to reach the female gamete.

5. Enlist the significance of reproduction.

Ans. Significance of reproduction includes:

- Propagation of species.
- Sustenance of life on this planet.
- Variation introduced during reproduction plays a role in evolution of new species.

6. Why do hilly areas of Kerela, Karnataka and Tamil Nadu transform into blue stretches that attracts many tourists?

Ans. *Strobilanthes kunthiana* which flowers only once in every 12 years flowered in 2006 that resulted into transformation of the hilly tracks of Kerela, Karnataka and Tamil Nadu into blue stretches.

7. Define 'oestrus' and 'menstrual' cycles.

Ans. Non- Primates like cows, sheep etc. show certain cyclic changes during reproduction called oestrus cycle while Primates like apes, humans the cycle is referred to as menstrual cycle.

8.What regulates the reproduction processes and the associated behavioural expressions in organisms?

Ans. Interaction between hormones and certain environmental factors regulate the reproductive processes and the associated behavioural expressions of organisms.

9. Mention the different stages of sexual reproduction.

Ans. The different stages in sexual reproduction include:

- Pre- fertilization events.
- Fertilization.
- Post – fertilization events.

3 Marks Questions

1. Mention the site of zygote formation in the ovule of a flowering plant. What happens to sepals, petals and stamens after fertilisation? State the fate of zygote, ovule and ovary in these plants.

Ans. Embryo sacSepals, Petals and Stamens dry and fall off. Zygote develops into embryo. Ovule develops into seed and ovary into fruit.

2. Distinguish between gametogenesis and embryogenesis.

Ans.

| Gametogenesis | Embryogenesis |
|---|--|
| 1. Formation of gametes 2. Produces haploid gametes 3. Cell division is meiotic | 1. Formation of embryo 2. Embryo is diploid 3. Cell division is mitotic. |

3. Fill the blank spaces a, b, c, and d given in the following table.

Ans.

| Organism | Organ | Gamete |
|-----------------------|-------------|---------------|
| a | Testes | Spermatozoa |
| Human female | b | Ovum |
| Plant (Angiosperm) | c | Pollen grains |
| Plant (pteridophytes) | antheridium | d |

a = Human male b = ovary

c = Anther d = Antherozoid

4. What are heterogametes? What do we call these gametes individually?

Ans. Most of the sexually reproducing organisms produce two morphologically distinct gametes called heterogametes.

The male gamete is called antherozoid or sperm and the female gamete is called egg or ovum.

5. Why is syngamy a major event in sexual reproduction?

Ans. The fusion of the male gamete with the female gamete is called syngamy or fertilization and plays an important role in exchange of genetic material to introduce variation and results in formation of diploid zygote.

6.What happens during embryogenesis?

Ans. Embryogenesis is the development of the embryo. The zygote undergoes mitotic cell division to increase the number of cells. It is followed by cell differentiation where the cells undergo certain modifications to form the specialized tissues and organs to form the organism.

7.Give any three differences between asexual and sexual reproduction.

Ans.

| ASEXUAL REPRODUCTION | SEXUAL REPRODUCTION |
|---|--|
| 1. There is involvement of only one individual. | 1. Two sexually distinct individuals are involved. |
| 2. There is no formation of gamete. | 2. There is formation of gametes. |
| 3. Syngamy and zygote formation is absent. | 3. Syngamy and zygote formation take place. |

8.Enlist the changes that occur post- fertilization in plants.

Ans. The various post- fertilization changes as observed in plants are

- The sepals, petals and stamens wither away.
- The pistil remains attached to the plant.
- The zygote develops into embryo, ovary develops into fruit and the ovules develop into seeds.

9. (a) Distinguish between asexual and sexual reproduction. Why is vegetative reproduction also considered as a type of asexual reproduction?

(b) Which is better mode of reproduction : Sexual or Asexual? Why?

Ans. (a)

| Asexual Reproduction | Sexual Reproduction |
|---|---|
| (i) Uniparental (ii) Gametes are not involved (iii) Only mitotic division takes place (iv) Offspring genetically similar to parent | (i) Biparental (ii) Gametes are involved (iii) Meiosis at the time of gamete formation and mitosis after fertilisation (iv) Offspring different from parent. |

Vegetative propagation takes place when new individuals arise from vegetative part of parent and have characters similar to that of parent plant.

(b) Sexual reproduction introduces variations in offsprings and has evolutionary significance. It helps offsprings to adjust according to the changes in environment. It produces better offsprings due to

Character combination.

CBSE Class 12 Biology
Important Questions
Chapter 2
Sexual Reproduction in Flowering Plants

1 Marks Questions

1. In a young anther, a group of compactly arranged homogenous cells were observed in the centre of each microsporangium. What is the name given to these cells?

Ans. Sporogenous tissue

2. Give the scientific name of a plant which came to India as a contaminant with imported wheat and causes pollen allergy.

Ans. Parthenium

3. Pollen grains of water pollinated species have a special characteristics for protection from water. What is that?

Ans. Presence of mucilagenous covering

4. Why are pollen grains produced in enormous quantity in Maize?

Ans. To ensure pollination because Maize is pollinated by wind.

5. In same species of Asteraceae and grasses, seed are formed without fusion of gametes. Mention the scientific term for such form of reproduction.

Ans. Apomixis

6. Arrange the following in correct developmental sequence : Male gamete, Potential pollen mother cell, sporogenous tissue, Pollen grains, Microspore tetrad.

Ans. Sporogenous tissue Potential pollen mother cell microspore tetrad Pollen grain male

gamete.

7. If the diploid number of chromosomes in an angiospermic plant is 16. Mention number of chromosomes in the endosperm and antipodal cell.

Ans. Chromosomes in endosperm and 16 chromosomes in antipodal cell.

8. What kind of structures is formed at the end of microsporogenesis and megasporogenesis?

Ans. Microsporogenesis results into formation of four haploid pollen grains arranged generally in a tetrahedral tetrad while Megasporogenesis forms four megasporangia arranged in linear tetrad.

9. What is funiculus?

Ans. The stalk of the ovule is called funiculus.

10. Define parthenocarpy.

Ans. Production and development of seedless fruit is called parthenocarpy.

11. What is microsporogenesis?

Ans. The process that leads to the formation of microspores from pollen mother cell through meiosis is referred to as microsporogenesis.

12. Why is emasculation done in the process of hybridization?

Ans. Emasculation that is the stamens are removed prior to artificial hybridization to ensure no undesirable pollens fall on the stigma and the flower can be pollinated with the desired pollen grains.

13. What do you understand by double fertilization?

Ans. Fertilization or fusion in the female gametophyte happens at two sites: the egg cell and

the generative cell; the vegetative cell and the polar nuclei. This is referred to as double fertilization.

14. What is sporopollenin?

Ans. The exine of the pollen grain is composed of a highly resistant organic chemical called sporopollenin.

15. Name one plant each where pollination occurs with the help of

a) Water.

b) Bats

Ans. Water pollinated: *Vallisneria* and *Hydrilla*.

Bat pollinated: *Anthocephalous* and *Bauhinia megalandra*.

16. Why do most zygotes develop after certain amount of embryo is formed?

Ans. The zygote divides only after certain amount of endosperm is formed as it is an adaptation to provide assured nutrition to the developing embryo.

17. What is polyembryony?

Ans. Polyembryony is the phenomenon of formation of more than one embryo during the development of seed.

18. Name the type of cross pollination in *Vallisneria* & *Bougainvillea*.

Ans. (i) *vallisneria* - Hydrophily

(ii) *Bougainvillea* - Entomophily

19. How many haploid nuclei and haploid cells are present in female gametophyte of angiosperm?

Ans. 8 – haploid nuclei and 7 – haploid cells.

20. Mention the scientific term for the type of pollination which ensures Genetic

Recombination.

Ans. Xenogamy or Allogamy

21. Which are the nuclei that fuse to form endosperm?

Ans. The second male gamete fuses with secondary nucleus (which is formed by fusion of two polar nuclei) to form a triploid primary endosperm.

22. Give an example of Bat – Pollinated flower.

Ans. Adansonia digitata.

23. Why are pollen grains produced in enormous quantity in maize?

Ans. because in maize, pollen grains are transferred through air Large quantity of pollen grains are produced but only few of air-borne Pollen grains are entangled by protruding stigma.

24. Name the part of an angiosperm flower in which development of male & female gametophyte takes place.

Ans. Development of male gametophyte takes place in microspore in pollen grains & development of female gametophyte occurs in megasporangium in ovule.

25. Why apple is called a false fruit. Which part of plant forms the fruit?

Ans. Apple is called a false fruit because it develops from ovary along with accessory floral parts e.g. Thalamus

26. Name the part of plant producing seed & fruit after fertilization.

Ans. After fertilization, ovule develops into seed & ovary develops into fruit.

2 Marks Questions

1. In angiospermic plant before formation of microspore sporogenous tissue undergo cell division

(a) Name the type of cell division.

(b) What would be the ploidy of the cells of tetrad?

Ans. (a) meiosis division (b) haploid

2. Outer envelop of pollen grain made of a highly resistant substance. What is that substance? At which particular point the substance is not present?

Ans. Sporopollenin; at germpore sporopollenin is absent.

3. Fruits generally develops from ovary, but in few species thalamus contributes to fruit formation.

(a) Name the two categories of fruits.

(b) Give one example of each.

Ans. Two categories of fruits are

(i) True fruits e.g., Mango

(ii) False fruit e.g., Apple

4. Among the animal, insects particularly bees are the dominant pollinating agents. List any four characteristic features of the insect pollinated flower.

Ans. i. Flowers are large.

ii. Colorful petals of flower.

iii. Presence of fragrance.

iv. Rich in nectar.

5. Differentiate between geitonogamy and xenogamy.

Ans.

| Geitonogamy | Xenogamy |
|---|---|
| 1. Transfer of pollen grains from the another to stigma of another flower of the same plant | 1. Transfer of Pollen grains from another to stigma of different plant. |
| 2. Does not provide opportunity for gametic recombination. | 2. Provide opportunity for gametic recombination. |

6. In the given figure of a dicot embryo, label the parts (A) and (B) and give their function.

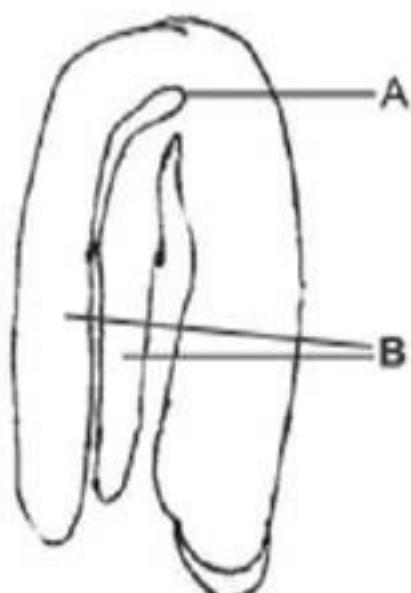


Figure 1

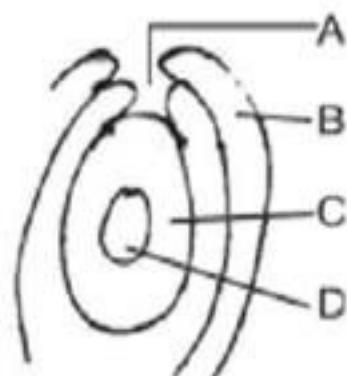


Figure 2

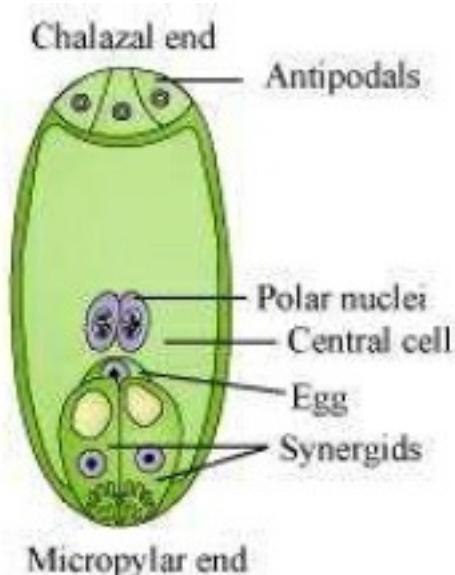
Ans. A = Plumule To form shoot system

B = Cotyledons Storage of food

7. Name the parts A, B, C and D of the anatropous ovule (Figure 2) given above.

Ans. A = Micropyle, B = Outer integument, C = Nucellus, D = Embryo sac

8. Given below is an incomplete flow chart showing formation of gamete in angiospermic plant. Observe the flow chart carefully and fill in the blank A, B, C and D.



Ans. A = Ovule/megasporangium, C = Tapetum

B = Megaspore mother cell, D = Pollen grains

9. Name the blank spaces a, b, c and d in the table given below : Item What it represents in the plant

(i) Pericarp a

(ii) b Cotyledon in seeds of grass family

(iii) Embryonal axis c

(iv) d Remains of nucellus in a seed.

Ans. a = wall of fruit, b = scutellum, c = shoot and root tip, d = perisperm

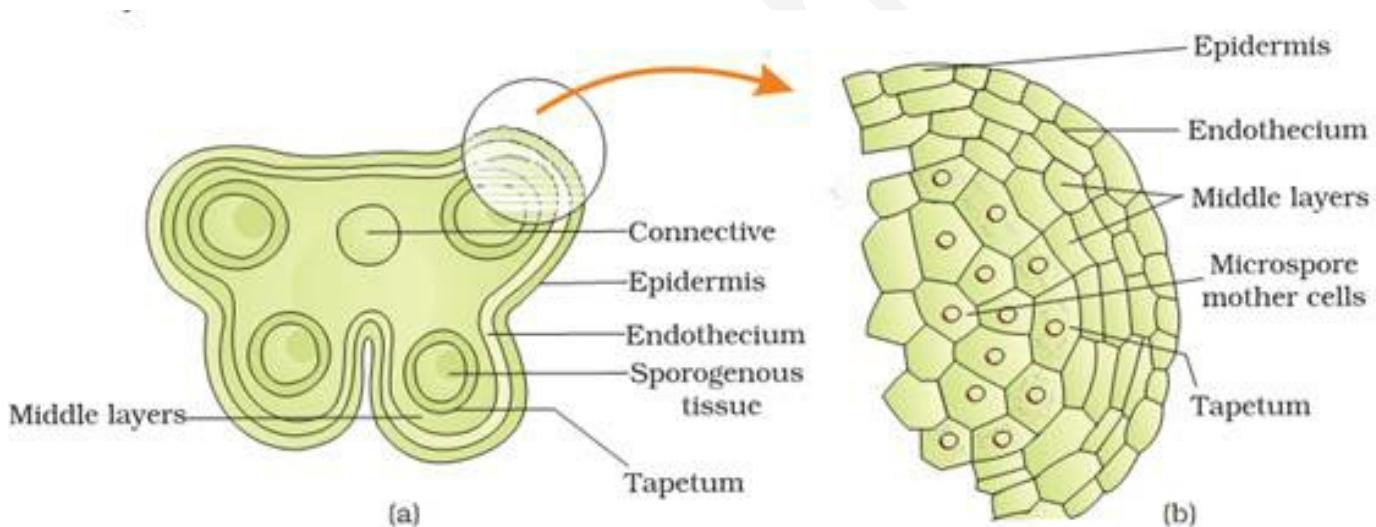
10. Even though each pollen grain has two male gametes. Why are at least 10 pollen grains and not 5 pollen grains required to fertilise 10 ovules present in a particular carpel?

Ans. Because only one male gamete is involved in syngamy. ie fursionof male gamete with egg cell.

11. Describe the structure of a microsporangium with a neatly labeled diagram.

Ans. The structure of the microsporangium is as follows:

- It is almost circular with four wall layers.
- The outer three layers: epidermis, endothecium and middle layers are protective in function and help in dehiscence of anther to release pollen grains.
- The inner tapetum nourishes the developing embryo. Sporogenous tissue occupies the central position.



12. Why pollen grains can remain well preserved as fossils?

Ans. Pollen grains are well preserved as fossils because the exine of the pollens is composed of a chemical, sporopollenin which can withstand high temperature, strong acids and alkalis and strong enzymes

13. How are the cells arranged in an embryo sac?

Ans. An embryo sac is a 7 celled and 8 nucleated structure. At the micropylar end is present a group of three cells; two synergids and one egg cell. The chalazal end consists of three cells called antipodals. There is a central cell with two polar nuclei.

14. Why are cleistogamous flowers invariably autogamous?

Ans. In a cleistogamous flower, the flower never opens and when the anther dehisce in the bud the pollen grains fall on the stigma of the same flower and thus it is strictly autogamous.

15. State any one advantage and disadvantage of pollen grains to humans.

Ans. Advantage: Pollen grains are rich in nutrients and therefore in the western world pollen tablets are used as food supplements. Disadvantage: Pollens of many species cause severe allergies and bronchial afflictions leading to chronic respiratory disorder.

16. State the characteristics of insect pollinated flowers.

Ans. The characteristics of an entomophilous flower include:

- Petal and sepals well developed with attractive colours to invite insects.
- Flowers are normally bigger in size with strong odour.

17. Differentiate between chasmogamous and cleistogamous flowers

Ans.

| Chasmogamous flower. | Cleistogamous flower. |
|--|--|
| 1. The flowers are conspicuous. The anthers and the stigmas are exposed. | 1. The flowers are small and inconspicuous. The anthers and stigmas are never exposed. |
| 2. Both self and cross pollination can occur. | 2. Only self pollination is possible. |

18. Which type of pollination ensures the arrival of genetically different pollen grains

to stigma?

Ans. In xenogamy pollens from a different plant of the same species pollinate the stigma and thus ensure the arrival of genetically different types of pollen grains on to the stigma.

19. What relationship exists between a species of moth and *Yucca* plant?

Ans. There exists a relationship between moth and *Yucca* plant. The moth deposits its egg in the locule of the ovary and in turn pollinates the flower of the plant. The larvae develop from the eggs as the seeds start developing.

20. Differentiate between Geitonogamy & Allogamy.

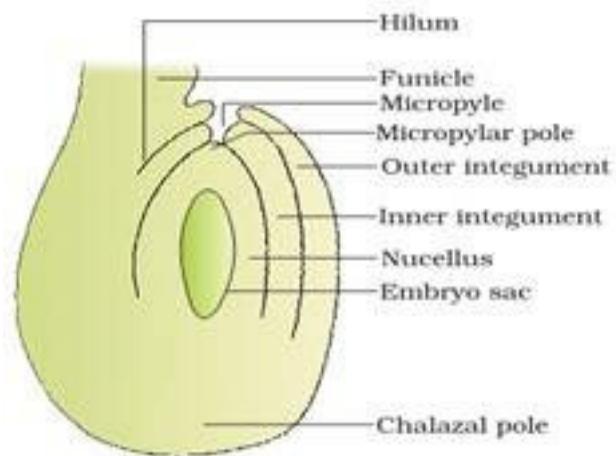
Ans.

| GEITONOGAMY | ALLOGAMY |
|---|--|
| i) It takes place between anther & pistil of different flowers of same plant. | i) It takes place between two flowers of two different plants of same species. |
| ii) Bisexual flower are essential for geitonogamy | ii) Unisexual flowers are essential for Allogamy. |
| iii) Progenies do not show variation & are genetically pure | iii) Progenies shows variations & are genetically impure |

21. Draw a diagram of L.S. of an anatropous ovule of an Angiosperm & label the following parts :-

- (i) Nucellus
- (ii) Integument
- (iii) Antipodal cells
- (iv) Secondary Nucleus.

Ans.



22. Why is process of fertilization in flowering plants referred to as double fertilization?

Ans. In flowering plants, the first male nuclei fuses with egg to form a diploid zygote & Second male nuclei fuses with Secondary nucleus to give rise to primary endosperm nucleus – thus process of fertilization twice in an embryo sac. & therefore called DOUBLE FERTILISATION.

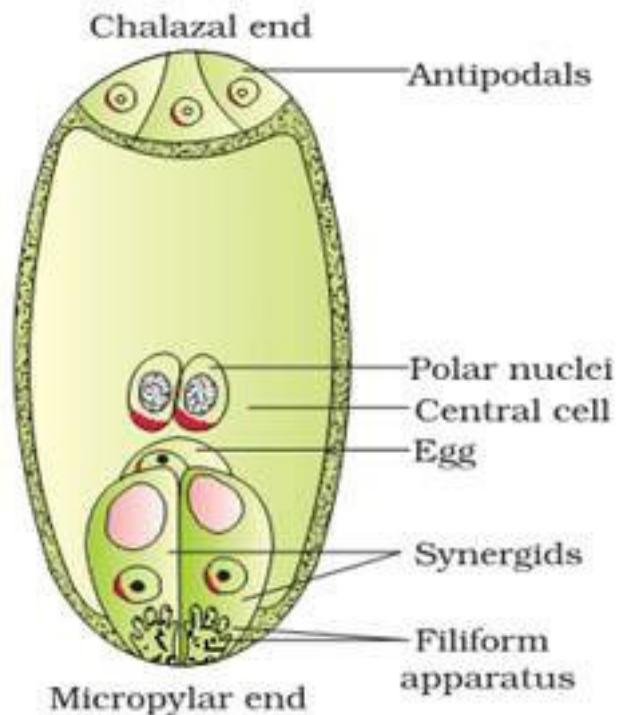
23.What are cleistogamous flowers? Can cross – pollination occurs in cleistogamous flowers. Give reason?

Ans. In some Angiospermic plants eg. Commelina, Oxalis etc, flowers are bisexual & they never open. This condition is called cleistogamy & flowers are called cleistogamous cleistogamous flowers are self – Pollination & to ensure this they never open Hence, cross pollination is not possible.

24. Draw a labeled diagram of mature embryo sac & label the following

- i) Egg cell ii) Antipodal cells iii) Synergids iv) Polar nuclei

Ans.



25. Mention two strategies evolved by flowers to prevent self-pollination

Ans. Two strategies evolved by flowers to prevent self-pollination

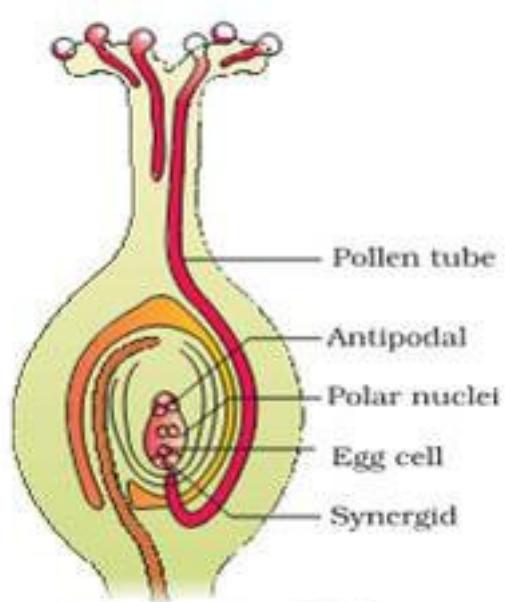
- (i) Dichogamy – In this, two reproductive organs of a bisexual flower matures at different time
- (ii) Self – sterility:-Pollen grains are unable to germinate on stigma of same flower or flower of same plant.

26. What is apomixis? What is its importance?

Ans. The development of reproductive propagules without meiosis & syngamy is called apomixis. It is also called asexual reproduction. It is a method of reproduction which produces new individuals with the help of vegetative part of plant body.

27. Draw a well labeled diagram of longitudinal section of pistil showing pollen germination?

Ans.



Longitudinal section of a flower showing growth of pollen tube

(c)

28. List the advantages of pollination to angiospermic plants?

Ans. Pollination leads to fertilization & production of seeds & fruits which are necessary for continuity of life.

- i) It is important for new varieties of plants.
- ii) It is important for production of hybrid seeds.
- iii) It helps in genetic recombination in plants.

3 Marks Questions

1. Continued self pollination lead to inbreeding depression. List three devices, which flowering plant have developed to discourage self pollination?

Ans. (a) Release of pollen and stigma receptivity is not synchronised in some species

(b) Anther and stigma are at different position/heights in some plants

(c) Self-incompatibility a genetic mechanism.

2. What will be the fate of following structures in the angiospermic plant? Ovary wall, Ovule, zygote, outer integument Inner integument and primary endosperm nucleus.

Ans. Ovary wall = Pericarp ; Ovule = Seed,

Zygote - Embryo; Outer integument = Testa;

Inner integument = Tegmen; Primary endosperm nucleus = Endosperm.

3. Differentiate between microsporogenesis and megasporogenesis. What type of cell division occurs during these events. Name the structure formed at the end of these two events.

Ans. Microsporogenesis Process of formation of microspore from a Pollen mother cell.

Megsporogenesis Process of formation of megaspore from megaspore mother cell. Meiotic division in both Microsporogenesis results in the formation of pollen grain while megasporogenesis results in the formation of megaspore.

4. Differentiate between microsporogenesis and megasporogenesis.

Ans.

| Microsporogenesis | Megasporogenesis |
|---|--|
| 1. It is the formation of haploid microspores or pollen grains from the diploid microspore mother cell. | 1. it is the formation of megasporules from the diploid megasporule mother cell. |
| 2. The pollen grains are arranged in tetrahedral tetrad. | 2. The megasporules are arranged in linear tetrad. |
| 3. All the microspores are functional. | 3. Only one megasporule is functional. Others degenerate. |

5. Explain the stages involved in the maturation of a microspore into a pollen grain.

Ans. The microspore has a dense cytoplasm and a prominent nucleus in the centre. As the microspore matures the nucleus is pushed towards the periphery due to the formation of vacuoles in the upper end of the cytoplasm. The nucleus divides mitotically to form two nuclei which separate out into two cells; the upper bigger vegetative cell and the lower generative cell. A mature pollen grain normally has two cells.

6. What is triple fusion? Where does it occur?

Ans. The nucleus of the vegetative cell of the pollen grain fuses with the two polar nuclei of the central cell of the female gametophyte to form the primary endosperm. This fusion is known as vegetative fusion or triple fusion as it involves three nuclei. It occurs in the central cell of the egg apparatus.

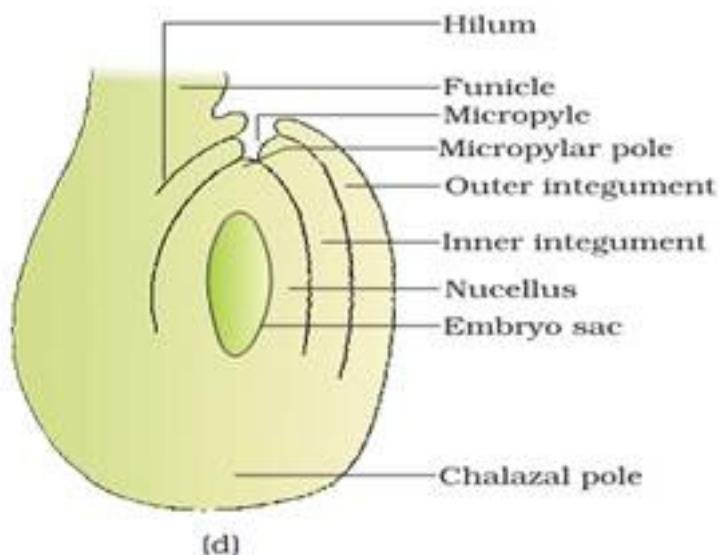
7. Explain the structure of an anatropous ovule with a neat labeled diagram?

Ans. An anatropous ovule consists of:

- a stalk called funicle attached to the placenta.
- the junction between the funicle and the ovule is called hilum.
- The ovule may be surrounded by one or more integuments with an opening at the tip. The opening is called the micropyle.
- the opposite end of the micropyle is referred to as chalazal end, the basal part of the

ovule.

- mass of cells known as nucellus is present within the integuments that contain normally single embryo sac.



8. Describe the structure of a pollen grain.

Ans. The pollen grain is normally spherical with two wall layers.

- the outer layer is exine composed of highly resistant organic substance called sporopollenin which is absent at the aperture region called germ pore.
- the inner layer is the intine which is composed of cellulose and pectin.
- a mature pollen grain has a vegetative cell and a generative cell

9. Enlist the advantages offered by seeds to angiosperms.

Ans. The significance or the importance of seed formation:

- seed formation is associated with pollination and fertilization that are independent of water and therefore more dependable process.
- it provides protection and nutrition to the developing embryo.
- seeds are means of multiplication of higher plants. Being capable of perennation, it can withstand variable climate.

10. Give any three advantages of sexual incompatibility.

Ans. Advantages of sexual incompatibility:

- it prevents self pollination.
- it has made plants outbreeders and this maintain vigour and vitality of the race.
- variations appear due to outbreeding provide adaptability to the changes in the environment.

11. List any three differences between wind pollinated flower & insect – pollinated flower.

Ans.

| Wind Pollinated flower | Insect Pollinated flower |
|--|---|
| i) Flowers are small & colourless. | i) Flowers are brightly coloured |
| ii) Flowers do not have scent or nectar | ii) Flowers possess nectar glands. |
| iii) Pollen grains are dry & unwettable. | iii) Pollen grains are sticky or Spiny. |
| iv) Stigma is large well- exposed hairy & branched | iv) Stigma is short & is present within the flower. |

12. Trace the development of microsporocyte into mature pollen grains.

Ans. i) When the anther is young, the microsporangium contains compactly arranged homogenous cells forming the Sporogenous tissues.

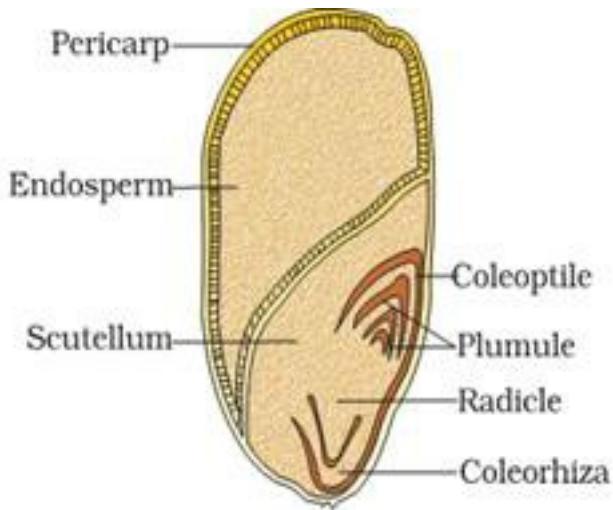
1. Every cell of the sporogenous tissue is a potential Pollen mother cell (PMC) & give rise to microspore tetrad or Pollen grains.
2. But Some of them forego this Potential & become differentiated into pollen or microspore mother cell (MMC)
3. Each microspore mother cell undergoes meiosis to form a cluster of four haploid cells called microspore tetrad.
4. As the anther matures, microspores dissociate from tetrad & develop into pollen grains.
5. The nucleus of microspore undergoes mitosis to form large vegetative cell & small generative cell. They develop a two layered wall – outer exine made up of sporopollenin

& inner intine made up of cellulose & pectin. Usually Pollen grains are liberated at two celled stage.

13. i) Explain the structure of a maize grain with the help of a diagram

ii) Why cannot we use the term maize seeds for maize grains?

Ans. (i) In grass family (eg. Maize) fruit is single seeded where pericarp & seed coat are fused together to form the husk. Just below husk, there is a layer of cells called aleurone layer, with stores proteins. There is a large endosperm that stores starch. The embryo lies on one side of endosperm & consists of a single cotyledon called scutellum & embryonal axis. The region of embryonal axis that points down ward from point of attachment of cotyledons is radicle & is covered by protective sheath called coleorhiza. The region of embryonal axis that points upward from point of attachment of cotyledon is plumule, it is covered by foliaceous sheath called coleoptile



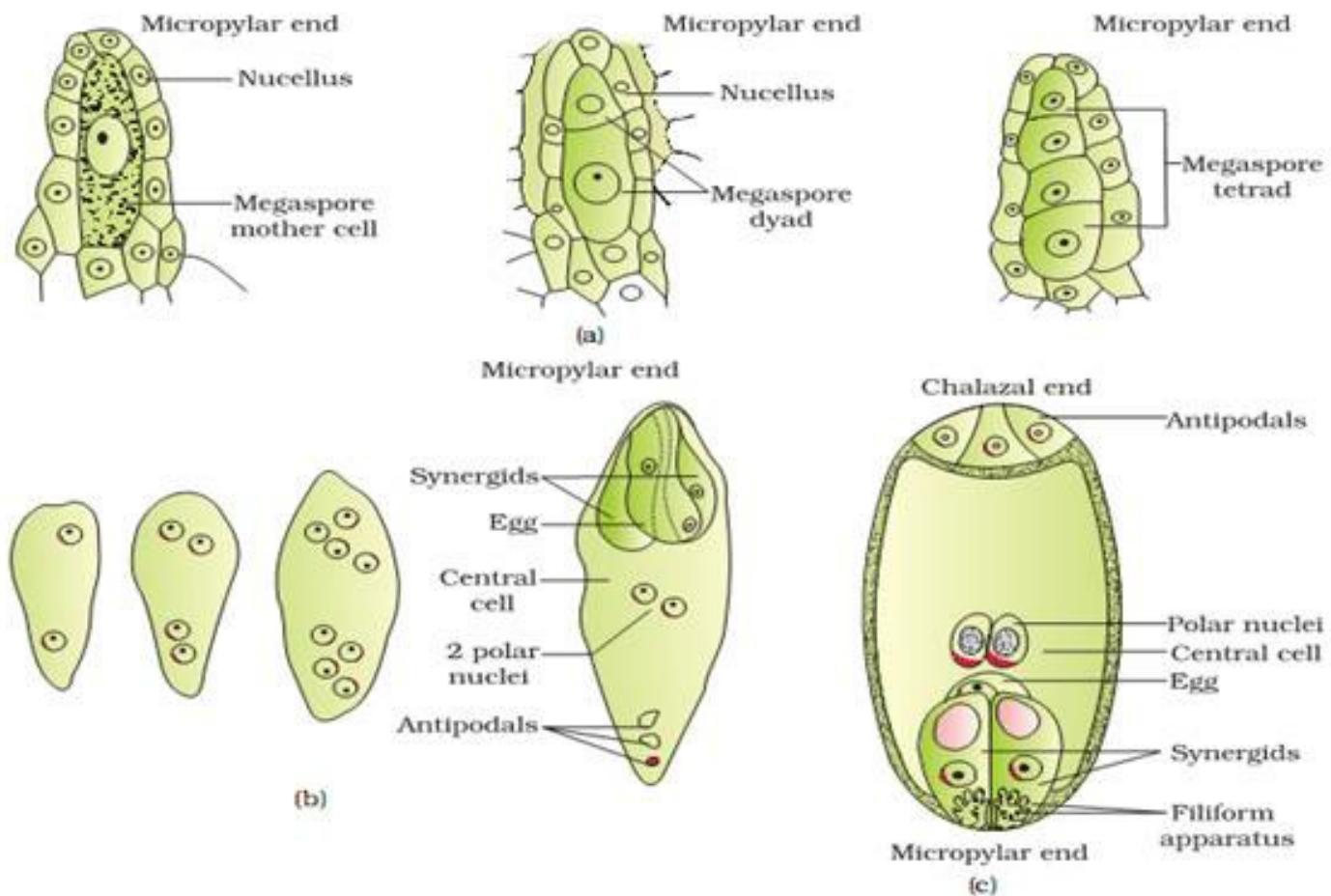
(ii) We cannot use the term seeds for maize grain because seed is not completely developed from embryo but retains a part of endosperm.

14. Trace the development of megasporocyte into mature ovule.

Ans. i. A single Megaspore mother cell is differentiated in the micropylar region of nucleus of an ovule & undergoes meiosis & forms a cluster of haploid cells called megasporocyte tetrad. Of these, soon three degenerates & only one megasporocyte becomes functional

- ii. Functional megasporangium enlarges to form embryo sac. Its nucleus undergoes mitotic division & two nuclei move to opposite poles forming 2-nucleate embryo Sac.
- iii. Two successive mitotic divisions in each of these two nuclei results in formation of 8-nucleate embryo sac.
- iv. Three cells are grouped together at micropylar end to form egg apparatus. consisting of two synergids & a female egg cell .
- v. Three cells are grouped together at the chalazal end, they are called antipodal cells.
- vi. The remaining two nuclei are called Polar nuclei, they move to centre of embryo sac & fuse to form Secondary nucleus.

Thus a typical angiospermic embryo sac is 8-nucleate 7-celled



15. “Incompatibility is the natural barrier in fusion of gamete”. Justify this statement.

Ans. Pollen grains of a plant species cannot germinate on stigma of other unrelated species because both the species are incompatible & process is called pollen – pistil incompatibility. In many angiospermic plants, it is seen that pollen grains germinate on stigma of unrelated species but male gametes produced in pollen tube cannot fertilize egg. This is called gametic incompatibility. Self incompatibility can be achieved by any of the following ways :-

1. Pollen Stigma interaction: - In this phenomenon, pollen grains fails to germinate on Stigma because of incompatibility.
2. Pollen tube style interaction: - In this phenomena, pollen grains become able to germinate on stigma & pollen tube penetrate stigmatic surface but due to incompatibility growth of pollen tube within stigma & style is inhibited.
3. Pollen – ovule interaction: - pollen tube successfully pierces & grows within style & its growth is inhibited at micropyle of ovule.

16. How dose pollination takes place in salvia. List any four adaptations required for such type of pollination.

Ans. In salvia, entomophily or pollination lay insects occurs. The flowers of salvia are bilipped. Its upper lip consists of two petals & lower lip consists of three petals. The lower lip functions as sitting pad for insects. In normal conditions, the connective remains upright. When insect enters the tube of corolla towards nectar sitting on lower lip, it pushes sterile anther lobe which automatically brings about fertile anther to touch the back of insects gets the blow of fertile lobe. Pollen grains are dusted on back feather & legs of insects.

ADAPTAIIONS EOR ENTOMOPHILY :-

1. Flowers are brightly coloured.
2. Flowers possess nectar glands.
3. pollen grains are usually sticky & spiny
4. flowers are large – sized & stout

5 Marks Questions

1. Draw the embryo sac of a flowering plants and label :

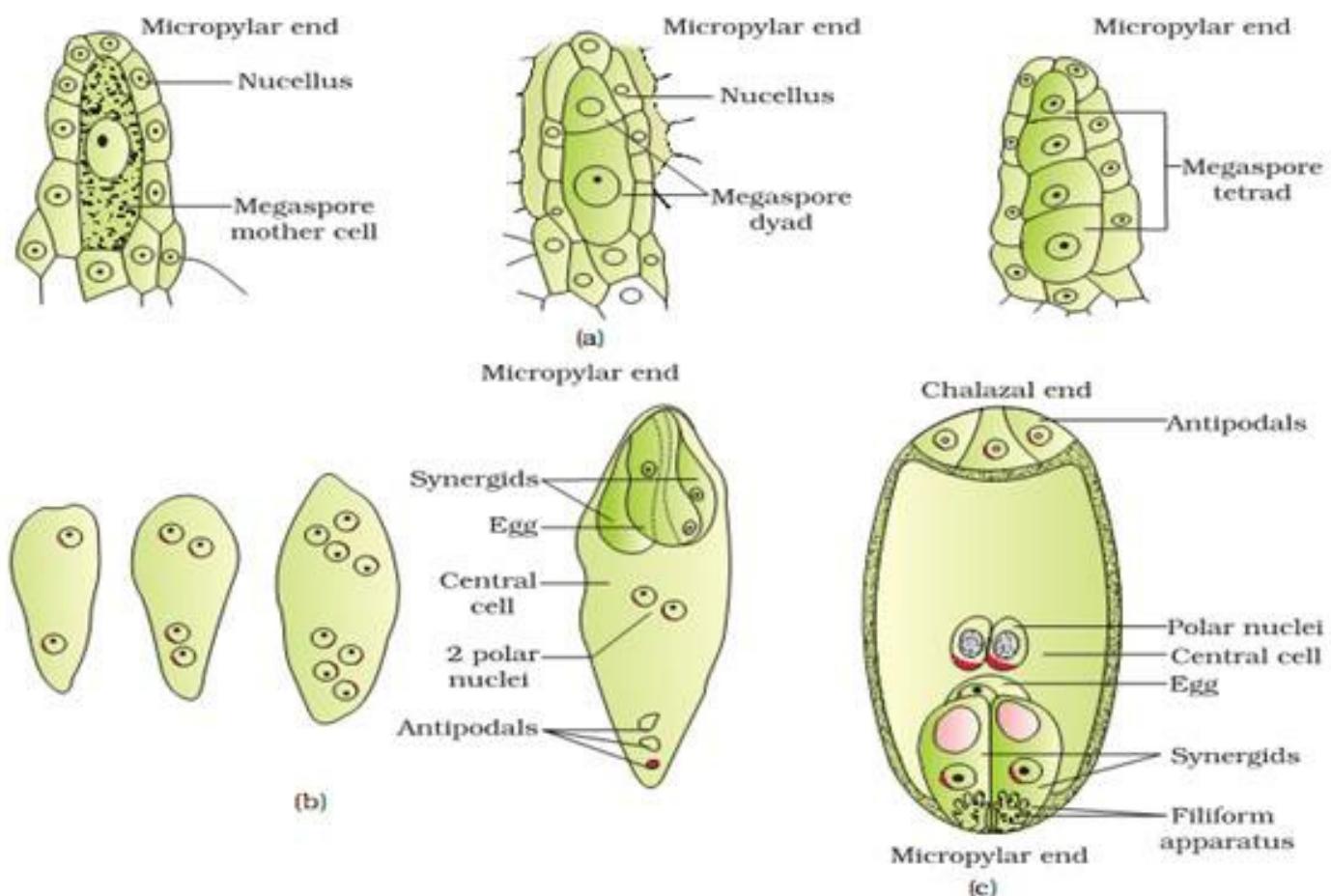
(a) (i) Central Cell (ii) Chalazal end (iii) Synergids

(b) Name the cell that develops into embryo sac and explain how this cell leads to formation of embryo sac.

(c) Mention the role played by various cells of embryo sac.

(d) Give the role of filiform apparatus.s

Ans. (a)



(b) Functional Megaspore

(c) Egg : Fuses with male gamete to form zygote or future embryo

Synergid : Absorption of nutrient, attract and guides pollen tube.

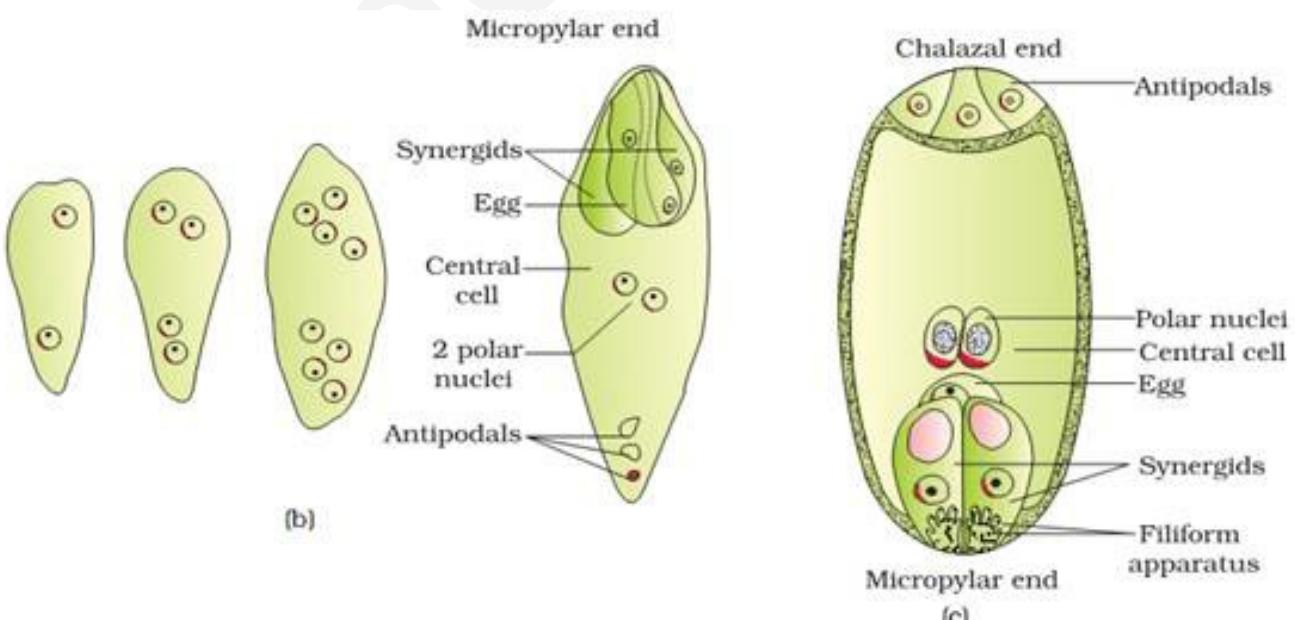
Central Cell : After fusion with second male gamete forms Primary endosperm cell which gives rise to Endosperm

(d) Guides the entry of pollen tube.

2. Explain the formation of an embryo sac with diagrams.

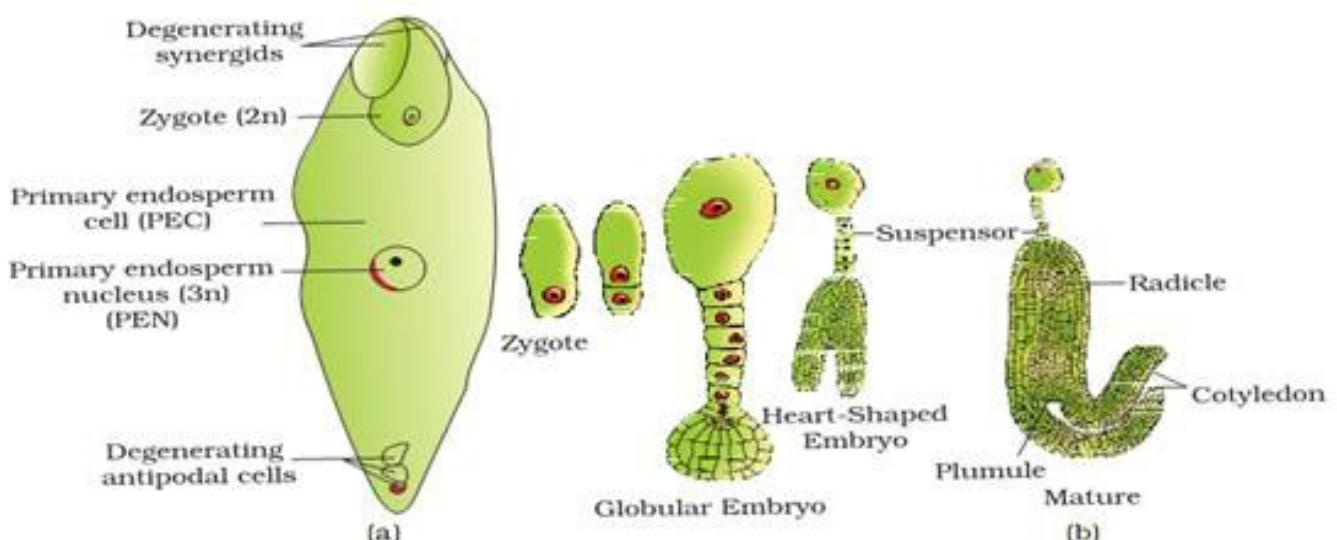
Ans.

- The functional megasporangium grows in size.
- The nucleus divides mitotically to form two nuclei which move to opposite poles.
- Each nucleus at the poles undergoes two mitotic divisions to form four nuclei in each pole or a total of 8 nuclei.
- Two nuclei from each pole move to the centre to form the polar nuclei.
- The other nuclei, three at each pole get surrounded by bit of cytoplasm to form cells.
- The female gametophyte or the embryo sac thus has 7 cells and eight nuclei.

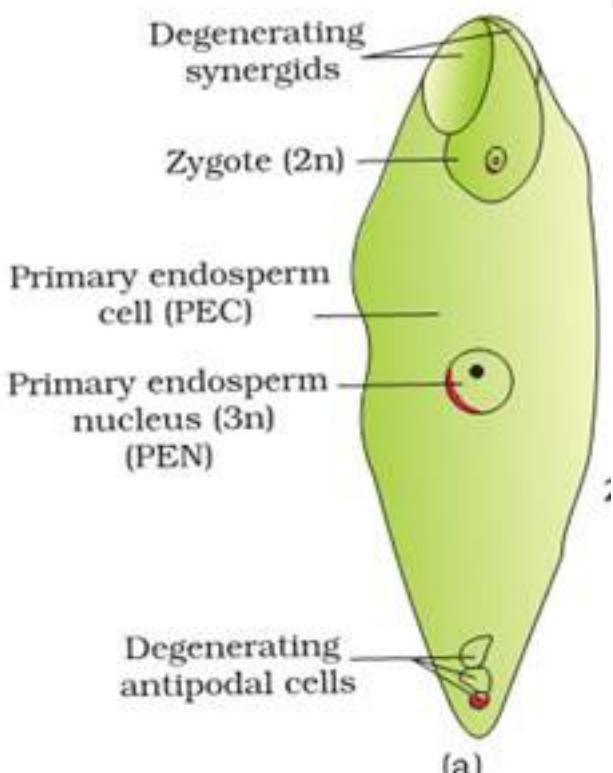


3. Explain the development of embryo in a dicotyledonous plant with neatly labeled diagrams.

Ans. The embryo develops at the micropylar end where the zygote is located. The zygote starts developing only after certain amount of endosperm is formed to assure nutrition to the embryo. The zygote divides mitotically to form various stages including pro-embryo, globular, heart shaped and finally the mature embryo



4. Describe the post-fertilization changes taking place in a flowering plant?

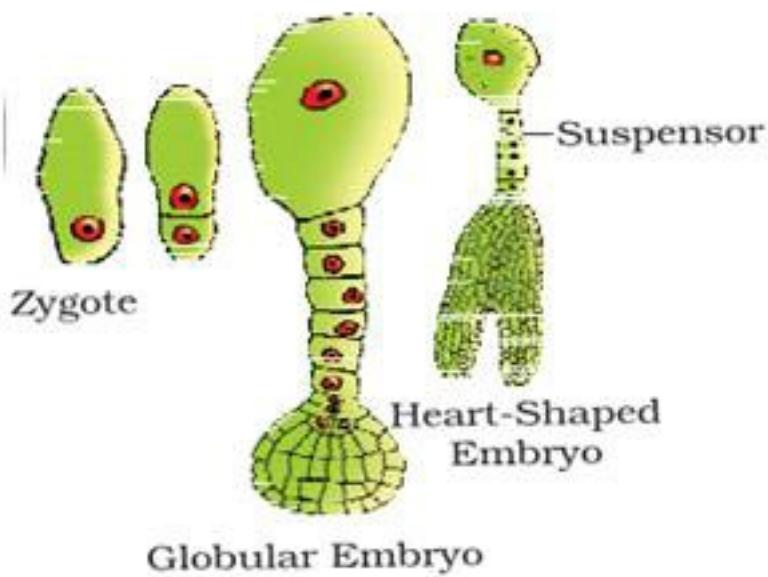


Ans. The major events taking place in a flowering plant after fertilization:-

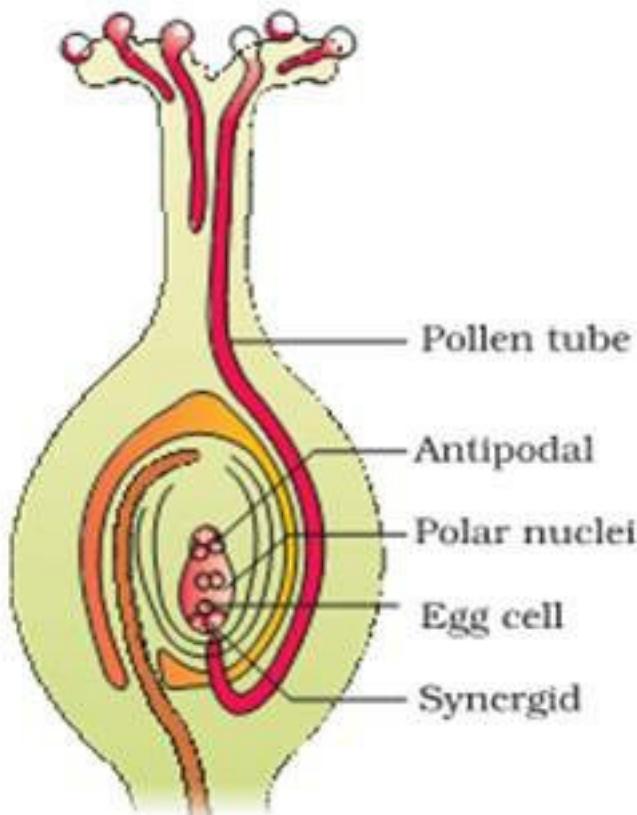
(i) DEVELOPMENT OF ENDOSPERM:- Endosperm development proceeds embryo development . The most common method of endosperm development is nuclear type where triploid endosperm (PEN) undergoes repeated mitotic divisions without cytokinesis – Subsequently cell wall formation occurs from periphery & endosperm store food materials

which is later used up by embryo.

(ii) DEVELOPMENT OF EMBRYO :- The zygote divides lay mitosis to for a pro-embryo first . Later development results in formation of globular & heart shaped embryo & that ultimately become horseshoe – shaped embryo with one or more cotyledons. In dicot embryo, the portion of embryonal axis about the level of attachment is epicotyl & it terminates into plumule while portion of embryonal axis below the level of attachment is hypocotyl & terminates into radicle.



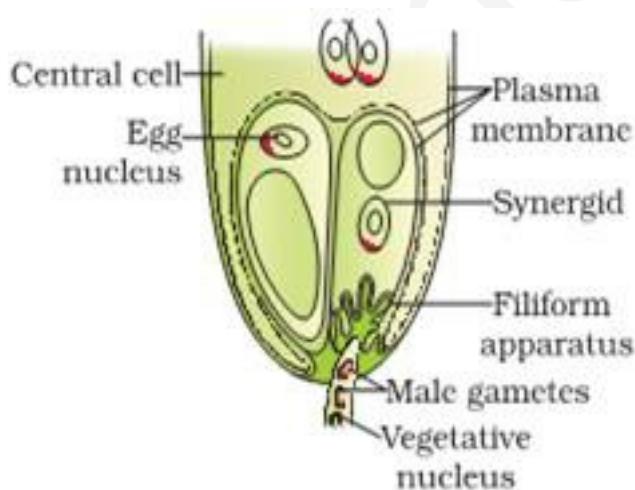
5. Trace the events that would take place in flower from the time of Pollen grain of species fall on stigma up To completion of fertilization.



Longitudinal section of a flower showing growth of pollen tube

Ans. GERMINATION OF POLLEN GRAINS ON STIGMA

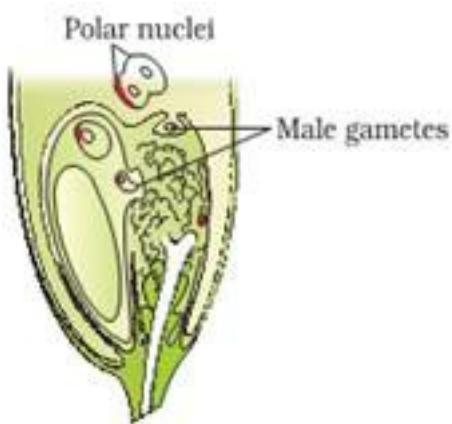
The pollen grains absorb fluid present on stigma & swell up. The exine ruptures at the place of germ pore & intine comes out in the form of tube with its internal contents. This small tubular structure is called pollen tube & process is called pollen germination.



- Entry of pollen tube into Ovule: - The entry of pollen tube into ovule occurs through

micropyle or chalaza or through lateral sides of ovule. Only one pollen tube enters inside the embryo sac of an ovule. Normal two synergids are destroyed while entry of pollen tube into embryo sac.

iii) Discharge of Male Gametes :- After entry of pollen tube both the male gametes discharged into embryo sac by either forming two pores into pollen tube & each male gamete is discharged through every pore or sometime pollen tube may burst & release the male gametes into embryo sac.



iv) Fertilization:- The fusion of first male gamete (n) with egg (n) is called fertilization. It results in formation of a diploid zygote ($2n$). The second male gamete fuses with secondary nucleus ($2n$) to form triploid endosperm nucleus ($3n$). This fusion between second male gamete & secondary nuclei is triple fusion. Since process of fertilization occurs twice. It is called double fertilization.

6. i) Why is zygotes dominant for sometime in fertilized ovule.

ii) What is polyembryony? Give an example.

iii) In fruits, what is formed from following parts :-

a) Ovary wall

b) Outer integument

c) Inner integument

d) zygote

e) primary endosperm

f) Ovary

g) Nucellus

Ans. (i) Zygote remain dominant for sometime in a fertilized ovule because embryo develops after formation of endosperm therefore zygote wants for formation of endosperm which supplies food material for developing embryo

(ii) The presence of more than one embryo in a seed is called polyembryony eg. Sometimes more than one embryo is formed within an embryo sac either by cleavage or splitting of egg, synergid, antipodal or endosperm.

(iii) In fruits, the following is formed from given parts:-

| | | |
|----|-------------------|------------|
| a) | Ovary wall | Per carp |
| b) | Outer integument | Testa |
| c) | Inner integument | Tegmen |
| d) | zygote | embryo |
| e) | primary endosperm | endosperm |
| f) | Ovary | fruit |
| g) | Nucellus | perisperm. |

CBSE Class 12 Biology
Important Questions
Chapter 3
Human Reproduction

1 Marks Questions

1. Failure of testes to descend into scrotal sacs leads to sterility. Why?

Ans. High temperature of abdomen kills the spermatogenic tissue of the testes, so no sperm are formed.

2. Both vaccine and colostrum produce immunity. Name type of immunity produced by these.

Ans. Vaccine Active immunity Colostrum Passive immunity.

3. How many sperms will be produced from 10 primary spermatocytes and how many eggs will be produced from 10 primary oocytes?

Ans. 40 sperms, 10 eggs.

4. The spermatogonial cell has 46 chromosomes in human male. Give the number of chromosomes in

(a) Primary spermatocyte (b) Spermatid

Ans. (a) 46 in Primary spermatocyte

(b) 23 in spermatid.

5. In ovary which structure transforms as corpus luteum and name the hormone secreted by corpus luteum?

Ans. Follicular cells of empty Graafian follicle.

Progesterone.

6. “Each and every coitus does not results in fertilisation and pregnancy”. Justify the statement.

Ans. Ovum and sperm should reach simultaneously to the ampullary – isthmic junction.

7. Why are male testes located outside the abdominal cavity?

Ans. The male testes are located in the scrotum outside the abdominal cavity as the scrotum provides low temperature than the normal body temperature required for spermatogenesis.

8. State the function of leydig cells.

Ans. The leydig cells synthesise and secrete testicular hormones called androgens.

9. Where do we find fimbriae?

Ans. Fimbriae are finger like projections found in the edges of the infundibulum.

10. What is semen?

Ans. The seminal plasma along with the sperms constitutes semen.

11. Define parturition.

Ans. The vigorous contraction of the uterus that results into the delivery of the child at the end of pregnancy is called parturition.

12. Where does fertilization normally takes place in a human female.

Ans. Ampulla (fallopian tube).

13. Name the substance present in the sperm acrosome & which help in sperms entry into egg.

Ans. Acrosome contains enzymes e.g. hyaluronidase that helps in dissolving membrane of ovum.

14. Name the layer of cells that forms the outer wall of blastocyst.

Ans. Trophoblast.

15. At what stage is the mammalian embryo implanted in uterus?

Ans. Blastocyst stage.

16. Despite the presence of So many sperms in the vicinity of an egg cell, only one sperm enters the ovum. Why?

Ans. Because when a sperm comes in contact with ovum (zona pellucida) & induces changes in membrane to block entry of other sperms.

17. How many polar bodies are given out in production of one egg during cogenesis?

Ans. Two polar bodies

2 Marks Questions

1. Give the function of

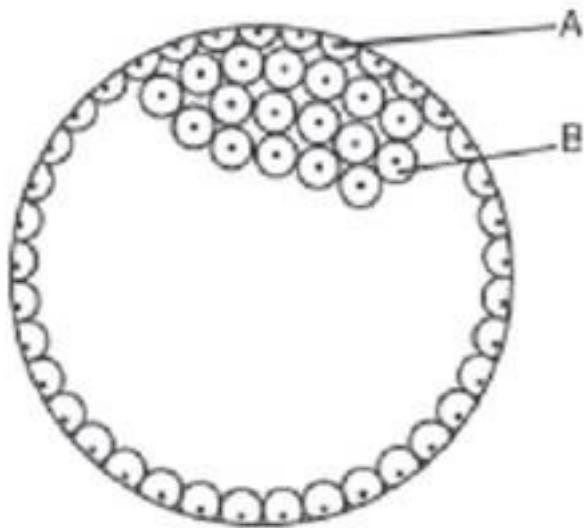
(a) Corpus luteum

(b) Endometrium

Ans. Corpus luteum : It secretes progesterone which prepares endometrium of uterus for implantation and normal development of foetus.

Endometrium : It undergoes cyclic changes during menstrual cycle and prepares itself for implantation of blastocyst.

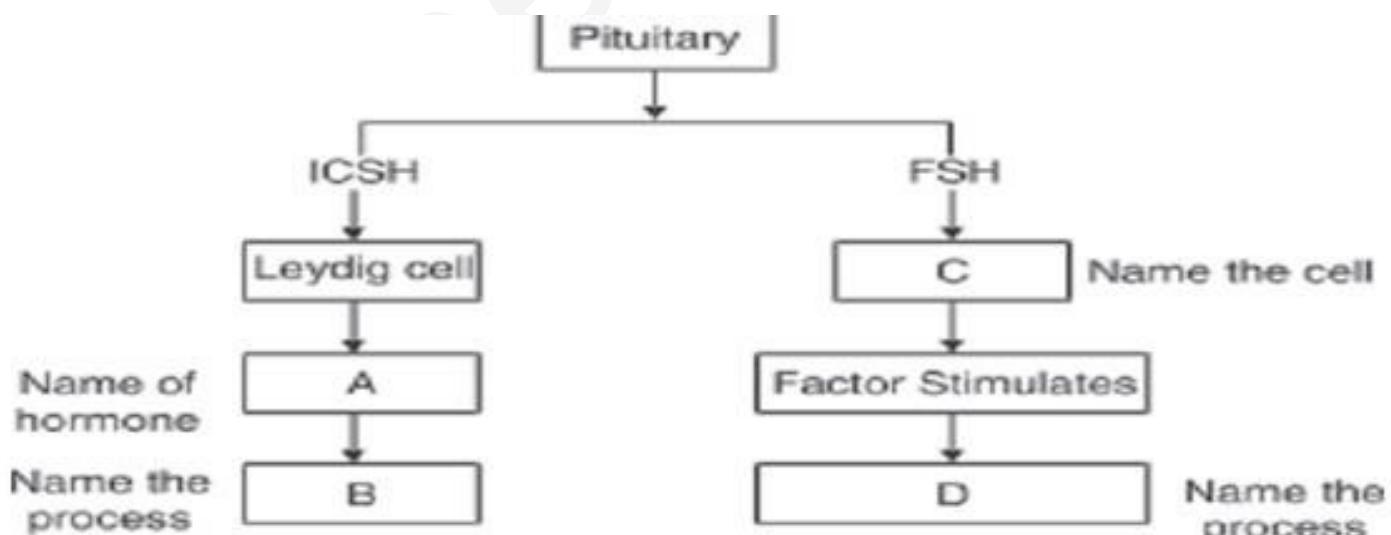
2. In the given figure, give the name and functions of parts labeled A and B.



Ans. A = Trophoblast Gets attached to endometrium and draws nutritive material secreted by uterine endometrium gland.

B = Inner cell mass Differentiates as Embryo.

3. Given below is an incomplete flow chart showing influence of hormone on gametogenesis in male, observe the flow chart carefully and fill in the blank A, B, C and D.



Ans. A = Testosterone; B = Spermatogenesis

C = Sertoli cells; D Spermiogenesis

4. Give reason for the following :

(a) The first half of the menstrual cycle is called follicular phase as well as proliferative phase.

(b) The second half of the menstrual cycle is called luteal phase as well as secretory phase.

Ans. (a) During this phase, primary follicles transform into Graafian follicle under FSH stimulation. Graafian follicles secrete estrogens which stimulate enlargement of Endometrium of uterus.

(b) During this phase, Corpus luteum is fully formed and secretes large quantity of Progesterone.

5. What is meant by L.H. Surge? Write the role of L.H.

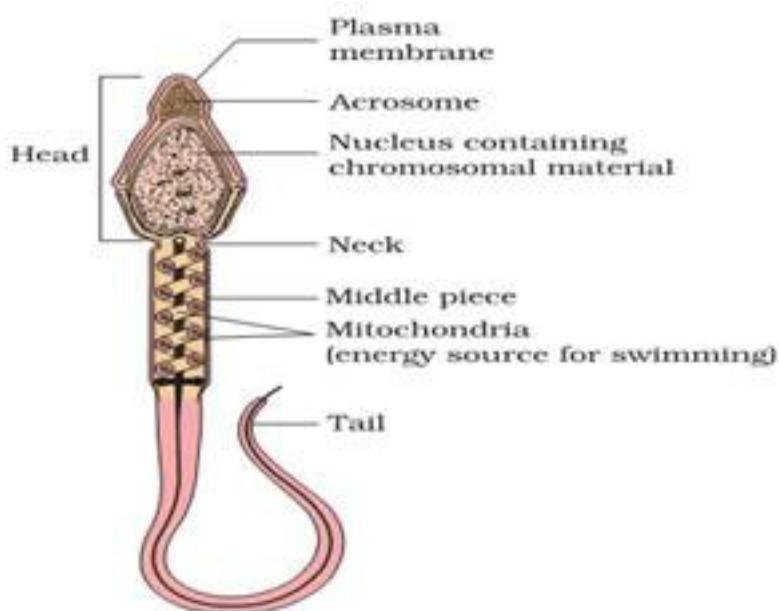
Ans. There are three phases in your menstrual cycle – follicular phase, ovulatory phase and luteal phase. In terms of the luteinizing hormone (LH) surge, the ovulatory phase is most important. During the follicular phase the follicle develops at the beginning of the menstrual cycle. This cycle begins with the menstrual period, the shedding of the uterine lining and the shedding cleanses the lining of the uterus in preparation for ovulation during the ovulatory phase.

6. Explain significance of the condition in which the testes remain suspended in scrotum outside the abdomen.

Ans. Human sperm cells cannot develop at body temperature. Spermatogenesis and maintenance of the seminiferous tubules requires a temperature slightly lower than that of the body. This is provided by the scrotum, which lies outside the abdominal cavity.

7. Describe the structure of a sperm with a diagram.

Ans. The human sperm is a microscopic structure with a head, middle piece and a tail. The head has the haploid nucleus and an anterior acrosome that contains the enzymes required for the fertilization of the egg. The middle piece has numerous mitochondria to produce the energy for the mobility of the tail of the sperm.



8. Enlist any two functions of a female placenta.

Ans. The structural and the functional unit between the developing embryo and the mother called placenta facilitates the supply of nutrients, oxygen to the embryo and also the removal of carbon dioxide and other excretory products produced by the embryo. It also acts as endocrine tissue and produces several hormones

9. What is the number of chromosomes in the following cells? Primary oocyte, secondary oocyte, ootid and follicle.

Ans. The number of chromosome in the cells is as follows:

Primary oocyte: 23 pairs. Secondary oocyte: 23. Ootid: 23. Follicle: 23 pairs.

10. What is corpus luteum. How does it function as endocrine gland?

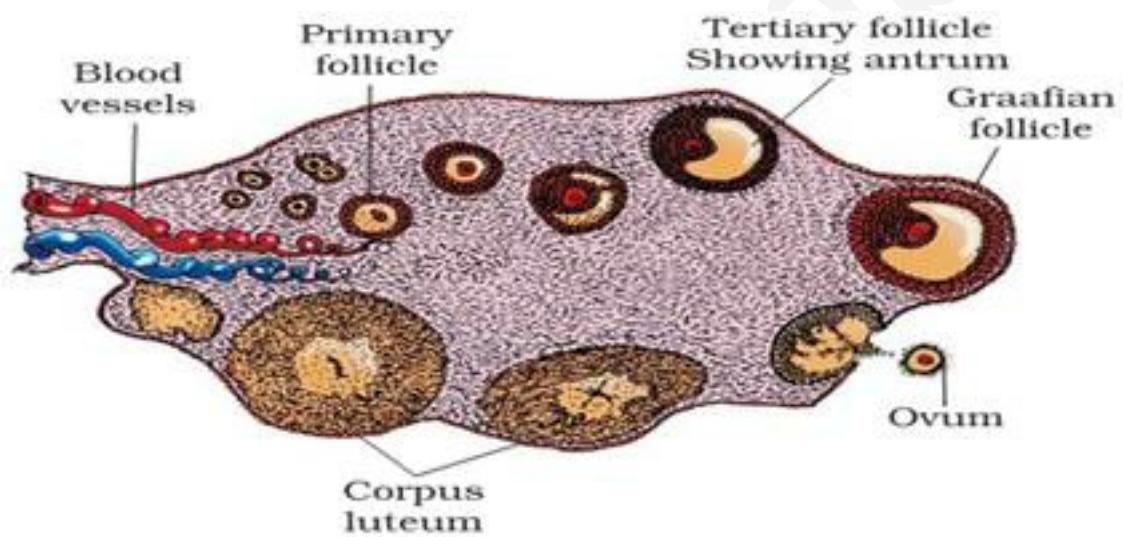
Ans. After ovulation, the graafian follicle ruptures & forms corpus luteum. Corpus luteum functions as endocrine glands as they secrete progesterone & estrogen in large quantities.

11. Where are Leydig cells located? What do they secrete?

Ans. Leydig cells or interstitial cells are located in between the seminiferous tubules. Leydig cells secrete male sex hormone TESTOSTERONE which promotes development of accessory glands & control male secondary sexual characters.

12. Draw well labeled diagram of T.S. of ovary?

Ans.

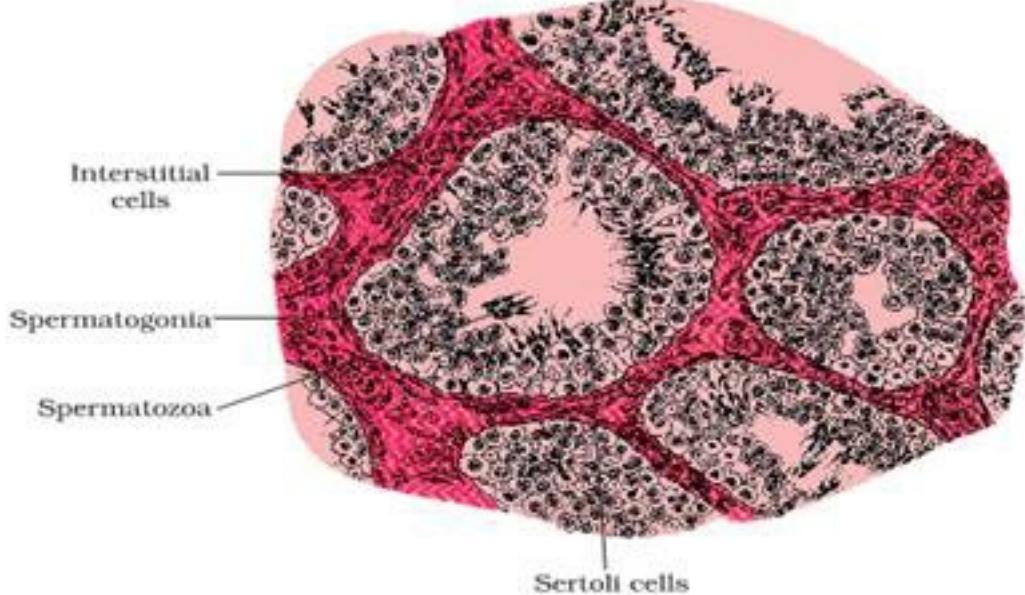


13. Why testes of human males are considered extra abdominal? What is the significance of this condition?

Ans. Testis in human males are called extra- abdominal because testis are located outside the abdominal cavity in a pouch called scrotum which provides a temperature 2-3°C lower than body temperature necessary for spermatogenesis.

14. Draw a diagram of the T.S. of seminiferous tubule of testis of an adult human male & label any four parts in it.

Ans.



15. What is colostrum? What is its significance to new born baby?

Ans. The milk secreted from mammary glands just after birth for 2 or 3 days is called colostrum. It is rich in proteins & low in fats. It also contains antibody IgA which provides immunity to new born infant.

3 Marks Questions

1. Mention the name and role of hormones which are involved in regulation of gamete formation in human male.

Ans. GnRH : Stimulates adenohypophysis to secrete gonadotrophins.

GSH : Stimulates Sertoli cells to secrete factors while help inspermatogenesis.

ICSH : Stimulates interstitial cells to secrete testosterone.

2. Three of the steps of neuro endocrine mechanism in respect of parturition are mentioned below.

Write the missing steps in proper sequence.

(a) Signals originate from fully developed foetus and placenta.

(b) _____.

(c) _____.

(d) Oxytocin causes strong uterine contraction

(e) Uterine contraction stimulates further secretion of oxytocin.

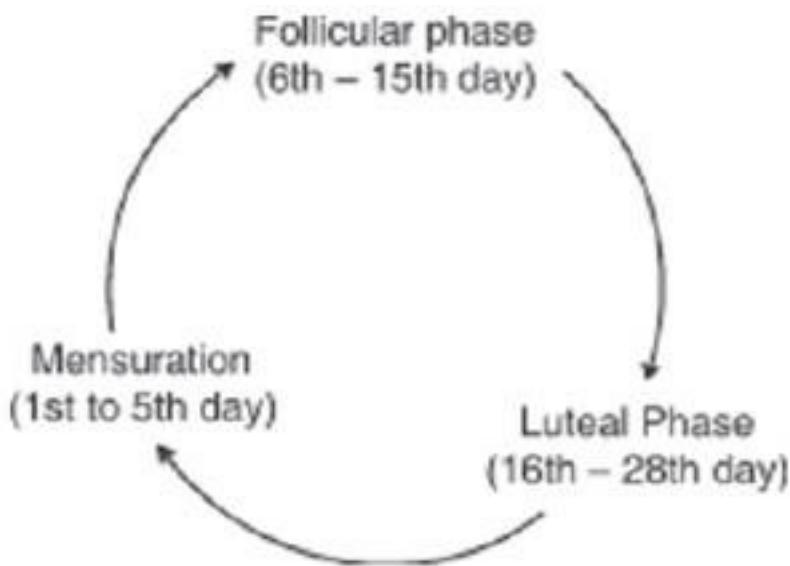
(f) _____.

Ans. (b) Foetal ejection reflex

(c) The reflex triggers release of oxytocin

(f) Expulsion of the baby out through birth canal.

3. The events of the menstrual cycle are represented below. Answer the following questions.



(i) State the levels of FSH, LH and Progesterone simply by mentioning high or low around 13th and 14th day and 21st to 23rd day.

(ii) In which of the above mentioned phases does egg travel to fallopian tube?

(iii) Why there is no mensuration after fertilisation?

Ans. (i) 13-14th day 21st -23rd day

FSH - High Low

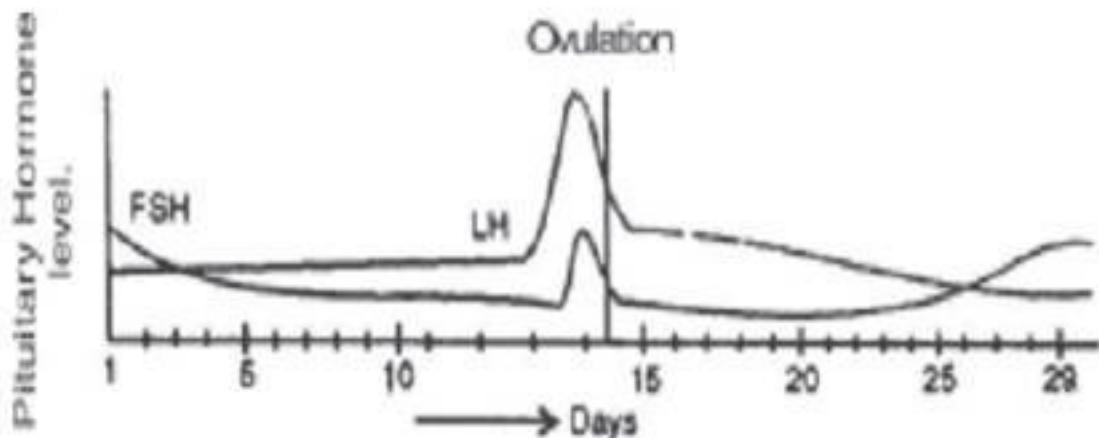
LH - High Low

Progesterone - Low High

(ii) End of follicular or proliferative phase.

(iii) Menstruation does not occur during pregnancy upon fertilization due to high level of progesterone secreted by persisting corpus luteum and Placenta.

4. (a) Read the graph given below. Correlate the ovarian events that take place in the human female according to the level of the pituitary hormone during the following day.



- (i) 10th - 14th days (ii) 14th -15th days
 (iii) 16th - 23th days (iv) 25th - 29th days

(If the ovum is not fertilised)

- (b) What are the uterine events that follow beyond 29th day if the ovum is not fertilised?**

Ans. (a) (i) Gonadotropins and FSH increases

(ii) LH attains peak level but FSH decreases

(iii) LH and FSH level decreases

(iv) LH remains low and FSH increases.

- (b) After 29th day there is a menstrual flow involving discharge of blood and cast off endometrium lining.**

5. T.S. of mammalian testis revealing seminiferous tubules show different types of cell.

(i) Name the two types of cells of germinal epithelium.

(ii) Name of cells scattered in connective tissue and lying between seminiferous tubules.

Differentiate between them on the basis of their functions.

Ans. (i) Germinal epithelium have two types of cell. 1. Spermatogonium. 2. Sertoli cells
(ii) Leydig cells or Interstitial cells.

Functions

Spermatogonium undergoes meiotic division leading to sperm formation.

Sertoli cell : Nourishes germ cells

Leydig cell : Synthesise and Secrete hormone androgen.

6. What are the various male accessory glands? Give their function.

Ans. The male accessory glands include paired seminal vesicles, a prostate gland and paired bulbourethral glands.

These glands secrete seminal plasma rich in fructose, calcium and certain enzymes.

Secretions of bulbourethral glands help in lubrication of the penis.

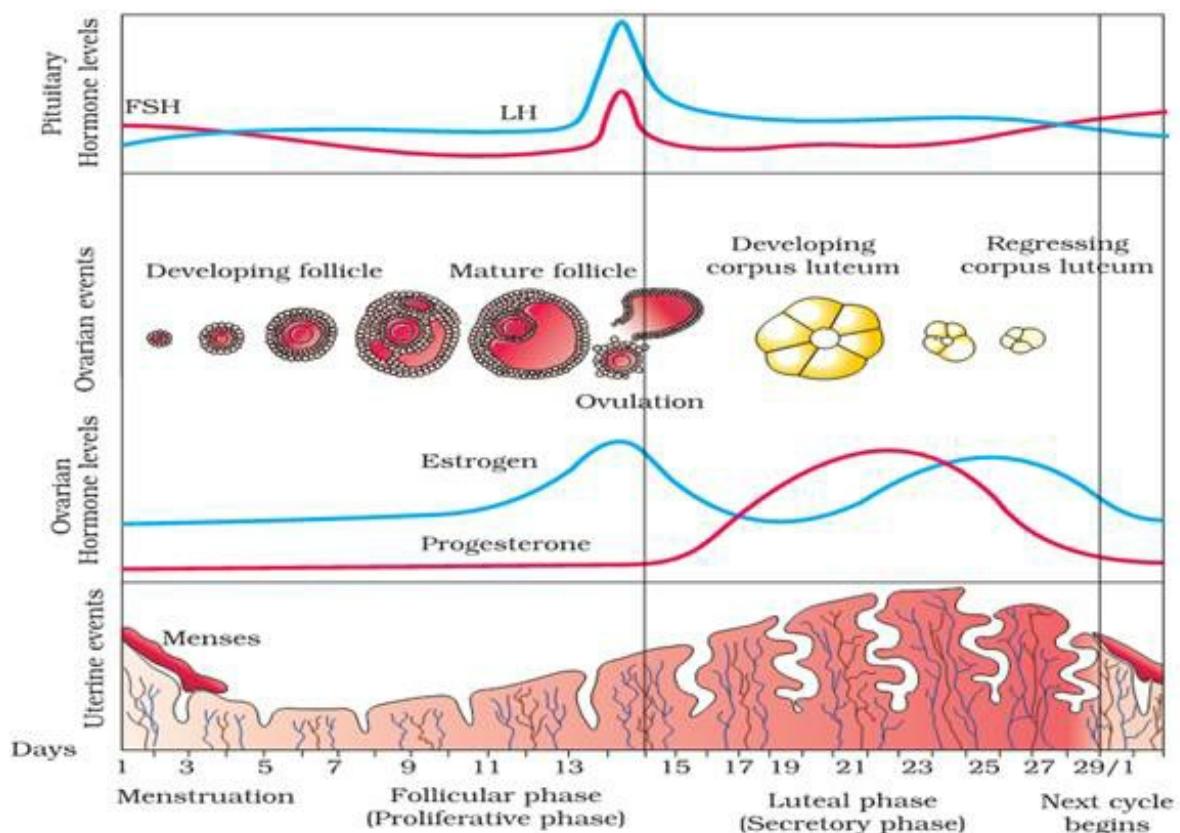
7. Explain the menstrual cycle with a diagram.

Ans. Menstrual cycle has three phases: menstrual, proliferative and secretory.

a) Menstrual Phase: The phase lasts for 3-5 days in human females and during this period the endometrial lining of the uterus is cast off and is slowly passed out from vagina as a mixture of blood.

b) Proliferative or Follicular Phase: It lasts for 11 days between 6th to 16th day of the cycle. During this phase one ovarian follicle is changed into Graafian follicle and the endometrial layer is rebuilt along with repair of the ruptured blood vessels. Estrogen increases. It ends with ovulation.

c) Secretory Phase: It lasts for 12 days between 17-28 days. The Graafian follicle is converted to Corpus Luteum. The endometrium grows and thickens further. Progesterone increases. It ends with the conversion of corpus luteum to corpus albic



8. Differentiate between spermatogenesis and oogenesis.

Ans.

| Spermatogenesis | Oogenesis |
|---|--|
| 1. It occurs inside the testes. | 1. It occurs inside the ovary. |
| 2. All the stages are completed inside the testes. | 2. Majority occurs inside the ovary but last stages occur in the oviduct. |
| 3. Spermatogonia develop from the germinal epithelium lining in the seminiferous tubules. | 3. Oogonia develop from the germinal epithelium overlying the ovary. |
| 4. All spermatogonia give rise to spermatocytes. | 4. Only few oogonia give rise to oocytes. |
| 5. Primary spermatocytes divide by meiosis | 5. Primary oocyte undergoes meiosis I to give rise to one secondary oocyte and a |

| | |
|--|--|
| I to give rise to two secondary spermatocytes | polar body. |
| 6. Secondary spermatocyte divides by meiosisII to give rise to two spermatids. | 6. Secondary oocyte divides by meiosisII to form the ovum and the second polar body. |
| 7. Each spermatid differentiates into spermatozoan or sperm. | 7. No differentiation is required after meiosisII. |
| 8. The sperms formed are motile. | 8. The ovum or egg is non- motile. |

9. ‘A fertilized egg is the blue print of future development’. Explain

Ans. The sperm carries the genetic information from the father in form of 23 chromosomes (including the male sex chromosome X or Y) while the egg bears the genetic information from the mother (including the female sex chromosome X). Thus during fertilization the fusion of the male and the female gametes produce new genetic combination which introduces variation in the progeny. The zygote or the fertilized egg contain the genetic information which accordingly controls the development of the embryo.

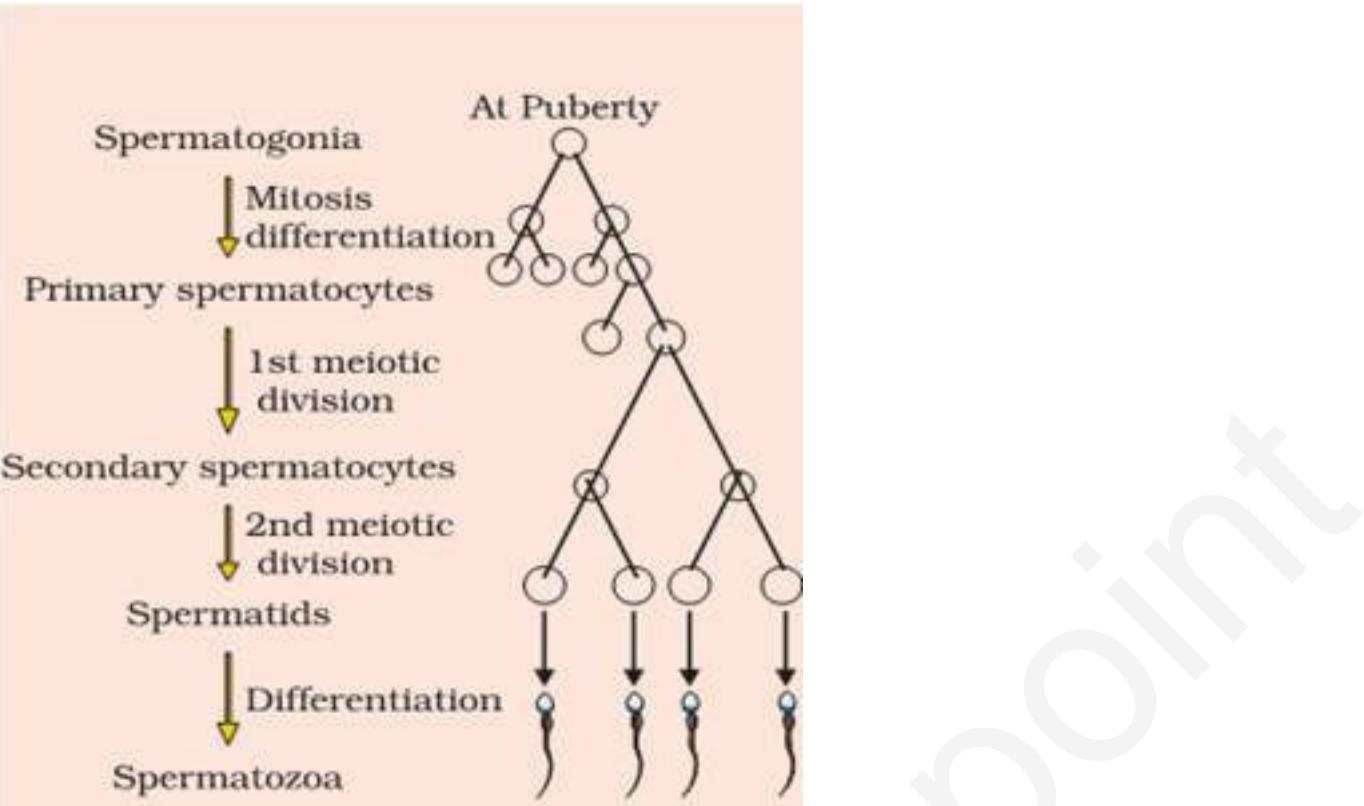
10. Briefly describe the stages of spermatogenesis in human?

Ans. Spermatogenesis consists of two phases:-

I. FORMATION OF SPERMATIDS :- It further consists of 3 phases

1. Multiplication phase :- undifferentiated germ cells undergo repeated division to produce sperm mother cell or spermatogonia.
2. Growth phase :- Spermatogonia increase in volume & is now called PRIMARY SPERMATOCYTES.
3. Maturation phase: - primary spermatocyte undergoes meiosis I to produce small size haploid secondary spermatocyte secondary spermatocyte divides by meiosis – II & forms haploid Spermatids.

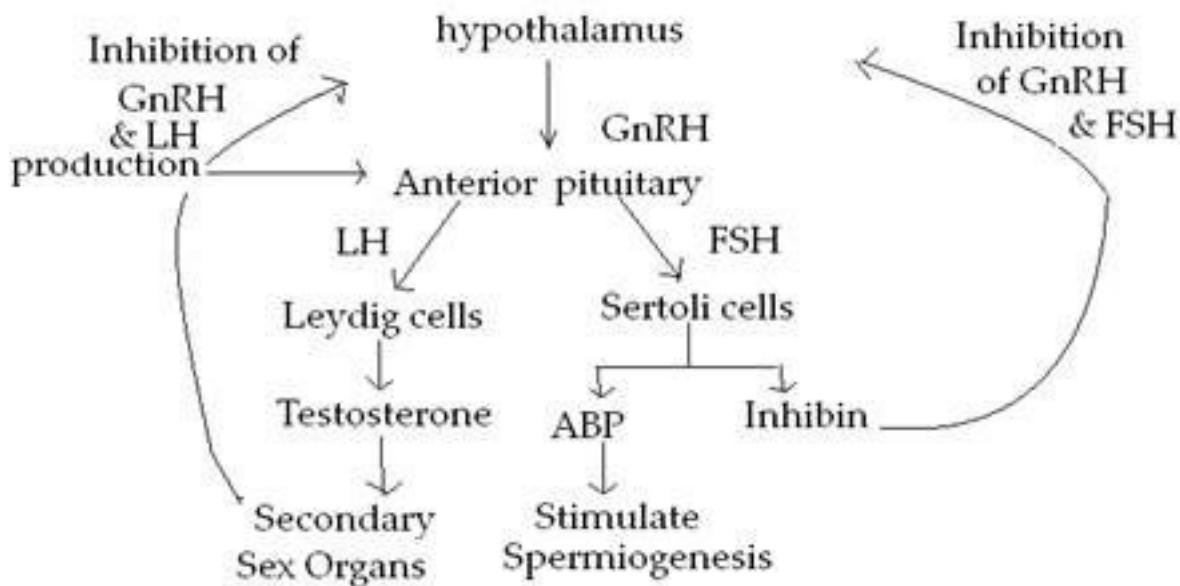
II. FORMATION OF SPERMS :- The transformation or differentiation of spermatids into spermatozoa or sperm is called spermiogenesis & occurs under the influence of FSH



11. Describe the hormonal control of human male reproduction system with the help of a flow chart & highlight the inhibitory & stimulatory directions in it?

Ans. i) Spermatogenesis is initiated due to an increase in the secretion of Gonadotropin releasing hormone from hypothalamus at the age of puberty.

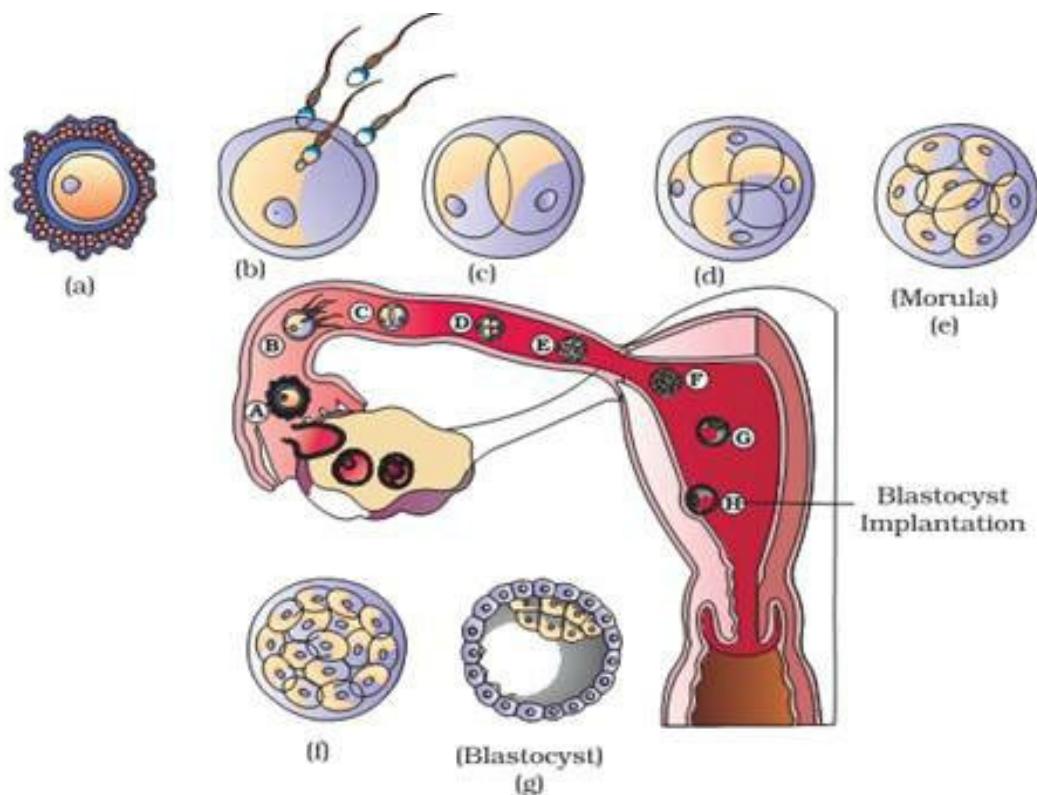
1. The increased levels of GnRH act on anterior pituitary & stimulate the secretion of two gonadotropins i.e. leuteinizing hormone (LH) & follicle stimulating hormone (FSH)
2. LH acts on Leydig cells & stimulate them to secrete testosterone
3. FSH acts on Sertoli cells & stimulate secretion of some factors help in spermiogenesis



12. A sperm has just fertilized a human egg in the fallopian tube. Trace the events that the fertilized eggs will undergoes upto implantation of blastocyst in the uterus.

Ans. 1. CLEAVAGE :-Fertilized egg starts dividing by specific mitotic divisions called cleavage. The zygotes undergoes mitotic division in the isthmus of oviduct to form daughter cell the cells formed as a result of cleavage called blastomere

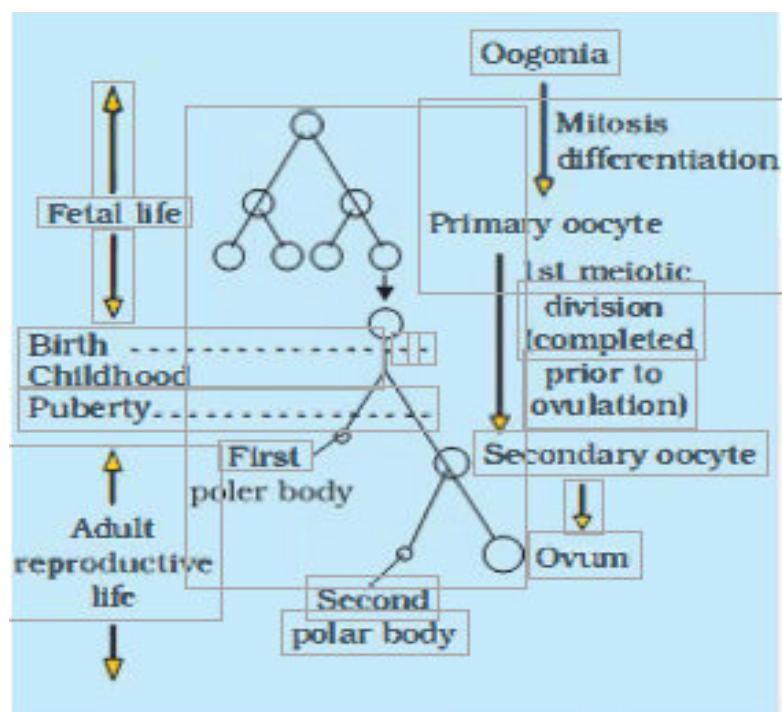
2. BLASTOCYST :- 3-4 days after fertilization, the morula twins into large mass of cells called blastocyst Outer peripheral cells enlarge & flatten further & form trophoblast. Trophoblast cells secrete a fluid into interior & form a cavity called blastocoel. The embryonic stage with blastocoels is called blastula.



13. Where oogenesis does takes place. Describe the stages of this process?

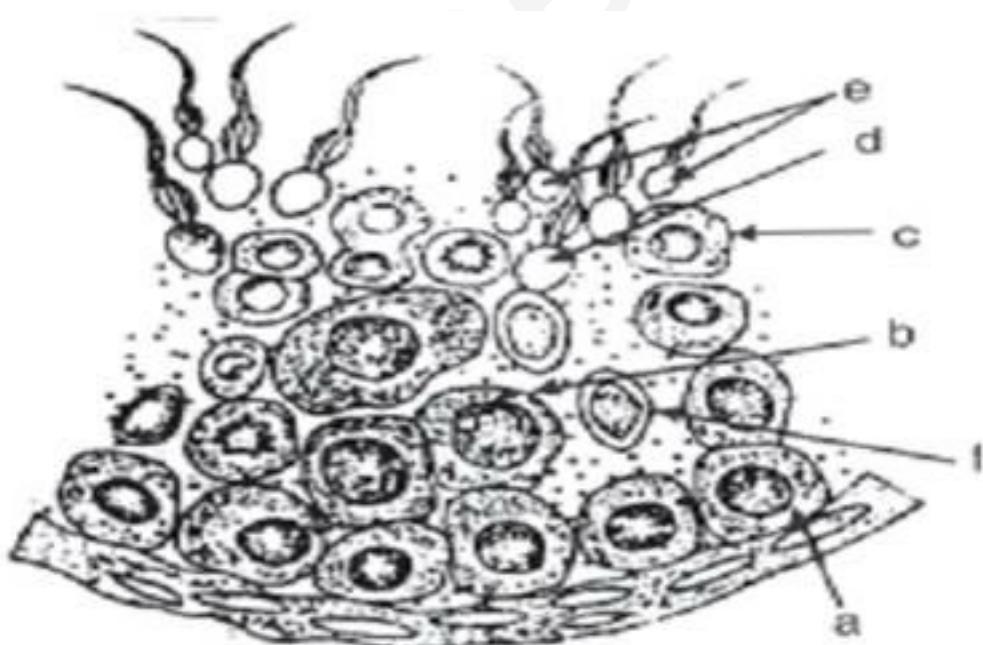
Ans. The process of formation & maturation of ovum is called oogenesis. It takes place in ovary & is initiated during embryonic development of female foetus. It consists of 3 phases :-

1. Multiplication phase :- The primordial germ cells divide by meiosis to produce oogonia. These oogonia divide lay repeated mitotic divisions forming clusters. In each cluster only one of them enters into growth phase & is called primary oocyte.
2. Growth phase :- Growth phase occurs only after attainment of puberty. It involves – increase in size of oocyte to many folds & synthesis of yolk.
3. Maturation phase :- The first division is meiotic as a result two haploid (n) cells are produced. In this division, cytokinesis is unequal, large daughter cell with almost all cytoplasm is called secondary oocyte & smaller one with less cytoplasm is called polar body. The secondary oocyte then undergoes second meiotic division to form an ovum & second polar body.



5 Marks Questions

1.



Ans. (i) 'D' Spermatids = undergo spermiogenesis

(ii) 'A'= Spermatogonium; B = Primary spermatocyte

(iii) 'B' = Diploid E = Haploid

(iv) 'F' = Sertoli cells - Nutrition to germ cells

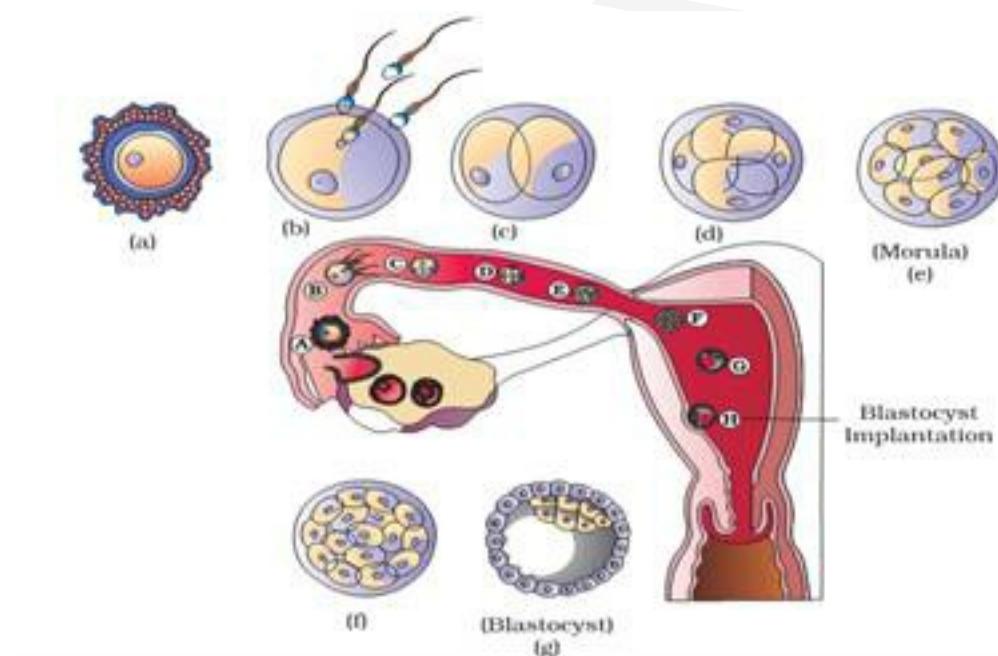
(v) Mitosis in Cell 'A', Meiosis in cell 'B'

2. Explain the development of human embryo with diagrams.

Ans. The Fusion of the sperm and the egg in humans result into formation of the diploid structure called zygote. The zygote starts dividing mitotically as it moves through the oviduct into the uterus to form 2,4,8,16 daughter cells called blastomeres. The stage is called morula. The Morula divides further and differentiates into blastocysts. The outer layer of blastomeres called trophoblast gets attached to the endometrial layer of the uterus.

The uterine wall divides and encloses the blastocysts and this is referred to as implantation.

The inner layer of blastomeres in the blastocysts gives rise to the embryo.

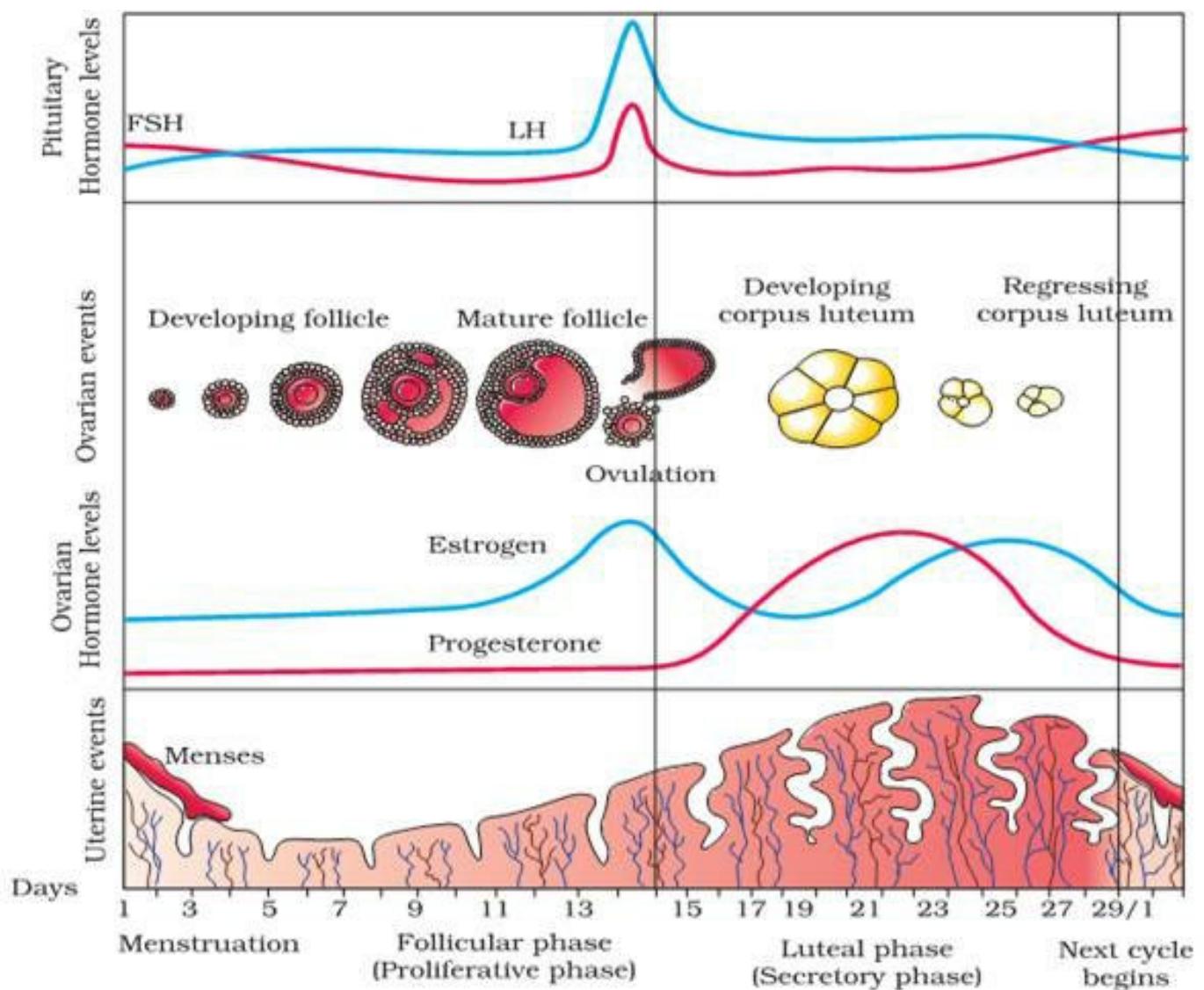


3. What is menstruation? What are the specific actions of FSH, LH, estrogen & progesterone in menstrual cycle?

Ans. During menstrual phase of menstrual cycle which starts on 28th day the endometrial lining of female genital tract break down due to lack of progesterone As a result bleeding occurs. This monthly flow of blood is called menstruation.

During menstrual cycles, the various changes occurs in the ovary under the influence of various hormones :-

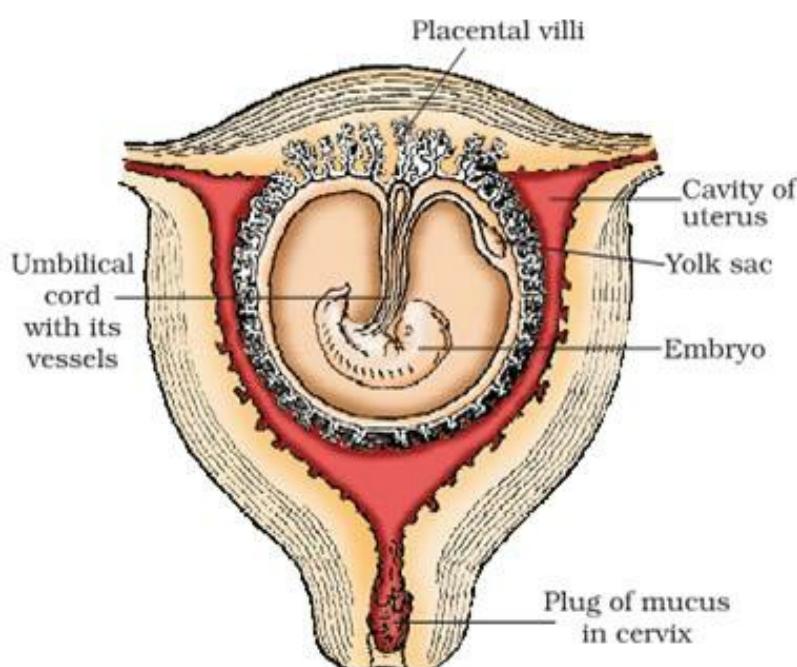
1. Menstrual phase :- The levels of hormones LH ,FDH estrogen & progesterone is very less which results in breakdown of endometrial lining of uterus.
2. Follicular phase :- In this phase , the levels of pituitary hormones FSH & LH increases which causes ovarian hormone estrogen to release,. FSH controls the follicular phase , it stimulates the growth of follicles. Both FSH & LH reach their peak level in middle of cycle (14th day)
3. OVULATORY PHASE :- The level of LH hormones reaches its peak (called LH swing) induces the ruptures of mature Graffian follicle & there by release of ovum
4. Luteal phase :- The LH & FSH hormones begins to decline. After ovulation, the follicle becomes to ruptures & is transformed into corpus Luteum which secretes large quantities of progesterone



4. A woman has conceived & implantation has occurred within her uterus. Discuss the sequence of changes up to parturition which will take place within her body under the influence of various hormones.

Ans. The following changes takes place in the body of women after implantation :-

1. The trophoblast differentiates into two layers outer layer secretes enzymes to dissolve the endometrium of uterus.
2. The inner layer grows out as finger – like projections called chorionic villi into uterine stoma. The chorionic villi & the uterine tissue become interdigitated to form structural & functional unit called placenta.
3. Placenta secretes hormones like HCG, HPL , estrogen & progesterone that are necessary to maintain pregnancy
4. Umbilical cord, the structure that connects the placenta with the foetus is formed.
5. Simultaneously, inner cell mass differentiates into outer layer called ectoderm & inner layer called endoderm. & a middle layer called mesoderm appears between ectoderm & endoderm.
6. The primary germ layers give rise to all the tissues & organs of the adults e.g. after one month heart is formed & after second month digits & limbs are formed.
7. By the end of ninth month of pregnancy, foetus is completely developed & is ready for delivery.
8. During parturition, ovary secretes a hormone called relaxin that facilitates parturition which softens the connective tissue. Mild contraction called foetal ejection reflex is induced. This triggers release of oxytocin from posterior pituitary. Oxytocin induces stronger leads to expulsion of baby from uterus, through birth canal.



**CBSE Class 12 Biology
Important Questions
Chapter 4
Reproductive Health**

1 Marks Questions

1. Give the term for prenatal diagnostic technique aimed to know the sex of developing foetus and to detect congenital disorders.

Ans. Amniocentesis.

2. After a successful in vitro fertilisation, the fertilised egg begins to divide. Where is this egg transferred before it reaches the 8-celled stage and what is this technique called?

Ans. Fallopian tube; Zygote intra fallopian transfer (ZIFT)

3. Give the term for rapid population growth.

Ans. Population explosion.

4. Name the fluid from which foetal cells are extracted for chromosomal analysis.

Ans. Amniotic fluid.

5. Give technical name of female used to bring up in vitro fertilized egg to maturity.

Ans. Surrogate mother.

6. Name the oral contraceptive developed by CDRI, Lucknow.

Ans. Saheli

7. What is the WHO's interpretation of reproductive health?

Ans. WHO defines reproductive health as total well being in all respects of reproduction including physical, emotional, behavioural and social.

8. Why has the Government imposed a statutory ban on amniocentesis?

Ans. The Government has banned amniocentesis to check on the incidences of female foeticides.

9. Expand MTP and ICSI.

Ans. MTP: Medical Termination of Pregnancy.

ICSI: Intra Cytoplasmic Sperm Injection.

10. What is lactational amenorrhoea?

Ans. It refers to absence of menstruation during period of intense lactation.

11. Write the scientific name of causative agents of :-

i) Syphilis

ii) Gonorrhoea.

Ans. (i) Treponema Pallidum

(ii) Neisseria Gonorrhoea

12. Name the technique by which one can disorder any possible chromosomal or metabolic disorders in foetus.

Ans. Amniocentesis.

13. Expand the following :-

i) GIFT

ii) ICSI

iii) IUCD

Ans. (i) Gamete Intrafallopian transfer.

(ii) Intra Cytoplasmic Sperm injection

(iii) Intra uterine contraceptive devices.

2 Marks Questions

1. Lactational Amenorrhea is a method of contraception Justify. What is the maximum effectiveness of this method in terms of period/duration?

Ans. (a) Ovulation and menstrual cycle do not occur during the period of intense lactation following parturition. Therefore, as the mother breast feeds, chances of conception are nil.

(b) It is effective only upto a maximum period of six months following parturition.

2. How are non medicated IUDS different from hormone releasing IUDS? Give examples.

Ans. (a) Non medicated IUDs = Lippes loop, Copper releasing IUDS (CuT, Multiload 375) ® These increase phagocytosis of sperms within uterus and release copper ions which suppress sperm motility and fertilizing capacity of sperm.

(b) Hormone releasing IUDs - Progestasert, LNG-20 -These makes uterus unsuitable for implantation and the cervix hostile to sperms.

3. What are implants? How do they help in preventing fertilisation?

Ans. The structures which contain hormones like progesterone and estrogen and are placed under the skin.

4. Briefly explain two natural barriers for birth control.

Ans. Periodic abstinence couple should avoid coitus from 10th to 17th day of menstrual cycle. Coitus interruptus Male partner withdraws his penis from the vagina just before ejaculation of semen.

5. Enlist any four possible reasons for infertility in human beings.

Ans. Physical, congenital disease, Drugs, Immunological and even psychological (any four).

6. What does GIFT represent?

Ans. It is the introduction of two unfertilized oocytes and several sperms into the fallopian tube of a woman desirous to be a mother through laproscope. The eggs may be hers or a donor's. The sperms may be of her husband's or of a donor. Fertilisation occurs in vivo and the development of the foetus takes place through natural process.

7. How does Cu-T act as a contraceptive?

Ans. It is an intrauterine device having ionized copper. The copper diffuses into the uterus and brings about the release of toxic cytokines. They inhibit sperm motility and therefore fertilization of ovum.

8. Mention any four probable reasons for the rapid rise of population in our country?

Ans. The probable reasons could be:

- Steady decline in the death rate due to improved health services.
- Early marriages especially in certain rural areas.
- Lack of education among the poor and they fail to understand the ill effects of a large family.
- Longer life span.

9. Identify the device used for the following methods of birth control: Barrier, IUD, Surgical technique and Administering hormone.

Ans. Barrier: Condom, IUD: Copper –T, Surgical technique: Vasectomy or Tubectomy, Administering Hormone : Oral Pill.

10. What are STDs? Mention any two of it.

Ans. Diseases or infections transmitted through sexual intercourse are collectively called Sexually Transmitted Diseases or STDs. Ex: Syphilis and Gonorrhoea.

11. “Removal of Gonads cannot be a contraceptive option”. Why?

Ans. Because in this methods, gonads are surgically removed it will lead to infertility & both male & female will be dependent on hormones in their remaining life to regulate functioning of many reproductive org.

12. What are MTPs ? Under what conditions MTPs are legally permitted?

Ans. MTP refers to as medical termination of pregnancy. It is legalized in our country only:-

1. in case of rape.
2. in case of casual unprotected intercourse
3. in case pregnancy is harmful for foetus or for mother.

13. Describe the technique which is used for sex determination in foetus?

Ans. Amniocentesis is the prenatal diagnosis in which sample of amniotic fluid from womb of a pregnant women is taken during early stages of foetal development, the cells are cultured & analyzed to determine the sex of foetus.

14. What are test tube babies? Are they different from normal babies?

Ans. The baby produced by conceiving eggs & sperms in a culture tube (envitro fertilization) & nursing in the uterus is called a test – tube baby. They are same as normal babies only the fertilization for such zygote occurs in in-vitro conditions.

15. Mention any four objectives of RCHC.

Ans. RCHC refers to a popular programme called “Reproductive & child health care (RCHC) & the major tasks under these programmes are :-

1. Creating awareness about various reproduction related aspects eg. STDs, birth control methods.
2. Providing facilities & support for building up reproductive healthy society.
3. Educating people about care of pregnant women, important of breast feeding.
4. awareness about sex abuse & sex related crimes

3 Marks Questions

1. Give another name for sexually transmitted diseases. Name two sexually transmitted diseases which are curable and two diseases which are not curable.

Ans. Veneral disease (VD)/Reproductive tract infection (RTI)

Curable : Syphilis, Gonorrhoea

Non Curable : Hepatitis B, AIDS, Genital herpes

2. Differentiate between Vasectomy and Tubectomy.

Ans.

| | Vasectomy | Tubectomy |
|----|--|---|
| 1. | Method of sterilisation in males | 1. Method of sterilisation in females. |
| 2. | Vasa efferentia of both sides are cut and tied | 2. Fallopian tube of both sides are cut and tied. |
| 3. | Prevents movement of sperms at cut end. | 3. Prevent movement of egg at cut end. |

3. Name the techniques which are employed in following cases :

- (a) Transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce ova but can provide suitable environment for fertilisation and development.**
- (b) Embryo is formed in laboratory in which sperm is directly injected into ovum.**
- (c) Semen collected either from husband or a healthy donor is artificially introduced either into vagina or uterus.**

Ans. (a) Gamete intra fallopian transfer.

(b) Intra cytoplasmic sperm injection

(c) Intra uterine insemination.

4. Mention the various precautions one has to take in order to protect himself/herself from STDs.

Ans. (i) Avoid blood transfusion from an infected person.

(ii) Avoid sex with an unknown partner or multiple partners.

(iii) Always use condom.

(iv) Avoid sharing of injections needles and syringes and surgical instruments.

5. What are the disturbing trends observed regarding MTP?

Ans. Majority MTPs performed illegally by unqualified quacks, misuse for female foeticide.

6. Enlist any three causes of infertility in men and women.

Ans. Reasons for infertility in men and women are:

7. State the consequences of over population.

Ans. The consequences of overpopulation are :

- An increase demand and therefore pressure on the natural resources.
- An increase in the level of pollution.
- More number of unemployment, poor infrastructure and pressure on the country's economy.

8. Differentiate between natality rate and mortality rate.

Ans.

| Natality rate (Birth rate) | Mortality rate (Death rate) |
|---|--|
| 1. It is the number of births per one thousand individuals per year. | 1. It is the number of deaths per one thousand individuals per year. |
| 2. It is the rate at which the new members are added to the population by reproduction. | 2. it is the rates at which the individuals die out. |
| 3. It increases population size and population density. | 3. It decreases population size and population density. |

9. Explain any one natural method of birth control.

Ans. One of the natural methods of birth control is Periodic abstinence or Rhythm method. The couple avoids or abstains from coitus from day 10 to 17 of the menstrual cycle because ovulation occurs during this period and therefore the period is highly fertile. The method is based on the facts the ovum remains alive for 1-2 days and the sperm remains alive for about 3 days. The effectiveness of this method is limited as most of the women have irregular menstrual cycle.

10. Give three differences between tubectomy and vasectomy.

Ans.

| Vasectomy | Tubectomy |
|--|---|
| 1. It is a sterilization technique for men. | 1. It is a sterilization technique for women. |
| 2. The two vasa differentia are cut and tied up. | 2. The two oviducts are cut and tied up. |
| 3. Passage of sperms is prevented. | 3. Passage of ova is prevented. |

11. Describe the three manners in which fertilization of human ovum by sperm can be prevented?

Ans. I. NATURAL METHODS : avoiding chances of meeting between the gametes.

1. Periodic Abstinence :-couples avoid coitus from 10-17th day of menstrual cycle when ovulation is expected.
2. Lactational Amenorrhoea :- absence of menstruation during intense lactation.

II. BARRIER METHODS :- ovum & sperms are prevented from coming closer with the help of barriers.

1. Condoms :- barriers made up of thin rubber or latex sheath to cover penis in males or cervix in females.
2. Diaphragms cervical caps :- made up of rubber & are reusable
3. Spermicidal creams along with these barriers

1. **SURGICAL METHODS** :- blocks transport of gametes & thereby conception.

1. Vasectomy :- small portion of vas deferens is removed or tied up through incision in scrotum.
2. Tubectomy :- small portion of fallopian tube is removed or tied up through vagina.

12. Suggest some methods to assist infertile couples to have children?

Ans. Three are special techniques called Assisted Reproductive Technologies (ART) to help infertile couples to have children:-

1. Test tube Baby Programme :- In this method, ova from wife or donor female & Sperm from husband are allowed to fuse under simulated conditions in the laboratory it is called In-vitro fertilization (IVF). The zygote is then transferred into uterus or fallopian tube this process is called embryo transfer (ET)
2. Gamete Intra fallopian Transfer (GIFT) :- It involves transfer of an ovum collected from a donor female into another female who cannot produce ova but can provide suitable condition for fertilization
3. Artificial Insemination: - In this method semen is collected from the husband or a healthy donor & is artificially introduced into vagina or uterus.

13. Briefly explain the various reproductive technologies to assist an infertile couple to have children.

Ans. Assisted Reproductive Technology (ART) includes in vitro fertilization-embryo transfer (IVF-ET), gamete intrafallopian transfer (GIFT), zygote intrafallopian transfer (ZIFT), and frozen embryo transfer (FET). These techniques also apply to oocyte donation and gestational carriers. Approximately 99 percent of ART cycles performed are IVF-ET. IVF-ET has helped many couples conceive successfully. ART may be recommended when other treatments (such as intrauterine insemination) have not been successful or when there is severe male factor infertility, severe endometriosis or tubal obstruction.

CBSE Class 12 Biology
Important Questions
Chapter 5
Principles of Inheritance and Variation

1 Marks Questions

1. Give any two reasons for the selection of pea plants by Mendel for his experiments.

Ans.(i) Many varieties with contrasting forms of characters

(ii) Can easily be cross pollinated as well as self pollinated.

2. Name any one plant that shows the phenomenon of incomplete dominance during the inheritance of its flower colour.

Ans. Dog flower (Snapdragon or Antirrhinum sp.)

3. Name the base change and the amino acid change, responsible for sickle cell anaemia.

Ans. GAG changes as GUG, Glutamic acid is substituted by valine.

4. Name the disorder with the following chromosome complement.

(i) 22 pairs of autosomes + X X Y

(ii) 22 pairs of autosomes + 21st chromosome + XY.

Ans.(i) Klinefelters Syndrome **(ii)** Downs syndrome

5. A haemophilic man marries a normal homozygous woman. What is the probability that their daughter will be haemophilic?

Ans. Their daughter can never be haemophilic. (0%).

6. A test is performed to know whether the given plant is homozygous dominant or heterozygous. Name the test and phenotypic ratio of this test for a monohybrid cross.

Ans. Test cross 1 : 1.

7. Name the phenomena that occur when homologous chromosomes do not separate during meiosis.

Ans. Non – disjunction.

8. Name one trait each in humans & in drosophila whose genes are located on sex chromosome.

Ans. Humans - Colorblindness

Drosophila - Eye colour

9. What is meant by aneuploidy?

Ans. Aneuploidy is the phenomena of gain or loss of one or more chromosomes that results due to failure of separation of members of homologous pair of chromosomes during meioses.

10. What genetic principle could be derived from a monohybrid cross?

Ans. Law of dominance.

11. Which one change is the cause of sickle – cell anaemia ?

Ans. It is caused due to a point mutation at 6th position in B-chain of hemoglobin in which glutamic acid is replaced by valine.

12. What is a test cross?

Ans. It is a cross where offspring with dominant phenotype whose genotype is not known is crossed with an individual homozygous recessive for the trait.

13. What is mutagen? Give an example?

Ans. The physical or chemical agents that causes mutations are called mutagen eg x-rays, CNBr etc.

14. What was the total number of varieties of garden pea which Mendel had taken to start his experiment?

Ans. fourteen.

15. Name any one plant & its feature that shows the phenomena of incomplete dominance?

Ans. Antirrhinum majus which shows incomplete dominance in flower colour.

2 Marks Questions

1. Identify the sex of organism as male or female in which the sex chromosome are found as

(i) ZW in bird (ii) XY in Drosophila (iii) ZZ in birds. (iv) XO in grasshopper.

Ans. (i) Female; (ii) Male; (iii) Female (iv) Male

2. Mention two differences between Turner's syndrome and Klinefelter's syndrome.

Ans. Turners Syndrome : The individual is female and it has 45 chromosomes i.e., one X chromosome is less.

Klinefelters Syndrome : The individual is male and has 47 chromosomes i.e., one extra X chromosome.

3. The human male never passes on the gene for haemophilia to his son. Why is it so?

Ans. The gene for haemophilia is present on X chromosome. A male has only one X chromosome which he receives from his mother and Y chromosome from father. The human male passes the X chromosome to his daughters but not to the male progeny (sons).

4. Mention four reasons why Drosophila was chosen by Morgan for his experiments in genetics.

Ans. (i) Very short life cycle (2-weeks)

(ii) Can be grown easily in laboratory

(iii) In single mating produce a large no. of flies.

(iv) Male and female show many hereditary variations

(v) It has only 4 pairs of chromosomes which are distinct in size and Shape.

5. Differentiate between point mutation and frameshift mutations.

Ans. Point Mutations : Arises due to change in a single base pair of DNA e.g., sickle cell anaemia. Frame shift mutations : Deletion or insertion/duplication/addition of one or two bases in DNA.

6. Give any two similarities between behavior of genes (Mendel's factor) during inheritance & chromosomes during cell division.

Ans. (i) In diploid cells, the chromosomes are found in pairs just like that of mendelian factors.

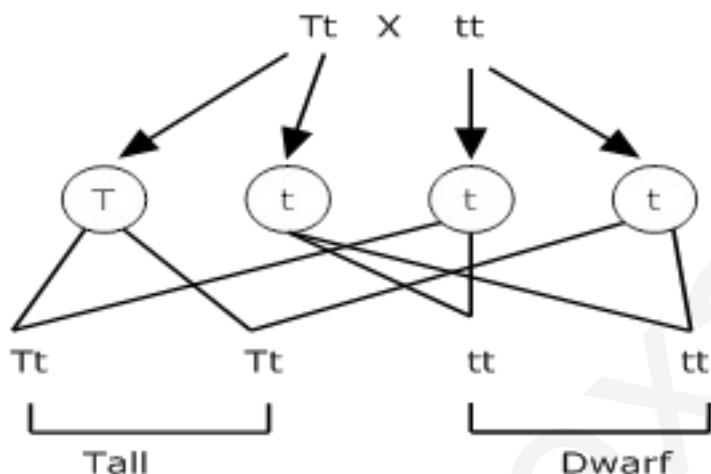
(ii) During meiosis, the chromosomes of different homologous pairs are assorted independently into gametes at random showing parallelism with mendelian factors.

7. Which law of Mendel is universally accepted? State the law?

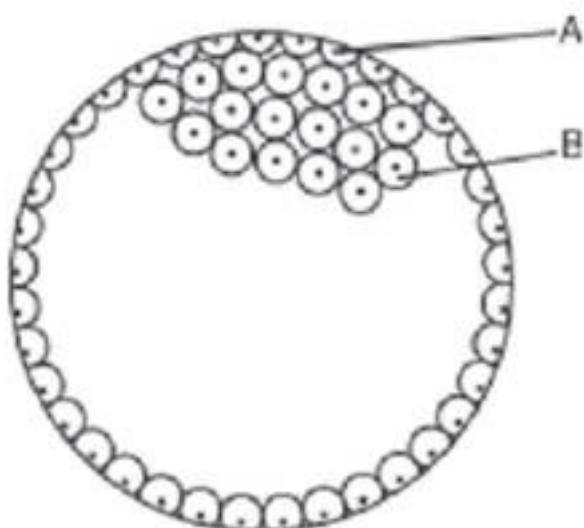
Ans. Mendel's law of segregation is universally accepted. It states that – “the two alleles of a gene remain separate & do not contaminate each other in F1 or the hybrid. At the time of gamete formation two alleles separate & pair into different gametes.

8. How will you find out whether a given plant is homozygous or heterozygous?

Ans. To test whether a plant is homozygous or heterozygous, test cross is performed in which individual is crossed with homozygous recessive for the trait. If plant is heterozygous, progeny of test cross consists of tall and dwarf plants in the ratio 1:1



If plant is homozygous, progeny of test cross will have all tall plants



9. Why do sons of haemophilic father never suffer from this trait?

Ans. Since haemophilic is a sex – linked character, it shows criss – cross inheritance i-e from father to his daughter therefore son of haemophilic father is never haemophilic.

10. How is the child affected if it has grown from the zygote formed by an XX-egg fertilized by Y-carrying sperm? What do you call this abnormality?

Ans. If a child has grown from the zygote formed by XX-egg fertilized by Y-sperm, the child will suffer from klinefiter syndrome & will have XXY genotype. It is characterized by prominent feminine characters e.g. tall stature with feminised physique, Breast development pubic hair pattern, poor beard growth & sterility.

11. The map distance in certain organism between genes A & B is 4 units, between B & C is units, & between C & D is 8 units which one of these gene paves will show more recombination frequency? Give reason.

Ans. C& D will show maximum gene recombination because genes which are more closely linked, frequency of recombination is least & vice versa.

12. Give the chromosomal constitution & related sex in each of the following :-

i) Turner syndrome

ii) Klinefilter syndrome

ans. i) Turner syndrome – XO females containing 45 chromosomes & lacking one X-chr .

ii) Klinefilter syndrome XXY males containing 47chr, one extra X-chromosome in males.

13.What is pedigree Analysis? How is it useful?

Ans. The analysis of family history about inheritance of a particular trait in several generations of a family is called pedigree Analysis. It provides a strong tool which is utilized to trace inheritance of specific trait or abnormality or disease.

14. What are multiple alleles? Give an example?

Ans. The presence of more than two alleles of a trait is called multiple alleles e.g. in human beings four types of blood groups are recognized and there different alleles IA IB & IO of a gene determines the phenotype of four blood groups.

3 Marks Questions

1. A woman with O blood group marries a man with AB blood group

(i) work out all the possible phenotypes and genotypes of the progeny.

(ii) Discuss the kind of dominance in the parents and the progeny in this case.

Ans. (i) Blood group AB has alleles as IA, IB and O group has ii which on cross gives the both blood groups A and B while the genotype of progeny will be IAi and IBi.

(ii) IA and IB are equally dominant (co-dominant). In multiple allelism, the gene I exists in 3 allelic forms, IA, IB and i.

2. Explain the cause of Klinefelters syndrome. Give any four symptoms shown by sufferer of this syndrome.

Ans. Cause : Presence of an extra chromosome in male i.e., XXY. Symptoms : Development of breast, Female type pubic hair pattern, poor beard growth, under developed testes and tall stature with Feminized physique.

3. In Mendels breeding experiment on garden pea, the offspring of F₂ generation are obtained in the ratio of 25% pure yellow pod, 50% hybrid green pods and 25% green pods State (i) which pod colour is dominant (ii) The Phenotypes of the individuals of F₁ generation. (iii) Workout the cross.

Ans. (i) Green pod colour is dominant

(ii) Green pod colour

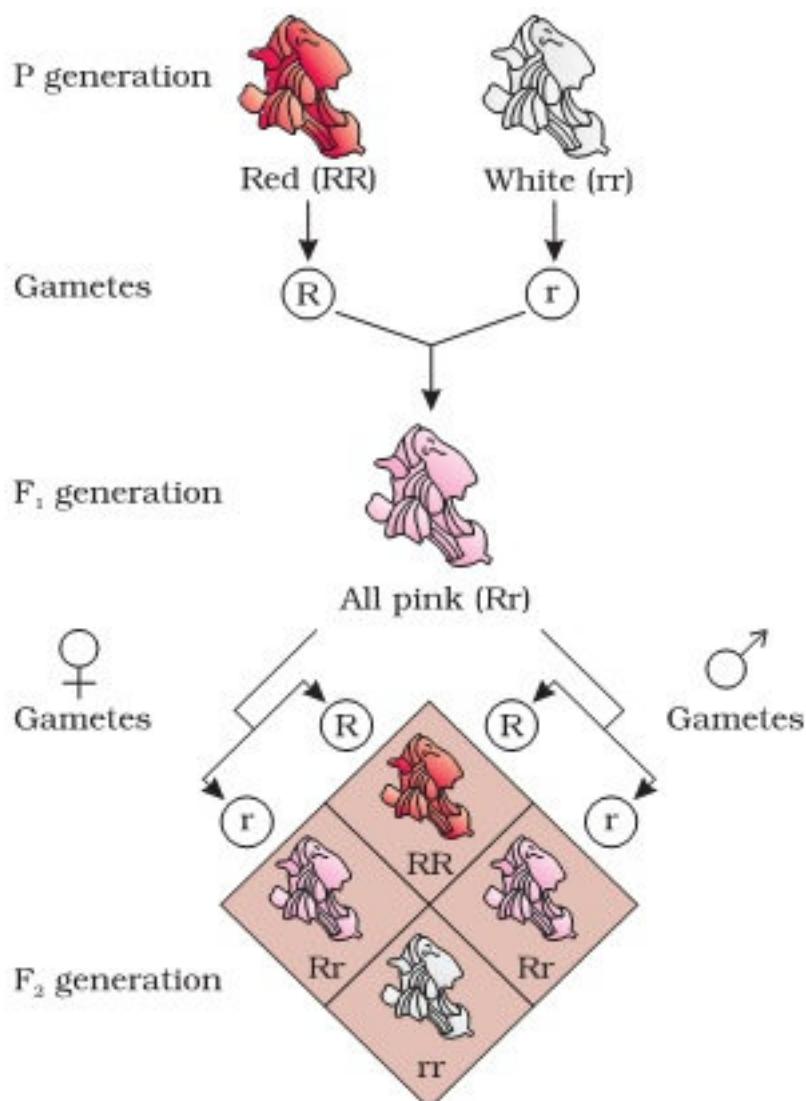
| | | | | | | |
|---------------|-----------|-----|-------------------|----|-----|-----|
| (iii) Parents | GG(green) | X | gg (yellow) | | | |
| Gametes | (G) | | (g) | | | |
| F1 generation | | | Gg (Hybrid green) | | | |
| Gametes | (G) | (g) | | X | (G) | (g) |
| F2 generation | GG | Gg | | Gg | gg | |

Phenotypic ratio 3 : 1

Genotypic ratio 1 : 2 : 1

4. In Antirrhinum majus a plant with red flowers was crossed with a plant with white flowers. Work out all the possible genotypes & phenotypes of F1 & F2 generations comment on the pattern of inheritance in this case?

Ans. The inheritance of flower colour in snapdragon or Antirrhinum majus is an example of incomplete dominance. When a cross was made between a red flowered plant & a white flowered plant, the F1 hybrid was pink i.e. an intermediate between red & white which means that both red & white are incompletely dominant. When F1 individuals were self-pollinated, the F2 generation consists of red, pink & white flower appears in ratio 1:2:1 respectively.

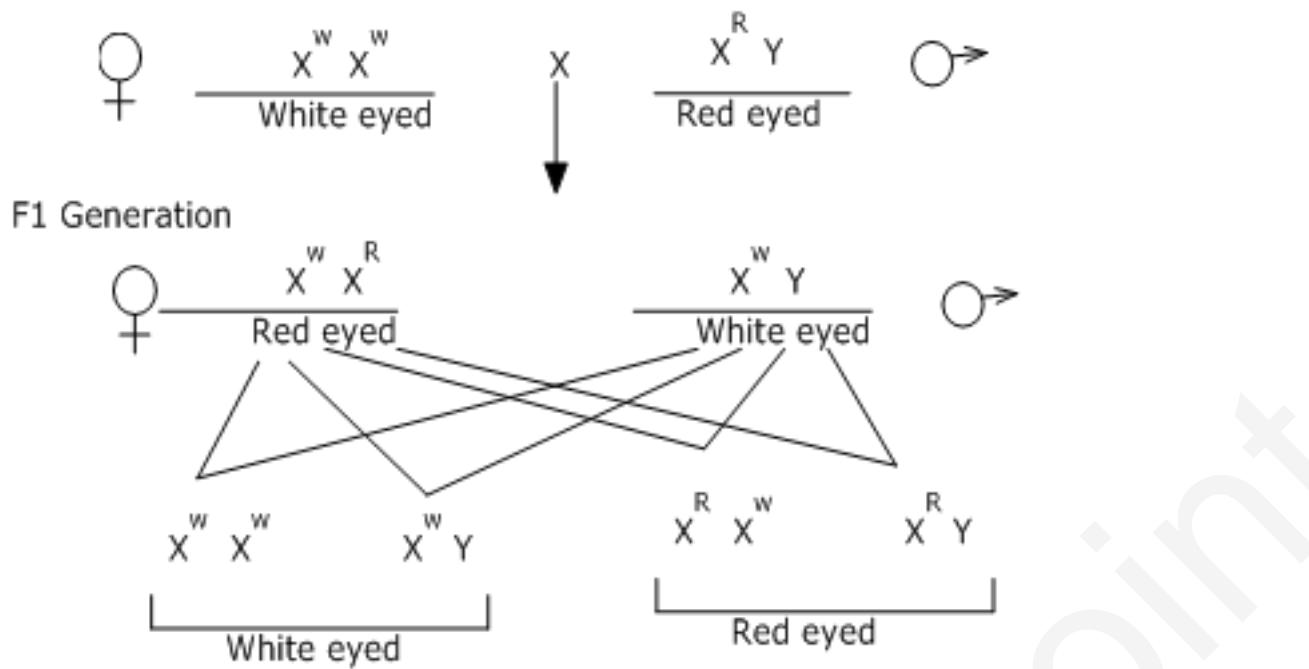


Phenotypic ratio : red : pink : white
1 : 2 : 1

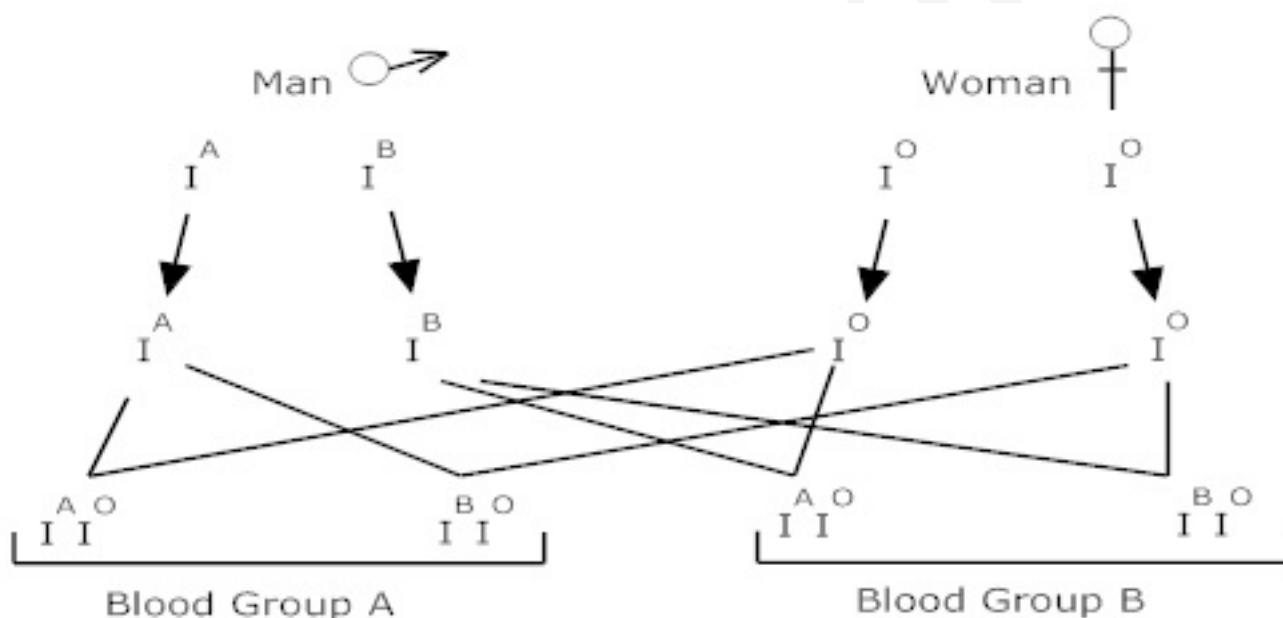
Genotypic ratio : RR : Rr : rr
1 : 2 : 1

5. A red eyed male fruitfly is crossed with white eyed female fruitfly. Work out the possible genotype & phenotype of F1 & F2 generation. Comment on the pattern of inheritance in this cross?

Ans. When a red eyed is crossed with white eyed female fruitfly, offspring will have both white eyed male & red eyed female in 1:1 ration in F1 generation. In F2 generation, 50% females will be red – eyed & 50% will be white eyed, similarly, in males 50% will be red eyed & 50% will be white eyed. This result indicates that in sex-linked genes, males transmit their sex-linked characters to their grandson through their daughter; such type of inheritance is called criss-cross inheritance –



6. A man with AB blood group marries a woman with O group blood.



(i) Work out all the possible phenotypes & genotypes of the progeny.

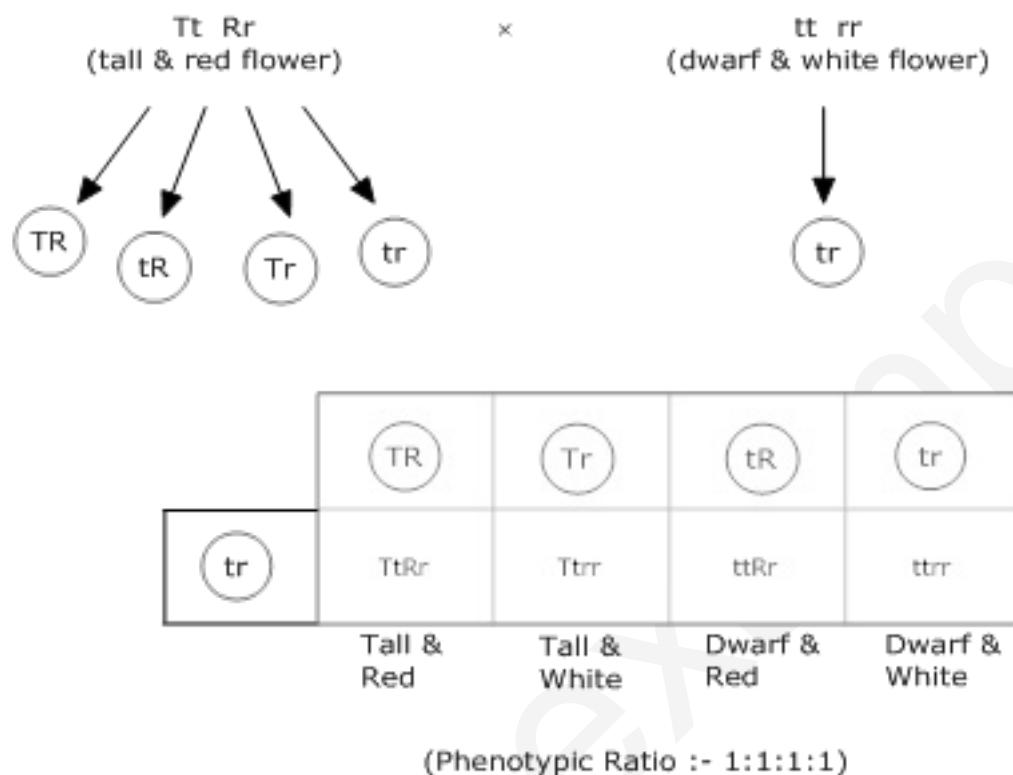
(ii) Discuss the kind of domination in parents & progeny in this case?

Ans. (i) Half the progeny will have blood group A with genotype IA IO & half the progeny will have blood group B with genotype IB IO.

(ii) IA & IB both the genes are dominant over IO gene hence progeny shows either blood group A or B while in parents since both the dominant genes are present together man will have blood group AB & this phenomena is called co-dominance.

7. In an cross made between a hybrid tall & red plant ($TtRr$) with dwarf & white flower ($ttrr$). What will be the genotype of plants in F1 generation?

Ans.



8. How sex is determined in human beings?

Ans. In human beings, it was found that all the females bear a pairs of X-chromosome while males have one X-chr & also one Y-chr which is comparatively smaller in size.

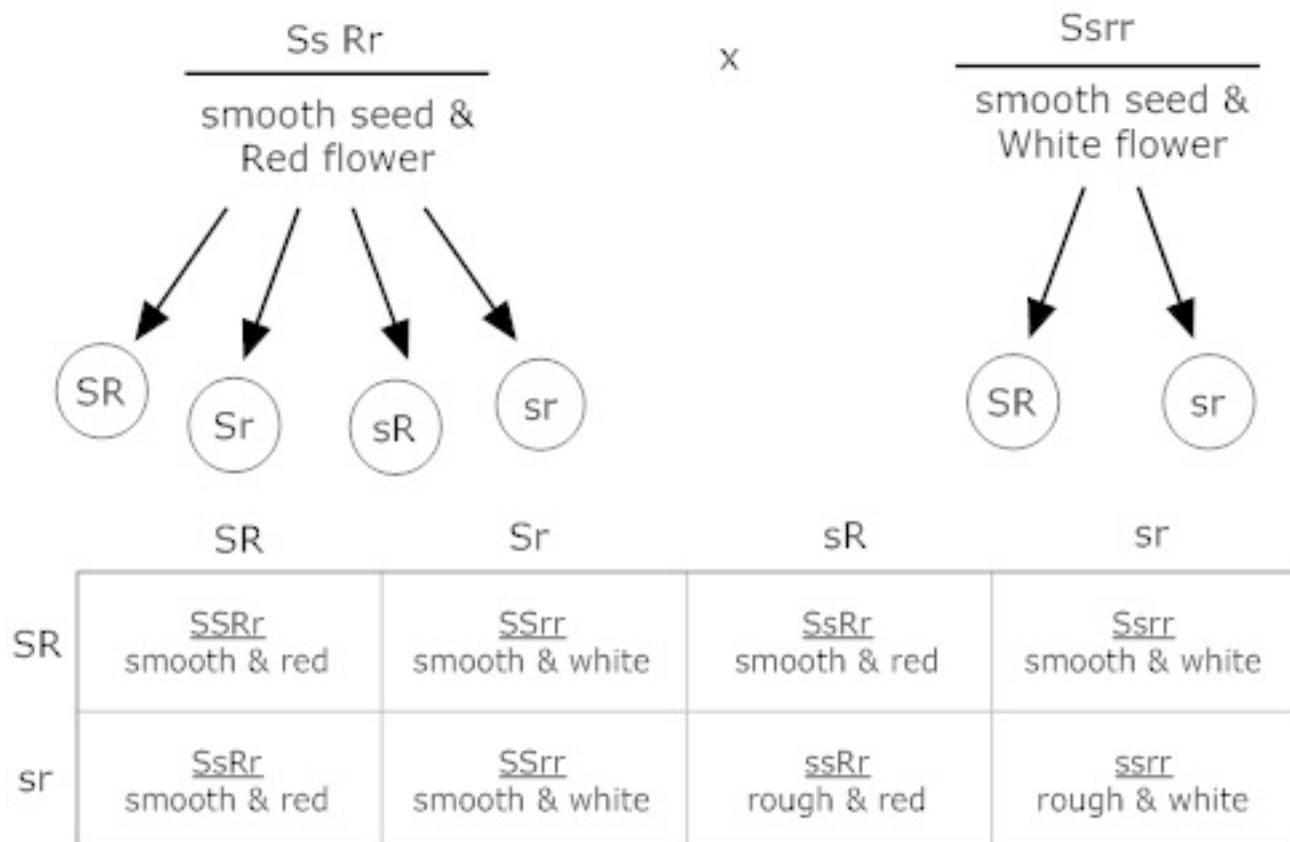
Thus in a cross between male & female there is equal probability of males & females in progeny & sex is determined by presence of a Y-chr. if Y-chr is present it is male otherwise it is a female.

9. A smooth seeded & red – flowered pea plant ($SsRr$) is crossed with smooth seeded &

white flowered pea plant (Ssrr). Determine the phenotypic & genotypic ratio in f1 progeny?

Ans.

1. Smooth seed & red flower =3
2. Smooth seed & white flower =3
3. Rough seed & red flower =1
4. Rough seed & white flower =1



5 Marks Questions

1. A dihybrid heterozygous round, yellow seeded garden pea (*Pisum sativum*) was crossed with a double recessive plant.

(i) What type of cross is this?

(ii) Work out the genotype and phenotype of the progeny.

(iii) What principle of Mendel is illustrated through the result of this cross?

Ans.(i) It is a dihybrid test cross

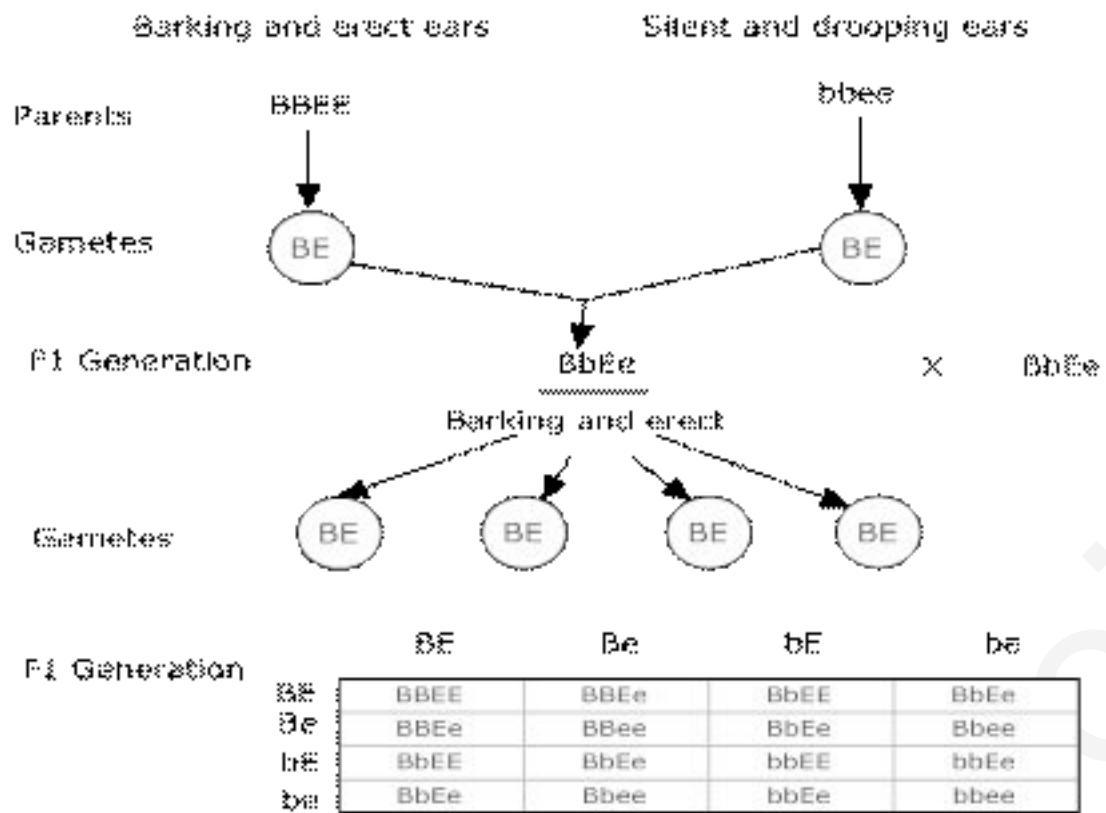
(ii)

| Gametes | (RY), (Ry), (rY), (ry) | X | (ry) | | | | | |
|--------------------------|------------------------|--------------------------|----------------------------|----------------------------|----------------------------|---|---|---|
| Gametes | RY | Ry | rY | ry | | | | |
| F ₁ , progeny | ry | RrYy Round, Yellow | Rryy Round and Green | rrYy Wrinkled Yellow | rryy Wrinkled, Green | | | |
| Phenotypic ratio | : | 1 | : | 1 | : | 1 | : | 1 |
| Genotypic ratio | : | 1 | : | 1 | : | 1 | : | 1 |

(iii) It illustrates the Principle of independent assortment.

2. In dogs, barking trait is dominant over silent trait & erect ears are dominant over drooping ears. What is the expected phenotypic ratio of offspring when dogs heterozygous for both the traits are crossed?

Ans.



Ration :- Barking & erect = 9

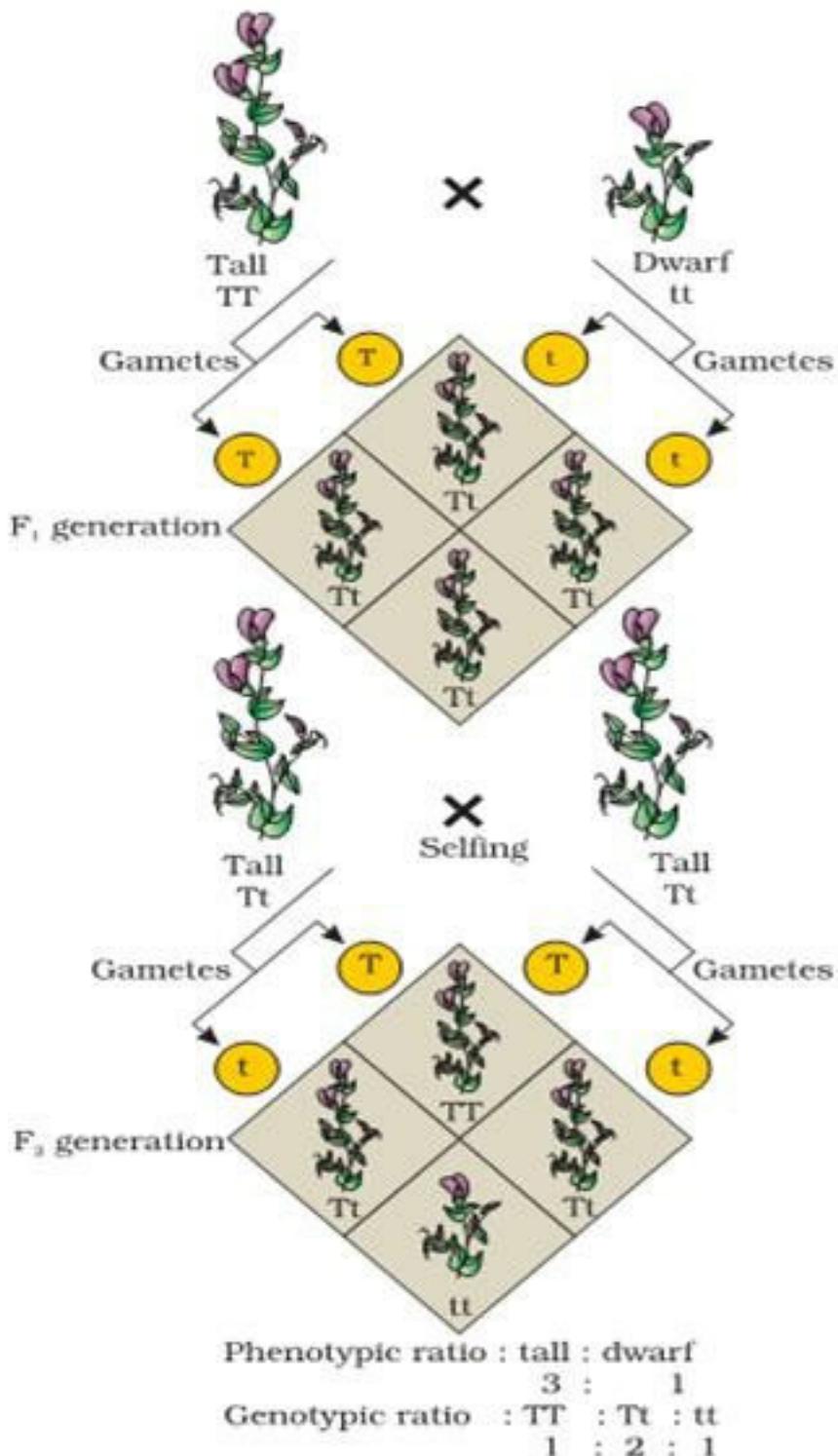
Barking & drooping = 3

Silent & erect = 3

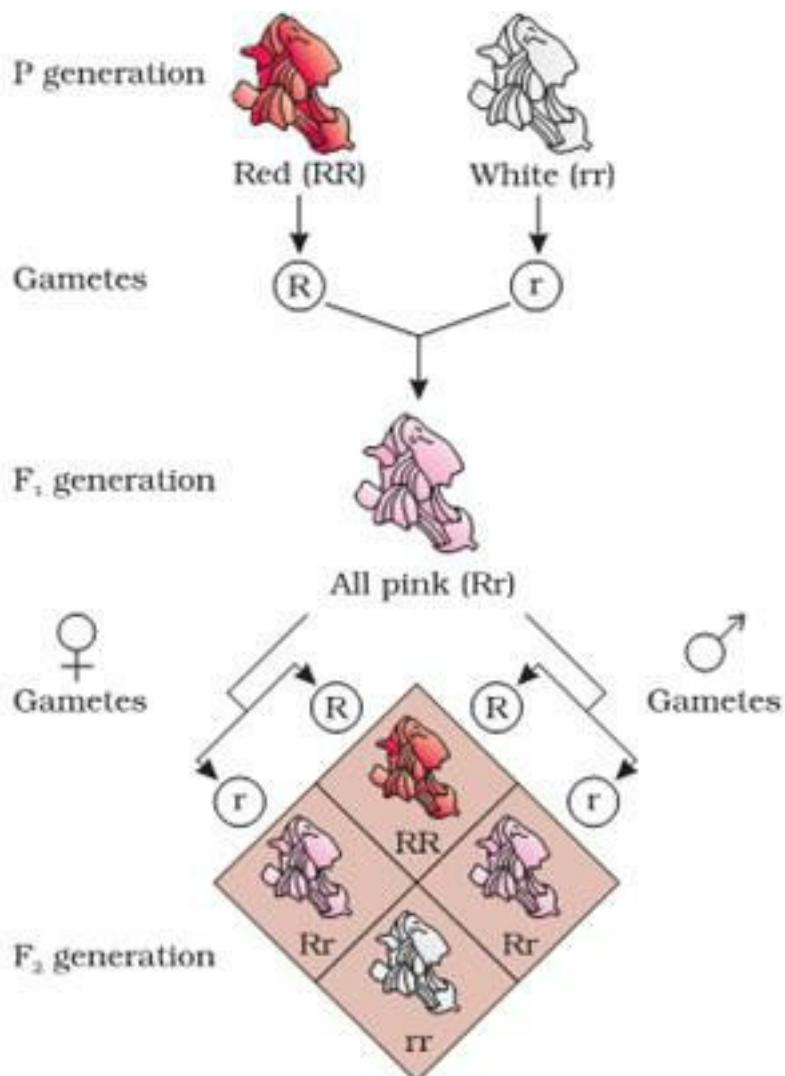
Silent & drooping = 1

Phenotypic ratio = 9 : 3 : 3 : 1

3. Differentiate between dominance, co-dominance & Incomplete dominance with one example each.



Ans. (i) Dominance :- When a cross is made between true – breeding tall pea plant & true – breeding dwarf pea plant, all the plants in F₁ generation are tall this shows that tall character is dominant over dwarf



Phenotypic ratio : red : pink : white
 1 : 2 : 1

Genotypic ratio : RR : Rr : rr
 1 : 2 : 1

(ii) Co-dominance :- If the two equally dominant genes are present together, both of them will be equally expressed, this phenomena is called co-dominance eg alleles of blood group IA & IB are dominant over IO but when both the alleles are present together, both of them will equally express & forms a phenotype AB.

| Allele from Parent 1 | Allele from Parent 2 | Genotype of offspring | Blood types of offspring |
|----------------------|----------------------|-----------------------|--------------------------|
| I^A | I^A | $I^A I^A$ | A |
| I^A | I^B | $I^A I^B$ | AB |
| I^A | i | $I^A i$ | A |
| I^B | I^A | $I^A I^B$ | AB |
| I^B | I^B | $I^B I^B$ | B |
| I^B | i | $I^B i$ | B |
| i | i | ii | O |

(iii) In complete dominance :- When a cross is made between two characters of which none of them is completely dominant then an intermediate character develops in the progeny eg. when a cross is made between red flower & white flower in snapdragon flower an intermediate pink colour appears in the progeny

4. A dihybrid heterozygous tall & yellow pea plant was crossed with double recessive plant.

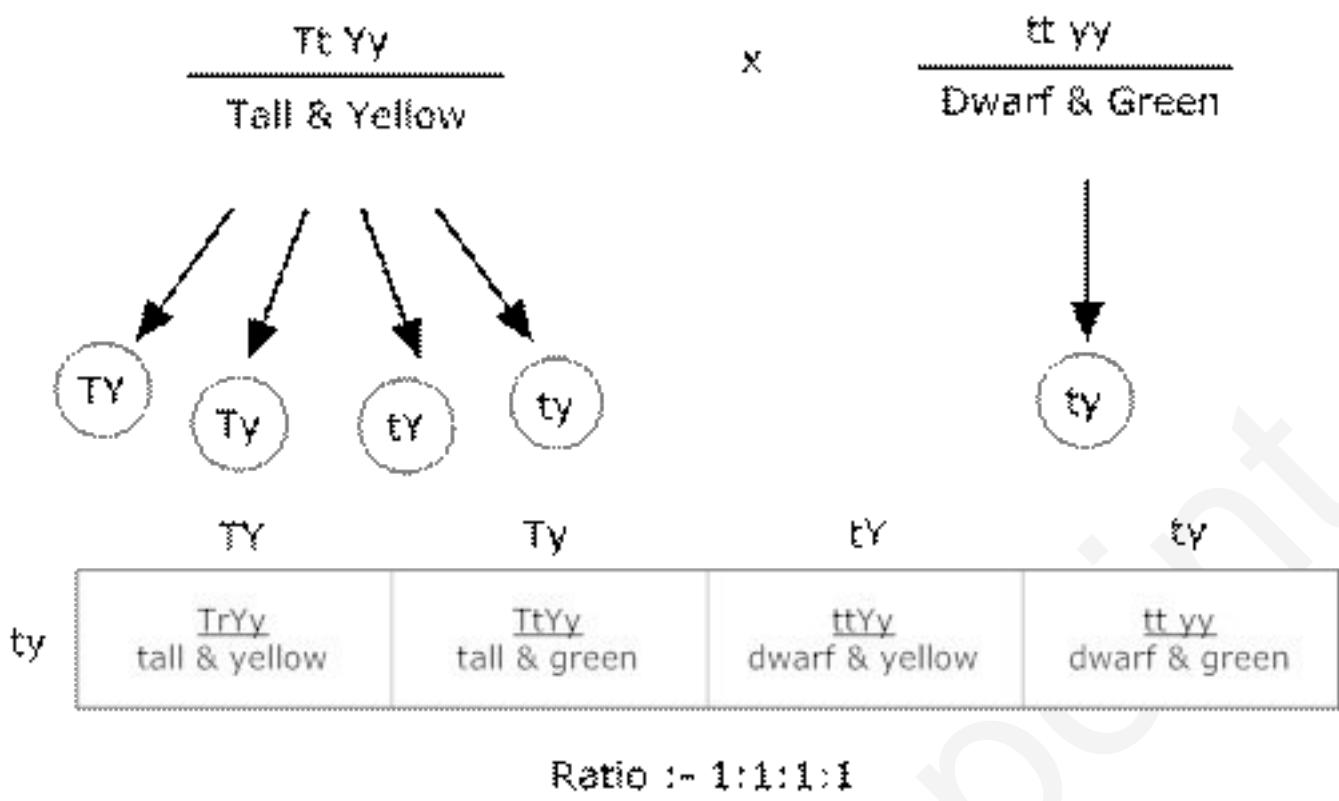
(i) What type of cross is this?

(ii) Work out the genotype & phenotype of progeny

(iii) What principle of Mendel is illustrated through result of this cross?

Ans. (i) Test cross.

(ii)



(iii) Principle of Independent Assortment – Acc to which, in the inheritance of contrasting characters the factors of each pair of character segregate independently of the factors of the other pair of characters.

CBSE Class 12 Biology
Important Questions
Chapter 6
Molecular Basis of Inheritance

1 Marks Questions

1. Name the factors for RNA polymerase enzyme which recognises the start and termination signals on DNA for transcription process in Bacteria.

Ans. Sigma (s) factor and Rho(p) factor

2. Mention the function of non-histone protein.

Ans. Packaging of chromatin

3. During translation what role is performed by tRNA

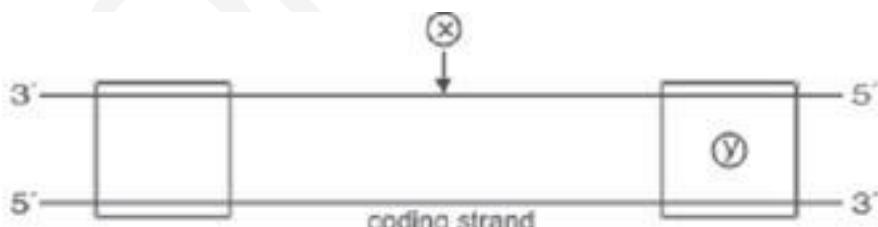
Ans. (i) Structural role

(ii) Transfer of amino acid.

4. RNA viruses mutate and evolve faster than other viruses. Why?

Ans. -OH group is present on RNA, which is a reactive group so it is unstable and mutate faster.

5. Name the parts 'X' and 'Y' of the transcription unit given below.



Ans. X - Template strand, Y - Terminator.

6. Mention the dual functions of AUG.

Ans. (i) Acts as initiation codon for protein synthesis

(ii) It codes for methionine.

7. Write the segment of RNA transcribed from the given DNA

3' -A T G C A G T A C G T C G T A '5' - Template Strand

5' - T A C G T C A T G C A G C A T '3' - Coding Strand.

Ans. 5'- U A C G U C A U G C A G C A U – 3' (In RNA 'T' is replaced by 'U')

8. Name the process in which unwanted mRNA regions are removed & wanted regions are joined.

Ans. RNA splicing.

9. Give the initiation codon for protein synthesis. Name the amino acid it codes for?

Ans. Initiation codon – AUG & it code for methionine.

10. In which direction, the new strand of DNA synthesised during DNA replication.

Ans. 5' → 3'

11. What is the function of amino acyl tRNA synthetase.

Ans. Amino acyl tRNA synthetase catalyses activation of amino acid and attachment of activated amino acids to the 3-end of specific tRNA molecule.

12. What is point mutation?

Ans. Mutation due to change in a single base pair in a DNA sequence is called point mutation.

13.Name the enzyme that joins the short pieces in the lagging strand during synthesis of DNA?

Ans.Ligase.

14.Name the enzyme which helps in formation of peptide bond?

Ans.Peptidyltransferase

15.Who experimentally prove that DNA replication is semi conservative.

Ans.Messelson&stahl.

16.What is a codon?

Ans.Triplet sequence of bases which codes for a single amino is called a codon.

17.Name the three non-sense codons?

Ans.UAA, UAG, UGA

18.What is the base pairing pattern of DNA?

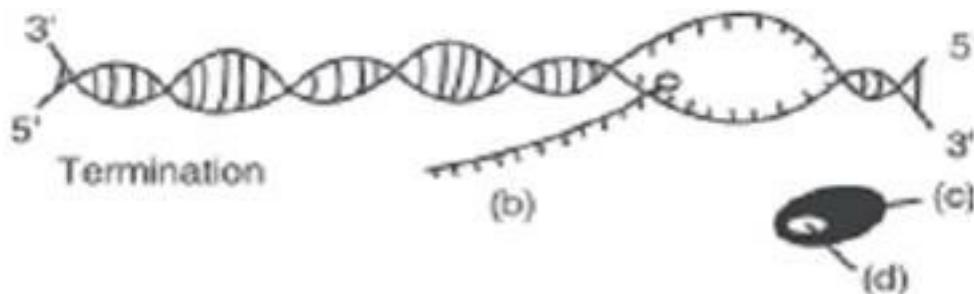
Ans.In DNA, adenine always binds with thymine & cytosine always binds with Guanine.

19.Mention the dual functions of AUG?

Ans.AUG codes for amino acid methionine & also acts as an initiator codon.

2 Marks Questions

1. The process of termination during transcription in a prokaryotic cell is being represented here. Name the label a, b, c and d.



- Ans. (a) DNA molecule
(b) mRNA transcript
(c) RNA polymers
(d) Rho factor

2. Complete the blanks a, b, c and d on the basis of Frederick Griffith Experiment.

S Strain → inject into mice → (a)

R strain → inject into mice → (b)

S strain (heat killed) → inject into mice → (c)

S strain (heat killed) + R strain (live) → inject into mice → (d)

- Ans.(a) Mice die
(b) mice live
(c) mice live
(d) mice die

3. Give two reasons why both the strands of DNA are not copied during transcription.

Ans. (a) If both the strands of DNA are copied, two different RNAs (complementary to each other) and hence two different polypeptides will produce; If a segment of DNA produces two polypeptides, the genetic information machinery becomes complicated.

- (b)** The two complementary RNA molecules (produced simultaneously) would form a double stranded RNA rather than getting translated into polypeptides.
- (c)** RNA polymerase carries out polymerisation in 5' to 3' direction and hence the DNA strand with 3' polarity acts as the template strand. (Any two)

4. Mention any two applications of DNA fingerprinting.

- Ans.** (i) To identify criminals in the forensic laboratory.
- (ii) To determine the real or biological parents in case of disputes.
- (iii) To identify racial groups to rewrite the biological evolution. (Any two)

5. State the 4 criteria which a molecule must fulfill to act as a genetic material.

- Ans.** (i) It should be able to generate its replica.
- (ii) Should be chemically and structurally stable.
- (iii) Should be able to express itself in the form of Mendelian characters.
- (iv) Should provide the scope for slow changes (mutations) that are necessary for evolution.

6.“DNA polymerase plays a dual function during DNA replication” comment on statement?

Ans. DNA polymerase plays a dual function – it helps in synthesis of new strand & also helps in proof reading i.e. replacement of RNA strands by DNA fragments.

7.Three codons on mRNA are not recognised by tRNA what are they? What is the general term used for them what is their significance in protein synthesis?

Ans. UAG, UAA & UGA are the three codons that are not recognised by tRNA; these are known as stop codon or non-sense codon. Since these three codons are not recognised by any tRNA

they help in termination of protein chain during translation.

8. Give two reasons why both the strands of DNA are not copied during DNA transcription?

Ans. I) If both the strands code for RNA two different RNA molecules & two different proteins would be formed hence genetic machinery would become complicated

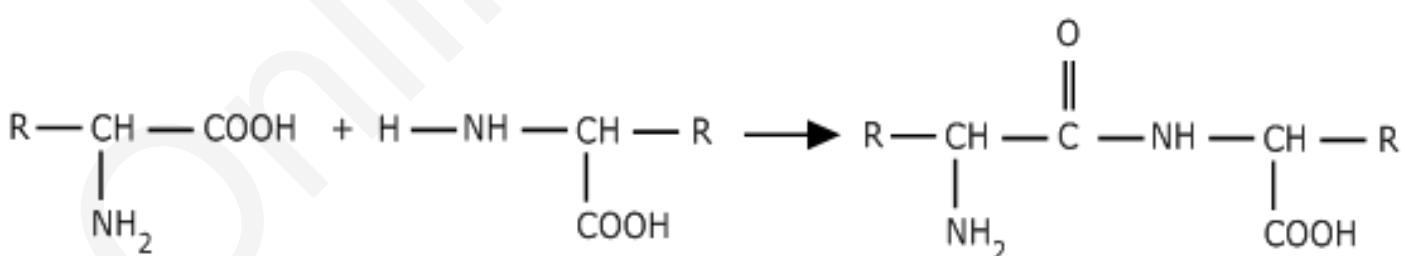
II) Since the two RNA molecules would be complementary to each other, they would wind together to form dsRNA without carrying out translation which means process of transcription would be futile

9. Why is it essential that tRNA binds to both amino acids & mRNA codon during protein synthesis?

Ans. It is essential that tRNA binds to both amino acids & mRNA codon because tRNA acts as an adapter molecule which picks up a specific activated amino acid from the cytoplasm & transferred it to the ribosomal in the cytoplasm where proteins are synthesized. It attracts itself to ribosome with the sequence specified by mRNA & finally it transmits its amino acid to new polypeptide chain.

10. What is peptide bond? How is it formed?

Ans. Peptide bond is formed between carboxylic group (COOH) of first amino acid & amino group (-NH₂) of second amino acid. This reaction is catalysed by peptidyltransferase



11. Explain what happens in frameshift mutation? Name one disease caused by the disorder?

Ans. Frameshift mutation is a type of mutation where addition or deletion of one or two bases changes the reading from the site of mutation, resulting in protein with different set of amino acid.

12.What do you mean by “Central Dogma of Molecular genetics?”

Ans. The central dogma of molecular genetics is the flow of genetic information from DNA to RNA through replication, DNA to mRNA through transcription & mRNA to proteins through translation.

ReplicationDNA → mRNA → proteins. transcription translation

13.Give two reasons why both the strands are not copied during transcription?

Ans.i) If both the strands codes for RNA, two different RNA molecules & two different proteins are formed hence genetic machinery would be complicated.

ii) Since two RNA molecules produced would be complementary to each other, they would wind together to form ds-RNA.

14.Why is human Genome project considered as mega project?

Ans. Human Genome project was called mega project for the following facts.

1. The human genome has approximately 3.3×10^9 bp, if the cost of sequencing is US \$3 per bp, the approximate cost is about US \$ g billion.
2. If the sequence obtained were to be stored in a typed form in books & if each page contained 1000 letters & each book contained 1000 pages than 3300 such books would be needed to store complete information
3. The enormous quantity of data expected to be generated also necessitates the use of high speed computational devices for data storage, retrieval & analysis.

15.Why is DNA & not RNA is the genetic material in majority of organisms?

Ans.The -OH group in the nucleotides of RNA is much more reactive & makes RNA labile & easily degradable thus, DNA and not RNA acts as genetic material in majority of organisms.

16.Mention any four important characteristics of genetic code.

Ans.Genetic codon has following imp-features :-

1. Each codon is a triplet consisting of three bases.
 2. Each codon codes for only one amino acid i.e. – unambiguous.
 3. Some amino acids are coded by more than one codon ∴ said to be degenerative.
 4. Codons are read in a continuous manner in direction & have no punctuation.
-

17.Why it is that transcription & translation could be coupled in prokaryotic cell but not in eukaryotic cell?

Ans.In prokaryotes the mRNA synthesised does not require any processing to become active & both transcription & translation occurs in the same cytosol but In Eukaryotes, primary transcript contains both exon & intron & is subjected to a process called splicing where introns are removed & exons are joined in a definite order to form mRNA.

3 Marks Questions

1. Give six points of difference between DNA and RNA in their structure/chemistry and function.

Ans.

| DNA | RNA |
|---|--|
| (i) Double stranded molecules (ii) Thymine as pyrimidine base (iii) Pentose sugar is Deoxyribose (iv) Quite stable and not very reactive (v) Dictates the synthesis of Polypeptides (vi) Found in the nucleus. | (i) Single stranded molecules (ii) Uracil as pyrimidine base (iii) Sugar is Ribose (iv) 2'-OH makes it reactive (v) Perform their functions in protein synthesis. (vi) They are transported into the cytoplasm. |

2. Explain how does the hnRNA becomes the mRNA. OR Explain the process of splicing, capping and tailing which occur during transcription in Eukaryotes.

Ans. hnRNA is precursor of mRNA. It undergoes

- (i) Splicing : Introns are removed and exons are joined together.
- (ii) Capping : an unusual nucleotide (methyl guanosine triphosphate is added to the 5' end of hnRNA).
- (iii) Adenylate residues (200-300) are added at 3' end of hnRNA.

3. Name the three major types of RNAs, specifying the function of each in the synthesis of polypeptide.

Ans. (i) mRNA-(Messenger RNA) : decides the sequence of amino acids.

(ii) tRNA-(Transfer RNA) : (a) Recognises the codon on mRNA (b) transport the aminoacid to the site of protein synthesis.

(iii) rRNA (Ribosomal RNA) : Plays the structural and catalytic role during translation.

4. Enlist the goals of Human genome project.

Ans. The Human Genome Project (HGP) is an international scientific research project with the goal of determining the sequence of chemical base pairs which make up human DNA, and of identifying and mapping all of the genes of the human genome from both a physical and functional standpoint

5. A tRNA is charged with the amino acid methionine.

(i) Give the anti-codon of this tRNA.

(ii) Write the Codon for methionine.

(iii) Name the enzyme responsible for binding of amino acid to tRNA.

Ans. (a) UAC (b) AUG (c) Amino-acyl tRNAsynthetase.

6. Illustrate schematically the process of initiation, elongation and termination during transcription of a gene in a bacterium.

Ans. In bacteria, the mRNA provides the template, tRNA brings aminoacids and reads the genetic code, and rRNAs play structural and catalytic role during translation.

There is single DNA-dependent RNA polymerase that catalyses transcription of all types of RNA in bacteria.

RNA polymerase binds to promoter and initiates transcription (Initiation)

It somehow also facilitates opening of the helix and continues elongation

Once the polymerases reaches the terminator region, the nascent RNA falls off, so also the RNA polymerase. This results in termination

**7.What is transformation? Describe Griffith's experiment to show transformation?
What did he prove from his experiment?**

Ans. Transformation means change in genetic makeup of an individual. Fredrick Griffith conducted a series of experiments on streptococcus pneumoniae. He observed two strains of this bacterium –one forming smooth colonies with capsule (S-type) & other forming rough colonies without capsule

(R-type)

- (i) when live S-type cells are infected into mice, they produced pneumonia & mice dies.
- (ii) When live R-type cells are infected into mice, disease was not produced did not appear.
- (iii) When heat – killed S-type cells were infected into mice, the disease did not appear.
- (iv) When heat killed S-type cells were mixed with live R-cells & infected into mice, the mice died.

He concluded that R-strain bacteria had somehow been transformed by heat –killed S-strain bacteria which must be due to transfer of genetic material

8.The base sequence on one strand of DNA is ATGTCTATA

- (i) Give the base sequence of its complementary strand.**
- (ii) If an RNA strand is transcribed from this strand what would be the base sequence of RNA?**
- (iii) What holds these base pairs together?**

Ans. (i) TACAGATAT.

(ii) UACAGAUAU

(iii) Hydrogen bonds hold these base pairs together. Adenine & thymine are bounded by two hydrogen bonds & cytosine & Guanine are bonded by three hydrogen bonds.

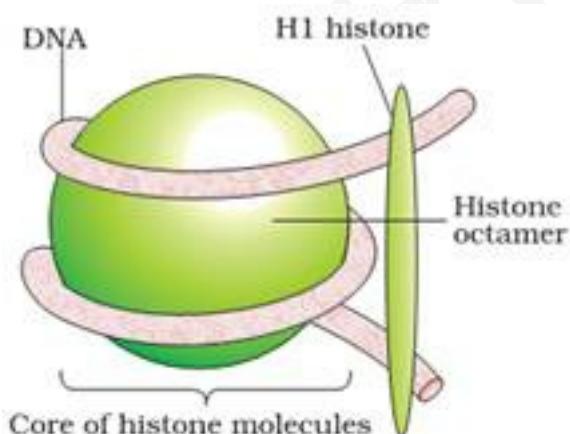
9.Two claimant fathers filed a case against a lady claiming to be the father of her only daughter. How could this case be settled identifying the real biological father?

Ans.This case to identify the real biological father could be settled by DNA – finger printing technique. In this technique :-

1. first of all, DNA of the two claimants who has to be tested is isolated.
2. Isolated DNA is then digested with suitable restriction enzyme & digest is subjected to gelelectrophoresis.
3. The fragments of ds DNA are denatured to produce ss DNA by alkali treatment.
4. The electrophoresed DNA is then transferred from gel into a nitrocellulose filter paper where it is fixed.
5. A known sequence of DNA is prepared called probe – DNA & is labelled with radioactive esotope ^{32}p & then probe is added to nitrocellulose paper.
6. The nitrocellulose paper is photographed on X – ray film through auto radiography. The film is analysed to determine the presence of hybrid nucleic acid.

Then, the DNA fingerprints of the two claimants is compared with the DNA fingerprint of the lady & her daughter, whosoever matches with each other would be declared as biological father of her daughter.

10.The length of DNA in an eukaryotic cell is N 2.2 m How can such a huge DNA be packaged in a nucleus of micrometer in diameter.



Ans. In eukaryotes, the DNA is wrapped around positively charged histone octamer into a structure called nucleosome. A typical nucleosome consists of 200bp of DNA helix. The nucleosomes are the repeating units that form chromatin fibres.

These chromatin fibres condense at metaphase stage of cell division to form chromosomes. The packaging of chromatin at higher level requires additional set of proteins called non-histone chromosomal proteins thus in nucleus, certain regions of the chromatin are loosely packed & they stain lighter than the other region, these are called euchromatin. The other region are lightly packed & they stain darker & are called heterochromatin

11. A tRNA is charged with amino acid methionine.

- i) At what site in the ribosome will the tRNA bind?**
- ii) Give the anticodon of this tRNA?**
- iii) What is the mRNA codon for methionine?**
- iv) Name the enzyme responsible for this binding?**

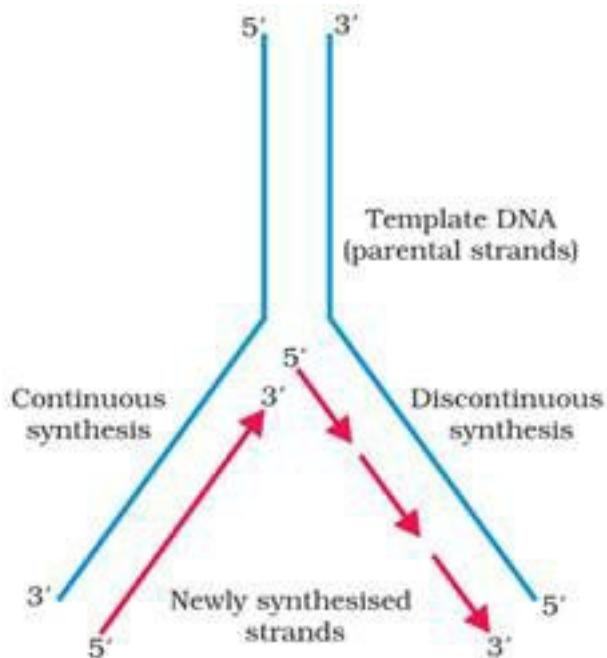
Ans. (i) P- site

(ii) UAC

(iii) AUG

(iv) Amino acyl tRNA Synthetase

12. Describe the continuous & discontinuous Synthesis of DNA?



Ans. Synthesis of new strand of DNA takes place by addition of fresh nucleotides to the 3 - OH group of the last nucleotide of the primer. This synthesis takes place in 5 direction & enzyme that catalyses this is DNA - polymerase

∴ synthesis of strand called leading strand is continuous.

The replication of second strand of the DNA molecule is

DISCONTINUOUS on strand called lagging strand.

Primase initiates primer synthesis on strand near the fork. The RNA - primer thus formed provides free for replication of single stranded region on lagging strand the new complementary strand is formed in small fragments of DNA called Okazaki fragments. It is called discontinuous because it has to be initiated several times & every time an Okazaki fragment is produced.

13. What are the three types of RNA & Mention their role in protein Synthesis?

Ans. There are three types of RNA :

1. Messenger RNA (mRNA) :- It is a single - stranded RNA which brings the genetic information of DNA transcribed on it for protein synthesis.
2. Transfer RNA (tRNA) :- It has a clover leaf like structure which acts as an adapter

molecule which contains an “anticodon loop” on one end that reads the code on one hand & an amino acid acceptor end which binds to the specific amino acid on other hand.

3. Ribosomal RNA (rRNA) :- Ribosomes provides the site for synthesis of protein & catalyse the formation of peptide bond.

14. Define bacterial transformation? Who proved it experimentally & how?

Ans. The transformation is a mode of exchange or transfer of genetic information between organism or from one organism to another.

Fredrick Griffith tested the virulence of two strains of Diplococci to show transformation in the following steps :-

1. When S-III strains of bacteria are injected into mice. It developed pneumonia & died.
2. When R-II strains are infected into mice, they did not develop pneumonia & survive.
3. When heat – killed S-III strains of bacteria are injected into mice, No symptoms of pneumonia develops & mice remain healthy.
4. When a mixture of heat – killed S-III strain & live R-II strain is injected into mice, they developed pneumonia & died.

From these results, Griffith concluded that the presence of heat – killed S-III bacteria must convert living R-II type bacteria to type S-III so as to restore them the capacity for capsule formation. This was called “BACTERIAL TRANSFORMATION”

S strain → Inject into mice → Mice die

R strain → Inject into mice → Mice live

S strain (heat-killed) → Inject into mice → Mice live

S strain (heat-killed) + R strain (live) → Inject into mice → Mice die

5 Marks Questions

1. What is meant by semi conservative replication? How did Meselson and Stahl prove it experimentally?

Ans. Meselson and Stahl, performed an experiment using E.coli to prove that DNA replication is semi conservative.

- They grew E.coli in a medium containing $^{15}NH_4Cl$.
- Then separated heavy DNA from normal (14N) by centrifugation in CsCl density gradient.
- The DNA extracted, after one generation of transfer from 15N medium to 14N medium, had an intermediate density.

-The DNA extracted after two generations consisted of equal amounts of light and hybrid DNA.

-They proved that DNA replicates in a semiconservative manner.

2. What does the lac operon consist of? How is the operator switch turned on and off in the expression of genes in this operon? Explain.

Ans. Lac Operon consists of the following :

- Structural genes : z, y, a which transcribe a polycistronic mRNA.
- gene 'z' codes for b-galactosidase
- gene'y' codes for permease.
- gene'a' codes for transacetylase.
- Promotor : The site where RNA polymerase binds for transcription.
- Operator : acts as a switch for the operon
- Repressor : It binds to the operator and prevents the RNAPolymerase from transcribing.
- Inducer : Lactose is the inducer that inactivates the repressor by binding to it.
- Allows an access for the RNA polymerase to the structural gene andtranscription.

3. What is an operon? Describe the major steps involved in an operon?

Ans. Operon is a group of controller & structural genes which controls the catabolism of the cell genetically e.g. lactose operon / lac operon.

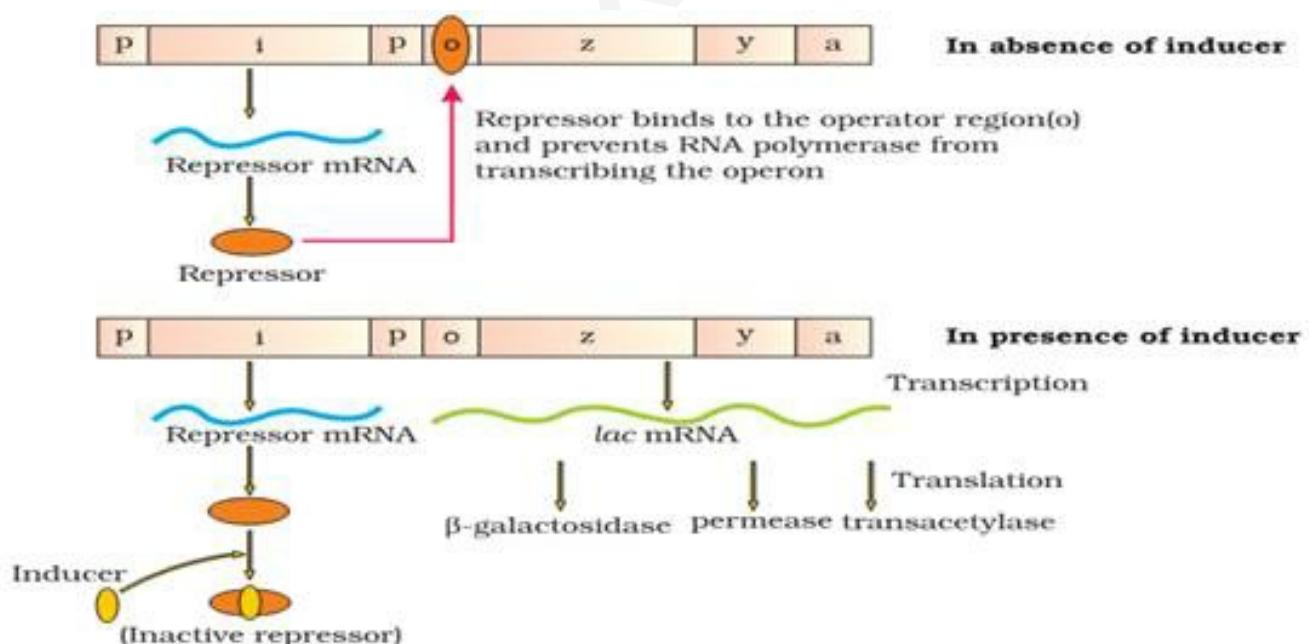
(i) When inducer or lactose is absent :-

The lac regulator gene synthesizes a repressor protein by transcription & translation. This repressor protein binds with operator site of lac operon & blocks RNA polymerase. Thus, RNA polymerase unable to transcribe mRNA & structural gene unable to translate enzyme B-galactosidase.

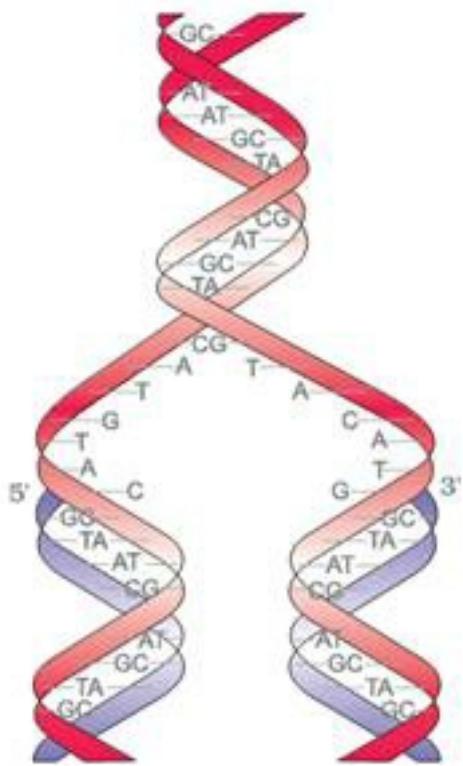
(ii) When inducer or lactose is present :-

The lac regulator gene transcribes mRNA & synthesizes active lac repressor protein & at the same time lactose is converted into isomer allolactose. Allolactose binds to active lac repressor due to which it is converted to inactive repressor. This inactive repressor is released from operator site of lac operon & RNA polymerase binds to promoter & starts to transcribe mRNA & forms β -galactosidase which converts lactose into glucose & galactose.

Thus, presence of lactose determines whether or not lac. Repressor is bound to operator & genes are expressed or not.



4.What do you mean semi conservative nature of DNA replication. Who proved it & how?



Ans. Semiconservative nature of DNA replication suggested that during replication two strands would separate & each acts as a template for the synthesis of new complementary strand so, that after complete replication, each DNA molecule would have one parental & one

newly synthesized strand thus, half the information is conserved over generation. Mathew Meselson & Franklin stahl have performed an experiment using Escherichia coli to prove that DNA replication is Semiconservative. They grew E.coli in a medium containing ^{15}N

$\text{N}^{\{H\}_4}\text{Cl}$

until ^{15}N was incorporated in the two strands of newly synthesised DNA this heavy DNA can be separated from normal DNA by centrifugation in

CsCl

density gradient. Then they transferred the cells into a medium with normal

$^{14}\text{N}^{\{H\}_4}\text{Cl}$

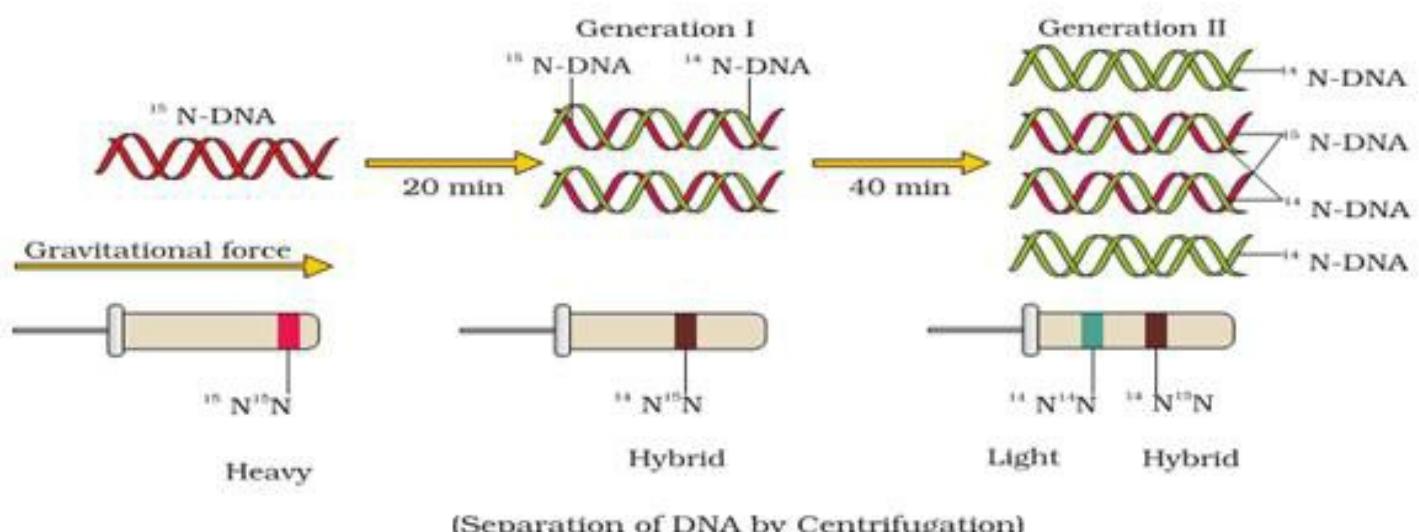
& took samples at various time intervals & extracted DNA & centrifuged then to measure their densities. The DNA extracted from the cells after one generation to transfer from

^{15}N

medium to

^{14}N

medium had an intermediate / hybrid density. The DNA extracted after two generations (i.e after 40 min) consisted of equal amount of "light" DNA & "Hybrid"DNA.

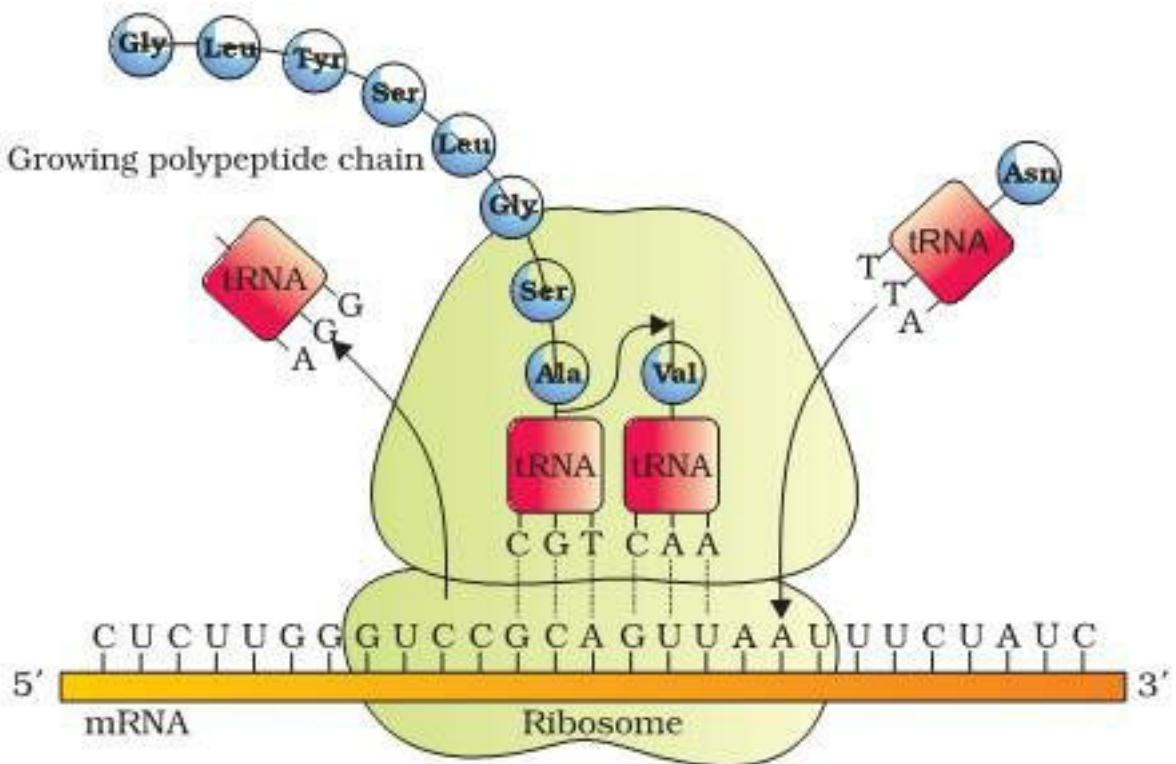


5. Where do transcription & translation takes place in a prokaryotic cell? Describe the three steps involved in translation?

Ans. In a prokaryotic cell both transcription & translation occurs in cytoplasm. It consists of following steps :-

- (i) ACTIVATION OF AMINO ACIDS :- amino acids are activated in the presence of ATP by aminoacyl tRNA synthetase.
- (ii) BINDING OF ACTIVATED AMINOACID WITH tRNA :- Activated amino acids binds with specific tRNA to form charged tRNA .
- (iii) INITIATION OF POLYPEPTIDE CHAIN :- Initiation codon is AUG which codes for methionine. Initiation codon of mRNA binds to P-site of ribosome with the help of initiation factors.
- (iv) ELONGATION OF POLYPEPTIDE CHAIN :-
 - (a) Second activated amino acid along its tRNA reaches the 'A' site & binds to mRNA codon next to AUG.
 - (b) A peptide bond is formed between two amino acid by peptidyl transferase.
 - (c) Ribosomes translocation mRNA in -direction due to which free tRNA slips away & peptidyl tRNA reaches at P – site. Now third amino acid reaches at A – site & process continues.
- (d) TERMINATION OF POLYPEPTIDE CHAIN :- When a termination codon (UAA, UAG, UGA) reaches at A- site translation terminates Since there is no specific tRNA for these codons.

(i)



6. Who performed the blender experiment? What does this experiment prove? Describe the steps followed in this experiment?

Ans. The proof for DNA as the genetic material came from the experiments of Harshey & chase who worked with bacteriophage.

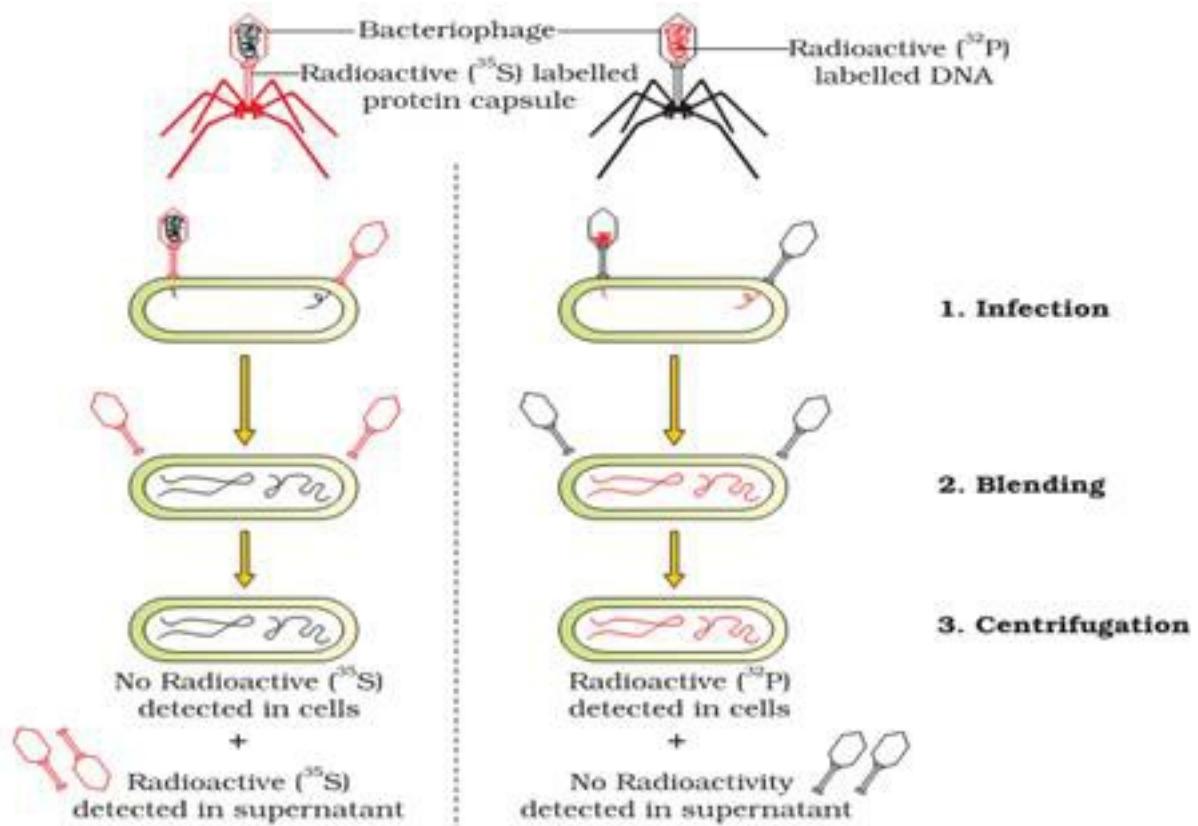
The bacteriophage on infection injects only the DNA into the bacterial cell & not the protein coat.

Bacterial cell treats the viral DNA as its own & subsequently manufactures more virus particles.

They grew some viruses on a medium that contained radioactive Phosphorus & some other on medium that contained radioactive sulphur. Virus grown in the presence of radioactive phosphorus contained radioactive DNA but not proteins because DNA contains phosphorus. Similarly virus grown on radioactive sulfur contained radioactive protein because DNA does not contain sulfur.

Radioactive phages are allowed to infect E. coli bacteria & soon after infection the cultures were gently agitated in a blender to separate the adhering protein coat of virus from bacterial

cell. It was found that when phage containing radioactive DNA was used to infect the bacteria its radioactivity was found in bacterial cells indicating that DNA has been injected into bacterial cell so, the DNA is the genetic material & not proteins



**CBSE Class 12 Biology
Important Questions
Chapter 7
Evolution**

1 Marks Questions

1. Name one fish like reptile that evolved from land reptile about 200 million years ago?

Ans. Ichthyosaurs.

2. For a long time, it was believed that life originated from decaying matter. What is this theory known as? Name the scientist who experimentally disproved this theory.

Ans. Theory of Spontaneous generation; Louis Pasteur.

3. If abiotic origin of life is in progress on a planet other than earth, what should be the conditions there?

Ans. Very high temperature, volcanic storms, Reducing atmosphere containing CH₄, NH₃, H₂ and water vapours.

4. Name the person who proposed that population tends to increase geometrically while food production increases arithmetically.

Ans. Thomas Malthus

5. Name the scientist who had also come to similar conclusion as that of Darwin about natural selection as a mechanism of evolution. Which place did he visit to come to conclusions?

Ans. Alfred Wallace, Malay Archipelago

6. Name any two vestigial organs found in human body?

Ans.Vermiform appendix, wisdom teeth.

7.What is the cause of speciation according to Hugo De Vries?

Ans.Mutations.

8.Name the phenomenon by which rapid speciation takes place?

Ans.Genetic Drift.

9.Name the two scientists who set up a special experiment to prove Oparin's theory of origin of life?

Ans.Urey & Miller.

10.Name the common ancestor of apes & man?

Ans.Dryopithecus.

11.Which period is known as “Age of amphibians”?

Ans.Carboniferous period.

12.What provided energy for a biotic synthesis on primitive earth?

Ans.Very high temperature due to lightening or uv – rays provided energy for a biotic synthesis.

13.Who showed that life comes from pre-existing life?

Ans.Louis Pasteur

14.What is meant by Gene pool?

Ans.Gene pool refers to sum total of different kinds of genes pooled by all the members of a

population.

15. Which period is called “Age of Reptiles”.

Ans. Jurassic period.

16. Name the species of human beings which is most closely related to modern man.

Ans. Cro-magnon.

17. What is “Founder’s effect”?

Ans. Sometime a change in allele frequency is so different in new sample of population that they become a new species in such cases original drifted population becomes founder & this effect is called Founder’s effect.

2 Marks Questions

1. Explain Oparin-Haldane theory of chemical evolution of life.

Ans. The first life form could have come from the pre-existing, non-living organic molecules (like RNA, Proteins, etc.) and the formation of life was preceded by chemical evolution.

2. Distinguish between convergent and divergent evolution giving one example of each.

Ans. Divergent Evolution - Development of different functional structures from a common ancestral form is called divergent evolution.

Homologous organs show divergent evolution.

Examples: Darwin's Finches, Australian Marsupials, locomotion in mammals.

Convergent Evolution - Development of similar adaptive functional structures in unrelated groups of organisms is called convergent evolution.

Analogous organs show convergent evolution.

Examples: Australian Marsupials and Placental mammals, various aquatic vertebrate and wings of insect, bird and bat.

3. What is adaptive radiation? Explain with an example.

Ans. Adaptive radiation is an evolutionary process that produces new species from a single, rapidly diversifying lineage. This process occurs due to natural selection. An example of adaptive radiation is Darwin finches, found in Galapagos Island. A large variety of finches is present in Galapagos Island that arose from a single species, which reached this land accidentally. As a result, many new species have evolved, diverged, and adapted to occupy new habitats. These finches have developed different eating habits and different types of beaks to suit their feeding habits. The insectivorous, blood sucking, and other species of finches with varied dietary habits have evolved from a single seed eating finch ancestor.

4. How did Louis Pasteur disprove spontaneous generation theory?

Ans. Louis Pasteur showed that in pre-sterilized flasks, life did not come from killed yeast while in another flask open to air, new organisms arose from 'killed yeast.'

5. Define homologous organs? Give one example of organ homologous to hand of man?

Ans. Homologous organs are those organs which are similar in basic structure & embryonic developments but perform different functions. e.g. bones of forelimbs of whales, bat, birds and human beings.

6. What is the role of variation in evolution?

Ans. Variations are useful for survival of species in changed environmental situations. If a population of reproducing organisms are suited to a particular niche & if the niche is drastically altered the population could be wiped out however if some variations were to be present in few individuals, there would be some chances for them to survive.

7. Describe one evidence which decisively proves that birds have evolved from reptiles?

Ans. Missing link between birds & reptiles called. Archaeopteryx showed that "Birds have evolved from reptiles". These are organisms which show the characters of both birds (e.g. presence of wings & feathers in the body) as well as of reptiles (e.g. long tail & jaws with identical teeth).

8.What is the study of fossils called? Mention any three points how the fossils throw light on past life?

Ans. Study of fossils is known as paleontology.

- Cross-section of the earth's crust indicates the arrangement of sediments one over the other during the long history of Earth.
 - Different sediments contain different life forms which probably died during the formation of particular sediment.
 - Connecting or missing link – which contains characters of different groups.
-

9.Why has natural selection not eliminated sickle – cell anaemia?

Ans. Sickle cell anaemia is not eliminated during natural selection because in some cases, sickle cell anaemia is beneficial as it provides natural defense against malarial parasite.

10.Life originated from the earth's inorganic atmosphere in the past, but this no longer happens today. Give two reasons?

Ans. Life cannot be originated in the present day atmosphere because:-

- (i) The temperature of present day atmosphere is much less than that of primitive atmosphere.
 - (ii) The present day atmosphere is oxidizing & not reducing due to presence of oxygen.
-

11.If you discovered a fossil bird with scales on the body & teeth in the beak. What would you conclude about its position in the animal kingdom?

Ans. Since this fossil bird has both avian characters & reptilian characters e.g. scales on body & teeth in beak it would be considered as a connecting link between reptiles & bird.

12.What is speciation? List any two events that lead to speciation?

Ans. Speciation refers to the origin of new species or the phenomena of development of new species from pre-existing one.

The two factors which lead to speciation are – Genetic drift, mutation & natural selection.

13.Would you consider wings of butterfly & a bat as homologous or Analogous & why?

Ans. Wings of butterfly & bat are said to be analogous because they have originated from different parts – e.g. in butterfly wings are originated from skin and feather & in bats wings are originated from forelimbs but both of them performs the same function of flying.

14.Define natural selection? Who else along with Charles Darwin proposed it as the mechanism of evolution?

Ans. Natural selection is a process of selection lay nature in which individuals with those characteristics which enable them to survive better in natural conditions would outnumber the others who are less adapted under the same natural conditions Alfred Wallace also proposed the same mechanism of evolution & called it “survival of fittest”.

15.A chimpanzee can hold objects by its hand & an elephant by trunk. Are these organs Analogous or homologous?

Ans. These organs are analogous organs as they are performing the same function of holding objects but are originated from different parts eg forelimbs in chimpanzee & nose in elephants.

16.Differentiate between convergent & divergent evolution?

Ans.

| Divergent Evolution | Convergent Evolution |
|--|--|
| <ol style="list-style-type: none"> 1. Evolutionary process of different species which produces new species diverged from a single ancestral form 2. e.g. Australian marsupials | <ol style="list-style-type: none"> 1. When more than one adaptive radiation occurs in an isolated geographical area. 2. e.g. Camels are found in Asia & Llamas are found in south America. |

17. Bring out differences between De Vries mutations Darwinian Variations?

Ans. (i) Mutations are large heritable changes in the characteristics of a population that arises suddenly. & cause speciation in single step while evolution for Darwin is gradual & occurs due to variations over number of generations.

(ii) Mutation are random & directionless while variations are small & directional.

3 Marks Questions

1. (i) State the Hardy-Weinberg principle.

(ii) When there is a disturbance in the Hardy-Weinberg equilibrium, what would it result in?

(iii) According to this principle, what is the sum total of all allelic frequencies?

Ans. (i) The allele frequency in a population are stable and constant from generation to generation.

(ii) Evolution.

(iii) One.

2. Classify the following as examples of homology and analogy

- (i) Hearts of fish and crocodile**
- (ii) Wings of butterfly and birds**
- (iii) Eyes of Octopus and Mammals**
- (iv) Tubers of potato and Sweet potato**
- (v) Thorns of Bougainvillea and spines of Opuntia**
- (vi) Thorn of Bougainvillea and tendrils of cucurbits.**

Ans. (i) Homology (ii) Analogy (iii) Analogy (iv) Analogy (v) Analogy (vi) Homology

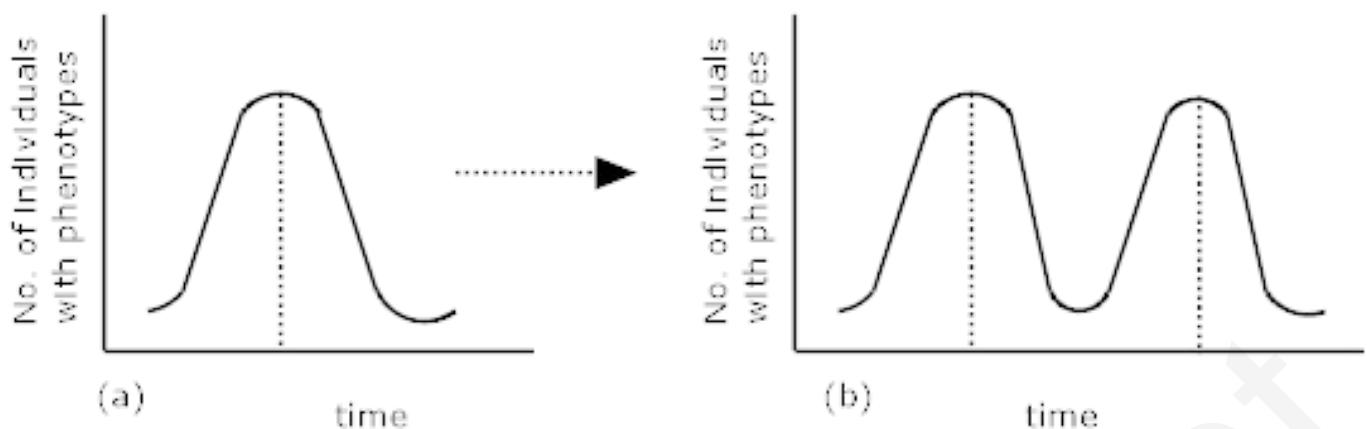
3. Stanley Miller and Harold Urey performed an experiment by recreating in the laboratory the probable conditions of the atmosphere of the primitive earth.

- (i) What was the aim of the experiment?**
- (ii) In what forms was the energy supplied for chemical reactions to occur?**
- (III) For how long was the experiment run continuously? Name two products formed.**

Ans. (i) To prove Oparins theory of origin of life.

- (ii) Electric discharge using electrodes.**
- (iii) One week; Amino acids and Sugar.**

4. Study the figures given below & answer the following question.



i) Under the influence of which type of natural selection would graph (a) become like graph (b).

ii) What could be the likely reason of new variations arising in a population.

iii) Who suggested natural selection as mechanism of evolution?

Ans. (i) Disruptive & elective.

(ii) Because individuals at the extremes contribute more offspring compared to those in the centre& produces two peaks in distribution of a trait.

(iii) Charles Darwin.

5. Fill up the blanks left in the table showing Era, period and organism.

| Era | Period | Organisms |
|-----------|----------|---|
| Cenozoic | A | Modern man, mammals, birds, rise fo monocot |
| B | Tertiary | Rise of first Primate, angiosperm |
| Mesozoic | C | Gingko, Gnetales |
| D | Jurassic | Conifers, cycads, Reptiles |
| Paleozoic | E | Early reptiles (extinct) |
| F | Silurian | Psilophyton |

Ans. (a) Quaternary **(b)** Coenozoic **(c)** Cretaceous

(d) Mesozoic **(e)** Carboniferous **(f)** Paleozoic

6. (i) In which part of the world, Neanderthal man lived?

(ii) What was his brains capacity?

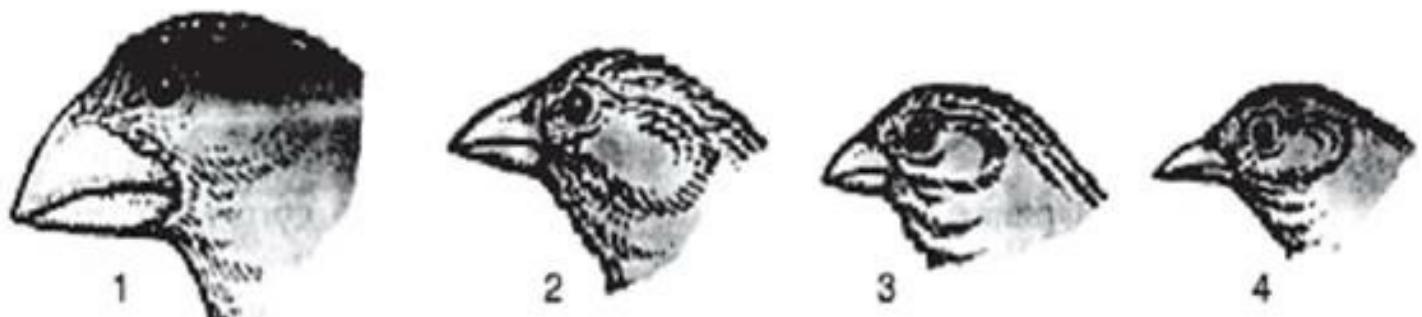
(iii) Mention the advancement which Neanderthal man showed over Homoerectus.

Ans. (i) Near Eastern and Central Asia

(ii) 1400 c.c.

(iii) More brain capacity, use of hides to cover body and burial of dead.

7. Figures given below are of Darwins finches?



Variety of beaks of Darwin's finches.

(a) Mention the specific geographical area where these were found.

(b) Name and explain the phenomenon that has resulted in the evolution of such diverse species in the region.

(c) How did Darwin visit the particular geographical area?

Ans. (a) Galapagos Island.

(b) Adaptive radiation - The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography (habitats) is called adaptive radiation.

(c) Through sea voyage in a sail ship called H.M.S. Beagle.

8. Give examples to show evolution by anthropogenic action.

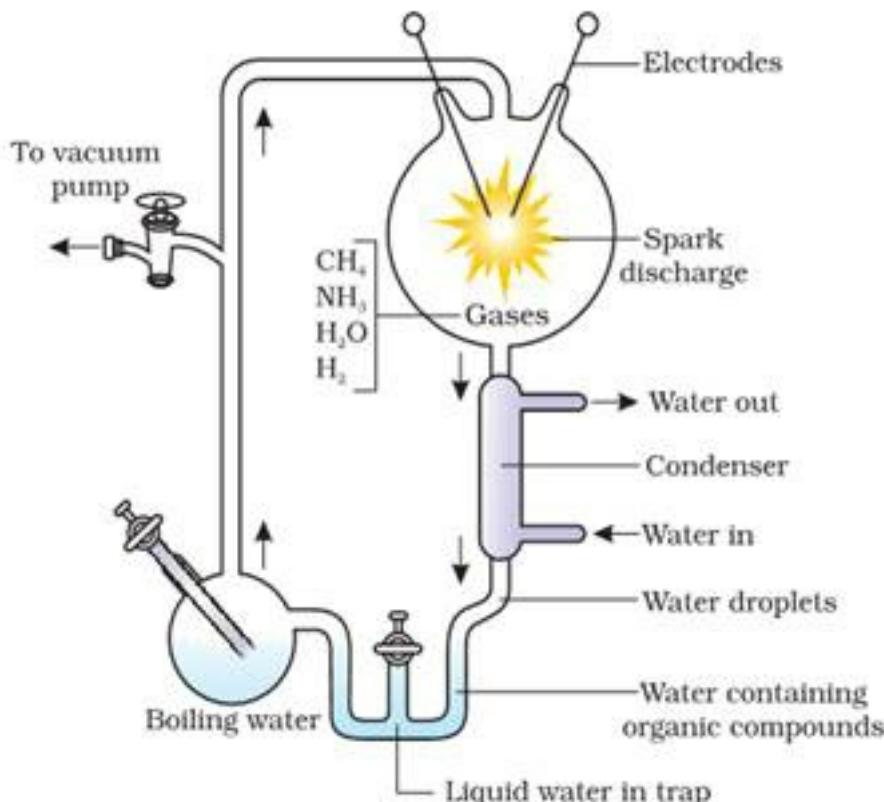
Ans. Excess use of herbicides pesticides etc. has resulted in selection of resistant varieties in a much lesser time scale. Same is true for antibiotic or drug resistant microbes.

9. By taking industrial melanism as an example, explain the concept of natural selection by evolution?

Ans. Theory of natural selection states that due to survival of fittest, the species change readily owing to preservation & transmission of minute variation & gradually give rise to new forms.

Example – In collection of moths in 1850 it was observed that there were whiter winged moth than dark winged but after industrialization there were darker winged moth. This is due to the reason that During post industrial period trees trunk become dark due to industrial smoke under this condition, white winged moth do not survive due to predators dark winged moth survived. Before industrialization sets in, thick growth of white colored lichen covered trees in that background white winged moth survived but dark – colored moth were picked out by predators hence nature selects which species is suitable.

10. Who were the two scientists that conducted an experiment to synthesise organic molecule abiotically? How did they provide the probable condition of the primitive earth in this experiment?



Ans. Urey & Miller tried to create in the laboratory the similar conditions which might have existed in early primitive atmosphere. A mixture of water vapours methane, ammonia & hydrogen is exposed to electric discharge in a closed chamber, this fluid thus formed is allowed to stand for several weeks as a result, amino acids e.g. glycine & alanine are formed from it. They suggested that electric discharge produced during lightning in primitive atmosphere of earth might have resulted in formation of organic compound.

11. What is Biogenetic law? How does comparative embryology provides evidences for evolution?

Ans. It has become evident from embryological studies that there was one developmental pattern.

In all organisms life begins with a unicellular structure. The embryo of fish, frog, turtle, bird & man resembles one another so closely that it becomes difficult to distinguish them.

Mammalian embryo passes through fish-like, amphibian-like, reptile-like & bird-like stages

during development of an organism (ontogeny), some of the evolutionary steps (phylogeny) are repeated in different group of organism. This leads Ernst Haeckel to formulate famous theory – “RECAPITULATION THEORY /

BIOGENETIC LAW. Which states that “Ontogeny recapitulates phylogeny” The sequence of embryonic development shows striking similarity e.g. appearance of gill cleft and notochord in embryonic development of all vertebrates from fish to man.

12. Chemical insecticides remain useful only for a limited time. Explain with reference to evolution with a suitable example.

Ans. “Chemical insecticides remain useful only for a limited time” because of the phenomena of natural selection with the course of time when chemical insecticides are excessively used to kill insects, some of the resistant varieties of the organism would have been created which are not killed by the insecticide such resistant varieties of the species are selected by nature & they multiply after sometime population of this resistant variety increases & the chemical insecticide will be ineffective to control these insects for example DDT is a common insecticide for mosquitoes but is now ineffective because DDT – resistant mosquitoes have appeared & selected in nature.

13. What are the facts that support Darwin's theory of Natural selection?

Ans. The following facts that supports Darwin's theory of Natural selection

1. Overproduction: - All organisms tend to multiply at high rate but it is not possible for all organisms to survive.
2. Struggle for Existence: - Because of limitation of space & food all the offspring of the result of overproduction will not survive & they will compete with one another to grow this develops struggle for existence not only among individuals of different species but also among same species.
3. Variations :- No two individuals of same species are exactly alike even coming out from same parental stock.
4. Survival of fittest :- The individuals with useful variation will survive during struggle of existence while those with less fortunate variation would perish.

14. Trace the important events or stages of human development?

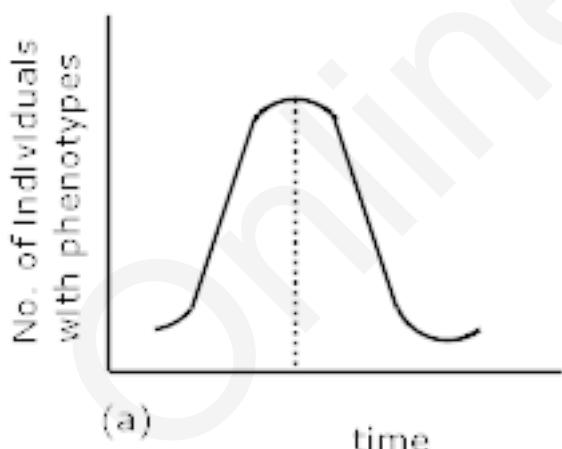
Ans. The common ancestor of apes & man is a primate Dryopithecus that lived about 15 million years ago. The human evolution is as follows :-

1. Australopithecus :- They are 4ft, with brain capacity – 500 to 650 cc. They have bipedal locomotion, omnivorous & has erect posture. They hunted with stone weapon & lived in caves.
2. Homo Erectus :- They showed increase in brain size. They are good hunters, ate meat, domesticated animal & discovered fire.
3. Neanderthal man :- They were short with heavy brows, receding forehead, large jaws & stooped postures. They wore clothes, good hunters & tool makers.
4. Cromagnon man :- They were completely erect & 6ft tall. He used bones as tools & was a cave dweller. They are excellent tool makers & fine artists.
5. Homo sapiens :- They have brain capacity 1450cc. & skull much thicker. His intelligence has enabled him to adapt & control environment. He started agriculture.

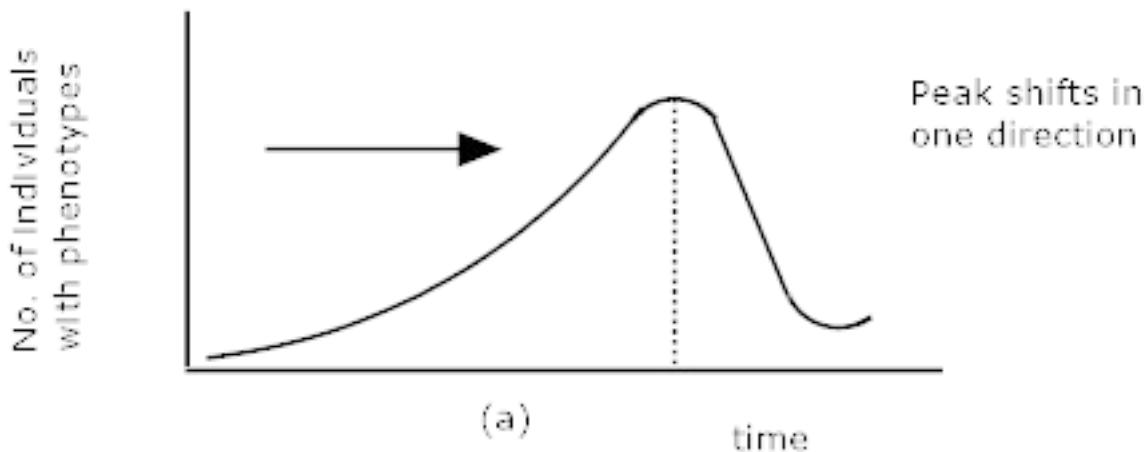
15. What are the three different ways in which selection may occur?

Ans. The three different ways in which selection may occur are as below:-

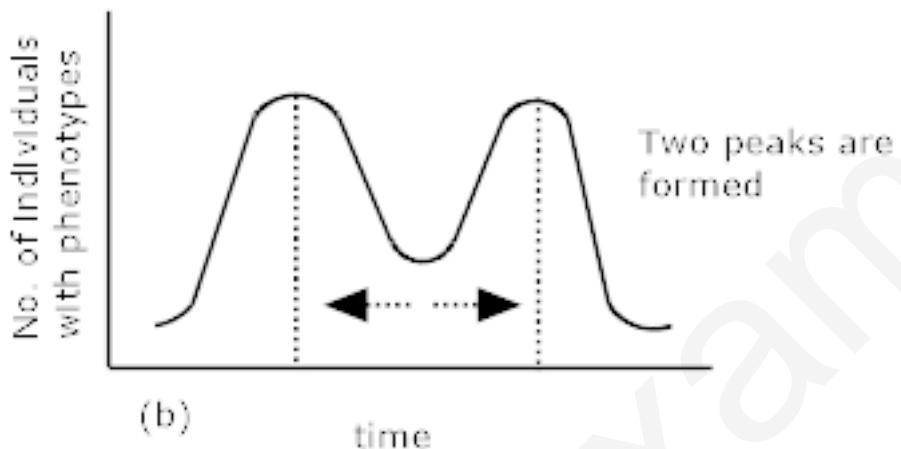
(i) Stabilising Selection :- Individuals with intermediate value of heritable phenotypic characteristics are favoured over other individuals.



(ii) Directional Selection :- Individuals with one extreme of heritable phenotypic characteristic have an advantage over individuals in a population.



(iii) Disruptive Selection :- individuals with either of both extreme of heritable phenotypic characteristics have advantage over individuals with intermediate phenotype.



16. State in what ways Stanley miller simulated the condition of :-

- Primitive atmosphere on earth.**
- Energy source at the time of origin of life .**
- Formation of organic molecule of life.**

Ans. i) A fluid containing mixture of methane, ammonia, hydrogen & water vapour in a closed flask.

ii) Energy source during origin of life was sun. This energy in the experiment is provided by electric discharge using electrode.

iii) Organic molecules formed during experiment are amino acids.

17.What is Biogeography? How Darwin's finches provide biogeographical evidence in favour of evolution.

Ans.The branch of geography which deals with the study of pattern of distribution of plants &animals in different parts of earth is called Biogeography.

Example Galapagos islands – group of 14 islands in Pacific Ocean on west coast of South America.Charles Darwin during his voyage found that animals of these lands resembles with those of SouthAmerican lands. E.g. birds of Galapagos Island called Darwin's finches do not resemble birds ofSouth America so he concluded that finches were derived from ancestral stock that had emigratedfrom mainland to island & has undergone profound changes under environmental conditions.

18. How did louispasteur successfully demolish the popular theory of spontaneous generation?

Ans.Louis Pasteur used a special swam-necked flask for his experiment. He took mixture of sugar &yeast powder & filled about half of it with water in this flask. He then boiled the content of flask till a steady current of steam rushed out from s-shaped tube –causing death of all microorganisms. Afterthis flask remains unchanged. But when neck of flask was cut-off showed thick growth ofmicroorganisms this is presumed that are contains microorganisms which in first case could not reach the flask whereas in second case they comes in direct contact with solution.

5 Marks Questions

1. What does Hardy Weinberg's principle states? What are the factors which affects Hardy Weinberg's equilibrium?

Ans. Acc. to Hardy Weinberg's principle, allele frequency in a population are stable & is constant from generation to generation i.e. total gene pool remains constant. This is called Genetic equilibrium e.g. In a diploid organism, suppose 'p' represents frequency of allele 'A' & 'q' represents frequency of allele 'q'. Then frequency of AA = p^2

$$\text{“ “ } Aa = pq$$

$$\text{“ “ } aa = q^2$$

total alleles in F1 Generation

$$AA + 2Aa + aa = 1$$

$$P^2 + 2pq + q^2 = 1$$

$$(p + q)^2 = 1$$

Factors affecting Hardy – Weinberg Equilibrium :-

(i) Gene flow :- when migration of a section of a population to another place occurs, gene frequency changes in original as well as in new population.

(ii) Genetic Drift :- If just by virtue of a chance or accident a particular allele frequency decrease or increase in a population.

(iii) Mutations:- which are sudden changes in the genotype which are carried over generation.

(iv)Genetic Recombination:- Sometimes changes in allele frequency is so different in new sample of population that they become a new species.

(v)Natural Selection:- process by which individual with particular heritable characteristics survive & reproduces at higher rate than other individuals favored by natural selection tend to be more common in next generation than in parent generation.

2. How do Darwin and Hugo de Vries after regarding Mechanism of Evolution?

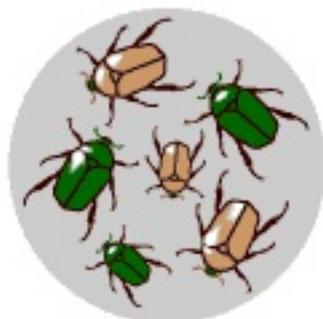
Ans. Darwin : Darwinian variations are gradual, small and directional Hugo deVries : put forth idea of mutations, mutations are sudden random and directional

3. With the help of suitable diagram, represent the operation of natural selection on different traits.

Ans. Natural selection is one of the basic mechanisms of evolution, along with mutation, migration, and genetic drift.

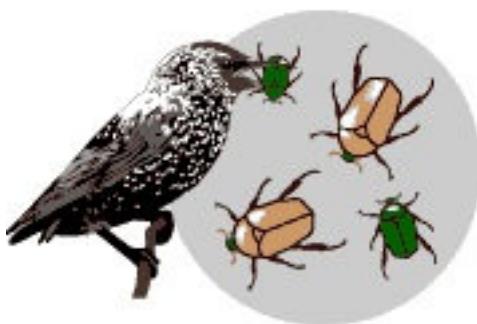
Darwin's grand idea of evolution by natural selection is relatively simple but often misunderstood. To find out how it works, imagine a population of beetles:

1. There is variation in traits.



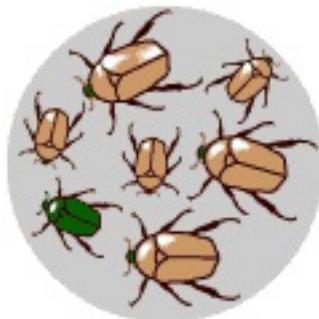
For example, some beetles are green and some are brown.

2. There is differential reproduction.



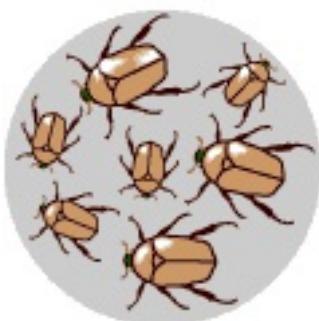
Since the environment can't support unlimited population growth, not all individuals get to reproduce to their full potential. In this example, green beetles tend to get eaten by birds and survive to reproduce less often than brown beetles do.

3. There is heredity.



The surviving brown beetles have brown baby beetles because this trait has a genetic basis.

4. End result:



The more advantageous trait, brown coloration, which allows the beetle to have more offspring, becomes more common in the population. If this process continues, eventually, all individuals in the population will be brown.

If you have variation, differential reproduction, and heredity, you will have evolution by natural selection as an outcome. It is as simple as that.

4.What does Oparin – haldane hypothesis about origin of life suggests.

Ans.According to Oparin & Haldane's Biochemical origin of life; origin of life occurs in three

stages

5.What is Chemogeny?

Ans. CHEMOGENY / CHEMICAL EVOLUTION :-Acc to them most of the primitive form of life would have generated spontaneously from some inorganic matter as a result of action of special external forces e.g. electric charge, uv-light etc.

1. Many saturated & unsaturated hydrocarbons were feasted when temp cooled to 900 c or below.
 2. From hydrocarbons small chain compounds of C, H, O are formed which condense to form sugar.
 3. Ketones & aldehydes condenses&polymerises to form fatty acid.
 4. Ammonia, hydrocarbon & H₂ O reacted together to form amino acid.
 5. Hot sea water which was rich in primary organic compound reacted to form nucleotides.
-

6. What is biogeny?

Ans. BIOGENY / BIOLOGICAL EVOLUTION :- This stage consists of

- i)Formation of nucleic acids by polymerization of nucleotide.
 - ii)Giant molecules of nucleoproteins have a tendency to be aggregated in various combinations to form large colloidal particles called COACERVATES.
 - iii)The development of plasma membrane resulted in accumulation of different substances inside coacervates& occurrence of certain internal reaction led to development of cell.
-

7. What is Cognogeny?

Ans. Cognogeny :-Cognogeny involves differentiation or diversification of living beings from simplest first living cell. The first organism evolved was chemo- autotrophic bacteria which later converted to tree autotrophic bacteria e.g. green algae.

CBSE Class 12 Biology
Important Questions
Chapter 8
Human Health and Disease

1 Marks Questions

1. Name the diagnostic test which confirms typhoid.

Ans. Widal test

2. Name the two major groups of cells required to attain specific immunity.

Ans. B-lymphocytes and T-lymphocytes.

3. You have heard of many incidences of Chickengunya in our country. Name the vector of the disease.

Ans. Aedes mosquitoes.

4. Breast fed babies are more immune to diseases than the bottle fed babies. Why?

Ans. The mothers milk consists of antibodies (Ig A) such antibodies are not available to bottle fed babies.

5. Name the pathogen which causes malignant malaria.

Ans. Plasmodium falciparum.

6. Which microorganism is used to produce hepatitis B Vaccine?

Ans. Yeast.

7. What is the reason of shivering in malarial patient?

Ans. After sporozoite infection, when RBC ruptures, a toxic substance haemoglobin is released which cause chilling and high fever.

8. When is a tumour referred to as malignant?

Ans. A tumour is said to be malignant when grows rapidly, invade & damage the surrounding normal tissues.

9. Why does an AIDS patient suffer from many infections?

Ans. Because in AIDS patient, immune system greatly weakens & cannot fight against any infection.

10. Name two curable sexually transmitted diseases?

Ans. Gonorrhoea & Syphilis

11. Name the type of cells that produce antibodies?

Ans. B – lymphocytes.

12. Give the scientific name of causative germ of elephantiasis?

Ans. Wuchereria Bancrofti.

13. Name the fish that help in eradication of mosquito larvae.

Ans. Gambusia

2 Marks Questions

1. Where are B-cells and T-cells formed? How do they differ from each other?

Ans. B-cells and T-cells are formed in bone marrow. B-cells produce antibodies but E-cells do not produce antibodies but help B-cells to produce them.

2. Given below are the pathogens and the diseases caused by them. Which out of these pairs is not correct matching pair and why?

- (a) Wuchereria Filariasis**
- (b) Microsporum Ringworm**
- (c) Salmonella Common Cold**
- (d) Plasmodium Malaria**

Ans. Salmonella : Common cold is not a matching pair.

3. What would happen to the immune system, if thymus gland is removed from the body of a person?

Ans. T-lymphocytes are developed and matured in thymus gland, Immune system will become weak on removal of thymus gland.

4. Lymph nodes are secondary lymphoid orgAns. Describe the role of lymph nodes in our immune response.

Ans. Lymph nodes provide the sites for interaction of lymphocytes with the antigen. When the microorganisms enter the lymph nodes, lymphocytes present there are activated and cause the immune response.

5. What is the role of histamine in inflammatory response? Name few drugs which reduce the symptoms of allergy.

Ans. Histamine acts as allergy-mediator which cause blood vessels to dilate. It is released by mast cells. Antihistamine steroids and adrenaline quickly reduce the symptoms of allergy.

6. Differentiate between two different types of tumours?

Ans.

| BENIGN TUMOUR | MALIGNANT TUMOUR |
|--|---|
| i) tumour remain confined to place of origin or affected organ | i) tumour invade surrounding tissue & spread throughout the body. |
| ii) It is harmless | ii) It is harmful |
| iii) rate of growth of tumour is low | iii) rate of growth of tumour is rapid |
| iv) causes limited damage | iv) Cause uncontrolled damage. |

7. What do you mean withdrawal Symptoms? What are its characteristics?

Ans. Withdrawal symptoms refers to the characteristic unpleasant symptoms by body of a drug addict if regular dose of drug is abruptly discontinued. These include anxiety, shakiness, sweating, restlessness, depression, muscular cramps etc.

8. Differentiate between active & passive immunity?

Ans.

| ACTIVE IMMUNITY | PASSIVE IMMUNITY |
|--|--|
| i) when antibodies are developed by our own cells in response to antigen | i) when antibodies developed in other vertebrates in response to deliberate infection of antigen |
| ii) It takes time to develop immunity | ii) It is used when the immune response has to be faster |
| iii) It stays for longer period | iii) It stays for short period |

9. Enumerate the two properties of cancer cells that distinguish them from normal cell.

Ans.i) uncontrolled proliferation of cells without any differentiation

ii) Ability of these cells to invade other tissues called metastasis.

10. What are allergens? How do they cause inflammatory response inside human body?

Ans.The substance which causes the hypersensitive reaction of the immune system is called an allergeneg. dust, pollen grains etc. These allergens are actually weak antigens. First exposure to allergen does not cause allergy but consequent exposure, allergen combines with Ig E on mast cell. That causes cells to burst & release Histamines which cause inflammatory response.

11. What are autoimmune diseases? Give two examples?

Ans.Immunity is based on ability to differentiate foreign organism from self cells. Sometimes immune system may go off the track & turns against self antigen and elicit immunity. Such conditions are called auto – immune diseases eg. Rheumatoid arthritis, Myasthenia gravis.

3 Marks Questions

1. What are Cannabinoids? From which plant Cannabinoids are obtained? Which part of the body is affected by consuming these substances?

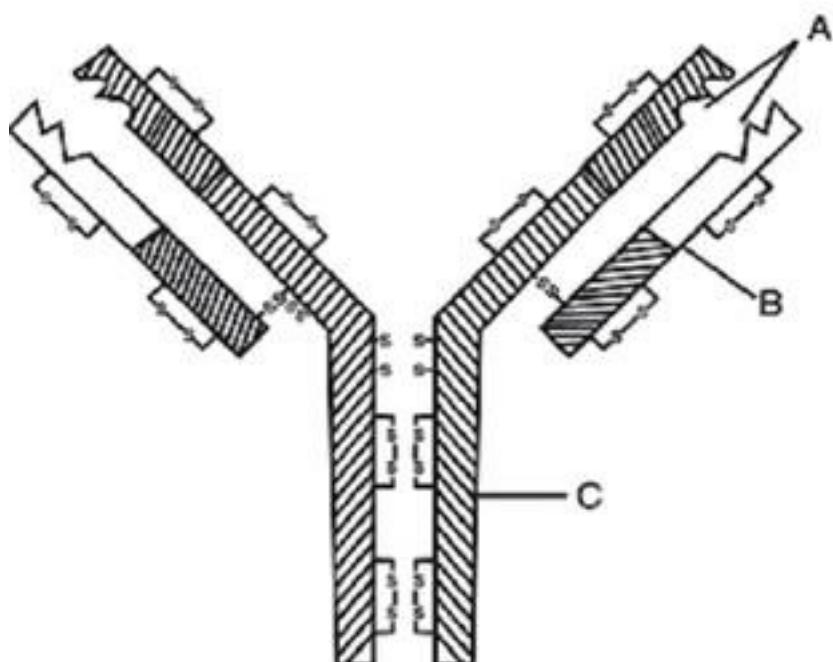
Ans. - Cannabinoids are a group of chemicals which interact with Cannabinoid receptors present

- Principally in the brain Cannabinoids are obtained from the inflorescences of the plant Cannabis sativa.

- The substances affect the cardiovascular system adversely

2. In the figure, structure of an antibody molecule is shown. Observe it and Give the answer of the following questions.

- (i) Label the parts A, B and C.
- (ii) Which cells produce these chemicals?
- (iii) State the function of these molecules.



- Ans.(a)** A-Antigen binding site B-Light chain
(b) B-lymphocytes.
(c) Heavy Chain
(d) Antibodies provide acquired immune response.

3. Mention any three causes of drug abuse. Suggest some measures for the prevention and control of drug abuse.

Ans. Reasons to attract towards drug abuse : Curiosity, peer pressure, escape from frustration and failure, family problems, false belief of enhanced performance.

Preventive measures :

- Avoid undue peer pressure
- Education and Counselling
- Seeking help from parents and peers.
- Looking for danger signs
- Seeking professional and medical help

4. A person shows unwelcome immunogenic reactions while exposed to certain substances.

- (a) Name this condition.
 (b) What common term is given to the substances responsible for this condition?
 (c) Name the cells and the chemical substances released which cause such reactions.

Ans.(a) Allergy **(b)** Allergens

(c) Mast Cells Histamine, Serotonin

5. Fill in the blanks in the different columns of the table given below to identify the nos 1 to 6.

| Name of disease | Causative organism | Symptoms |
|-----------------|----------------------|--|
| Pneumonia | Streptococcus | (1) |
| Typhoid | (2) | High fever, weakness, headache, stomach pain |
| (3) | Rhinoviruses | Nasal Congestion, and discharge, sore throat, cough, headache |
| Ascariasis | Ascaris | (4) |
| Ringworm | (5) | Dry, Scaly lesions on various body parts, Intense itching, redness. |
| (6) | Entamoebahistolytica | Constipation, cramps, abdominal pain, Stools with excess mucous and blood clots. |

Ans.(i) Alveoli filled with fluid, reduced breathing, fever, chills, cough and headache.

(ii) *Salmonella typhi*

(iii) Common Cold

(iv) Internal bleeding, muscular pain, anaemia, fever and blockage of the intestinal passage.

(v) *Microsporum* species/*Trichophyton* species/*Epidermophyton* Species.

(vi) Amoebiasis/amoebic dysentery

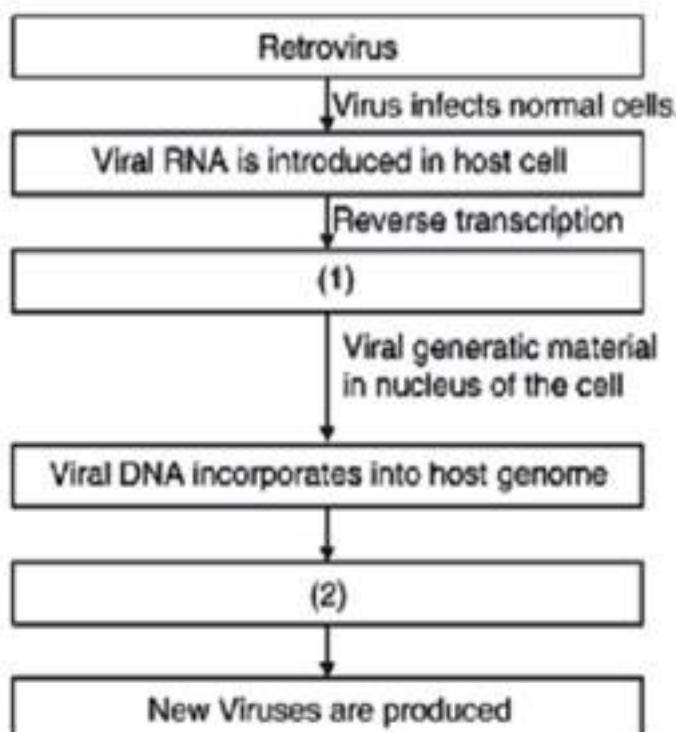
6. In the given flow diagram, the replication of retrovirus in a host cell is shown.

Examine it and answer the following questions

(a) Why is virus called retrovirus?

(b) Fill in (1) and (2)

(c) Can infected cell survive while viruses are being replicated and released by host cell?



Ans.(a) HIV has RNA genome. It produces DNA by reverse transcription.

(b) 1 : Viral DNA is produced by reverse transcriptase.

2 : New Viral RNA is produced by the infected cell.

(c) Infected cell can survive.

7. What is innate immunity? List the four types of barriers which protect the body from the entry of the foreign agents.

Ans. Innate Immunity is non-specific type of defense that is present at the time of birth.

(i) Physical Barriers : Skin, mucous-coated epithelium or respiratory, digestive and urinogenital tract.

(ii) Physiological Barriers : Acidity of Stomach, lysozyme in saliva, tears, sweat.

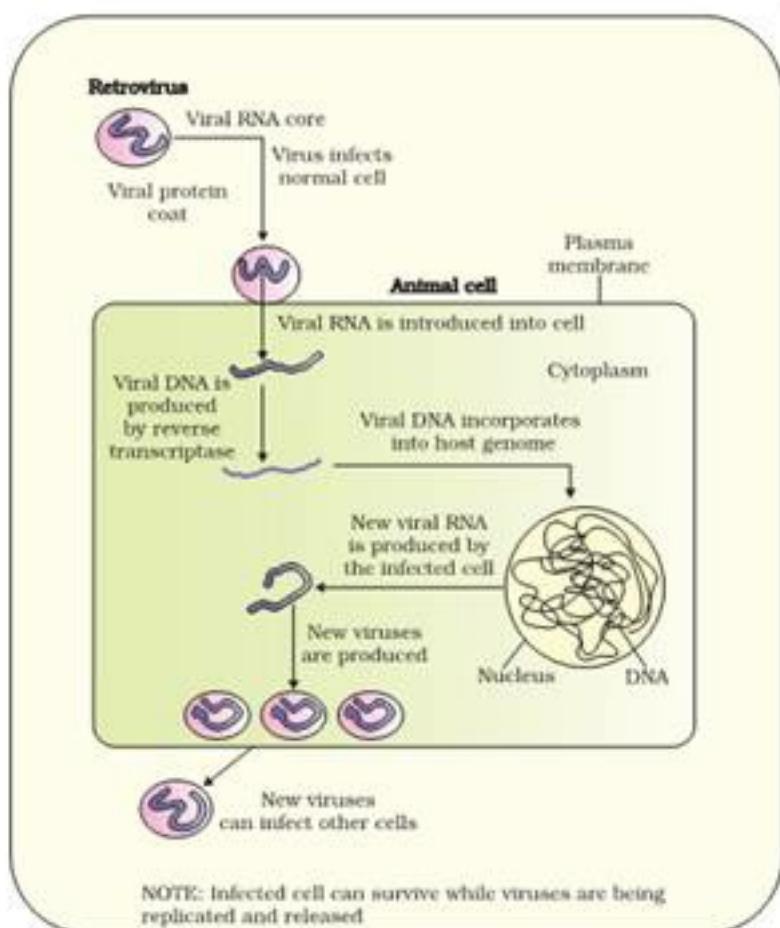
(iii) Cellular Barrier : Macrophages, neutrophils, monocytes and natural killer lymphocytes..

(iv) Cytokine Barriers : Interferons produced by Viral infected cells, protect the non-infected cells from further Viral infection.

8. How does humoral immune system works when our body is infected?

Ans. Humoral immune response is one in which antibodies are developed which are capable of attacking microbes. Each B-cell has receptors on its surface that recognize a specific antigen. Initial exposure of B-cell to Antigen triggers B-cells to proliferate forming a large clone cell continuous stimulation increases the number of B-lymphocytes which differentiates into smaller antibody producing plasma cells. Each clone of plasma cells manufactures antibodies that specifically react with antigenic determinant that stimulated the initial proliferation. The antibody binds to antigen- forming an antigen-antibody complex which is later digested by phagocytic cells. Some of these plasma cells develops into memory cells which rapidly differentially into plasma cells on later exposure to same antigen.

9. It was diagnosed by a specialist that the immune System of the body of a patient has been suppressed. Describe the infection & the mechanism of its proliferation in the body.



Ans. If the immune system of the patient is found to be suppressed, he is found to suffer from human immunodeficiency virus (HIV). The HIV virus enters into helper T- cells & replicate to produce progeny viruses. The replication of virus involves:-

- After viral capsid enters the cell enzyme reverse transcriptase copies single stranded RNA into complementary DNA.
- The RNA is degraded by ribonuclease H & the DNA strand is duplicated to form double - stranded DNA.
- Proviral DNA is integrated into cells DNA through a complex sequence of reactions catalysed by Integrase enzyme.
- Once the virus has infected the cell, virus becomes active & large number of virus particles are liberated that can infect other cells.

10.What are carcinogens? What are the different types of carcinogens? Also mention the different methods of treatment of cancer?

Ans.The things that cause cancer are called CARCINOGENS. These agents may be chemical or physical things like:-

1. Smoking
2. Tobacco chewing
3. Radiations eg. uv- x-ray, cosmic rays.
4. Chemical eg. mustard gas, aflatoxin, cadmium oxide
5. Biological agents eg. retroviruses
6. Cellular agents proto-oncogenes which when activated under certain condition may lead to oncogenic transformation of cells.

Treatment of cancer involves :-

1. SURGERY :- surgical removal of tumour
2. CHEMOTHERAPY : treatment with drugs that can destroy cancer cells
3. IMMUNOTHERAPY : use of interferons, interleukin, vaccines to generate non-specific defense mechanism
4. RADIATION THERAPY :- x-ray therapy or radiotherapy use of ionizing radiations to kill cancer cells.
5. HARMONAL SUPPRESSION : providing or blocking certain hormones.

11.Describe the ill – effects of drug abuse in males & females. Also mention the preventive measures that is to be taken to reduce such effects.

Ans.1) ILL – DEFECTS IN MALES :- acne, increased aggressiveness , mood swing depression reduction of size of testicles, decreased Sperm production, kidney & liver dysfunction, premature baldness.

2) ILL – EFFECTS IN FEMALES :-masculinisation, increased aggressiveness, mood swings, depression abnormal menstrual cycle, excessive hair growth on face & body & deepening of voice.

The following measures are need to be taken to prevent such problems :-

1. EDUCATION & COUNSELLING :- to face problem or stress, to accept failure as part of life & to channelize child's energy to some health promoting activities.
 2. AVOID UNDUE PEER PRESSURE :- to pressurize a child to perform beyond his capabilities
 3. SEEKING HELP FROM PARENTS &PEERS :- to share the feeling of anxiety & guilty.
 4. SEEKING PROFESSIONAL FOR MEDICAL HELP :- help available in the form of highly qualified psychiatrist, psychologist etc.
-

12.What is vaccination? What type of immunity is provided by vaccination?

Ans.Vaccination is a process of development of immunity with administration of vaccines in the body, here weakened pathogen are infected into the body to produce immunity against a particular pathogen. This pathogen stimulates the body to produce antibodies. The antibodies produced against these antigens would neutralize the pathogenic agent. The vaccine also generates memory B – and T – cells that recognize pathogen quickly on subsequent exposure & overwhelm the invaders with massive production of antibodies.

The type of immunity is ACTIVE IMMUNITY.

However, if a person is infected with some deadly microbe to which quick immune response is required, we need to directly injected to patient's body, This type of immunization is called PASSIVE IMMUNISATION.

13. (i) Differentiate between communicable & non – communicable diseases?

(ii) Name the body part & the host in which following events takes place in life cycle of plasmodium.

(a) fertilization

(b) Development of Gametophyte :-

(c) Release of sporozoites :-

(d) Asexual Reproduction.

Ans. (i) Communicable diseases are caused by biological agents & can spread from one person to another or one place to another through air, water, physical contact etc.

Non – communicable diseases are confined to a person & do not easily spread from one person to another.

- (ii) (a)** in the gut of female anopheles.
- (b)** in RBCS of Human beings.
- (c)** Salivary gland of female anopheles.
- (d)** liver cells of human beings.

5 Marks Questions

1. Answer the following with respect to Cancer.

- (a) How does a cancerous cell differ from a normal cell?**
- (b) Benign tumor is less dangerous than malignant tumor. Why**
- (c) Describe causes of cancer.**
- (d) mention two methods of treatment of the disease.**

Ans. (a) In normal cells, growth and differentiation is 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).

- (b)** 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.
- (c)** Cancer may be caused due to carcinogens which are physical (radiations), chemicals (Nicotine, Aflatoxin, Cadmium oxide, Asbestos) and biological (viral oncogens).
- (d)** Surgery, radiotherapy, Chemotherapy

2. The pathogen of a disease depends on RBCs of human for growth and reproduction. The person with this pathogen suffers with chill and high fever.

- (d) Represent the life cycle of the pathogen diagrammatically.**

Ans. (a) Malaria

- (b)** Different species of Plasmodium viz P. vivax, P. Malariae and P. falciparum.
- (c)** Malaria is caused by the toxins (haemozoin) produced in the human body by the malarial parasite. This toxin is released by the rupturing of RBCs.
- (d)** Life cycle of Plasmodium : Fig. 8.1 Page 148, NCERT book, Biology - XII

3. The immune system of a person is suppressed. He was found positive for a pathogen in the diagnostic test ELISA.

- (a) Name the disease, the patient is suffering from.**
- (b) Which pathogen is identified by ELISA test?**
- (c) Which cells of the body are attacked by the pathogen?**
- (d) Suggest preventive measure of the infection.**

Ans. (i) AIDS (Acquired Immuno Deficiency Syndrome)

- (ii) HIV (Human Immunodeficiency Virus)
- (iii) Helper T-cells, macrophages, B-lymphocytes.

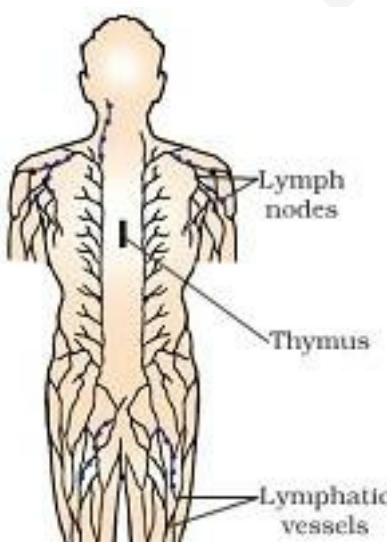
(iv) Preventive measures :

- (a) People should be educated about AIDS transmission.
- (b) Disposable needles and syringes should be used
- (c) Sexual habits should be changed immediately
- (d) High-risk groups should be discouraged from donating blood.
- (e) Routine screening may be done.

4. Discuss the role of lymphoid organs in the immune response. Explain the different types of lymphoid organs giving two examples of each type in humans.

Ans. Lymphoid organs are organs where origin or maturation & proliferation of lymphocytes occurs. These lymphoid organs are of two types:-

1. PRIMARY LYMPHOID ORGAN: - where immature lymphocytes differentiate into antigen – sensitive lymphocytes. It includes :-



(a)BONEMARROW :- It is the main lymphoid organ present in the thigh region where all types of blood cells including lymphocytes are formed. It provides micro – environment for the development & maturation of B – cells.

(b)THYMUS :- It is located beneath the chest bone near heart. It provides microenvironment for the development & maturation of T – lymphocytes.

2.SECONDARY LYMPHOID ORGAN :- They provide the site for interaction of lymphocytes with antigen which then proliferate to become effector cells. It includes.

(a)SPLEEN :- It is large bean shaped organ & contains mainly lymphocytes & phagocytes. It acts as a filter of blood by trapping blood – bound micro – organism.

(b)LYMPH NODE :- They are small – solid structure located at different points along lymphatic system. It serves to trap antigen which happens to get into lymph & tissue fluid. Antigen trapped in lymph nodes are responsible for activation of lymphocytes,

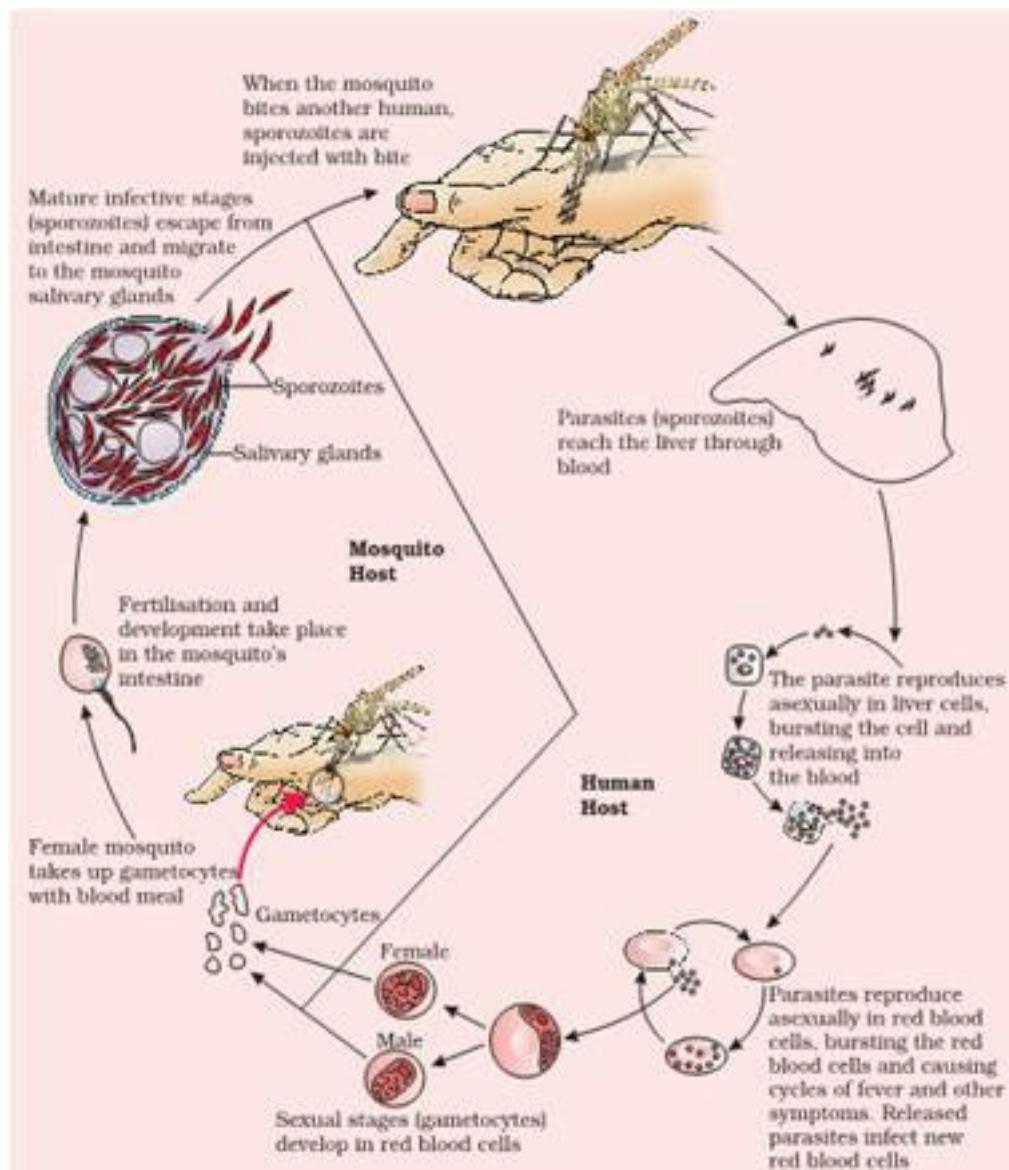
5. With the help of a well – labelled diagram, Describe the life cycle of malarial parasite.

Ans. Malaria is caused by plasmodium vivax. It has two hosts – female anopheles is the vector of plasmodium while the primary host is man where the parasite maintains an amoeboid stage in RBCS & later produces gametophyte.

Life cycle of plasmodium involves following steps:-

1. The sporozoites enters the human body, reach the liver through blood & multiply within the liver cells such liver cells burst & release the parasites into blood.
2. They attack RBCS, multiply & cause their rupture.

The rupturing of RBCS is associated with the release of a toxin called haemoglobin, which is responsible for recurring fever & the chill / shivering.



1. Gametophytes are developed in RBCS.
2. When a female anopheles mosquito bites an infected person, these parasites enter the mosquito's body & undergo further development. These parasites multiply within then in the stomach & develop a cyst.
3. The cyst produces sporozoites which reach salivary gland of mosquito. When such infected Anopheles sucks blood of a healthy person, it transfers. Sporozoites to repeat amoeboid stage again.

6. What do you mean by “Out – breeding”. What are the different methods employed for out breeding.

Ans. Breeding between the unrelated ale & female animals is called Outbreeding. It can be done in following ways:-

1. OUT CROSS :- The mating of animals within the same breed but do not have any common ancestor on either side of their pedigree for 4-6 generation is called an out cross. It is the best method of breeding of animals that are below average in milk production, growth rate of beef cattle etc.
2. CROSS-BREEDING :- It is a cross between superior males of one breed & Superior females of another breed. It allows the desirable qualities of two different breeds to be combined & are used for commercial production eg .Hisardale, a new breed of sheep is developed by crossing bikaneri ewes & Marino rams.
3. INTERSPECIFIC HYBRIDISATION :- male & female animals of two different related species are mated so, that progeny may combine desirable features of both parents eg. mule is produced by crossly donkey & a female horse.

7. What is somatic hybridization – Explain the steps involved in the production of somatic hybrids?

Ans.Somatic hybridization is the process of fusing protoplasts of somatic cells derived from two different varieties or species of a plant on a suitable nutrient culture medium under sterile condition. One example of somatic hybrid is topato produced by fusion of protoplast of tomato & potato.

Somatic hybridization involves the following steps:-

1. Isolation of protoplast from two different varieties of plants – each having a desirable character,
2. Fusion of cytoplasm of two protoplast results in coalescence of cytoplasm. The nuclei of two protoplasts may or may not fuse together even after fusion of cytoplasm, fusion of protoplast requires a suitable agent called fusogeneg. PEG or polyethylene glycol.
3. Under favourable conditions, hybrid protoplast synthesise new cell wall around it. Hybrid cell functions as a single cell & then undergo sustained division to form callus.
4. The regenerated callus is transferred to a new culture plates containing suitable culture media. Here callus divide & form root & shoot after organogenesis.

CBSE Class 12 Biology
Important Questions
Chapter 9
Strategies for Enhancement in Food Production

1 Marks Questions

1. Why is inbreeding necessary in animal husbandry?

Ans. Inbreeding increases homozygosity.

2. Name two fungal diseases of Crop plants.

Ans. Brown rust of wheat, Smut of wheat, red rot of Sugar cane, Late blight of potato.

3. Which product of Apiculture is used in cosmetics and polishes?

Ans. Beewax.

4. Semi-dwarf varieties of a crop plant were derived from IR-8. Name that crop.

Ans. Paddy crop (rice)

5. Write two qualities of *Saccharum officinarum* (Sugarcane) grown in South India.

Ans. Thicker stem and higher sugar content.

6. Name any two semi – dwarf varieties of wheat introduced into all wheat growing places of India?

Ans. Sonalika & Kalyan sona.

7. What is Biofortification?

Ans. The breeding of crops to increase the levels of vitamins, minerals & higher proteins & healthier fats content is called biofortification.

8. Give an example where mutation breeding has been successfully carried out for introducing disease resistance.

Ans. varieties of mung bean have been successfully developed that are resistant to yellow mosaicvirus & powdery mildew.

9. Name two better yielding varieties of rice developed in India?

Ans. Jaya & Ratna

10. Name the microbe that is grown for use as protein – rich food?

Ans. Methylophilus methylotropous.

11. Why is mutation breeding necessary for breeding for disease resistance?

Ans. because there is limited availability of disease – resistance genes in the crop plants & wide varieties.

12. Give any two commercial products produced from Apis species?

Ans. Honey & bee wax

13. What is the major advantage of producing plants by micropropagation?

Ans. a large number of plants can be grown in a short period of time.

14. What is a somaclones?

Ans. Somaclones are the genetically identical plants developed from any part of a plant by micropropagation.

15. Name any two fresh water fishes?

Ans. Rohu & catla.

2 Marks Questions

1. A new breed of sheep was developed in Punjab by crossing two different breeds of Sheep. Name the two breeds which were crossed and the new breed developed.

Ans. By crossing Bikaneri ewes and Marino rams, the new breed Hisardale was developed.

2. Study the table given below and fill in the blanks marked A, B, C and D

| S.No | | Crop Variety | Resistant to Disease |
|------|----------|----------------|------------------------------|
| 1. | Wheat | Himgiri (A) | White rust |
| 2. | Brassica | (B) | Bacterial blight |
| 3. | (C) | Pusa Koma | Chilly mosaic Virus, Tobacco |
| 4. | Chilli | (D) | mosaic Virus and leaf curl |

Ans. A - Leaf and Stripe rust, hill bunt.

B - Pusa swarnim (Karan rai).

C - Cowpea

D - Pusa Sadabahar

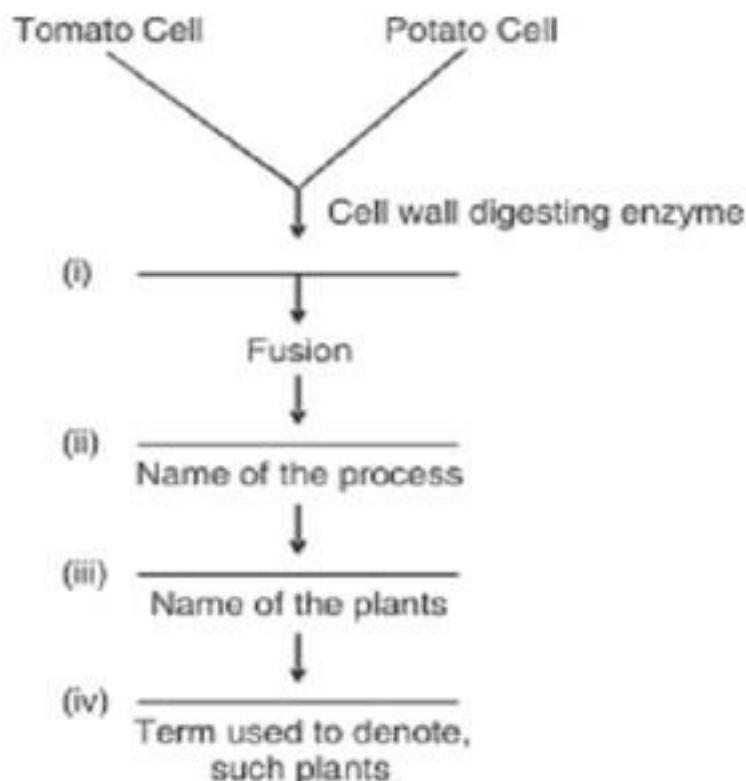
3. Why are proteins synthesized from Spirulina called Single celled Proteins? What is the significance of such a protein?

Ans. The protein rich food produced by microbes is called as single celled protein (SCP) Spirulina is a microorganisms which has more protein. It is a quick method of protein production because the growth rate of microbes is enormous. Hence, it provides a protein rich diet for human beings.

4. Differentiate between inbreeding and outbreeding in animals.

Ans. When breeding is between animals of the same breed, it is called inbreeding, while cross between different breeds is called out breeding.

5. Observe the process of Somatic hybridisation given below and fill in the blanks. (i), (ii), (iii) and (iv)



Ans. (i) Isolation of protoplast of Tomato cell and Potato cell.

(ii) Somatic hybridisation.

(iii) Poma

(iv) Somatic hybrid

6. What is single cell protein? What is its significance?

Ans. The production of edible proteins on a large scale from microorganisms for human beings & animals is called Single cell protein. It is important because :-

1. it provide protein – rich supplement in diet.
 2. It reduces pressure on agriculture for supply of desired proteins.
 3. It helps to minimise environmental pollution
-

7. Expand MOET. How is it carried out?

Ans. Moet is multiple ovulation Embryo transfer. It involves following steps :-

1. a cow is administered hormones to induce follicular motivation & super ovulation.
 2. Cow is mated with a selected bull.
 3. Fertilized eggs at 8-32 celled stage are recovered & transferred to surrogate mother.
-

8.What is germplasm? Why is it necessary to have gemplasm collection?

Ans. The sumtotal of all the alleles of the gene present in a plant & its relative is called Germplasm. Germplasm collection is very essential for effective exploitation of natural genes available in the population.

9.What is inbreeding depression? Why do self – pollinated crops do not show the ill-effects of inbreeding depression?

Ans. Continued inbreeding especially close inbreeding usually reduces fertility & even productivity. This is called inbreeding depression. In self – pollinated crops, since the male & female reproductive parts are of the same flower & are compatible with each other to cause fertilisation : it does not show ill – effects of inbreeding depression.

10.What is interspecific hybridization. Give an example?

Ans. It is a method of outbreeding in which male & female animal of two different species are crossed to combine the desirable features of both the parents into one eg, mule is produced by a cross between donkey & a female horse.

11.What are the advantages of breeding for disease-resistance in plants?

Ans. Plant breeding for disease resistance has two advantages

i)Enhance food production by reducing losses due to diseases.

ii)Reduced dependence on use of fungicides & bacteriocides

12.Which part of the plant is best suited for making virus free plants & why?

Ans.Apical & intercalary buds having apical meristem are best suited part of the plant body for making virus free plants as they are free from viral infection.

13.What is artificial insemination? What are the advantages of this technique?

Ans.It is a process in which the semen collected from a superior male is injected into the reproductive tract of the selected female by the breeder.

Advantages :-

1. Semen can be used immediately or stored
2. Semen can be transported in frozen form to a distant place.
3. Semen from one selected male can be used on number of females.

14.Why was hybridization carried out between species of Sugarcane in North India & that grown in south India?

Ans.Saccharum barberi grown in North India but had poor sugar content & Yield.

Saccharum officinarum had thicker stem & high sugar content but cannot grow well in north India. The hybrid of these two varieties has desirable quality of high yield, thick stem, high sugar & ability to grow in North India.

15.Name the variety developed & disease to which it is resistant in case of :-

i) Brassica

ii) Cowpea

Ans.i) Pusa swarnim variety developed against white rust.

ii) Pusa komal variety developed against Bacterial blight.

16.What is meant by the term “breed”. What are the objectives of animal breeding?

Ans.The group of animal having similar ancestral characters size, general appearance etc – are called breed.

Objectives of Animal Breeding :-

(a) Increase the yield of animals.

(b) Improvement in the desirable qualities of the produce.

3 Marks Questions

1. What is micropropagation? Why are plants produced by this technique called somaclones? Name any two food plants which are produced on commercial scale using this method.

Ans. The method of producing many plants through tissue culture is called micropropagation.

The plants produced through micropropagation will be genetically identical to the original plant from which they were grown, hence are called somaclones.

Tomato, banana, apple are produced on commercial scale using this method.

2. What is mutation? Explain the significance of mutation in plant breeding. Give an example of a disease resistant variety of cultivated plant induced by mutation.

Ans. Mutation : Sudden inheritable change in the characters of an organism due to change in the sequence of bases in the gene(s).

Mutation results in a new character or trait, not found in the parental type. It can also be induced by using mutagens like gamma radiations.

Such plant materials are used as such or used for breeding new varieties.

Mung bean resistance to yellow mosaic virus and powdery mildew.

3. How can we improve the success rate of fertilisation during artificial insemination in animal husbandry programmes?

Ans. The Multiple Ovulation Embryo Transfer (MOET) technology can improve the success rate of fertilisation.

In the procedure, a cow is given hormonal treatment (FSH), so that more than one ova/eggs (6-8) are produced per cycle. After mating or artificial insemination the embryos at 8-32 celled stage, are transferred to different surrogate mother cows. This technology has been successfully used for cattle, sheep, rabbit, mares and buffaloes.

4. Biofortification is the most practical means to improve public health. Justify the statement with examples.

Ans. Biofortification is the plant breeding programme designed to increase Vitamins, minerals, higher proteins and healthier fat content in crops. This programme improves the quality of food products. It is required to prevent hidden hunger. Some of the examples of fortified crops are:

- (i) New hybrid of maize : has twice the amount of amino acid lysine and tryptophan.
- (ii) Wheat : Atlas 66, having a high protein content.
- (iii) Rice : 5 times iron than the normal amount. IARI Delhi has released several crops which are rich in vitamins and minerals. Consumption of such biofortified food will vastly improve the public health.

5. What is meant by germplasm Collection? Describe its significance in plant breeding programmes.

Ans. The collection of all the diverse alleles of all the genes of crop plant is called germ plasm collection.

In plant breeding programmes, the germplasm provides the entire of genes and alleles, and the characteristics which they express. The plant breeders select the most favourable characters of a particular gene and manipulate its transfer to a desirable parent.

6. To which product, following products are related (a) Blue revolution (b) white revolution (c) Green revolution

Ans. (a) Fish production (b) Milk production (c) Crop production

7.What measures would you undertake to improve the quality & quantity of milk production?

Ans. The quality & quantity of milk production depends on three factors :-

1. Genetic makeup.
2. Nutrition &
3. Environment

Thus, the following steps should be taken to improve management of livestock :-

a.SHEDS :- Sheds should be neat & clean, well – ventilated with pucca floor & will drained channel.

b.BALANCED DIET :- a balanced feed consists of appropriate quantities of carbohydrates, proteins, vitamins, minerals & water. The feed consists of two main components :-

i.Roughage – include fodder, hay, straw & Silage.

ii.Concentrates – broken forge crops, grams, cereals, mullets, cotton, seeds.

a.CLEAN WATER :

b.HEALTH CARE:- It requires regular inspection with proper record keeping.

8.What is “tissue culture”. What are the steps involved in tissue culture?

Ans.“Tissue culture is an experimental process through which a mass of cells (callus) is produced from an explant tissue & used directly to regenerate plant. It involves following steps :-

1. Selection of an elite plant
2. Preparation of suitable culture media
3. Sterilisation of an explant & inoculation on culture media under controlled temp ~ 250 c in light
4. Callus induction in explant.
5. Organogenesis :- a high cytokine : auxin ratio induce Shoot formation while high auxin : cytokinin ratio induce root formation.
6. Acclimatization :- test tube rooted plantlets are first subjected to acclimatization in green house & then transferred to the field.

9.What are the measures that need to be taken for effective poultry farm management?

- Ans.**
- i) It requires a crowd – free, rainproof, well ventilated & protected brood house.
 - ii).Brood house should be clean & disinfected.
 - iii).Good drainage system.
 - iv).Proper fed & clean & fresh drinking water.
 - v).Proper light management for optimum egg production.
 - vi).Poultry are more sensitive to heat so, measures should be adopted to overcome heat shock.
 - a).Sheds should be covered with grass or low vegetation.
 - b).Provide sprinklers on roof.
 - c).Maximum Ventilation.
 - vii)Disease – free & suitable breeds should be selected for breeding.
-

10.The steps in a programme are :-

Collection of germplasm, crossbreeding the selected parents, selection superior recombinant progeny & Testing, releasing & marketing new cultivars?

- i) What is this programme related to?**
- ii) Name two special qualities as the basis of selection of progeny.**
- iii) What was the outcome of the programme?**

iv) What is the popular term given to this outcome? Also name the India Scientist who is credited with chalking out of this programme.

v) Among the above – mentioned step which is the most crucial step of this programme& why?

Ans. i). Plant breeding.

ii). Disease resistance & yield.

iii). Production of improved varieties.

iv). The popular term give to this outcome is HYBRID. Dr. S. Swamminathan is credited with chalking out of this programme.

v). Selection of superior progeny is the most crucial step of this programme because it yields plants that are superior to both parents & are then self – pollinated for several generations.

11. What is apiculture? What are the requirements to consider for bee–keeping?

Ans. The culturing of honey bees for the production of honey or beewax is called Apiculture.

Bee – keeping can be practised in any area where there is sufficient bee pastures of some wild shrubs, fruits orchards & cultivated crops. The following points are important for successful bee – keeping :-

1. Knowledge of nature & habits of bee.
2. Selection of suitable location of keeping beehives.
3. Catching & hiving of swarms.
4. Management of beehives during different seasons.
5. Handling & collection of honey & beewax.

12.What are the major steps involved in Plant breeding?

Ans. The major steps involved in plant breeding are :-

i). Collection of varieties :- collection & preservation of all the different wild varieties, species & relatives of the cultivated species.

- ii). Evaluation & Selection of Parents :- Germplasm collected is evaluated to identify plants with desirable character. The selected plants are multiplied & used.
- iii). Hybridisation of Selected Parents :- The selected parents are hybridized so that the traits in them can be combined in the hybrid progeny.
- iv). Selection & Testing of Superior Recombinants :- Individuals with desired combination of characters have to be selected from among the progeny. Such hybrids are superior to both the parents.
- v). Testing, Release & commercialization of New cultivars :-

Evaluation is done by growing these plants in the research field & recording their performance under ideal conditions of irrigation, fertilizers & other crop practices. The selected plants are then tested in the farmer's field for at least three growing seasons. The material thus selected is certified & released as a variety.

5 Marks Questions

- 1. Does apiculture offer multiple advantages to farmers? List its advantages, if it is located near a place of commercial flower cultivation. Name the most common species of bee which is reared in India.**

Ans. Apiculture or Bee-Keeping is the maintenance of hives of honeybees for the production of honey. Apiculture is beneficial for farmers in many ways. Honey bee also produces beeswax which is used in industries, such as in preparation of cosmetics and polishes of various kinds. If Bee keeping is practiced in any area the commercial flowers are cultivated, it will be beneficial in the following ways.

- (i) Bees are pollinators of many crop species including flowering crops such as sunflower.
- (ii) It improves the honey yield, because honeybees collect the nectar from flowers for making honey.

Apis indica is the most common species which is reared in India.

2. What is somatic hybridisation? Describe the various steps in producing somatic hybrids from protoplasts. Mention any two uses of somatic hybridisation.

Ans. Somatic Hybridisation : The process of fusing protoplasts of Somatic cells derived from different varieties or species of plants to produce a hybrid.

Steps :

- (i) Removal of cell wall of fusing cells by digestion with a combination of pectinase and cellulase to form protoplasts.
- (ii) Fusion between protoplasts of selected parents is induced by the use of poly ethylene glycol (PEG).
- (iii) The resulted product is cultured on a suitable medium to regenerate cell walls.
- (iv) The cells obtained begin to divide to produce plantlets called somatic hybrids.

Uses/Applications :

- (i) Somaclonal variations can be created
- (ii) Lines or varieties/species of plants which can not be sexually hybridised, they can be hybridised.
- (iii) Allopolyploids can be raised by the method.

3.What do you mean by “Out – breeding”. What are the different methods employed for out breeding.

Ans. Breeding between the unrelated male & female animals is called Outbreeding. It can be done in following ways:-

- i) OUT CROSS :- The mating of animals within the same breed but do not have any common ancestor on either side of their pedigree for 4-6 generation is called an out cross. It is the best method of breeding of animals that are below average in milk production, growth rate of beef cattle etc.
- ii) CROSS-BREEDING :- It is a cross between superior males of one breed & Superior females of another breed. It allows the desirable qualities of two different breeds to be combined & are used for commercial production eg . Hisardale, a new breed of sheep is developed by crossing bikaneri ewes & Marino rams.
- iii) INTERSPECIFIC HYBRIDISATION :- male & female animals of two different related species are mated so, that progeny may combine desirable features of both parents eg. mule is produced by crossly donkey & a female horse.

4.What is somatic hybridization – Explain the steps involved in the production of somatic hybrids?

Ans. Somatic hybridization is the process of fusing protoplasts of somatic cells derived from two different varieties or species of a plant on a suitable nutrient culture medium under sterile condition. One example of somatic hybrid is topato produced by fusion of protoplast of tomato & potato.

Somatic hybridization involves the following steps:-

- I). Isolation of protoplast from two different varieties of plants – each having a desirable character,
- II). Fusion of cytoplasm of two protoplast results in coalescence of cytoplasm. The nuclei of two protoplasts may or may not fuse together even after fusion of cytoplasm, fusion of protoplast requires a suitable agent called fusogen eg. PEG or polyethylene glycol.
- III). Under favourable conditions, hybrid protoplast synthesise new cell wall around it. Hybrid cell functions as a single cell & then undergo sustained division to form callus.
- IV). The regenerated callus is transferred to a new culture plates containing suitable culture

CBSE Class 12 Biology
Important Questions
Chapter 10
Microbes in Human Welfare

1 Marks Questions

1. How does a small amount of curd added to fresh milk convert it into curd? Mention a nutritional quality that get added to the curd.

Ans. A large number of lactic acid bacteria are found in small amount of curd which multiply and convert the milk into curd by producing the lactic acid. The nutritional quality improves by increasing Vitamin B12.

2. Why is secondary treatment of water in sewage treatment plant called biological treatment?

Ans. In this treatment Organic wastes of sewage water are decomposed by certain microorganisms in presence of water.

3. An antibiotic called Wonder Drug was used to treat the wounded soldiers of America during World War-II. Name the drug and the scientist who discovered it.

Ans. Penicillin, Alexander Fleming.

4. You have observed that fruit juice in bottles bought from the market are clearer as compared to those made at home. Give reason.

Ans. Bottle juices are clarified by the use of pectinase and proteases.

5. Alexander Fleming discovered Penicillin, but its full potential as an effective antibiotic was established by other scientists. Name the two scientists.

Ans. Ernest chain and Howard Florey.

6. Name the plant whose sap is used in making Toddy. Mention the process involved in it.

Ans. Palm tree, by fermentation.

7.What is the medical use of cyclosporin A.

Ans. Cyclosporin A is used as an immunosuppressive drug during organ transplantation.

8.Name the pests that lady bird & dragon flies help to get rid off respectively?

Ans. Lady bird beetle is useful to get rid off aphids & dragon – flies control mosquitoes.

9.Give an example to prove that microbes release gases during metabolism?

Ans. The best example of microbes release gases during metabolism are the puffed dough & bread.

10.What are interferons?

Ans. Proteins released by cells in response to viral infection which they help to combat are called interferons.

11.Name the enzyme which is used as clot buster” to remove blood clot from blood vessels of patients.

Ans. Streptokinase.

12.Name the first antibiotic manufactured & also name its source microorganism.

Ans. Penicillin obtained from penicillium notatum.

13.Name any two fungus which are used in production of antibiotics?

Ans. Penicillium notatum, cephalosporium acremonium.

14. Expand LAB?

Ans. Lactic acid Bacteria

15. Name any two free – living nitrogen fixing bacteria.

Ans. Azotobacter, Azospirillum

16. Name the organism used in the dough for making bread.

Ans. Saccharomyces cerevisiae.

17. Name the fungus used as a biocontrol of plant diseases.

Ans. Trichoderma.

18. Name any two gases produced during secondary treatment of Sewage?

Ans. Methane, Hydrogen sulphide & carbon dioxide.

2 Marks Questions

1. Name two alcoholic drinks produced in each of the following ways.

(i) by distillation and (ii) without distillation.

Ans. (i) Whisky, brandy, rum by distillation

(ii) Wine, beer without distillation

2. Lactic Acid Bacteria (LAB) is commonly used in the conversion of milk into curd. Mention any two other functions of LAB that are useful to humans.

Ans. (i) LAB in human intestine synthesizes Vitamin B12.

(ii) LAB in human stomach checks the growth of harmful microbes.

3. How do mycorrhizae function as biofertilisers? Explain with example.

Ans. Mycorrhiza are fungi associated with the roots of plants. Many members of genus Glomus form mycorrhiza. These fungal symbionts absorb water and minerals like phosphorus from the soil and provide them to the plant.

3 Marks Questions

1. Fill in the blanks spaces a, b, c, d, e, and f, given in the following table:

| S.No | Name of Organism | Commercial Product | Application |
|------|--------------------------|--------------------|--------------------------|
| 1. | Penicillium notatum | Penicillium | (a) |
| 2. | (b) | Lactic acid | Making Curd. |
| 3. | Streptococcus | Clot buster enzyme | (c) |
| 4. | Trichoderma polysporum | (d) | Immuno suppressive agent |
| 5. | Saccharomyces cerevisiae | Ethanol | (e) |
| 6. | (f) | Swiss cheese | Food Product |

Ans. (i) to kill disease causing bacteria

(b) Lactobacillus

(c) remove clots from blood vessels

(d) Cyclosporin A

(e) Beverage/medicines

(d) Propionibacteriumsharmanii.

2. What is biochemical oxygen demand (BOD) test? At what stage of Sewage treatment this test is performed? BOD level of three samples of water labelled as A, B and C are 30 mg/L, 10mg/L and 500 mg/L respectively. Which sample of water is most polluted?

Ans..

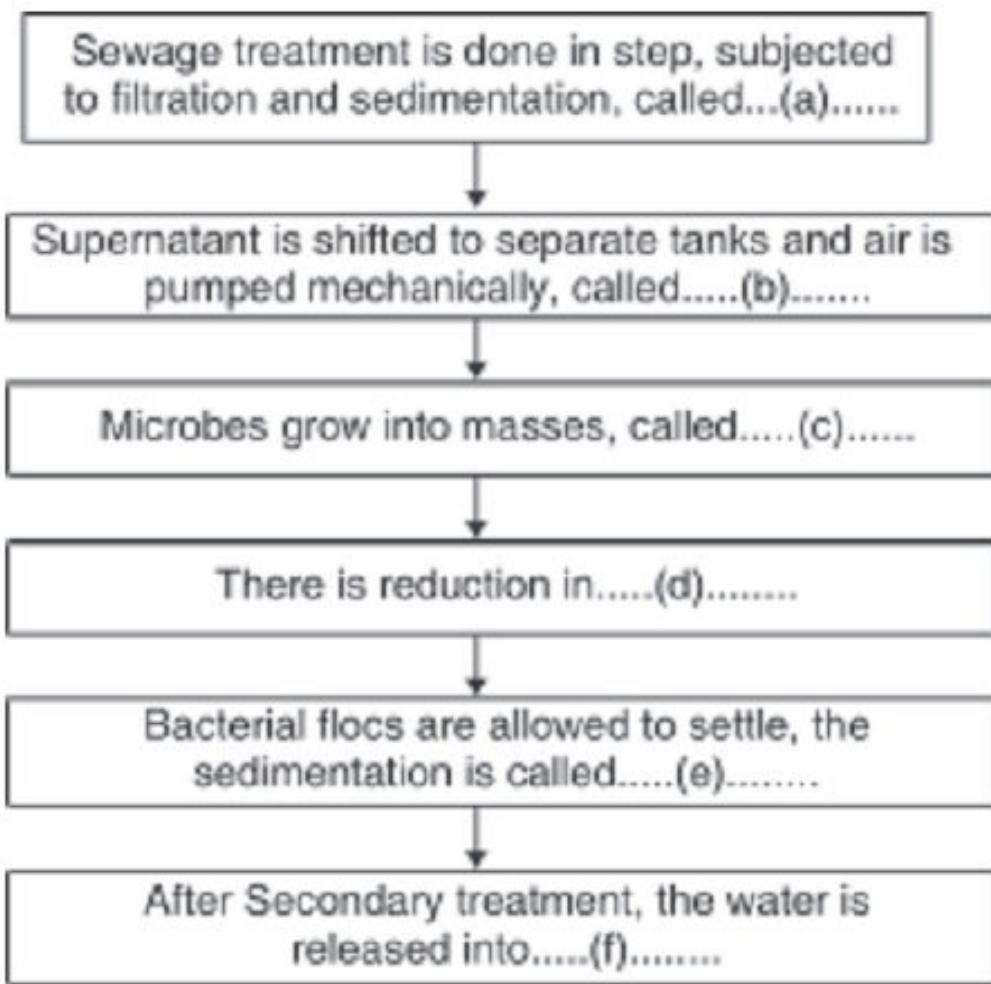
- The BOD test measures the rate of uptake of oxygen by microorganisms in a sample of water.
 - Biological treatment or Secondary treatment
 - Sample C is most polluted because it has highest BOD level among the three samples of water.
-

3. Given below is the Flow chart of Sewage treatment. Fill in the blank spaces marked 'a' to 'f'.

Ans. (a) Primary treatment (b) Aeration

(c) Flocs (d) Biochemical Oxygen Demand (BOD)

(e) Activated sludge (f) Water bodies like riverstream.



4. What are biofertilisers? A farmer is advised to add a culture of bacterium in the soil before sowing the crop. Name the bacterium in the culture. How is this bacterium useful to the crop?

Ans.

- Biofertilisers are organisms that enrich the nutrient quality of the soil.
- Azotobacter/Azospirillum (free living)
- This bacterium fixes atmospheric nitrogen into organic forms, which is used by the plants as nutrient.

5. What are statins? Name the microorganism that produces this substance. How is it medically important?

Ans. Statins are cholesterol reducing agents.

- They are produced by *Monascuspurpureus* (Yeast)
 - They act by Competitively inhibiting the enzymes responsible for synthesis of cholesterol and are used as blood cholesterol lowering agents.
-

6. Describe the procedure involved in Sewage treatment?

Ans.. For treatment of sewage waste, following procedure are followed :-

i) PRIMARY TREATMENT :- It is the physical separation of suspended solids in settling tanks to lower BOD. To remove solid fraction the raw Sewage is piped into huge open tanks where they are Subjected to anaerobic digestion.

ii) SECONDARY TREATMENT :- Secondary treatment relies aerobic or anaerobic microbial activity. The methods employed in secondary treatment:-

a) filtration by sand filters

b) Aeration process

c) Use of oxidation ponds.

The sludge which accumulates after secondary treatment is disposed off after drying & effluent is allowed for tertiary treatment

iii) TERTIARY TREATMENT :- It includes chemical treatment to remove inorganic compounds & Pathogenic microorganism. Chlorination is the usually employed method of disinfection.

7. What is Biogas? How is it produced & Name the microbes involved in Biogas production.

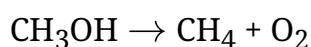
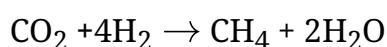
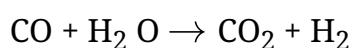
Ans.. The gas produced by anaerobic fermentation of waste biomass is called BIOGAS. It consists of methane, CO₂, hydrogen, nitrogen, Oxygen, H₂S etc. The microbes which are commonly used for Biogas production-

i) hydrolytic bacteria eg. *cellulomonas*, *chlostridium*

ii) H₂ producing bacteria eg. Syntrophomonaswolfei

iii) Methanogenic bacteria eg. Methanobacteriumomelians.kii

The Biogas plant consists of concrete tank is fed. A floating cover is placed over slurry, which keeps on rising as the gas is produced in the tank due to microbial activity. The Biogas plant has an outlet which is connected to a pipe to supply biogas to nearby houses. During biogas production, microbes convert the organic fraction of biodegradable organic solid waste & refuse into energy in the form of biogas & humus.



8. Microbes can be used to decrease the use of chemical fertilizers & pesticides. Explain how can this be accomplished?

Ans. In modern society, the problems of plant diseases & pests are been tackled by use of chemicals but these chemicals are toxic & extremely harmful to human beings & environment. Thus in agriculture, there is a method of controlling pests that relies on natural predation rather than chemicals eg. In order to control butterfly, caterpillar etc, a bacteria called *Bacillus thuringiensis* (Bt) are available as dried spores in sachet which are mixed with water & sprayed onto vulnerable plants eg – brassica etc where these are eaten by insect larvae. In the gut of larvae, the toxin is released & larvae get killed. The bacterial disease will kill the caterpillar but leave other insects unharmed.

9. How do Biofertilisers enrich the fertility of soil? How does cyanobacteria acts as biofertiliser?

Ans. The Biological routes of improving soil fertility for optimum crop production are operated by micro-organism & they are hence known as “BIOFERTILIZERS. These microorganisms increase crop productivity by either of the following methods

- i) By fixing atmospheric nitrogen
- ii) By solubilising insoluble fertilizers
- iii) By stimulating plant growth.
- iv) By phosphorus uptake.
- v) By bringing about decomposition of plant residues.

Cyanobacteria eg. Anabaena which is found in the leaf cavity of water fern Azolla, fixes nitrogen from atmosphere & excretes nitrogenous compound into leaf cavity.

10 . How does primary sludge differ from activated sludge? What type of changes in the sludge are carried out in anaerobic sludge digester? Give the composition of biogas produced in the sewage treatment plant.

Ans. Primary sludge is all solids like soil, small pebbles that settle down in settling tank during primary treatment of sewage. Activated sludge is the sediment of bacterial flocs in settling tank during biological treatment. Flocs are masses of bacteria held together by slime and fungal filaments. A part of activated sludge is used as inoculum in aeration tank and remaining is passed into a large tank called anaerobic sludge digester. In this tank, other kind of bacteria which grow anaerobically, digest the bacteria, fungi and biomass in the sludge. Biogas that is produced in Sewage treatment plant is a mixture of methane, hydrogen and Carbon dioxide.

CBSE Class 12 Biology
Important Questions
Chapter 11
Biotechnology Principles and Processes

1 Marks Questions

1. A restriction enzyme digests DNA into fragments. Name the technique used to check the progression of this enzyme and separate DNA fragments.

Ans. Gel electrophoresis

2. Name two commonly used vectors in genetic engineering.

Ans. Plasmid and Bacteriophage.

3. Some enzymes are considered as molecular scissors. in genetic engenrring. What is the name assigned to such enzymes?

Ans. Restriction Enzymes.

4. Write conventional nomenclature of EcoRI.

Ans. E. Escherichia; co coli; R Name of Strain; I order in which enzyme isolated from strain of bacteria.

5. A linear DNA fragment and a plasmid has three restriction sites for EcoRI how many fragments will be produced from linear DNA and plasmid respectively.

Ans. Number of fragments of linear DNA = 4

Number of fragments of plasmid = 3

6. An extra chromosomal segment of circular DNA of a bacterium is used to carry gene of interest into the host cell. What is the name given to it?

Ans. Plasmid.

7. Identify the recognition sites in the given sequences at which E.coli will be cut and make sticky ends.

5'-GAATTC-3'

3'-CTTAAG-5'

Ans. 5 - $G \downarrow A A T T C 3$

3 - $C T T A A \uparrow G 5$

8.Name the substance used as a medium in gel electrophoresis.

Ans. Agarose

9.What is Bioconversion?

Ans. Bioconversion refers to the process by which raw material are converted to specific product by microbial, plant or animal cell.

10.Name the bacterium that yields thermostable DNA polymerase.

Ans. *Thermus aquaticus*.

11.Which enzymes are known as “molecular Scissors”?

Ans. Restriction Endonuclease.

12.Name the commonly used vector for trans formation in plant cell?

Ans. *Agrobacterium tumefaciens*.

13.Name the technique used for amplification of DNA?

Ans. Polymerase Chain Reaction.

14. Name the enzyme responsible for removal of 5 – phosphate group from nucleic acid?

Ans. Alkaline Phosphates.

15. Who isolated Restriction enzymes for the first time?

Ans. Warner Arber & Hamilton Smith.

16. Why do eukaryotic cells do not contain restriction enzymes?

Ans. Because in eukaryotic cell, DNA is heavily methylated.

17. Why does DNA moves towards anode in gel electrophoresis.

Ans. Because of presence of phosphate group, DNA is negatively charged & ∴ moves towards anode.

2 Marks Questions

1. Name two main steps which are collectively referred to as down streaming process.

Why is this process significant?

Ans. Separation and Purification

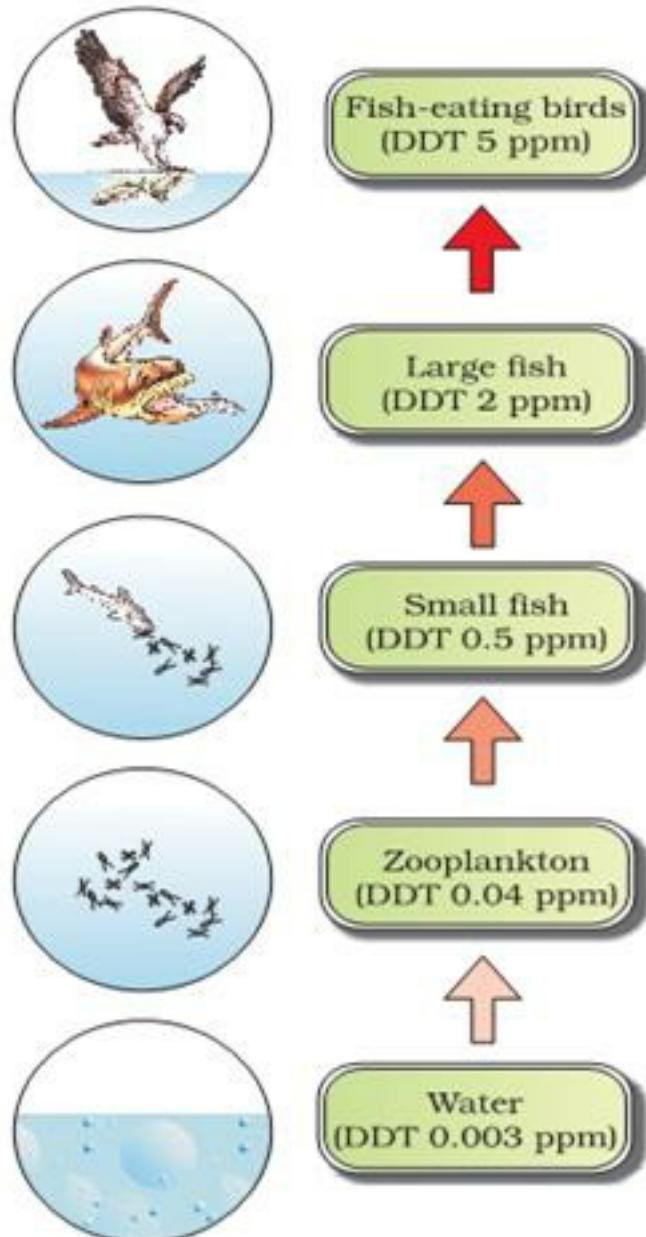
This process is essential because before reaching into market, the product has to be subjected for clinical trial and quality control.

2. How does plasmid differ from chromosomal DNA?

Ans.

| | Plasmid DNA | | Chromosomal DNA |
|-------|--------------------------------------|-------|--|
| (i) | Circular DNA | (i) | Linear DNA |
| (ii) | Occurs only in bacterial cells | (ii) | Occurs in nucleus of eukaryotic cells |
| (iii) | Used as Vector in rDNA technology | (iii) | and bacterial cell. Not used as vector in rDNA technology. |

3. A bacterial cell is shown in the figure given below. Label the part 'A' and 'B'. Also mention the use of part 'A' in rDNA technology.



Ans. A- Plasmid, B - Nucleoid

Plasmid is used as vector to transfer the gene of interest in the host cell.

4. Mention two classes of restriction enzymes. Suggest their respective roles.

Ans. Exonucleases and endonucleases

- Exonucleases remove nucleotides from the ends of the DNA.
- Endonucleases cut DNA at specific sites between the ends of DNA.

5. In the given process of separation and isolation of DNA fragments, some of the steps are missing, Complete the missing steps –

A : Digestion of DNA fragments using restriction endonucleases

↓

B :

↓

C : Staining with ethidium bromide

↓

D : Visualisation in U.V. light

↓

E :

↓

F : Purification of DNA fragments.

Ans. B - Gel Electrophoresis

E - Elution

6. Write any two properties of restriction endonuclease enzymes?

Ans.(i) Each Restriction endonuclease functions by inspecting the length of DNA sequence & bindto DNA at the recognition Sequence.

(ii) It cuts the two strands of DNA at specific point in their sugar – phosphate backbone.

7.What are ‘Selectable marker’? What is their use in genetic engineering?

Ans.A selectable marker is a gene which helps in selecting those host cells which contains thevector& eliminating the non-transformanteg – gene encoding resistance to antibiotics are useful>Selectable markers as they allow Selective growth of transformants only.

8.How can the desired product formed after genetic engineering be produced on a commercial scale?

Ans.The product obtained from genetic engineering is subjected to a series of processes collectivelycalled downstream processing before it made into final processes involved in downstreamprocessing are :- Separation & purification.

9.What is “Insertional Inactivation”?

Ans.If a recombinant DNA is inserted within the coding Sequence of enzyme B– galactosidase. Thisresults into inactivation of enzyme which is referred to as “Insertional Inactivation”. The presenceof chromogenic Substrate gives blue–coloured colonies if the plasmid in bacteria does not have aninsert presence of insert results into insertional inactivation &the colonies do not produce anycolor.

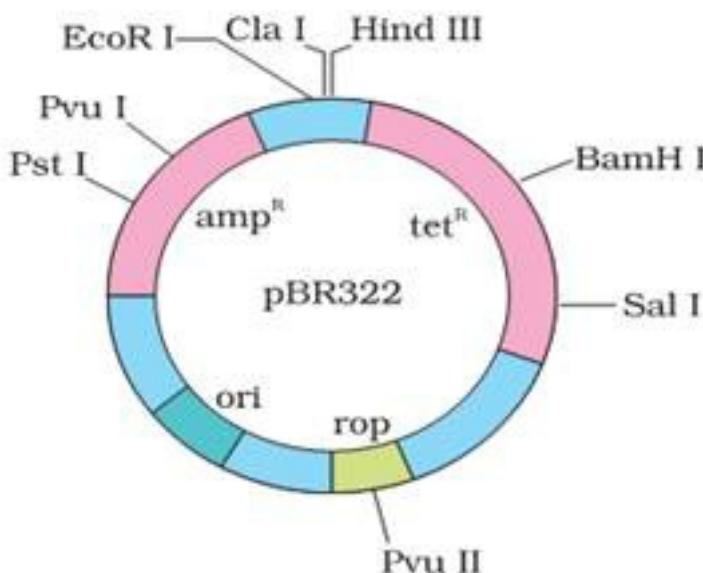
10.What are the two basic techniques involved in modern Biotechnology?

Ans.The two basic techniques involved in modern Biotechnology are:-

- a) Genetic Engineering is the technique of altering the nature of genetic material or introduction of it into another host organism to change its phenotype.
- b) Techniques to facilitate the growth & multiplication of only the desired microbes or cells in large number under sterile conditions for manufacture

11. Represent diagrammatically the E. coli. Cloning vector β PBR 322.

Ans.



12. Differentiate between plasmid DNA and chromosomal DNA?

Ans. Plasmid DNA is extranuclear DNA, found in protoplasmic whereas chromosomal DNA is the nuclear or genetic DNA which is found within the nucleus.

13. What is the role of enzyme “Ligase” in genetic Engineering?

Ans. Enzyme “Ligase” acts as molecular Suture which helps in joining two pieces of DNA. The Joining process requires ATP as it derive energy to construct phosphodiester bond between cohesive ends.

14.Name the components a bioreactor must possess to achieve the desired product?

Ans.Enzyme “Ligase” acts as molecular Suture which helps in joining two pieces of DNA. The Joining process requires ATP as it derive energy to construct phosphodiester bond between cohesive ends.

15.The following proteins of given molecular weight are Subjected to Get electrophoresis. Write the order of Sequence in which these proteins are isolated in a gel?

| S.no. | Proteins | Mol.wt |
|-------|-------------|----------|
| 1. | Albumin | 23,000 |
| 2. | Keratin | 48,000 |
| 3. | Myosin | 1,25,000 |
| 4. | Haemoglobin | 84,000 |
| 5. | Ribozyme | 62,000 |
| 6. | Insulin | 1,14,000 |

Ans.The sequence of proteins obtained from top to bottom in a gel:-

Myosin > Insulin >Haemoglobin> Ribozyme > Keratin > Albumin.

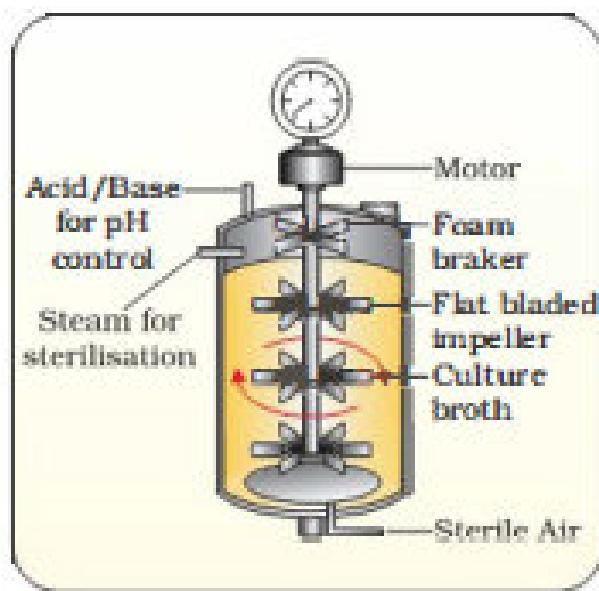
16.How is gene Z used as a marker?

Ans.Lac Z gene codes for enzyme B-galactosidase, if a recombinant DNA is inserted within the coding sequence of an enzyme B-galactosidase. This results into inactivation of enzyme. The bacterial colonies whose plasmid does not have an insert produce blue colour but those with an insert do not produce any colour.

17.What is Bioreactor? What are the advantages of Stirred tank Bioreactor over Shake flask. Show diagrammatically a simple Stirred tank Bioreactor?

Ans. Bioreactors are large vessels in which raw materials are biologically converted into specific proteins using microbial, plant, animal or human cells. The advantages of Bioreactor over shake flask are :-

- a) It provides optimal conditions for achieving desired product by providing optimum growth conditions eg. temp, pH etc.
- b) Small volume of cultures can be withdrawn periodically from bioreactor to test the sample.
- c) It has an agitation system, temp control system, from control system & pH control system
- d)



3 Marks Questions

1. Since DNA is a hydrophilic molecule, it cannot pass through cell membranes. Name and explain the technique with which the DNA is forced into (ii) a bacterial cell (ii) a plant cell (iii) an animal cell.

Ans. (i) Chemical treatment and exposure to cold and high temp.(42°C) alternatively.
(Bacterial cell)

(ii) Biolistics or gene gun. (Plant cell)

(iii) Micro-injection. (animal cell) Explanation Refer page 200, biology Text Book for class XII.

2. How will you obtain purified DNA from a cell?

Ans. Cells are treated with appropriate enzymes to release DNA. Lysozyme (bacteria), cellulase (plant cells), chitinase (fungus).

- RNA and proteins are removed by treatment with ribonuclease and protease enzymes respectively.
-

3. In recombinant DNA technology, vectors are used to transfer a gene of interest in the host cells. Mention any three features of vectors that are most suitable for this purpose.

Ans.(i) Have origin of replication(Ori)

(ii) Have a selectable marker

(iii) Have at least one recognition site.

4. Why is Agrobacteriummediated genetic engineering transformation in plants considered as natural genetic engineering?

Ans. Agrobacterium tumefaciens is a pathogen in many dicot plants. It is able to deliver a piece of DNA (T-DNA) to transform normal plant cell into a tumor and directs these tumor cells to produce the chemicals required by pathogen.

5. Observe the given sequence of nitrogenous bases on a DNA fragment and answer the following question

5' - CAGAATTCTTA - 3'

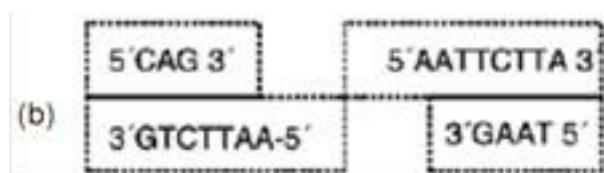
3' - GTCTTAAGAAT - 5'

(a) Name a restriction enzyme which can recognise this DNA sequence.

(b) Write the sequence after digestion.

(c) Why are the ends generated after digestion called sticky ends?

Ans. (a) EcoRI



(c) These are named sticky ends, because they form hydrogen bonds with their complementary cut parts.

6. A selectable marker is used in the selection of recombinants on the basis of their ability to produce colour in presence of chromogenic substrate.

(a) Mention the name of mechanism involved.

(b) Which enzyme is involved in production of colour?

(c) How is it advantageous over using antibiotic resistant gene as a selectable marker?

Ans. (a) Insertional inactivation

(b) b-galactosidase.

(c) Selection of recombinants due to inactivation of antibiotics requires simultaneous plating on two plates having different antibiotics. (Refer page 200 NCERT Biology for class XII).

7. Mention the important properties which a good vector must possess?

Ans. The important properties which a good vector must possess are :-

- i) Size :- The vector must have small size so that it is easier to purify & isolate.
 - ii) Origin of replication :- This is a sequence of base pairs where replication starts. Any piece of DNA linked to this sequence can be made to replicate within its host cell & thus, controls the copy number of linked DNA.
 - iii) Selectable Marker :- A marker is a gene which helps in selecting those host cells which contain the vector & eliminating the non – transformants Common Selectable marker include gene encoding resistance to antibiotics.
 - iv) Cloning Sites :- The vector Should have a few or at least one unique recognition site to link the foreign / alien DNA. Presence of a particular recognition site enables the particular restriction enzyme to cut the vector.
-

8. Describe any three vectors less method of introducing the rDNA into a competent host cell?

Ans. i) Transformation :- In order to force bacteria to take up the plasmid, the bacterial cell must first be made competent to take up DNA. This is done by treating them with specific concentration of divalent cationeg. Ca^{2+} which increases the efficiency with which DNA enters the bacterium through pores in its cell wall Recombinant DNA can then be forced into such cells by incubating the cells with recombinant DNA on ice, followed by placing them at 420 C & then putting them back into ice. This enables the bacteria to take up the recombinant DNA.

ii) Microinjection :- recombinant DNA is directly injected into the nucleus of an animal cell

using a micro – needle of tip with diameter (~ 4mm)

iii) Biolistics / Gene gun :- cells are bombarded with high velocity micro – particles of gold or tungsten coated with DNA.

9. Why is Agrobacterium mediated genetic transformation described as Natural Genetic engineering in plants?

Ans. Agrobacterium tumefaciens, a natural pathogen of several dicot plants is able to deliver a piece of DNA known as “t – DNA” to transform normal plant cell into a tumor & direct gene transfer transform tumor cells to produce chemicals required by pathogen . The tumor inducing (Ti) plasmid of

Agrobacterium tumefaciens has now been modified into a cloning vector which is no more pathogenic to plant but is still able to use the mechanism to deliver genes of our interest into a variety of plants Since Agrobacterium tumefaciens has the natural ability to donate a part of its DNA to the plant during infection. This property of Agrobacterium is exploited and a gene of interest is ligated into T-DNA so that it automatically gets transformed into plant cell thus, Agrobacterium tumefaciens is known as “Natural Genetic Engineer” of plants.

10. Mention the important tools required for genetic engineering technology?

Ans. The process of genetic engineering is accomplished only when we have following key tools :-

a) Restriction enzymes:- Restriction enzymes are a group of endonucleases which cut the DNA at specific position anywhere in its length. Each restriction endonuclease functions by inspecting the length of DNA & binds to DNA at the recognition sequence.

b) Cloning Vector:- The DNA molecule which carry the desired DNA segment of an organism & transfer it to cell or DNA of another organism is called cloning vector.

c) Desired foreign DNA:- The segment of DNA containing genes having desired characters & which are being transferred into genome of another cell with the help of vector is called foreign DNA.

5 Marks Questions

1. The development of bioreactors is required to produce large quantities of products.

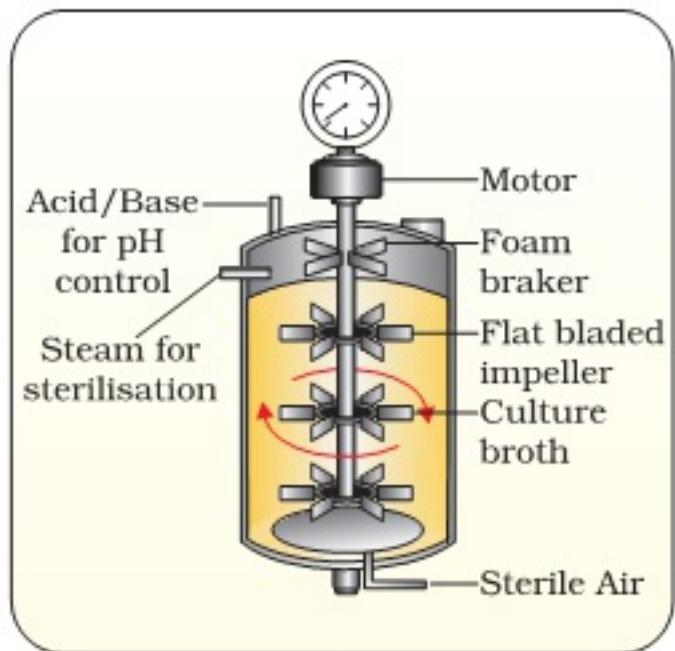
(a) Give optimum growth conditions used in bioreactors.

(b) Draw a well labelled diagram of simple stirred tank bioreactor.

(c) How does a simple stirred tank bioreactor differ from sparged stirred – tank’ bioreactor?

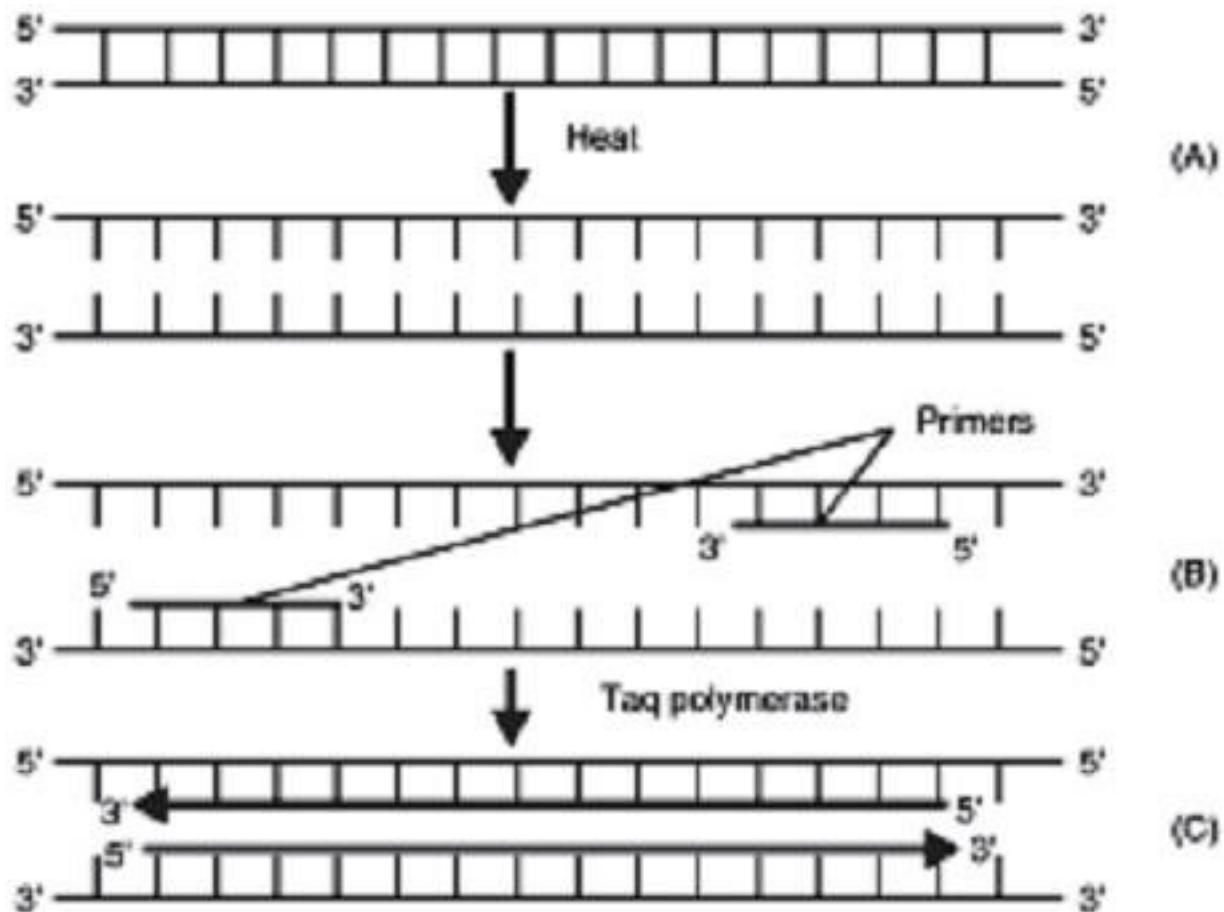
Ans. (i) Temperature, pH, substrates, salts, vitamins and oxygen.

(ii) (a) simple stirred tank bioreactor



(iii) The stirrer facilitates even mixing and oxygen availability throughout simple stirred tank bioreactor, whereas in case of sparged stirred-tank bioreactor, air is bubbled throughout the reactor for proper mixing.

2. In the given figure, one cycle of polymerase chain reaction (PCR) is shown-



(a) Name the steps A, B and C.

(b) Give the purpose of each of these steps.

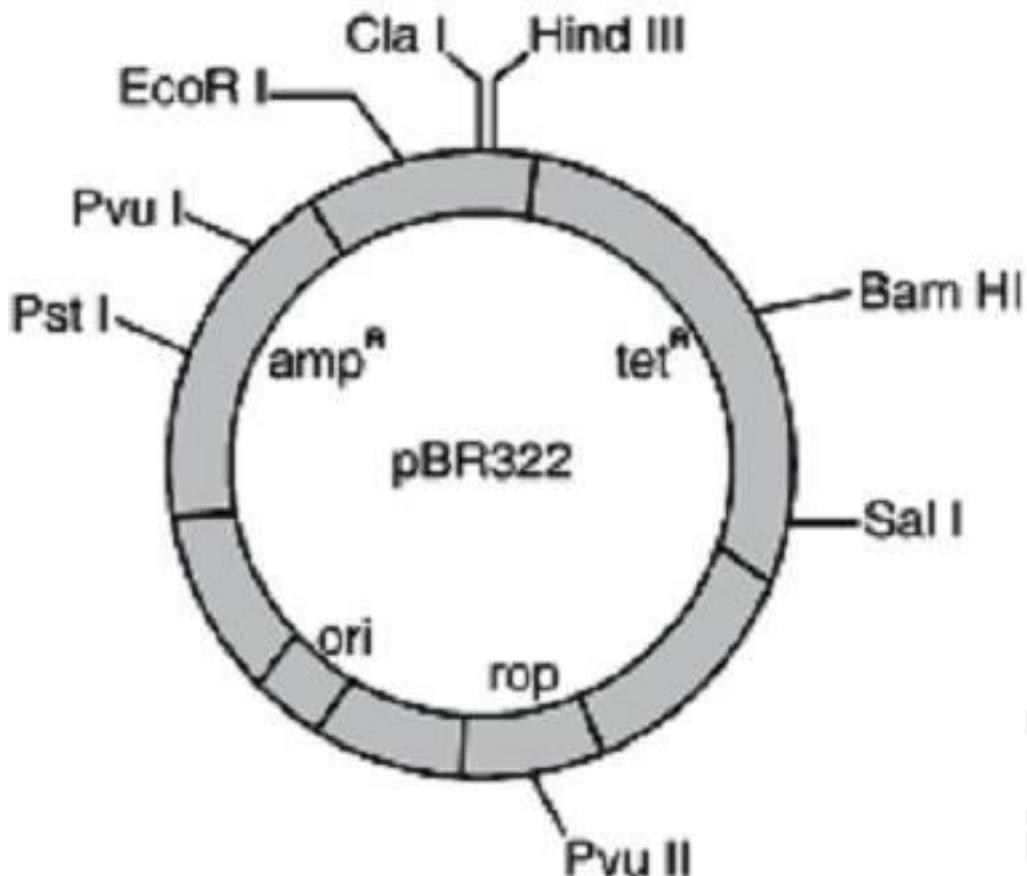
(c) State the contribution of bacterium *Thermus aquaticus* in this process.

Ans. (a) Denaturation Heat denatures DNA to separate complementary strands.

(b) Annealing : Primers hybridises to the denatured DNA strands.

(c) Extension : Extension of primers resulting in synthesis of copies of target DNA sequence. Enzyme Tag polymerase is isolated from the bacterium *Thermus aquaticus*. This enzyme induces denaturation of double stranded DNA at high temperature.

3. Study the figure of vector pBR322 given below in which foreign DNA is ligated at the Bam H1 site of tetracycline resistance gene.



Answer the following questions :

- (a) Mention the function of rop.
- (b) What will be the selectable marker for this recombinant plasmid and why?
- (c) Explain transformation.

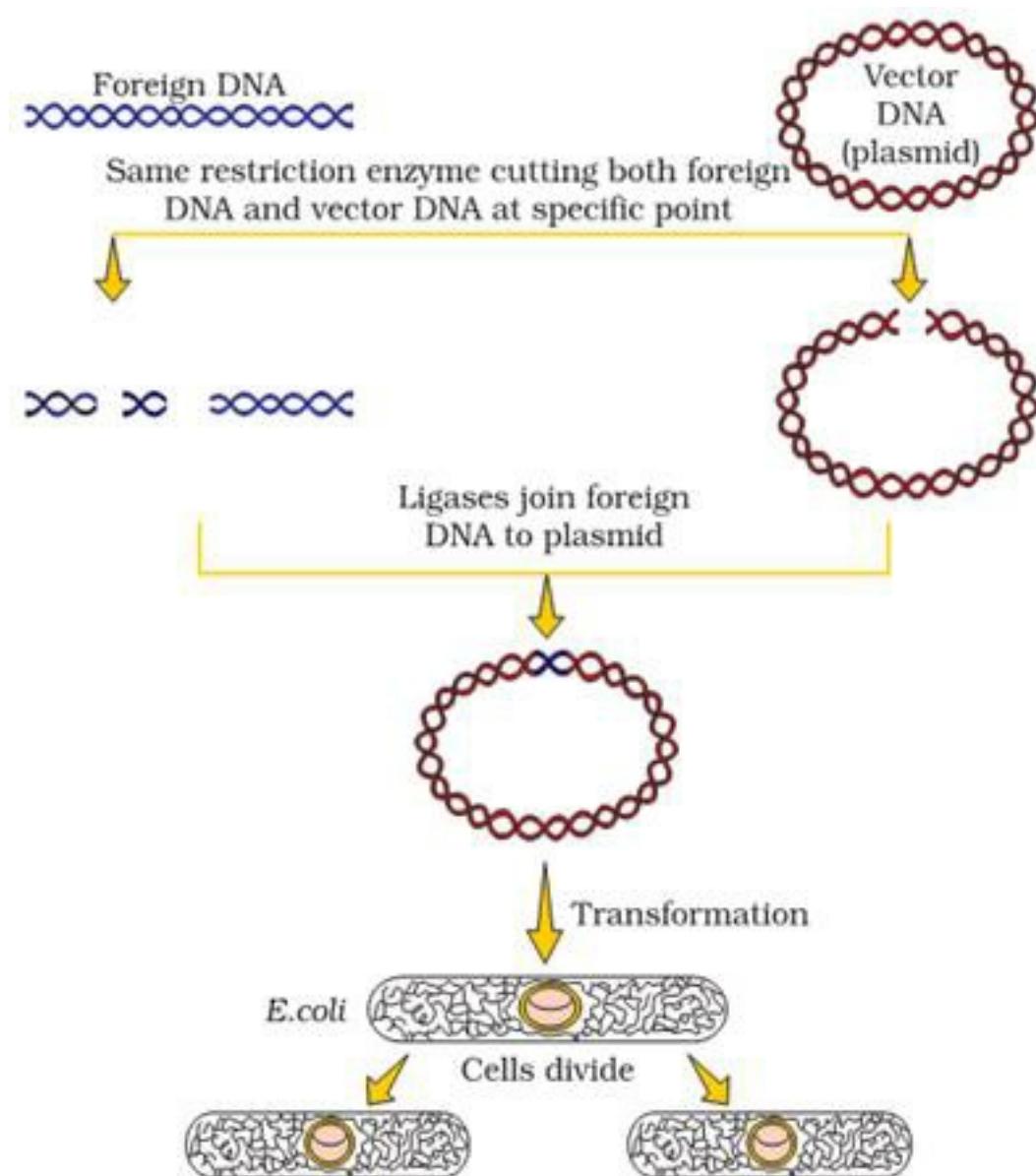
Ans. (a) rop codes for the proteins involved in the replication of plasmid

(b) Selectable marker ampicillin resistance gene. It will help distinguishing transformants from non-transformants after plating them on ampicillin containing medium.

(c) Transformation It is the phenomenon by which the DNA isolated from one type of cell and introduced into another type and is able to bring about some of the properties of former to the later.

4. Describe the various steps involved in Recombinant DNA technology with the help of a well labeled. Diagram?

- Ans.** i) Identification of DNA with desirable Genes:- Other molecules in the target cell can be removed by appropriate treatment & purified DNA ultimately precipitates out after addition of chilled ethanol.
- ii) Cutting the DNA at specific location :- After having cut the source DNA as well as vector DNA with Specific restriction enzyme, the cut out “gene of interest” from the source DNA & the cut vector with space are mixed & ligase is added.
- iii) Insertion of Recombinant DNA into host cell :- Recipient cells after making them competent to receive takes up DNA in its surrounding. Recombinant DNA is introduced into suitable host cell by vector – based or vector – less method.



iv) Selection & Screening :- If a recombinant DNA bearing gene for resistance to an antibiotic is transferred into E-coli the host – cell become transformed into ampicillin – resistant cells. Due to this amp gene one is able to select a transformed cell in the presence of ampicillin. This amp r gene is called selectable marker.

v) Obtaining the foreign Gene product :- After having cloned the gene of interest & having optimized the conditions to induce expression of the target protein, one has to consider producing it on large scale.

5. Expand PCR? Describe the different Steps involved in this technique?

Ans. PCR stands for polymerase chain reaction. It is a technique for amplification of gene of interest

or to obtain multiple copies of DNA of interest.

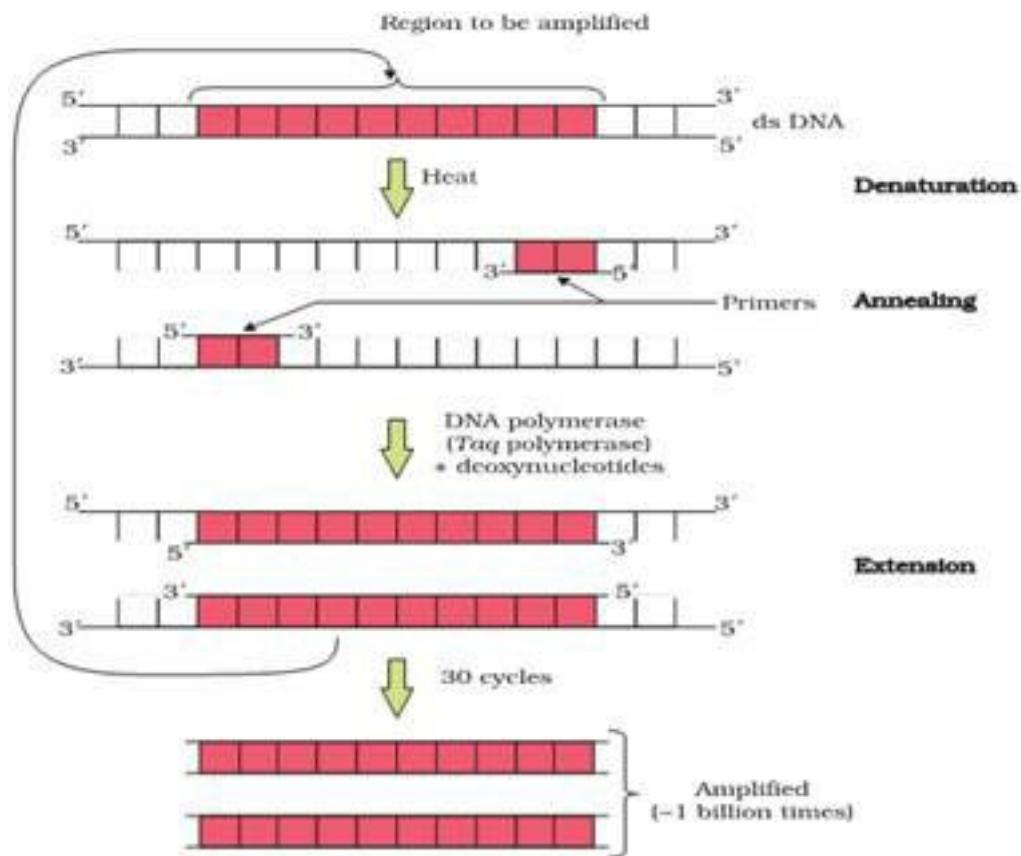
The PCR requires primers, taq polymerase, target sequence, DNA sample & deoxyribonucleotides.

PCR includes number of cycles for amplifying DNA of interest invitro. Each cycle has three steps :-

a) DENATURATION:- The first step is denaturation of DNA sample in a reaction mixture to 940c. During this step, DNA strand gets separated.

b) RENATURATION / ANNEALING:- The temperature is allowed to cool down to 500c to allow two oligo-nucleotide primers to anneal to complementary sequence in DNA molecule.

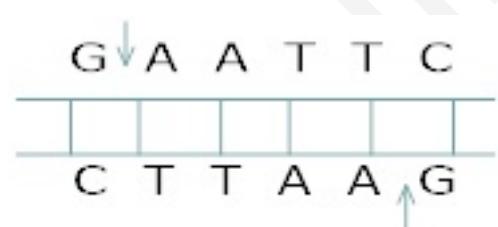
c) EXTENSION:- The temperature is raised to 750c. At this temperature, taq – polymerase initiates DNA Synthesis at 3-OH end of primer.



6.What are Restriction enzyme? Why do bacteria have these restriction enzymes. Show diagrammatically a restriction enzyme its recognition & the product it produces?

Ans. Restriction enzymes are endonucleases which recognize a specific sequence within DNA and cut the DNA within that sequence at a specific point. In bacteria, these restriction enzymes operate a modification restriction system which modifies & cuts the foreign DNA entering into the bacterial cell & thus, provides immunity to bacterial cell.

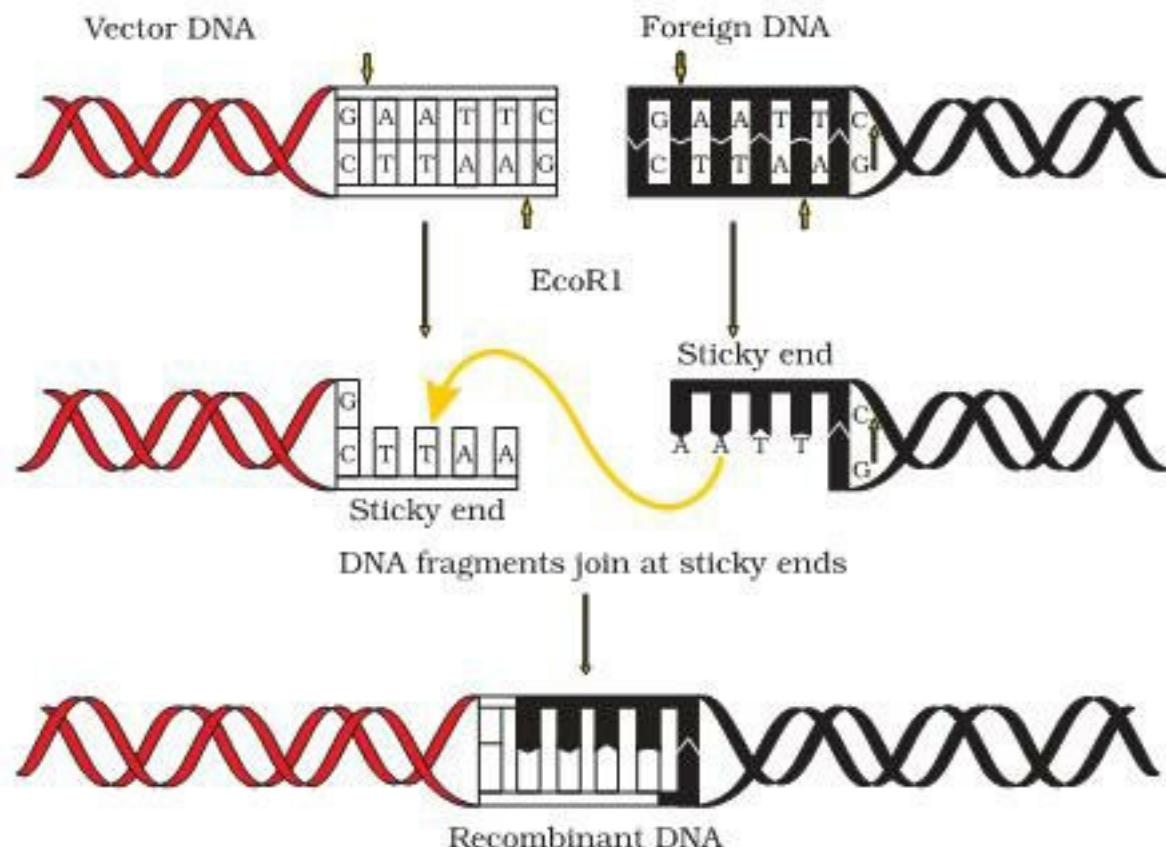
Name of Restriction enzyme- EcoRI Substrate DNA on which it acts



Action of Restriction enzyme

The enzyme cuts both DNA strands at the same site

EcoRI cuts the DNA between bases G and A only when the sequence GAATTC is present in the DNA



CBSE Class 12 Biology
Important Questions
Chapter 12
Biotechnology and its Applications

1 Marks Questions

1. Name the technique based on the principle of antigen-antibody interaction used in detection of a virus (HIV).

Ans. ELISA (Enzyme linked immuno - sorbent Assay)

2. Development of a transgenic food crop may help in solving the problem of night blindness in the developing countries, name this crop plant.

Ans. Golden Rice

3. Which nematode infects the roots of tobacco plant and causes a great reduction in yield?

Ans. Meloidogyne incognita.

4. The first transgenic cow, produced human protein - enriched milk. Name the cow and the protein found in milk.

Ans. Rosie, alpha-lactalbumin

5. The insulin produced using recombinant DNA technology is more advantageous than the insulin extracted from pancreas of slaughtered cattle and pigs. How?

Ans. Insulin obtained from animal source causes allergy.

6. Name two pest resistant plants produced by using recombinant DNA technology.

Ans. Bt Cotton, Bt Corn, Bt Brinjal.

7.Name the genetically engineered human Insulin?

Ans.Humulin

8.Write the Scientific name of nematode that attacks the root of tobacco plant?

Ans.Meloidogyneincognitia.

9.Define a patent?

Ans.Patent is the government protection to the inventor of biological material, Securing to him for a specific time the exclusive right of manufacturing, exploiting, using & selling an invention.

10.Expand GEAC.

Ans.Genetic Engineering Approval Committee.

11.Name the first transgenic cow?

Ans.Dolly.

12.Which vaccine was being tested on mice?

Ans.Polio vaccine.

13.Name the bacterium which is used to produce insect-resistant plants by genetic engineering.

Ans.Bacillus thuringiensis.

14.Name any disease against which vaccine is developed lay Recombinant DNA technology.

Ans.Hepatitis B vaccine.

15.Name the technique which is used to detect HIV in Suspected AIDS patient?

Ans.PCR (polymerase chain reaction)

16.Name any two diseases for which transgenic mice are used as model organisms.

Ans.Rheumatoid Arthritis& cystic fibrosis.

17.What is the difference between 'Cry' & 'CRY'.

Ans.Cry is the gene which codes for Bt-toxin which is an insecticidal protein while CRY is the protein coded by cry genes.

18.Name any one disease for which gene therapy has been proved effective?

Ans.Adenosine deaminase deficiency (ADA).

2 Marks Questions

1. What are the two methods for correcting ADA deficiency in a child?

Ans.Bone marrow transplantation having functional ADA enzyme and Enzyme replacement therapy.

2. Some crop plants are modified genetically by manipulating their genes. How are they made beneficial?

Ans.More tolerant to abiotic stresses; pest resistant; reduction in post harvest losses; increased nutritional value of food.

3. GEAC is one of the organisation set up by Indian Government. Write its full form. Give its two objectives.

Ans. GEAC - Genetic Engineering approval committee. Objectives of GEAC as below:

- (i) To make decisions regarding validity of GM research.
- (ii) Safety of introducing GMO for public use.

4. “Industrialised nations are exploiting the bioresources of under industrialised nations. Justify the statement with a suitable example.

Ans. Industrialised nations are collecting and patenting the genetic resources of under industrialised country like India. An American Company got patent rights on Basmati rice.

Valuable biomolecules obtained from bioresources are patented and used for commercial purposes.

5. What is Golden rice? What is its advantage?

Ans. Golden rice is a transgenic variety of rice which contains a gene which codes for Vitamin A precursor. This variety have green yellow coloured grains and is rich in Vitamin A & thus nutritionally very advantageous.

6. What are the three critical research areas in the field of Biotechnology?

- Ans.**
- i) providing best catalyst in the form of improved organism usually in the form of microbe or pure enzyme.
 - ii) Creating optimal conditions through engineering for a catalyst to function.
 - iii) downstream processing to purify the protein / organic compound.

7. What are the advantages of molecular diagnostics over conventional methods?

Ans. In conventional methods, presence of pathogen is normally suspected only when pathogen has produced a disease symptom. By this time the concentration of pathogen is already very high in Body which could be harmful but with molecular diagnostics, Small amount of pathogen could be detected by amplification by PCR.

8.What are genetically modified organisms? Name two factors on which their behaviour depends?

Ans. Those organisms whose genes have been altered by manipulation, are called genetically modified organism or transgenic organisms. The two factors on which their behaviour depends:-

- i) proper insertion of gene of interest.
 - ii) Proper harvesting of Genetically modified organisms to produce desired product.
-

9.What do you mean by “Biopiracy” Give an example?

Ans. Biopiracy refers to the use of bio-resources by multinational companies & other organizations without proper authorizations from the countries & people concerned eg. Basmati rice grown in India is distinct for its unique flavor & aroma but an American company got patent rights on Basmati through US patent.

10.What are transgenic Bacteria? Illustrate using any one example?

Ans. The bacteria in which genes of interest (i-e. foreign DNA fragment) have been introduced are called transgenic bacteria eg. E. coli when two DNA sequences A & B chains of insulin are introduced into plasmid of this bacteria, then it is called transgenic bacteria & starts to produce insulin chain.

11.Give any two examples of products, how transgenic animals can be used to produce biological compounds?

- Ans.** i) Alpha-1-antitrypsin – a protein that is used to treat emphysema.
ii) Alpha-lactalbumin – protein-rich milk that is more nutritionally balanced product for human babies?

12.How is autoradiography used to detect a mutated gene?

Ans.A single stranded DNA or RNA tagged with radioactive molecule is allowed to hybridise to its complements DNA in a clone of cells followed by detection using autoradiography. The clone having the mutated gene will hence not appear on photographic film because probe will not have complementarily with mutated gene.

13.Why did Bacterial toxin does not kill the bacteria but only the insects?

Ans.Bacterial toxin does not kill the Bacillus because. But toxic protein exist as inactive protoxin but once an insect ingest the inactive protoxin it is converted into active form of toxin due to alkaline pH of gut which solublises the crystal. The activated toxin binds to surface of midgut epithelial cells & create pores that cause cell swelling & lysis.

14.Mention any four applications of Biotechnology in the field of Agriculture?

- Ans.**i) to made crops tolerant to abiotic stresses eg. cold, drought, salt, heat.
ii) to reduce reliance on chemical pesticide by producing pest-resistant crops.
iii) increased efficiency of mineral usage by plants.
iv) enhanced nutritional value of food eg. Vit – A rich golden rice.

15.Why is recombinant Insulin produced by genetic engineering need to be processed?

Ans.Recombinant Insulin produced by Genetic engineering need to be processed because insulin which is produced as proinsulin contains an additional C-peptide apart from α – & β - chain of insulin so, to make an active insulin vaccine; a peptidase enzyme is added to proinsulin to cleave C peptide & rejoining of α – & β - chain to form active Insulin.

3 Marks Questions

1. Some multinational companies and other organisations are using bioresources for commercial benefits, without proper authentication and compensation to concerned authorities.

(a) Give the term for this unauthorised act.

(b) Suggest any two ways to get rid of this.

Ans. (a) Biopiracy

(b) (i) Benefits of bioresources should be shared between developed and developing nations

(ii) Laws should be developed to prevent unauthorised exploitation of them bioresources.

2. A bacterium *Bacillusthuringiensis* produces a toxic protein named ‘cry protein’ that is lethal to certain insects but not to bacterium

(a) Why this toxin does not kill the bacteria?

(b) What type of changes occur in the gut of insects on consuming this protein?

(c) How man has exploited this protein for his benefit?

Ans. (a) Produced in inactive form as Prototoxins.

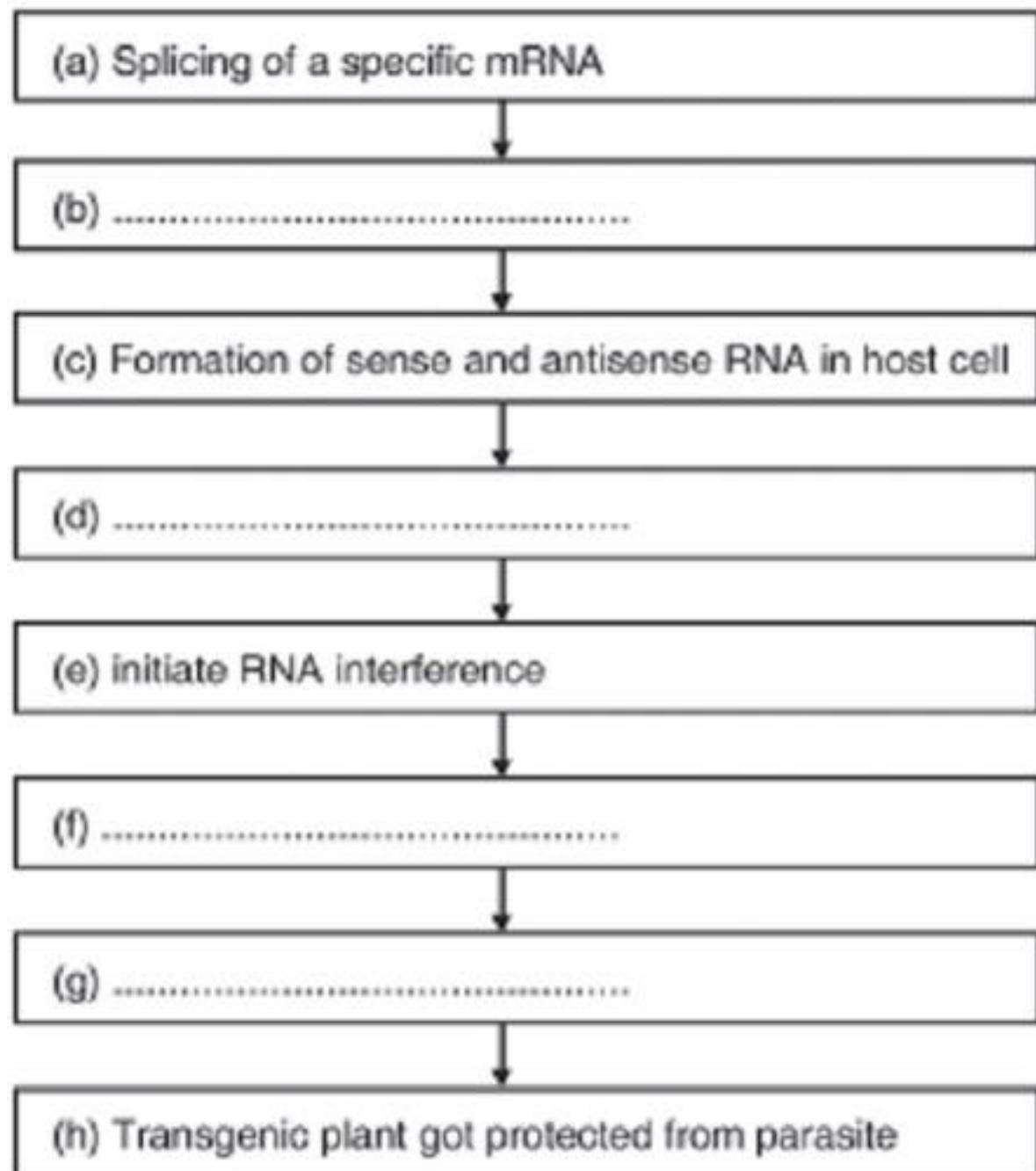
(b) Prototoxin becomes active toxin in alkaline pH of gut of insects. Toxins bind to surface of midgut and cause perforation, swelling, lysis of cells ultimately leading to death.

(c) Specific Bt toxin genes isolated from *Bacillusthuringiensis* and incorporated into several crop plants such as cotton and corn which become pest resistant against certain insects.

3. Given below is an incomplete flow chart showing the process of production of nematode resistant tobacco plants based on RNAitechnique.

(i) Write the missing steps in proper sequence

(ii) At which level RNAi silences the gene?



Ans. (i) (b) Using Agrobacterium as a vector, introduced into tobacco

(d) dsRNA (double stranded RNA)

(f) Silenced specific mRNA of the nematode

(g) Parasite could not survive.

(ii) RNAi silences the gene at translation level

4. Describe with example, Why transgenic animals are produced?

Ans.. Transgenic animals are produced for following purposes:-

1. To allow the study of how genes are regulated & how they affect normal function of body & its development eg. information obtained about biological role of insulin like growth factor.
 2. To increase our understanding on how genes contribute to development of diseases.
 3. To produce useful biological compounds by introducing a portion of DNA that codes for that product from other organisms, eg. α -1 antitrypsin, a protein used to treat emphysema.
 4. For testing the safety of vaccine eg. polio vaccine in transgenic mice.
 5. To test the toxicity of drugs.
-

5. Describe how nematode – resistant transgenic plants have been obtained?

Ans. A nematode Meloidogyne incognita infects tobacco plant & reduces its yield. The specific genes from parasite are introduced into plant using Agrobacterium. The genes are introduced in such a way that both sense & Antisense RNA are produced. Since these two RNAs are complementary, they form a double stranded RNA (ds RNA). This neutralizes the specific RNA of nematode by a process called RNA interference as a result, the parasite cannot live in transgenic host & plant is protected from the pest.

6. What are Cry proteins? Name an organism that produces it. How has man exploited this protein to his benefit?

Ans. The soil bacterium Bacillus thuringiensis produces crystal proteins called cry proteins that are toxic to larvae of insects like tobacco budworm, beetles & mosquitoes. The cry proteins exist as inactive protoxin & gets converted into active toxin when ingested by the

insect, as the alkaline pH of gut solubilises the crystal. The activated toxia binds to surface of epithelial cells of midgut & creates pores that cause lysis of cells leading to death of insects. The genes encoding this protein are isolated from bacterium & incorporated into crop-plant to make them insect-resistant.

7. Write an account on the production of human insulin in transgenic organisms.

Ans. Human insulin consists of two short polypeptide chains: chain A & B linked by disulfide bonds. Insulin is secreted as prohormone which has to be processed before it becomes a mature & functional hormone. The prohormone contains another polypeptides called C-peptide which is removed during

maturity. Using genetic engineering, the two DNA sequences coding for chains A & B of human insulin are introduced into plasmid of E - coli - to produce insulin. The two chains produced are extracted & combined by creating disulfide bridges.

8. Compare & contrast the advantages & disadvantages of production of Genetically modified organisms?

Ans. ADVANTAGES OF PRODUCING GMOS.

1. GM crops produce desired phenotypic traits in crop plants.
2. The genes responsible for production of specific proteins are inserted into GM crops. These crops then produce that specific protein.
3. Transgenic crops synthesize new end product of specific biochemical pathway.
4. These crops also help in preventing expression of existing native Gene.

DISADVANTAGES OF PRODUCING GMOS:

1. Transgenic crops may endanger wild & native species.
2. GM crops may cause health problems by supplying allergens.
3. GM crops may damage to the natural environment.

9. What is RNA Silencing? How is this strategy used to create pest – resistant plants?

Ans. RNA silencing is a technique which involves silencing or disabling of specific mRNA due

to complementary ds RNA molecule that binds to & prevent translation of mRNA. This strategy is used to prevent infection of roots of tobacco plants by nematode Meloidogyne incognita. In this strategy, complementary ds RNA is produced against specific mRNA. The source of this complementary RNA could be from an infection by viruses having RNA genomes. Using Agrobacterium vector nematode specific genes were introduced into host plant. The introduction of DNA was such that it produced both sense & anti-sense RNA in the host cell. These two RNA's being complementary to each other formed a double-stranded RNA that initiated RNAi & thus silenced specific mRNA of the nematode. The consequence was that parasite could not survive in transgenic host.

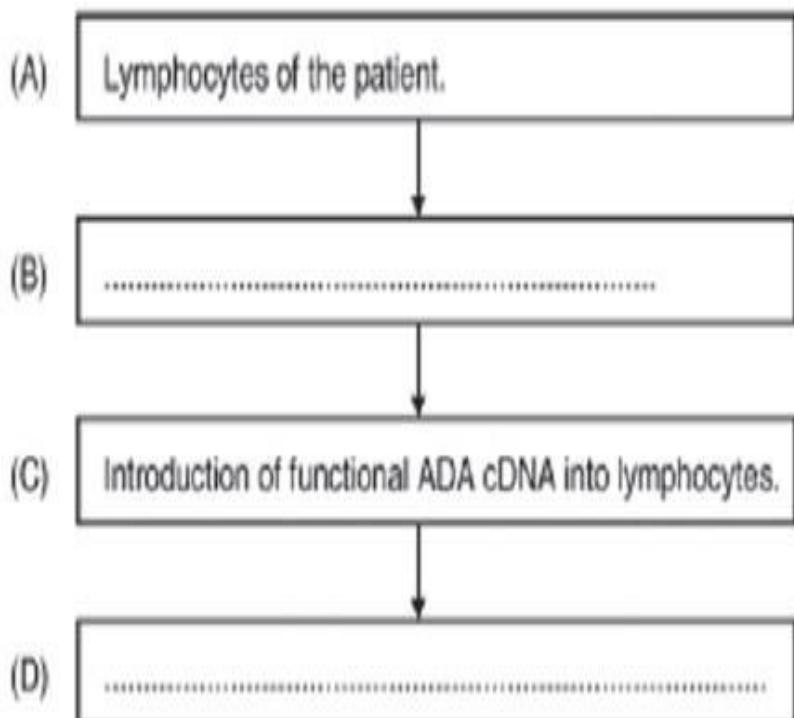
10.What are the steps involved in synthesis of genetically engineered insulin.

Ans. Steps involved in Insulin production are :-

1. for synthesis of Insulin, RNA is extracted from β -cells of islets of Langerhans of pancreas.
2. With the help of enzyme Reverse transcriptase, single stranded DNA complementary to mRNA is synthesized second strand of DNA complementary to first is synthesized with enzyme DNA polymerase.
3. The two strands of copy DNA is joined to plasmid by using an enzyme called terminal transferase.
4. The two ends of DNA get annealed by enzyme called ligase thus ends of inserted DNA & plasmid are sealed & a new circular plasmid is formed. This is a molecule of recombinant DNA.
5. This recombinant DNA is then inoculated in a new bacterial cell of E-coli & inserted in a bacterial gene after having cut by restriction enzyme.
6. After proper expression of genes the bacterial cells of both cultures are lysed with appropriate chemicals. The fragments of insulin are then separated from enzyme by cyanogen bromide.

5 Marks Questions

1. The clinical gene therapy is given to a 4 years old patient for an enzyme which is crucial for the immune system to function.



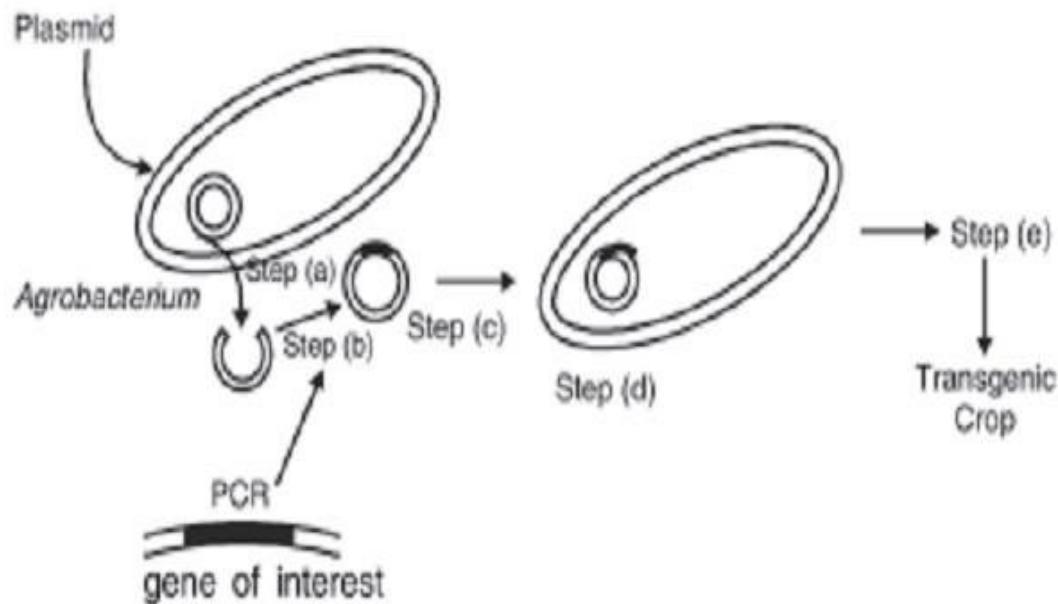
Observe the therapeutical flow chart and give the answer of the following:

- (a) Complete the missing steps (B) and (D)
- (b) Identify the disease to be cured.
- (c) Why the above method is not a complete solution to the problem?
- (d) Scientists have developed a method to cure this disease permanently. How?

Ans. (a) Step (B) : Lymphocytes are grown in culture medium. Step (D) : Infusion of genetically engineered lymphocytes into patients.

- (b)** Adenosine deaminase (ADA) deficiency.
- (c)** As genetically engineered lymphocytes are not immortal, the patient requires periodic infusion of cells.
- (d)** If the gene isolated from bone marrow cells producing ADA is introduced into cells at early embryonic stages, it could be a permanent cure.

2. In the given figure, Agrobacterium is utilized for the production of a transgenic crop. Explain the steps a, b, c, d and e shown in the figure.



Ans. Step (a) Plasmid is removed and cut open with restriction endonuclease.

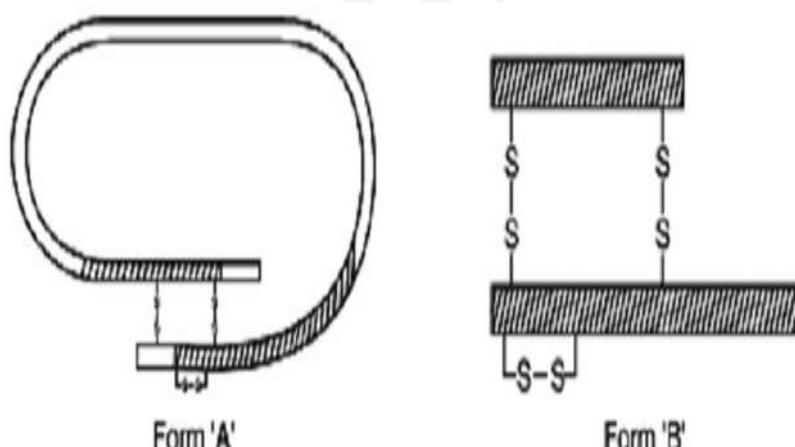
Step (b) Gene of interest is isolated from another organism and amplified using PCR

Step (c) New gene is inserted into plasmid

Step (d) Plasmid is put back into Agrobacterium

Step (e) Agrobacterium based transformation.

3. In the given figure, Form (A) and Form (B) represents different forms of a proteinaceous hormone secreted by pancreas in mammals.



- (a) What type of bonding is present between chains of this hormone?**
- (b) What are these form (A) and form (B). How these forms differ from each other?**
- (c) Explain how was this hormone produced by Eli Lilly, an American company, using rDNA technology.**

Ans. (a) Disulphide bonds

(b) Form (A) - Proinsulin

Form (B) - Mature insulin. Proinsulin contains an extra stretch called C peptide which is absent in mature insulin.

(c) Eli Lilly company prepared two DNA sequences corresponding to A and B peptide chains of human insulin and introduced them in plasmid E. coli to produce insulin chains. Chains A and B were produced separately, extracted and combined by creating disulphide bonds to form insulin.

4.What is Gene therapy – Illustrate using example of Adenosine deaminase deficiency?

Ans. Gene therapy is a collection of methods that allows correction of a gene defect. In this method, genes are inserted into the cells & tissues of an individual to correct certain hereditary diseases. It involves delivery of a normal gene into the individual or embryo to replace the defective mutant allele of the gene. Viruses which attack the host cell & introduce genetic material into host are used as vectors.

For example Adenosine deaminase (ADA) deficiency can be cured by bone marrow transplantation in some children but is not curative for Gene therapy, lymphocytes are grown in a culture & functional ADA, cDNA is introduced into these lymphocytes. These lymphocytes are then transferred into body of patient the patient requires infusion of such genetically engineered lymphocytes.

CBSE Class 12 Biology
Important Questions
Chapter 13
Organisms and Populations

1 Marks Questions

1. Which are the factor responsible for the wide variety of habitat formed within each biome?

Ans. Regional and local variations

2. Fresh water animals are unable to survive for long in sea water. Give reason.

Ans. Due to osmotic problems.

3. With which population growth model is the Verhulst Pearl equation associated?

Ans. Logistic Growth.

4. Define diapause. Which organisms exhibit it?

Ans. A stage of suspended development, zooplanktons.

5. Calculate the death rate if 6 individuals in a laboratory population of 60 fruit flies died during a particular week.

Ans. $6/60 = 0.1$ individuals per fruitfly per week.

6. In biological control method, one living organism is used against another to check its uncontrolled growth. Which kind of population interaction is involved in this?

Ans. Predation.

7. An organism has to overcome stressful condition for a limited period of time. Which strategies can it adopt to do so?

Ans.(i) Migration

(ii) Suspension of active life by hibernation/aestivation/spore formation.

8. Write what do phytophagous insects feed on?

Ans.Plant sap and other parts of plant.

9. Why do leaves contains Sunken stomata?

Ans.Leaves contains sunken stomata i.e. Stomata arranged in deep pits to minimizes water loss by transpiration.

10. Name the type of interaction that is detrimental to both the interaction.

Ans.Competition.

11. What type of interaction is shown by sparrows eating the seeds?

Ans.Predation.

12. Define homeostasis?

Ans.Homeostasis refers to the maintenance of a steady internal environment by organisms.

13. Give an example of suspension?

Ans.Hibernation is frogs, reptiles or polar bear.

14. What is Allen's rule?

Ans.Mammals living in colder regions have short ears & limbs to minimise heat loss.

15.“Cuckoo bird lays eggs in the nest of crow” which type of interaction is shown in this relation?

Ans.Brood parasitism.

16.Give one function of aerenchyma in aquatic plants?

Ans.Aerenchyma in aquatic plants provides buoyancy & helps them in floating.

17.What does J-shaped curve indicates?

Ans.J-shaped curve indicates that the resources are unlimited in a habitat.

18.Name the type of interaction in which one species is harmed while other is neither benefitted nor harmed?

Ans.Ammensalism.

19.Why are calotropis plants not browsed by herbivores?

Ans.Because calotropis plant produces a highly poisonous glycoside that is a cardiac poison & thus, directly kills the predator.

20.What are the two primary requirements of a parasite from host?

Ans.Food & shelter.

21.What is the ecological principle behind biological control method of managing pest insects.

Ans.Predation, where predators prey upon pests & control their number.

22.Write the equation for verhulst – poarl logistic growth of population.

Ans.
$$\frac{\Delta N}{\Delta t} = \frac{rN(K-N)}{K}$$

23. Name the mechanism employed by ophrys to get its flowers pollinated?

Ans. Mutualism.

24. List any two factors which determine the nature of soil?

Ans. Climate & weathering process.

2 Marks Questions

1. What are the four levels of biological organisation with which ecology basically deals?

Ans. Organisms, population, communities and biomes.

2. Differentiate between stenohaline and euryhaline organisms.

Ans. Euryhaline :Organisms tolerant in wide range of salinities.

Stenohaline :Organisms tolerant to narrow range of salinities.

3. List four features which enable the Xeric plants to survive in the desert conditions.

Ans. (i) thick cuticle

(ii) Stomata in deep pits

(iii) Stomata closed during day time

(iv) leaves reduced to spines (CAM photosynthetic pathway).

4. Mention the attributes which a population has but not an individual organism.

Ans. Birth rate, Death rate, Sex ratio, age groups.

5. Differentiate between stenothermal and eurythermal organisms.

Ans. Eurythermal :Organisms that can tolerate and thrive in wide range of temperatures
Stenothermal :Organisms restricted to a narrow range of temperature.

6. What are the four ways through which the living organisms respond to abiotic factors?

Ans. (i) Regulate (ii) Conform (iii) migrate (iv) Suspend

7. Why do clown fish and sea anemone pair up? What is this relationship called?

Ans. Clown fish lives in tentacles of sea Anemone and gets protection from predators.

Interaction – commensalism.

8. Distinguish between ectotherms & Endotherms?

Ans. Ectotherms are those animals whose body temperature changes & matches with that of environment in which they are living whereas Endotherms are those animal whose body temperature is maintained relatively constant by physiological regulation.

9. "Lichens are considered good examples of obligate mutualisms". Comment?

Ans. Lichens show an intimate mutualistic relationship between a fungus & an algae or cyanobacterium where the fungus helps in absorption of nutrients & provides it to bacteria while the algae or cyanobacterium prepares the food.

10. Give any two examples of defense mechanism in plants against herbivory?

Ans. i) plants develops certain morphological means of defense e.g. thorns in bougainvillea & spines in cactus.

ii) plants produce & store certain chemicals which functions with by directly killing them or by inhibiting them from feeding .

11.What is Brood parasitism? Give an example. What adaptation has evolved in this phenomenon?

Ans.Brood parasitism refers to the phenomenon in which one bird species lays its eggs in the nest of another bird species. Evolution has occurred in such a way that the eggs of the parasitic birds resemble those of the host bird in size, colour etc to avoid host bird detecting the foreign eggs & ejecting them from the nest e.g. cuckoo bird lays eggs in the nest of crow. It is considered as a parasitic type of interspecific interaction because in this relationship the parasite i.e. eggs of cuckoo birds depend on crow's nest for its food & shelter but the crow is harmed because there is competition for limited food and shelter amongst the crow's egg & cuckoo's egg thus, in parasitic interspecific interaction the parasite is benefited while the host is harmed.

12.An orchid plant is growing on the branch of mango tree. How do you describe this interaction between the orchid & the mango tree?

Ans.Orchids grow as epiphytes on mango tree. This is an example of commensalism in which orchids are benefited by getting a shelter while the tree is neither benefited nor harmed.

13.State Gauss's competitive exclusion principle?

Ans.Gause's competitive exclusion principle states that two closely related species competing for the same resources cannot exist together as the competitively inferior one will be eliminated but this is true only when resources are limiting & not otherwise.

14.What is migration? Why do animals show this phenomenon?

Ans.Migration is a phenomenon in which organisms can move away temporarily from the stressful conditions in the habitat with hospitable conditions e.g. birds undertake long distance migration during winter.

15.How do desert lizards maintain a fairly constant body temperature?

Ans. Desert lizards manage to deal with high temperature by keeping their body temperature fairly constant by behavioral means. They bask in the sun & absorb heat when their body temperature is below the comfort level & move into shade when it is higher.

16.Differentiate between Hibernation & aestivation?

Ans. Hibernation is the phenomenon of spending cold period in inactive stage by an animal whereas aestivation is the phenomenon of spending dry & hot conditions in an inactive stage by animal.

17.Name the bind of interaction present between the following :-

- i) Indian Nightingale & crow**
- ii) Nodulated roots & rhizobium**
- iii) Plasmodium & man**
- iv) Orchids & Mongo tree**

Ans. i) Indian Nightingale & crow :- Brood parasitism

ii) Nodulated roots & rhizobium :- Mutualism

iii) Plasmodium & man :- Parasitism

iv) Orchids & Mongo tree :- Commensalism.

18.Define carrying capacity?

Ans. The maximum number of individuals of a population that can be sustained by a given habitat is called its carrying capacity.

19.If a marine fish is placed in fresh water aquarium, will the fish be able to survive.

Why or why not?

Ans.No, marine fish is unable to survive in a fresh water aquarium because they are adapted to live insaline sea water. They are unable to cope with outside hypotonic environment because ofOsmoregulation problem.

20.Out of the two population growth models, which one is more realistic & Why?

Ans. Logistic or S-shaped growth curve is more realistic because no population can continue to grow exponentially, as the resource availability becomes limiting at certain point of time.

21.What role do predators play in an ecosystem?

Ans.Predators plays an important role in ecosystem :-

- i)They act as conduct for energy transfer to higher trophic level.
 - ii)Theykeep the prey population under control which otherwise can reach very high population density.
 - iii)They help in maintaining species diversity in a community.
-

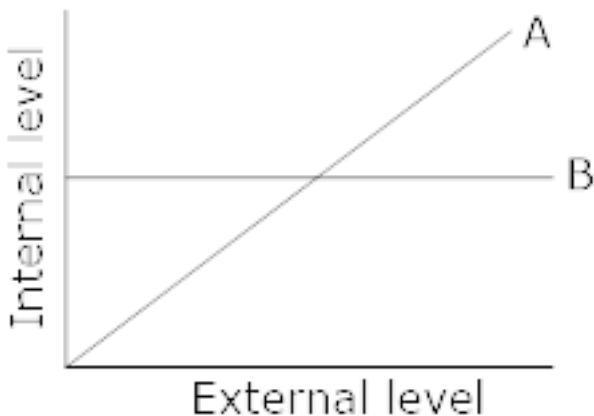
22.Most living organisms cannot survive at temperature above 450c. How are some microbes able to live in habitat with temperature exceeding 1000c.

Ans.Some microbes are able to live in habitats with temperate exceeding 1000 c because theypossess minimum amount of free water in their body. Removal of water provide resistance to hightemperature.

**23.Give below is a graph depicting organismic response to changing external condition.
Name the type of organisms which will show:-**

i) pattern A

ii) pattern B



Ans. i) Conformers shows pattern A where body temperature changes with the ambient temperature.

ii) Regulators shows pattern B where body temperature remains constant.

24. Mention any two ways in which organisms tide over unfavourable conditions by suspending their activities.

Ans. i) Hibernation – phenomenon of spending cold period in inactive stage by an animal e.g. frog, reptiles, polar bear.

ii) Aestivation – phenomenon of spending dry & hot conditions in an inactive stage by an animal e.g. snail, fishes.

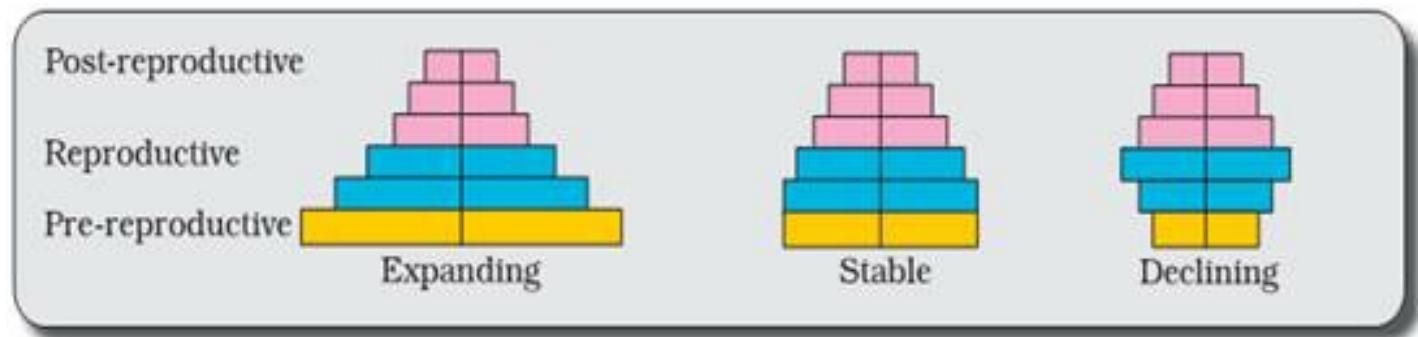
25. Why are predators “prudent in nature”?

Ans. Predators are said to be prudent in nature because if a predator is too efficient & overexploits prey, then the prey might become extinct & following it the predator will also become extinct for lacking of food.

3 Marks Questions

1. How does the shape of age pyramid reflect the growth status of a population?

Ans. Shape of pyramids reflects growth status of the population (a) growing (b) Stable (c) declining.



2. Darwin showed that even a slow growing animal like elephant could reach enormous number in absence of checks. With the help of your understanding of growth models, explain when is this possible? Why is this notion unrealistic?

Ans. Possible if the growth model is Exponential, i.e., having unlimited resources. Its an unrealistic situation because resources are limited. Hence, it follows logistic growth model.

3. How will you measure population density in following cases?

(i) fish in a lake

(ii) tiger census in a national park

(iii) single huge banyan tree with large canopy .

Ans. (i) fish caught per trap.

(ii) number per unit area

(iii) percentage cover in biomass.

4. Species facing competition might evolve mechanism that promotes coexistence rather than exclusion. Justify this statement in light of Gause's competitive exclusion principle, citing suitable examples.

Ans. State Gause's competitive exclusion principle. Mechanisms of resource partitioning. E.g., experiment of Mac Arthur on Warblers (Refer page 325, NCERT book, Biology - XII).

5. Describe the specific adaptation of xerophytes with respect to root system, stem & leaves.

Ans. i) ADAPTATIONS IN ROOTS :- Xerophytes have well developed & extensively branched long root system. While some perennial xerophytes of succulent nature possess extensive but shallow root system. They can absorb water from dew drops & small rain droplets.

ii) ADAPTATION IN STEM:- stems of woody xerophytes are comparatively stunted hard & rigid. They may be covered with thick e.g. Acacia main stem & branches may occur as thick, fleshy, flattened & green modified structure called phylloclade.

iii) ADAPTATION IN LEAVES:- Leaves are usually short sized which decreases the chances of getting over-heated when exposed to solar radiation & thus by reducing rate of transpiration. Leaves of xerophytes are usually thick, fleshy green & leathery which are known to store water.

6. List the important characteristics of a population & Explain?

Ans. A population has following four major characteristics :-

i) Population Density :- The size of a population in relation to a definite unit of space is termed as population density. The maximum limit of density depends upon energy flow in an ecosystem, nutritional status of trophic level & metabolic equilibrium. Population density can be mathematically calculated as : $D = \frac{N/a}{t}$

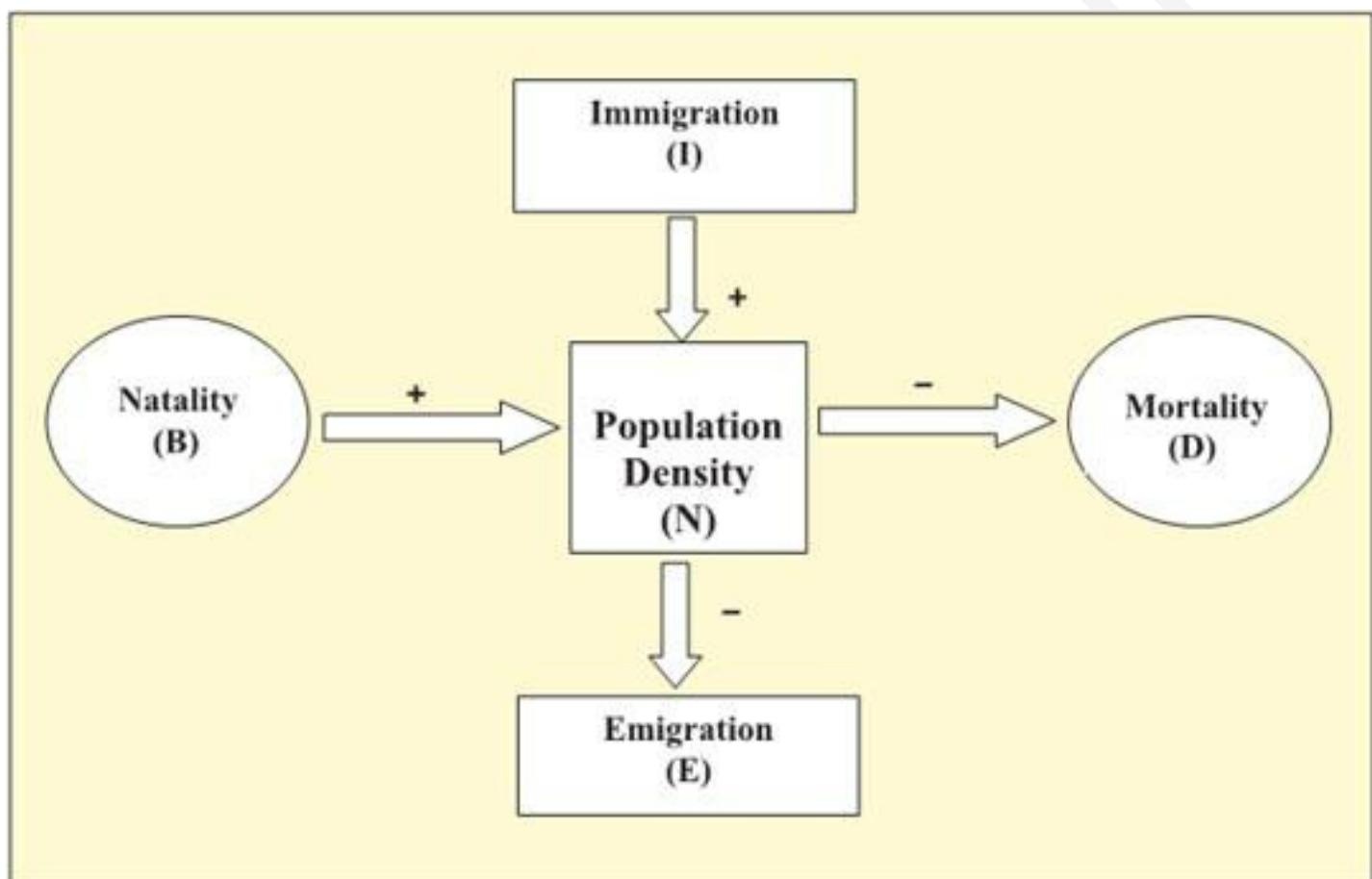
ii) Birth Rate / Natality :- The birth rate or natality denotes the produced number of new individuals by any natural method in per unit time. The birth can be expressed by formula

$$B = \frac{Nn}{t}$$

iii) Death Rate / Mortality :- It refers to death rate of individuals in the population. It is expressed as number of individual dying in a given period. Death Rate =

$$\frac{\text{no of death in population}}{\text{Time}}$$

iv) Carrying Capacity:- Each habitat or ecosystem has a certain space which can accommodate a finite number of organisms depending on its size & productivity. This is called carrying capacity



7. Describe the specific adaptations of hydrophytes with respect to roots, stem & leaves?

Ans. i) ADAPTATIONS IN ROOTS:- Root system is feebly developed & unbranched some floating plants or submerged plants lack roots. Root hairs are absent except rooted floating hydrophyte. True root caps are absent.

ii) ADAPTATIONS IN STEM :- In submerged hydrophytes, stems are long slender & flexible whereas in the free – floating hydrophytes stem are modified as thick, stout, stoloniferous & occur horizontal on water surface.

iii) ADAPTATIONS IN LEAVES:- Leaves are thin, long, ribbon shapes submerged forms. In free floating plants, the petioles of leaves show indefinite power of growth.

8. Name & explain the bind of interaction in the following.

i) Algae & fungi in

ii) Head louse & humans

iii) Hermit crab & sea anemone.

Ans. i) Algae & fungi in lichens :- Lichens shows an intimate mutualistic interaction in which both fungi helps in absorption of nutrients & provides protection, while algae or cyanobacterium prepares the food.

ii) Head louse & humans:- Head louse shows ectoparasitism on humans in which head louse is getting nutrition from human body & is thus benefited while human beings are harmed.

iii) Hermit crab & sea anemone:- Hermit crab & sea anemone shows commensalism as hermit crab is benefited because it gets protection from predators which stays away from stinging tentacles of the sea anemone.

9. Mention the different defense mechanism to reduce the impact of predation?

Ans. plant species evolved various defense mechanism to reduce impact of predation :-

i) Certain insect species & frogs have camouflage or cryptic colouration to avoid detection by their predators.

ii) Some animals like monarch butterfly are highly distasteful to their predators because they accumulate a certain chemical by feeding on poisonous weeds during its caterpillar stage.

iii) Some prey are poisonous & hence are avoided by predators .

iv) Plants have evolved certain morphological, or chemical defense mechanism against herbivores e.g. thorns in bougainvillea.

v) plants also produce certain chemicals which functions as :-

- They make animal feel sick.
- They may inhibit them from feeding.
- They may interfere with digestion.
- They may directly kill them.

10. Mutualism often involves co-evolution of mutualists. Describe taking the example of animal plant (wasp-fig) relationship.

Ans. Plants need the help of animals for pollination their flowers & dispersing their seeds. Animals obviously have to be paid fees for the services that plants expect from them. Plants offer rewards or fees in the form of seed dispersers “plant – animal interactions often involve co-evolution of the mutualists that is, the evolution of the flower & its pollinator species can be pollinated only by its partner wasp species & no other species. The female wasp uses the fruit not only as an oviposition site but uses the developing seeds within the fruit for nourishing its larvae. The wasp pollinates the fig inflorescence while searching for suitable egg-laying sites. In return for the favors of pollination the fig offers the wasp some of its developing seeds as food for the developing wasp larvae.

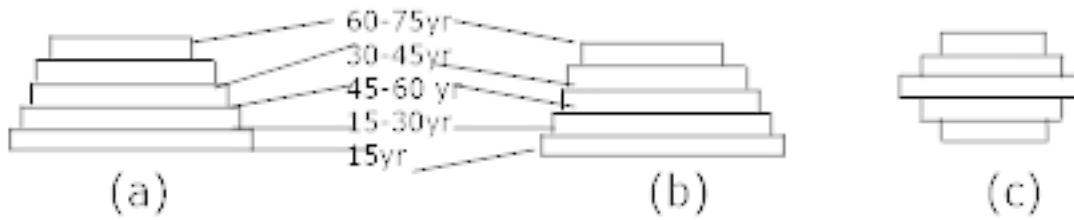
11. How do kangaroo rats live in the absence of water in North American deserts?

Ans. The kangaroo rat in North American deserts is capable of meeting all its water requirement through its internal oxidation of fat, where water is by-product, it can also concentrate its urine to a minimal volume.

12. How is diapause different from Hibernation?

Ans. Diapauses is the phenomenon of spending unfavourable climatic conditions by insects during their development whereas. Hibernation is a phenomenon of spending the winter in a resting or dormant conditions by cold – blooded animals to escape cold by hiding them in hollow tree trunk or burro or caves etc, revealing minimum physiological activity.

13. Study the three representative figures of age of pyramid relating to human population & answer the following question.



- i) Mention the given to the three kinds of age profile (a), (b) and (c)
- ii) Which one of them is ideal for a population & why.
- iii) How do such age – profile helps policy making concerned about our growing population & prepare for future generation.

Ans. i) (a) is called young population

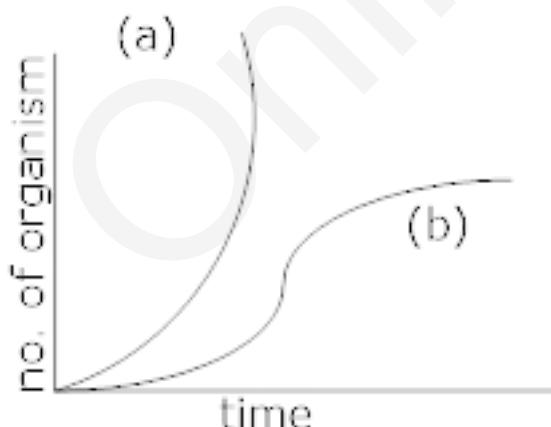
(b) is called stable population

(c) is called declining population

ii) Among the three, stable population is ideal because it has identical birth death rate.

iii) Age profile helps policy makers get concerned about our wing population & to make on idea for future population growth so that they make future plans.

14. In the adjacent population growth curve :-



- i) What is the name given to curve (a) & (b).
- ii) What is the status of food & space in thecurve (a) & (b).
- iii) In absence of predators, which curve “a” or “b” would appropriately depict the prey population?
- iv) When does curve ‘b’ changes into curve ‘a’.

Ans. i) Curve (a) is known as exponential growth curve & curve (b) is known as logistic growth curve.

- ii) Food & space is less in curve ‘a’ whereas plenty of food & space is available in curve ‘b’.
- iii) Curve “a”.
- iv) When the food resources in a given place become unlimited the curve (b) assumes a J – shape & changes into curve (a).

5 Marks Questions

1. What is altitude sickness? What its causes and symptoms? How does human body try to overcome altitude sickness?

Ans. Breathlessness at high attitudes.Cause :Low atmospheric pressure at high altitudes due to which body does not get enough oxygen. Symptoms :Nausea, fatigue and heart palpitations.

Body adapts by :

- (a) increasing red blood cell production
- (b) decreasing binding affinity of haemoglobin
- (c) by increasing breathing

2. Orchid flower, Ophrys co-evolves to maintain resemblance of its petal to female bee. Explain how and why does it do so?

Ans.

- employs ‘Sexual deceit’
- one petal bears uncanny resemblance to female of the bee.
- Male bee is attracted to what it perceives as a female ‘pseudocopulates,’ during which pollen dusted on male bee is body .
- Male bee transfers pollen to another flower when the same bee pseudocopulates with another flower.
- Ophrys does so because pollination success will be reduced unless it co-evolves with female bee.

3. Describe the exponential growth model of a diagram along with a curve?

Ans. This kind of curve is observed in the case of under population of reindeer growing in a predator free natural environment having plenty of food. In this case, the curve formed is J-curve the small population first takes time to adjust into new environment so there is no increase in the population. Once they get adapted they multiply exponentially. This growth & multiplication continues so far the food is available. After sometime the food supply becomes less as compared to the population increases. This causes mass starvation & mortality & results in the formation of J-shaped curve.

The J-shaped growth form is described by equation

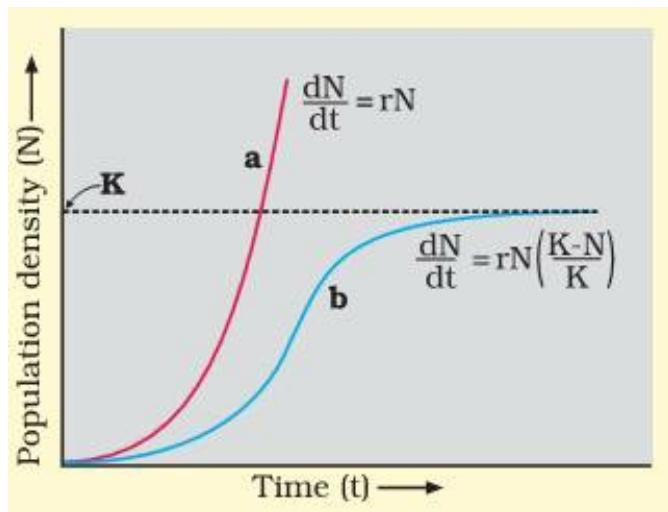
$$\frac{\Delta N}{\Delta t} = rN \text{ or } \frac{\Delta N}{\Delta t} = rN$$

4. Describe the logistic growth model of population along with a suitable curve. Why is this curve more realistic?

Ans. The logistic growth curve shows a sigmoid or a S-shaped curve. It has three phases:-

- (i) Lag-phase** :- It is the early phase of little or no growth. Lag phase is one in which under population of cells adapt to or stabilises with the growth conditions before embarking up their multiplication.
- (ii) Log phase or Exponential phase** :- It is the middle phase of rapid or geometric rise, Once stabilized cells starts to multiply rapidly when the small population is stabilised, the multiply becomes faster because of the plenty amount of food & other requirements of life.
- (iii) Stationary phase or steady phase**:- Soon after the amount of food decreases in proportion to the number of cells & this results in the onset of stationary phase. During this phase, the number of new cells produced is roughly equal to the number of cells dead & so there is no net increase in the number of cells.

Sigmoid growth curve is demonstrated by $\frac{dN}{dt} = rN \frac{(K-N)}{N}$



ΔN – rate of change in population Δt - change in time.

K – carrying capacity

R – biotic potential

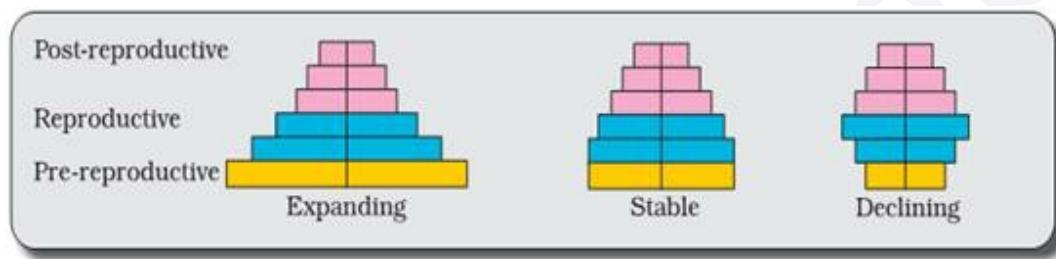
5. Give an example to show that completely unrelated species can also compete for same resources?

Ans. Completely unrelated species can also compete for same resources for e.g. In certain shallow lakes of South America the visiting flamingoes & the native fishes compete for the same zooplanktons as their food.

6.What is Age pyramid? What are the different types of age pyramid?

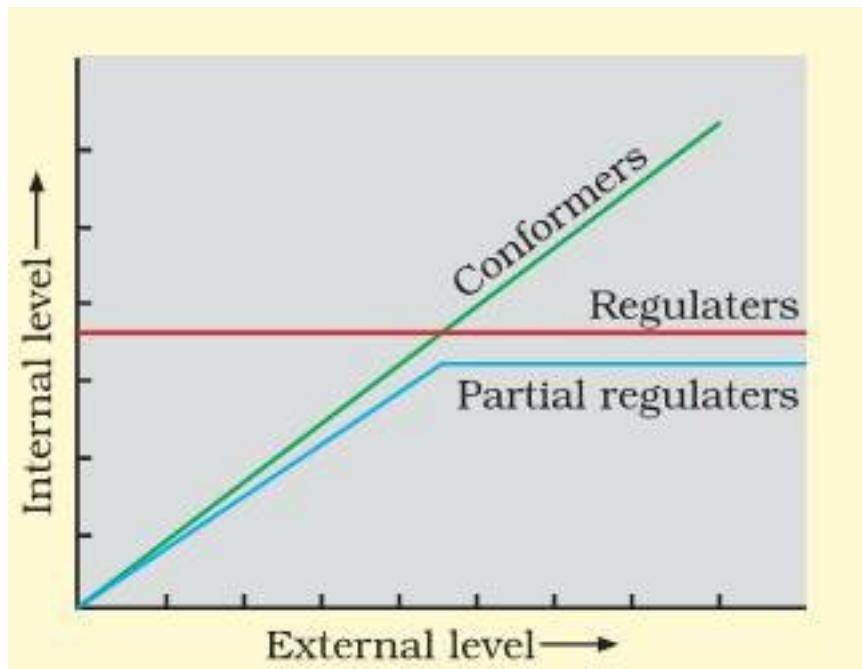
Ans.The geometrical diagrammatic representation of different age groups in a population of any organism is called Age of pyramids. These are of three types:-

- i) Expanding pyramid:- It is a broad base, triangular pyramid which represents a population containing large number of young people. It is rapidly expanding population with high birth rate.
- ii) Stable pyramid:- It represents a moderate proportion of young to old. As the rate of growth becomes slow & stable i.e.- pre-reproductive & reproductive age groups becomes more or less equal in size.
- iii) Declining Pyramid:- The type of pyramid of population decreasing in size is characterised by a narrow base because there are fewer pre-reproductive individuals than in the other two age categories.



7. Differentiate between regulators & conformers? Why do small animals do not show regulations?

Ans.The organisms which maintain homeostasis by physiological or behavioral means & ensures a constant body temperature & constant osmotic concentration etc. are called regulators e.g. all birds,mammals some lower vertebrates & invertebrates, for example in summer, when outside temp is more than our body temperature we sweat profusely evaporative cooling brings the body temp – down. Whereas those organisms which cannot maintain a constant internal environment. Their body temperature changes with ambient temperature e.g. majority of animals & nearly all plants.



Small organisms do not show regulation because thermoregulation is an energy-expensive process. Since small animals have large surface area relative to volume, they tend to lose body heat very fast when it is cold outside. They have to expend much energy to generate body heat through metabolism.

CBSE Class 12 Biology
Important Questions
Chapter 14
Ecosystem

1 Marks Questions

1. Decomposition is faster if detritus is rich in nitrogen and water soluble substance like sugars. When is the decomposition process slower?

Ans. Its slower if detritus is rich in lignin and chitin.

2. If we count the number of insects on a tree and number of small birds depending on those insects as also the number of larger birds eating the smaller, what kind of pyramid of number would we get?

Ans. Inverted Pyramid of Number .

3. Differentiate between Sere and Seral communities.

Ans. Sere :Entire sequence of communities that successively change in a given area. Serial community :Individual transitional community .

4. Who are generally the pioneer species in a Xerarch succession and in a Hyararch succession?

Ans. Pioneer species in Hydrarch succession are usually the small phytoplanktons and that in Xerarch succession are usually lichens.

5. Which metabolic process causes a reduction in the Gross Primary Productivity?

Ans. Respiration.

6. What percentage of photosynthetically active radiation is captured by plants?

Ans.2 – 10%

7. Name the pioneers of primary succession in water.

Ans. Phytoplanktons

8. Name any two man – made ecosystem?

Ans. Aquarium & Garden.

9. Define stratification?

Ans. Stratification in an ecosystem refers to the vertical distribution of different species occupying different levels.

10. Name the ecological pyramid that is always upright?

Ans. Pyramid of energy.

11. Name the trophic level occupied by secondary consumers & tertiary consumers?

Ans. Third trophic level & fourth trophic level respectively

12. Define standing crop?

Ans. The amount of living matter or biomass present at every trophic level is known as standing crop.

13. Name the ecological pyramid that is inverted in tree ecosystem?

Ans. Pyramid of Number.

14. What are the products of decomposition?

Ans. CO₂, H₂O & nutrients.

15.What is 10% law?

Ans.At each trophic level, 90% energy is degraded into heat & only 10% is transferred to next trophic level this rule is called 10% law.

16.Mention one similarity between hydrach&Xerach secession?

Ans.Both hydrach&xerach leads to establishment of similar mesic conditions.

17.What is the approximate value of net primary productivity of biosphere?

Ans.170 billion tons.

18.Name two climatic factors that regulate decomposition?

Ans.Chemical composition of detritus & climatic factors.

19.What is sere?

Ans.The entire sequence of communities that successively change in a given area resulting in climax community is called sere.

20.Name the primary consumers in aquatic ecosystem?

Ans.Zoo planktons.

21.Name the pioneer species in the primary succession on rock?

Ans.Lichens.

2 Marks Questions

1. What is the shape of pyramid of biomass in sea? Why?

Ans. Inverted, because biomass of fishes far exceeds that of phytoplankton.

2. Give an example of an ecological pyramid which is always upright. Justify your Answer.

Ans. Pyramid of energy is always upright and can never be inverted, because when energy flows from a trophic level to the next trophic level some energy is always lost as heat at each step.

3. Differentiate between primary succession and secondary succession. Which one occurs faster?

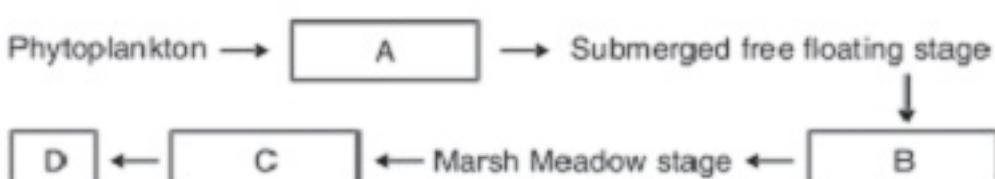
Ans. Primary Succession :Aprocess that starts where no living organisms are there.

Secondary succession :Aprocess that starts in areas which have lost all the living organisms that existed there.

4. Gaseous nutrient cycle and sedimentary nutrient cycles have their reservoir . Name them. Why is a reservoir necessary?

Ans. Reservoir for Gaseous nutrient cycle : Atmosphere; for sedimentary nutrient cycle : Earth's crust. Reservoir is needed to meet with the deficit which occurs due to imbalance in the rate of influx and efflux.

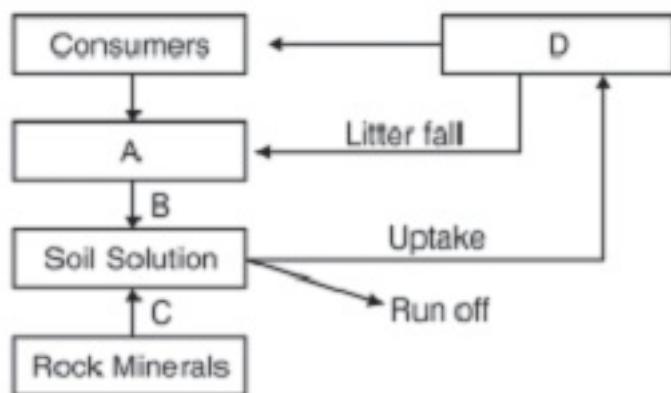
5. Fill up the missing links depicted as A, B, C and D in the given model of primary succession.



Ans. A = Submerged plant stage B = Reed Swamp Stage

C = Scrub stage D = Forest stage

6. In the model of phosphorus cycle given below , what does A, B, C and D refer to?



Ans. A = Detritus B = Decomposition

C = Weathering D = Producers.

7. Differentiate between Hydrarch and a Xerarch succession.

Ans. Hydrarch Succession :Starts in water proceeds from hydric (aquatic) to mesic (neither dry nor wet) situations. Xerarch succession :Starts on barren rock Proceeds from Xeric (dry) conditions.

8. What is the effect on decomposition rate if :-

a) Detritus is rich in lignin and chitin

b) Detritus is rich in nitrogen and sugars

Ans. a) Decomposition rate is slower

b) Decomposition rate is faster.

9. What are the limitations of ecological pyramids?

Ans. (i) Does not take into account same species belonging to two or more trophic levels.

(ii) Assumes simple food chain, does not accommodate food web.

(iii) Saprophytes have not been given any place in ecological pyramids.

10. Name any four ecosystem services. Who gave the price tags on nature's life support services? Which is the most important ecosystem service provider?

Ans.

- Forest (ecosystem) purify water and air
- Mitigate Droughts and floods
- Nutrient cycling
- Generate fertile soil
- Provide habitat for wildlife
- Pollinate flower
- Maintain Biodiversity
- Provide aesthetic, cultural & spiritual values
- Robert Constanza gave price tags to ecosystem services.
- Most important ecosystem services provider : Soil formation.

11. Study the table given below and fill the blanks from 'A' to 'F'.

| S.No | Component of the Ecosystem | Position of the trophic level | Organism present in the Food chain |
|------|----------------------------|-------------------------------|------------------------------------|
| 1. | E | | F |
| 2. | Secondary consumer | Fourth trophic level D | Bird, fish, wolf. C |
| 3. | B | Second trophic level A | Phytoplankton, grass, tree. |
| 4. | Primary producer | | |

Ans.A = First trophic level

B = Primary consumer

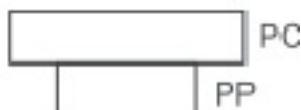
C = Zooplankton, Cow, Grass hopper

D = Third trophic level

E = Tertiary consumer

F = Man, Lion

12. In the pyramid of biomass drawn below , name the two crops (i) one which is supported (ii) one which supports in which ecosystem is such a phryamid found?



Ans. (i) Supported trophic level is founded by zooplanktons

(ii) Supporting trophic level is formed by phytoplanktons ecosystem It is found in aquatic ecosystem.

13.Why is secondary sucession faster than primary sucession?

Ans.Secondary succession refers to community development on sites previously occupied by welldeveloped communities where the environment is both organic & inorganic. Since these bare areaspossesses suitable soil for proper growth so, secondary successes is more rapid them primarysuccession.

14.Distinguish between upright & inverted pyramids?

Ans.In upright pyramid the number of producers or its biome is maximum in an ecosystem & it decreases progressively at each trophic level. Whereas in inverted pyramid at producer level is minimum & is increasing progressively at each trophic level in a food chain.

15.Explain with an example, why is the length of a food chain in an ecosystem generally limited to 3-4 trophic level?

Ans. In a food chain at each trophic level about 90% of energy is degraded into heat & only 10% energy is transferred to next trophic level thus of trophic levels in the food chain the amount energy to be transferred to next trophic level will be approximately negligible thus a food chain is generally limited to 3-4 trophic levels.

16.What is meant by ecological succession? Describe the different stages in which succession occurs?

Ans. Ecological succession is a community – controlled phenomenon in which the structure & composition of community changes in an orderly & sequential manner, leading ultimately to establishment climax community.

STAGES OF SUCESSION :-

- i) Invasion :- Invasion is the arrival of propagating organ e.g. seed spores bulbils etc on a bare area of primary or secondary succession. Those for which conditions are favorable germinate in new area & some of them grow into mature plants. These new arrivals from outside are called pioneer.
- ii) Establishment :- The process by which migrants adjust themselves in new areas after migration is called ecesis. It consists of three essential processes – germination, growth & reproduction.
- iii) Aggregation :- The coming together of individuals of various species in an area are called aggregation.
- iv) Competition :- The species which have similar requirements of nutrition are known as competitive species eg. those with different requirement are complimentary species.
- v) Reaction :- It is the change brought about by colonizers in the habitat. The influence of vegetation on the site is called reaction till a stable community develops in that area.

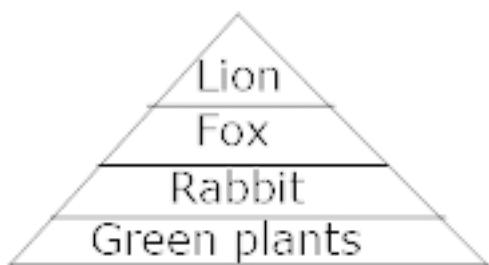
17.What is meant by ecological pyramid? With the help of one example each, show that

pyramid of number can be both upright as well as inverted.

Ans. The graphic representation of the trophic structure of a food chain is known as ecological pyramid. The ecological pyramid of number represents the numerical representation between different trophic levels both upright or inverted.

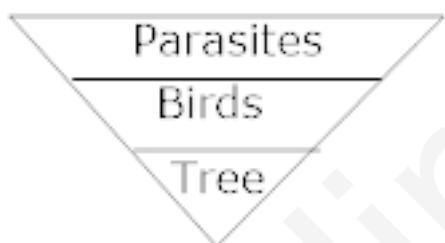
In upright pyramid of numbers, the more abundant species form the first trophic level & forms the base of pyramid & less abundant species remains near the top e.g. Grass land ecosystem.

Green plants → Rabbit → Fox → Lion



In inverted pyramid of number, the most abundant species occurs at the top while the less abundant species forms the base eg. Tree ecosystem

Tree → Birds → Parasite



18. Describe the components of an ecosystem?

Ans. Ecosystem is a functional unit of nature consisting of biotic & abiotic factors where the living organisms interact among themselves & with physical environment. Ecosystem consists of two components:-

i) ABIOTIC COMPONENTS :- e.g.

a) Inorganic substances phosphorus, sulphur, carbon, nitrogen, hydrogen etc.

- b) Organic substances e.g. carbohydrates, proteins, lipids.
- c) Climatic regime e.g. light, humidity, rainfall, temperature.

ii) BIOTIC COMPONENTS:

- a) Producers :- The organisms which produce food for themselves & for all living organism from inorganic raw material with the solar radiation are called producers.
- b) Consumers :- Those living heterotrophic members of ecosystem which consume the food synthesized by producers. They are broadly classified as.
 - i) Primary consumers:- They are directly dependent on producers called herbivores e.g. rat, deer, cow, goat,.
 - ii) Secondary consumers:- The organism that use primary consumers as their food are called carnivores e.g. fox, cats, lions.
 - iii) Tertiary consumers:- These are top carnivores which prey upon other carnivores, & herbivores
e.g. crow, man.
- c) Decomposers :- Organism that break up the dead bodies of plants animals & the related waste products are called decomposers e.g. bacteria, Fungi etc.

19.“Energy flow in an ecosystem is always unidirectional justify the statement.

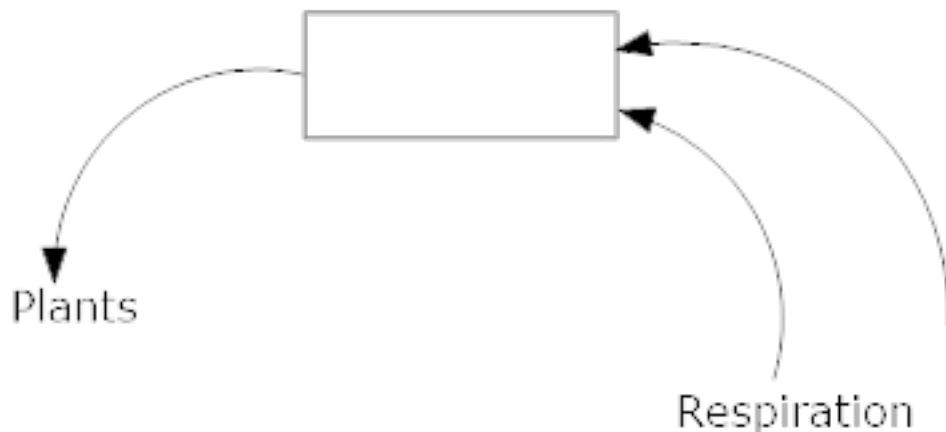
Ans. Energy flow in an ecosystem is always unidirectional means that energy is always transferred from one trophic level to next trophic level & is not reverted back – e.g. energy from sun is captured by producers which are then eaten by primary consumer & energy is transferred to next trophic level.

20. Differentiate between Production & decomposition?

Ans. Production refers to the process of synthesis of organic food materials from inorganic substances such as CO₂ H₂O in the presence of sunlight whereas decomposition is a

process of breakdown of complex substances into its constituents & it is brought about by bacteria, fungi etc.

21. Explain why pyramid of energy of an ecosystem is always uprights never inverted?



Ans. The pyramid of energy represents total amount of energy utilized by different trophic level organism in unit area. At each level, total energy available is relatively more than at higher trophic level because of loss of energy from one trophic level to other thus, pyramid of energy is always straight.

22. i) Name the compound whose cycle is depicted.

ii) In what way do vehicles add this compound to atmosphere?

iii) What adverse effect does its excess have on the environment?

iv) Cite an event which depicts this effect in modern times.

v) Suggest two ways of depleting this effect.

Ans. i) Carbon cycle

ii) By burning of fossil fuel e.g. diesel or petroleum, they introduce CO₂ in the atmosphere

iii) Environmental pollution.

iv) Ozone layer depletion

v) a) By reducing use of fossil fuels

b) By planting more & more trees.

23.What do you mean by “productivity of an ecosystem? What are the types of productivity also mention the factors on which productivity of an ecosystem depends?

Ans. Productivity of an ecosystem is the rate at which solar radiations energy is fixed by vegetation of an ecosystem per unit area & per unit time. It is generally expressed in terms of unit of energy (cal) produced in a unit area (m^2) per unit time (year).

Productivity can be of two types:-

1) Primary Productivity:- It is defined as the amount of biomass or organic matter produced per unit area over a time period by plants during photosynthesis primary productivity can further be of two types:-

a) Gross primary productivity :- It refers to the total amount of food formed by producers.

b) Net primary productivity:- It refers to gross production minus loss by respiration & decomposition $NPP = GPP - \text{respiration loss}$

2) Secondary Productivity :- The rate of storage at consumer level is secondary productivity. It is the rate of resynthesis of organic food by consumers primary productivity depends on:-

i) a number of environmental factors

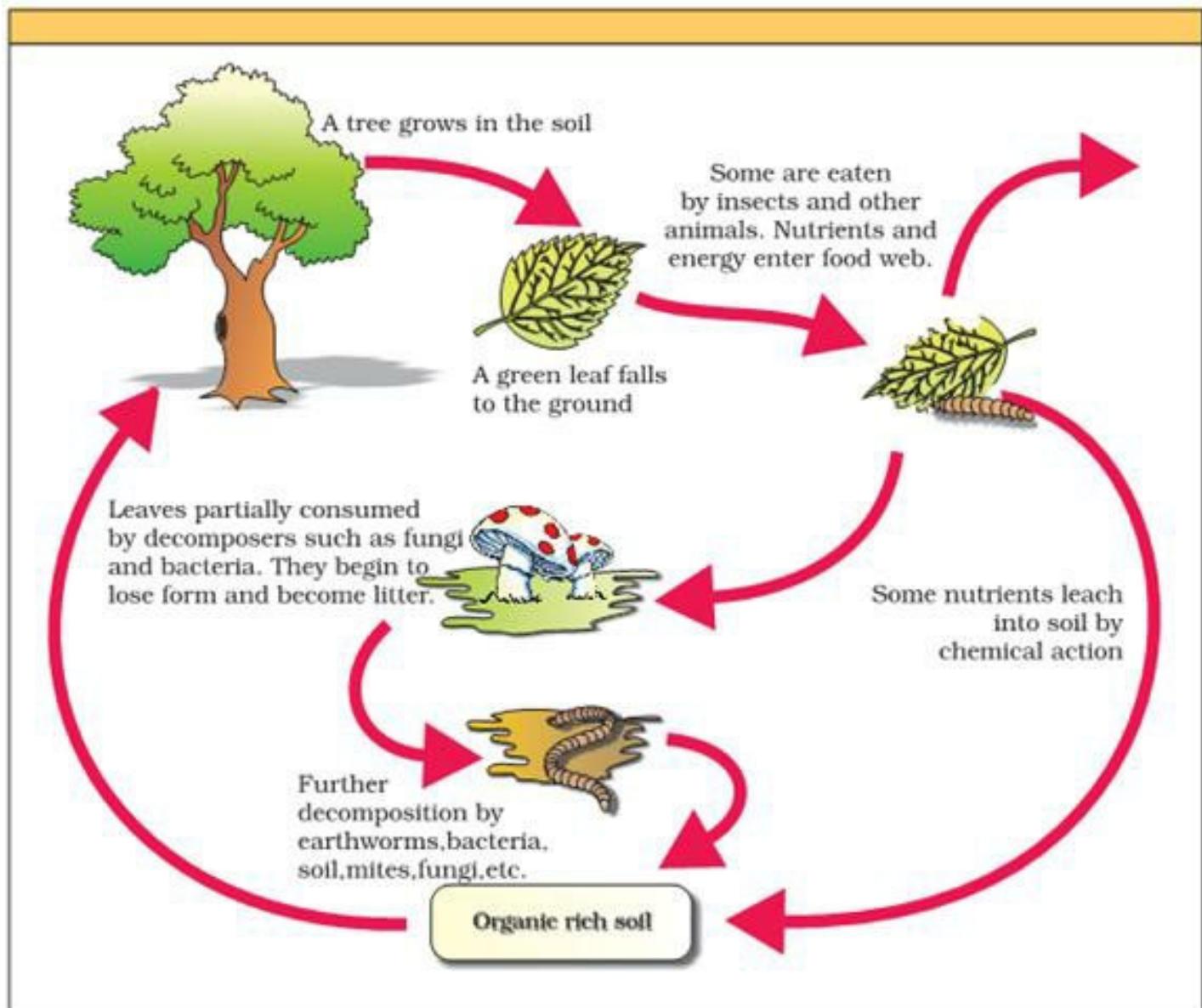
ii) availability of nutrients.

iii) photosynthetic capacity of plants.

24.What is decomposition – Describe the different processes involved in decomposition?

Ans. Decomposers e.g. bacteria, fungi etc. helps in breakdown of complex organic matter into inorganic substances like CO₂, water minerals & this process is called decomposition. Dead plant remains e.g. leaves, bark flowers & dead remain of animals including faecal matter constitute detritus. The important processes involved in decomposition or :-

- i) Fragmentation :- Detritivores breaks down detritus into smaller particles.
- ii) Leaching :- Water soluble inorganic nutrients go down into soil horizon & get precipitated as unavailable salts by process of leaching.
- iii) Catabolism:- The enzymes of bacteria & fungi degrade detritus into simple inorganic substances
- iv) Humification :- Humification leads to accumulation of a dark colored amorphous substance called humus that is highly resistant to microbial action & undergoes decomposition at extremely slow rate.
- v) Mineralisation :- The humus is further degraded by some microbes & release of inorganic nutrients occurs by the process of mineralization.



25. Why is productivity of coral reef maximum?

Ans. The productivity of coral reef is maximum because of availability of good light, enough warm water and abundant nutrients.

26. In the pyramid of biomass, drawn below, name the two crops:-

i) one which is supported & the one which supports

ii) In which ecosystem is such a pyramid found.



Ans. i) In this ecosystem bird is supported & insect supports.

ii) Such type of pyramid is found in ecosystem of pond or tree.

27. Differentiate between primary productivity & secondary productivity?

Ans. Primary productivity refers to productivity at trophic level i.e. food energy formed by way of photosynthesis using solar energy whereas secondary productivity refers to gross productivity minus losses by way of respiration & decomposition.

28. What ecological principles are derived from the study of food chains?

Ans. i) Each food chain is complete & self – containing

ii) All the food chains must always begin with photosynthesis & ends with decay

iii) Shorter food chains are more efficient because the more steps it has, greater the wastage of energy.

iv) The successive members of food chains are large in size but fewer in number.

29. List the factors on which pioneer species depend during secondary succession?

Ans. In secondary succession, the type of pioneer species depends on :-

i) Conditions of the soil

ii) Availability of water

iii) Environmental conditions

iv) Seeds or other propagules present.

30.The productivity of ecosystem increases from polar regions towards tropics. Why?

Ans. The productivity of ecosystem increases from polar region towards tropics because of the increasing sunlight & temperature.

31.Mention some of the ecological services provided by forests?

- Ans.**i) Forests purify air
ii) They mitigate droughts & floods.
iii) They help in cycling of nutrients.
iv) They provide habitat to number of wild life
v) They maintain biodiversity.
-

32.Differentiate between food chain & food web?

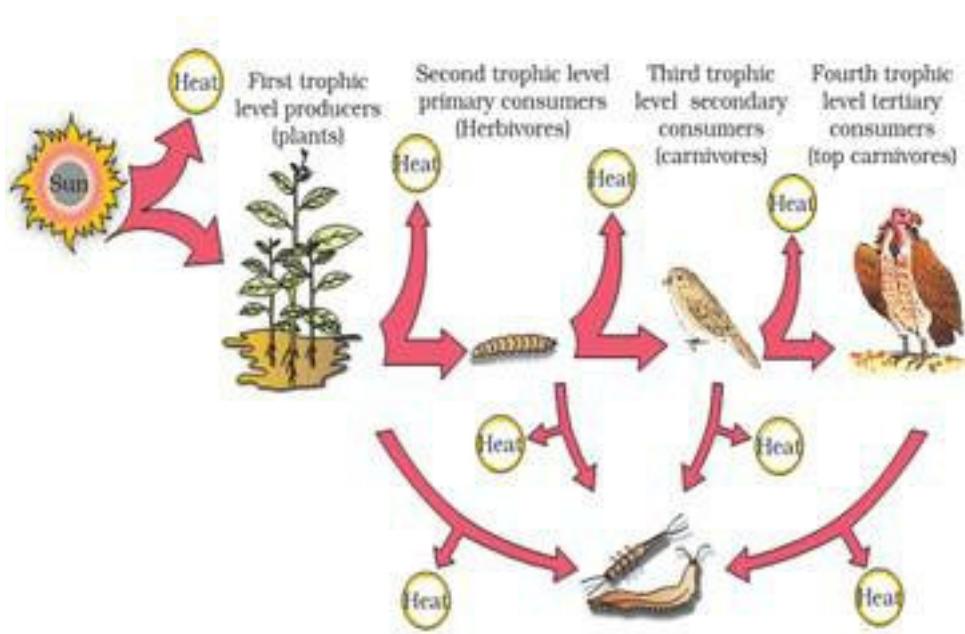
Ans.The unidirectional sequence of organisms in which energy flows in the form of food from oneorganism to another through the process of eating & being eaten is called food chain whereas thenetwork of interlinked food chains are collectively known as food web.

3 Marks Questions

1. With the help of a diagram, represent the energy flow through different trophic level.

Ans.In an ecosystem, energy flows through different trophic level by food chain. In consists of two steps:-

i) Trapping solar energy:- Primary source of energy is sun only 48% of sun's energy reaches the surfaceof earth & only a part of it is used lay plants for photosynthesis. The chemical energy produced lay plantsis stored in plant tissues. The photosynthetic organism uses a part of this chemical energy & transfer therest to organism at next trophic level.



ii) Path & flow of energy:- The primary consumers therefore take chemical potential energy in the form of food. Most of it dissipates as heat during respiration & is lost out of ecosystem. The same process is repeated at secondary consumers, at each trophic level 90% energy is degraded into heat & only 10% is transferred to next trophic level this rule of energy flow is called ten percent law.

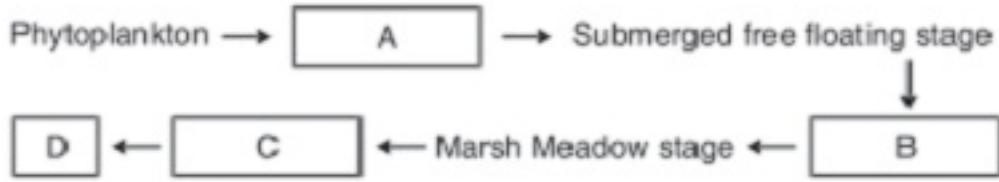
2. What is pyramid of biomass? Represent the pyramid of biomass in

- (i) grassland ecosystem
- (ii) aquatic ecosystem.

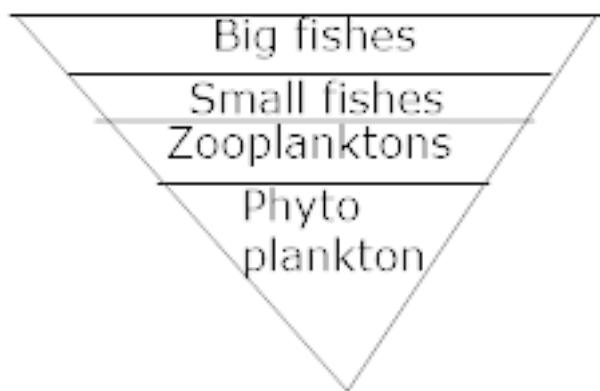
Ans. The biomass means the total weight of dry matter pyramid of biomass represents the weight of dry matter at different trophic levels of ecosystem at one time in a food chain or food web.

i) Grassland ecosystem :- In grassland ecosystem, the pyramid of biomass is upright i.e. pyramid of biomass shows gradual reduction in biomass at each trophic level from base to apex.

Grass → cow → fox → Lion



ii) In pond aquatic ecosystem, the biomass of consumers is always greater than biomass of producers hence it occurs as an inverted pyramid



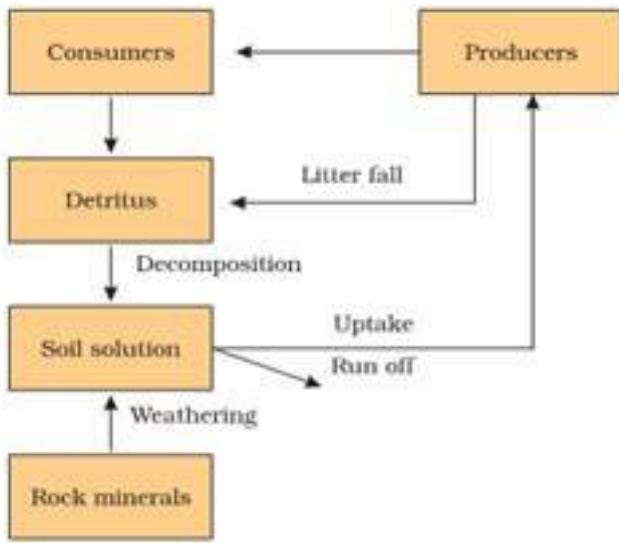
5 Marks Questions

1. Represent schematically & describe the phosphorus cycle in an ecosystem?

Ans. The major reservoir of phosphorus is sedimentary rocks which are only available to basic cycle in small amounts as a result of weathering. These phosphorus are weathered & later transported to the soil by wind & water, where they exist as inorganic dissolved phosphates.

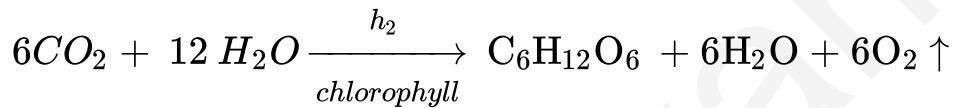
The basic phosphorus cycle begins with dissolved phosphates which are absorbed by plants for making their own tissue. Plants are eaten by animals. Decay bacteria breakdown the tissue of dead animals down these products & return phosphate to soil.

The water-soluble phosphates is lost to the deep sediments of the ocean through runoff. The major pathway of returning phosphorus to land is uplifting of marine sediments. Some amount of phosphorus is returned to absorb inorganic phosphate, when they die, most of absorbed phosphate is recycled back into ambient matter. This sort of cycling is called biological cycle or metabolic cycle.



2. Represent schematically & describe carbon cycle in ecosystem?

Ans. The source of carbon is atmosphere & water. Carbon is present in atmosphere mainly in the form of CO_2 . It is vital to the production of carbohydrates through photosynthesis.

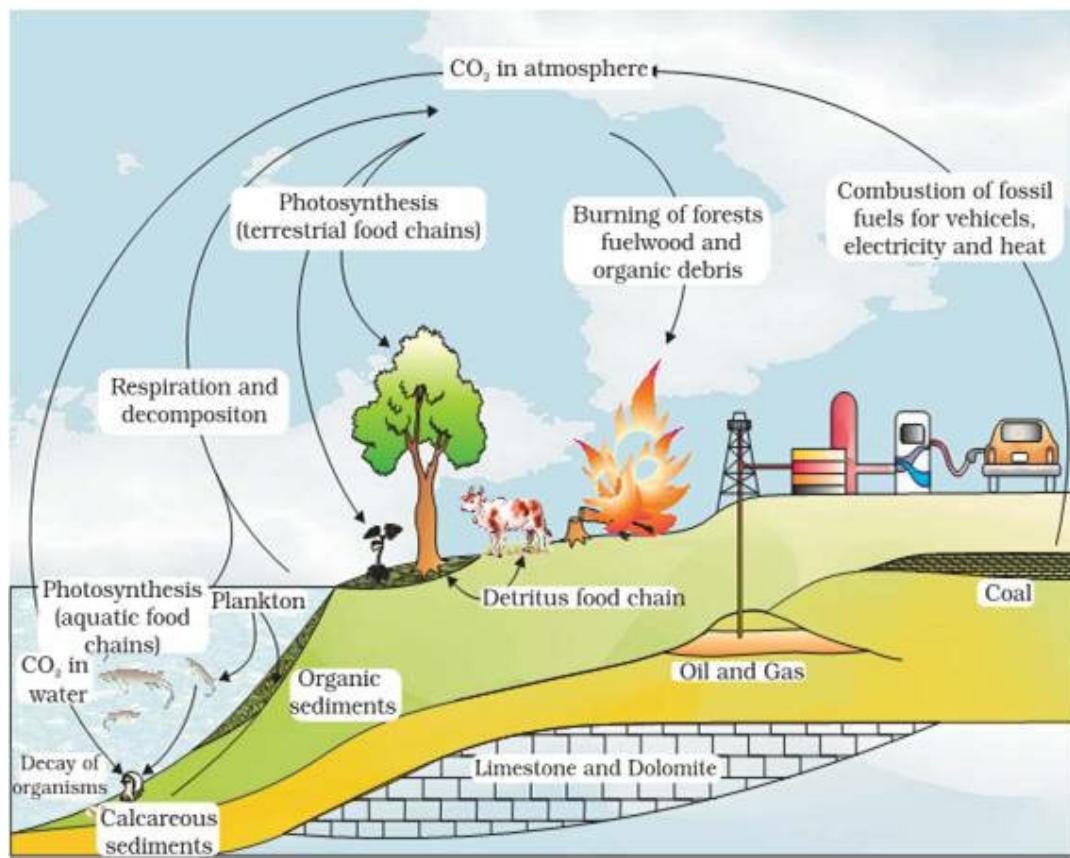


In atmosphere, carbon is present in the form of CO_2 from the atmosphere it is incorporated into tissues of green plants e.g. carbohydrates, proteins & lipids.

The CO_2 dissolved in sea water is utilized by marine animals like protozoans, corals, mollusks etc. for their life. In these animals, CO_2 is converted into calcium carbonate which is used for construction of shell.



After death of marine animals, $CaCO_3$ stored in shells is either deposited as sedimentary rock or dissolved in water to release CO_2 . A certain proportion of carbon is deposited as coal. Carbon from coal returns to air in the form of CO_2 through combustion & weathering thus, carbon from atmospheric pool moves to green plants, then to animals & finally to bacteria, fungi etc. to return it to atmosphere through decomposition-



CBSE Class 12 Biology
Important Questions
Chapter 15
Biodiversity and Conservation

1 Marks Questions

1. Habitat loss and fragmentation has caused severe damage to a particular type of ecosystem. Name it.

Ans. Tropical Rain Forest.

2. What trend is observed in respect of species diversity when we move from equator to poles?

Ans. In general, species diversity decreases as we move away from the equator towards poles.

3. Which region is considered as the one with highest biodiversity on earth? What is the name given to such region. forests?

Ans. Amazonian rain forests. They are also called the ‘Lungs of the planet’.

4. Ecologists have discovered that value of Z lies in range of 0.1 to 0.2 regardless of taxonomic group or region. When will the slope of line steeper in species area relationship?

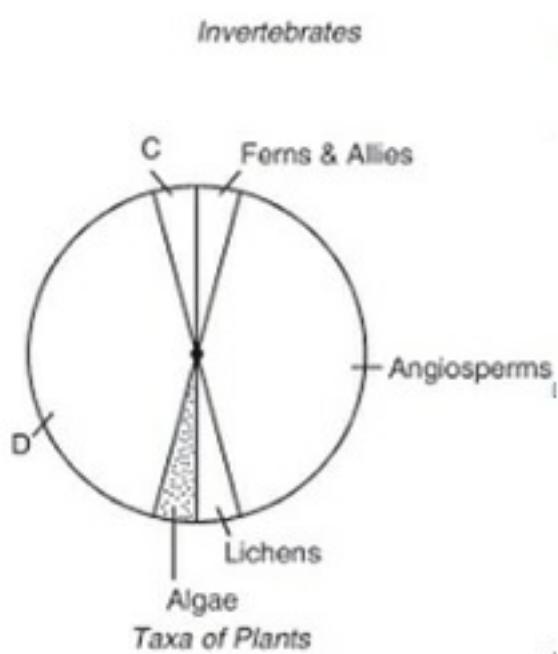
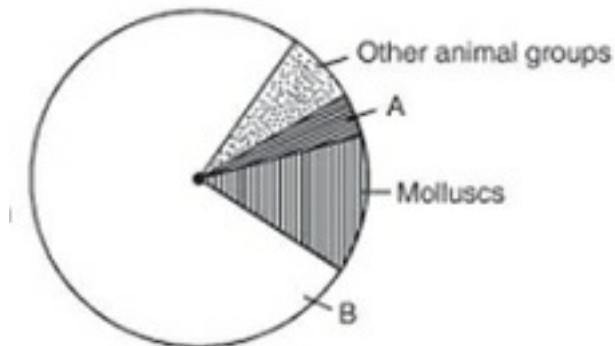
Ans. Slope of line is much steeper if one analyses the species; Varea relationship among very large areas like entire continents.

5. Define cryopreservation. Why is it useful in conserving biodiversity?

Ans. Preserving a material in liquid nitrogen at – 196°C. It can be done to preserve threatened species in viable and fertile condition for long period.

6. What is the reason for genetic variation shown by medicinal plant Rauwolfiavomitoria?

Ans. Genetic variation might be in terms of potency and concentration of the active chemical reserpine produced by plant.



7. Expand i) IUCN -

ii) MAB –

Ans. i) IUCN – International union of conservation of mature & natural resources

ii) MAB – man & biosphere programme.

8. What are hot spots?

Ans. Hot spots are the priority areas of conservation that are extremely rich in species have high endemism & under constant threat of extinction.

9. Name any two threatened animal species of India?

Ans. Swamp Deer & Great Indian Rhinoceros

10. Name two most biodiversity rich zones of India?

Ans. Western Ghats & eastern Himalayas. [1]

11. Expand : i) – WWF

ii) - IBWL

Ans. i) WWF – World wildlife fund

ii) IBWL – Indian Board of wild life.

12. What is cryopreservation?

Ans. Cryopreservation is the storage of materials at ultra – low temperature either by rapid cooling or by grade cooling & simultaneous dehydration at low temp.

13. Write the scientific name of the plant that yields reserpine?

Ans. Rauwolfia serpentina.

14. Name any two conventional methods of ex-situ conservation?

Ans. Botanical garden & zoological parks.

15. What do you mean by “vulnerable species”?

Ans. Species that are believed to move into endangered species category in the near future if the causal factors continue operating are called vulnerable species.

16. Name the national park for Rhinoceros & lion in India respectively?

Ans. Kaziranga national park & Gir National Park respectively.

2 Marks Questions

1. How many species of plants and animals have been described by IUCN in 2004? What is global species diversity according to Robert May?

Ans. IUCN (2004) has described slightly more than 1.5 million species of plants and animals.

According to Robert May's estimates the global species diversity is about 7 million.

2. Explain co-extinction with a suitable example.

Ans. Coextinction refers to the disappearance of species with extinction of another species of plant or animal with which it was associated in an obligatory way. e.g., Plant-pollinator mutualism.

3. Study the pie-diagram and answer the questions which follows :

What do A, B, C and D represent in these diagrams.

Ans. A → Crustaceans B → Insects

C → Mosses D → Fungi

4.What is IUCN red list? Give any two uses of this list?

Ans. IUCN (International union of conservation of nature & natural resources) maintains a “Red data list” which is a catalogue of taxa facing risk of extinction. The main purpose of this list:-

- i) to identify & document the species with high risk of extinction.
- ii) to provide awareness to the degree of threat to biodiversity.

5.“Species diversity of plants is much less than that of animals” Why?

Ans. The species diversity of plants is much less than that of animals because most animals possesses nervous system that control & coordinate various activities of animals. They also possess receptors to receive environmental stimuli some of these responses are adaptive & ensure survival of organism in changing environmental conditions.

6.What is the difference between in-situ & ex-situ conservation?

Ans.

| In-situ conservation | | Ex-situ conservation | |
|----------------------|---|----------------------|--|
| i). | It is the process of protecting the species in its natural habitat by protecting or cleaning up the habitat | i). | It is the process of protecting the species lay removing it from unsafe habitat & placing under car. |
| ii). | It helps in recovering population in the surroundings. | ii). | It help in recovering population under simulated conditions |
| iii). | eg. National park, Biosphere reserves. | iii). | eg. Botanical garden Gene bank. |

7.“Amazonian rain forest in south America has the greatest bio-diversity on earth”.

Justify the statement.

Ans. Amazonian rain forest in south America has the greatest biodiversity on earth; it harbors about 40000 species of plants, 1,25,000 species of insects, 3000 species of fishes, 427 of amphibians, 378 of reptiles, 1300 of birds & 427 of mammals.

8.Sometimes introduction of an exotic species upsets native species of the ecosystem.

Substantiate the statement with the help of an example?

Ans. The alien species become invasive & compete with native species causing extinction of indigenous species e.g. introduction of African catfish (*Clarias gariepinus*) for aquaculture purposes, is posing threat to our Indigenous catfish, (*Clarias baterachus*).

9.What do you mean by species diversity? Name two measures of species diversity?

Ans. Species diversity refers to the variety of species within a region. The two important measures of species diversity are:-

- i) Species richness:- It refers to number of species per unit area.
 - ii) Species evenness :- It refers to relative abundance with which each species is represented in an area.
-

10.What are sacred grooves? What is their role in conservation?

Ans. Sacred groves are sacred forest patches around the places of worship. Tribal people do not allow to cut even a single branch of tree in these sacred groves due to which many endemic species flourish in these regions.

11.What do you mean by IPR. What are the drawbacks of IPR.

Ans. IPR refers to Intellectual property rights, under which transformed plants, animals or microorganisms can be patented & become exclusive private property.

Drawbacks of IPR:-

- i) Increase in price of seeds
- ii) Greater domination of agriculture by multinational companies.
- iii) Slower diffusion of new varieties
- iv) Replacement of local varieties by exotic varieties.

12. Which type of conservation measures – in situ or ex-situ will help the larger number of species to survive? Explain.

Ans. In-situ conservation will help the larger number of species to survive because it provides natural environment for growth & development of species.

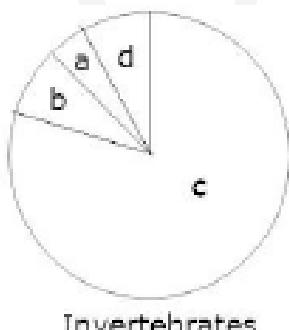
13. What is Biodiversity? Why has it become important recently?

Ans. Biodiversity means the variability among living organisms from all sources including inter alia terrestrial, marine & other aquatic ecosystem & ecological complexes of which, they are parts, this includes diversity within species, between species & of ecosystem. In modern times, industrialization, civilization, urbanization has developed to large scale use of different species of plants & animals as a result of which life of several species of organism has been endangered thus, Biodiversity has become so important in recent times.

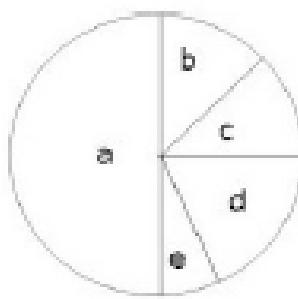
14. List the important attributes of a stable community?

- Ans.**
- i) It shall not show too much of variations in the year – to – year productivity.
 - ii) It must be either resistant or resilient to seasonal disturbances.
 - iii) It must be resistant to invasion by alien species.

15. Given below are the representation of global diversity of invertebrates & vertebrates.



Invertebrates



Vertebrates

Mention the class of organism which belongs to each group in this representation.

Ans.

| | Invertebrates | | Vertebrates |
|----|---------------------|----|-------------|
| a- | Crustaceans | a- | Fishes |
| b- | Molluscs | b- | Mammals |
| c- | Insects | c- | Birds |
| d- | Other animal groups | d- | Reptiles |
| | | e- | Amphibians |

16. Give reason why is it difficult to estimate global diversity for prokaryotes?

Ans. It is difficult to estimate climate diversity of prokaryotes because :-

- i) Conventional taxonomic methods are not suitable for identifying microbial species.
- ii) Many of these species cannot be cultured under laboratory conditions.
- iii) Biochemical & molecular biology techniques would put their diversity into millions.

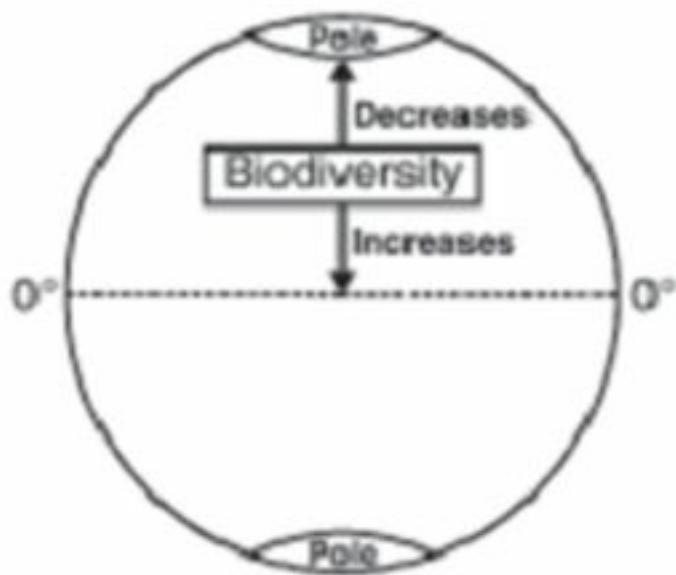
3 Marks Questions

1. Hot spots are the regions of exceptionally high biodiversity . But they have become regions of accidental habitat loss too. Name the three hot spots of our country. Why are they called 'Hot spot'?

Ans. Western Ghats and Sri Lanka; Indo-Burma; Himalaya called 'biodiversity hot spots' as they show

- (i) High level of species richness
- (ii) High degree of

2. Study the diagram of the earth given below . Give the name of the pattern of biodiversity therein. Suggest any two reasons for this type of occurrence.



Ans. Latitudinal gradients

- (i) More solar energy available in tropics, more productivity.
- (ii) Tropical environments are less seasonal, so more predictable.

3. What is so special about tropics that might account for their greater biological diversity?

Ans.a) Speciation is a function of time, unlike temperate regions subjected to frequent glaciations in the past, tropical latitudes have remained relatively undisturbed for millions of years and thus had long evolutionary time for species diversification

- b) Tropical environments are less seasonal, more constant and predictable
- c) More solar energy available in the tropics contributing to high productivity leading to greater diversity .

4.What do you mean by biodiversity? What are the different types of Biodiversity?

Ans. Biodiversity can be defined as the totality of genes species & ecosystem of a given region.

Three important components of Biodiversity are:-

- i) Genetic Biodiversity:- It refers to the diversity of genes within a species, Greater the genetic diversity among organisms of a species. More sustenance it has against environmental perturbations whereas genetically uniform populations are highly prone to diseases or harsh environment
- ii) Species Biodiversity:- It refers to variety of species within a region. It has two important measures :-
 - a) Species richness:- i.e. number of species per unit area.
 - b) Species evenness:- i.e. abundance with which each species is represented in an area.
- iii) Ecosystem Biodiversity:- It refers to variation of habitats, community types & abiotic environment present in an area. It is further of three types:-
 - a) α - diversity- It refers to number of species in a given community.
 - b) β - diversity – biodiversity which appears in range of communities due to replacement of species with change in community is called β - diversity.
 - c) γ - diversity – It refers to diversity of habitats over the total geographical area.

5.What do you mean by latitudinal gradient? What could be the possible reasons for diversity between tropic & temperate region?

Ans. Latitudinal gradient in diversity means that species diversity usually decreases as we move away from equator towards the poles, Tropic area of latitudinal range 23.50°C harbor more species than temperate or polar area. Three hypothesis have been proposed to explain this difference:-

- i) Speciation is a function of time, which temperate regions were subjected to frequent glaciations in the past, the tropics have remained unchanged & hence evolved more species diversity.
- ii) As compared to temperate region, tropical environments are less seasonal, relatively more constant & predictable; such constant environment promotes niche specialization & greater species diversity.
- iii) There is more solar radiation available in tropical regions, this contributes directly to greater productivity & indirectly to greater species diversity.

6. Why is it necessary to conserve biodiversity?

Ans. The reasons for conserving biodiversity can be grouped into three categories.

- i) Narrow utilitarian reasons:- Human beings derive a number of economic benefits like food, fibre, firewood, industrial products & medicinal products.
- ii) Broad utilitarian reasons:- Biodiversity plays a major role in providing ecosystem services like :-
 - a) production of oxygen
 - b) Pollination of flowers, without which seeds or fruits are not produced.
 - c) Aesthetic pleasures like bird watching, watching spring flowers, walking through thick forest, listening to bulbul's song etc.
- iii) Ethical reasons :- Every species has an intrinsic value even if it is not of any economic value to us - we have a moral duty to care for their well-being & pass on the biological legacy in a proper form to our future generation.

7.What is the relation between species richness & area? What is the significance of slope of regression?

Ans.Alexander Von Humboldt has observed that within a region, species richness increased with increase explored area but only upto a limit thus the relationship between species richness & area for a number of taxa is found to be a rectangular hyperbola. On a log scale, the relationship becomes linear & is described by equation

$$\text{Log } S = \log C + Z \log A$$

The values of slope of regression are identical regardless of the taxonomic group or the region. When such analysis is made among very large areas, the slope of regression would be much steeper.

8.What are the different approaches for biodiversity conservation in India?

Ans.There are two major approaches for conservation of biodiversity:-

i) In-situ conservation :- It is the process of protecting the endangered species of plant or animal in their natural habitat by either protecting or cleaning up the habitat or by defending species from predators. It includes:-

a) Biosphere Reserves:- There are 425 biosphere reserves in the world of which 14 are in India. Hotspots have been identified for maximum protection to endemic or endangered species.

b) National parks or wildlife Sanctuaries:- India has about 90 national parks & 448 wildlife sanctuaries.

c) Sacred forests:- These are undisturbed forests without any human intervention & are surrounded by highly degraded landscapes.

ii) Ex- situ Conservation:- It is the process of protecting the endangered species of plants or animals by removing it from threatened habitat & placing them under care of humans. It includes :-

- a) Botanical garden, zoological park and arboreta are conventional methods of ex-situ conservation
 - b) Cryopreservation to the storage of materials at ultra low temperature either by rapid cooling or by gradual cooling & simultaneous dehydration at low temperature.
-

9.Give an account of Biodiversity in India?

Ans. India is one of the 10th mega biodiversity countries of the world because of the presence of variety of climatic conditions prevailing on different ecological habitat ranging from tropical, subtropical, temperate. So far as biodiversity of India is concerned, it comprises about 47,000 plants & 81,000 animal species. India occupies 2-4% of total land area of world but in terms of biodiversity, India contributes about 10-35% of global diversity.

A large number of species is native of India. About 5000 species of flowering plants belonging to 141 genera & 47 families had a birth in India. There are 62% of amphibian species & 50% of lizards endemic to our country with large number in Western Ghats. India is an origin place of 166 species of crop plants & 320 species of wild relatives of cultivated crop. India is rich in marine biodiversity lying along coastline of 7500 km. There are two hotspots located in India out of 25 in world – These are Western Ghats & Eastern Himalayas.

10.What is the significance of Biodiversity to Human beings?

Ans. Biodiversity provide numerous direct or indirect services to human beings. These are-

- i) Source of food & improved varieties:- Biodiversity directly or indirectly adds as the source of food, cloth & shelter.
- ii) Fats & Oils:- A variety of plants are used to extract different kinds of oils.

- iii) Fibres:- A variety of plants eg. cotton, hemp, jute are chief sources of fibres.
- iv) Resins:- Resins are sticky exudation of plants.
- v) Gums, Timber, Paper, Tannins, Dyes:- Plants species provide variety of useful products eg. gums, raisins, dyes, similarly animal species provide leather, fur, honey, silk, pearl etc.
- vi) Drugs & Medicines:- Hiving organism also contain number of therapeutically useful substances.
- vii) Stability of Ecosystem:- The food web, food chain energy flow in various tropic level & biochemicalcycles occurs in natural ways without any hindrance if there is proper availability of diversified species
- viii) Aesthetic, Scientific & Recreational values :- Indian people grow many plants because they regard them as sacred.

5 Marks Questions

1. Why is the sobriquet ‘The Evil Quartet’ used in context of biodiversity? Name the members of this quartet. Why do we grieve for the genes when a species is lost?

Ans. The ‘Evil Quartet’ is used as a sobriquet to refer to the cause of loss of biodiversity :

- (i) Habitat loss and fragmentation :When large habitats are broken up into smaller fragments due to various human activities, the animals requiring large territories (elephants, birds etc.) are badly affected and their populations decline.
- (ii) Over-exploitation :When need of a resource becomes greed. e.g., over exploitation of passenger pigeon led to its extinction. Also marine fish is at brink of being endangered due to over exploitations.
- (iii) Alien species invasion :Intentional or non-Intentional introduction of a species to a nearby area may disturb the harmony of existing species. e.g., Eichhornia after introduction posed a big threat to the native species.
- (iv) Co-extinction :Extinction of one species invariably leads to extinction of another when they are associated with each other in an obligatory way . e.g., when host species is extinct, obligate parasites dependent on it also die.
- (v) We grieve for the loss of genes, because the wild forms are hardy and more resistant to pathogen attack and can be beneficial in crop breeding programmes.

2. Describe at least two approaches each for ex-situ conservation and in situ conservation as a strategy for biodiversity conservation.

Ans. In situ conservation :

- (i) Identification and maximum protection of 'hot spots'
- (ii) Legal protection to ecologically rich areas.
- (iii) Biosphere reserves, national parks and sanctuaries
- (iv) Sacred groves.

Ex situ Conservation :

- (i) Creation of zoological parks, botanical garden, wild life sanctuary
 - (ii) Cryopreservation
 - (iii) Seed bank.
-

3.Mention the major causes for loss of biodiversity?

Ans.The four major causes for loss of Biodiversity are :-

- i) Habitat loss & fragmentation of crops or conversion into grassland for raising beef-cattle.
Total loss of habitat deprives many plants & animals their home & they face extinction.
Similarly when a large habitat becomes fragmented, animals requiring large territory & those with migratory habits are adversely affected.
- ii) Over exploitation :- when nature is over-exploited by man for natural resources, many species become extinct.
- iii) Invasion of alien species:- The alien species became invasive & compete with native species & cause extinction of indigenous species.
- iv) Co-extinction:- Co-extinction is a phenomenon in which when a species become extinct, the plant & animal species associated with it in an obligatory manner & become extinct

CBSE Class 12 Biology
Important Questions
Chapter 16
Environmental Issues

5 Marks Questions

1. Pollutant released due to human activities (like effluents from industries and homes) can radically accelerate the ageing process of the water body .

(a) Explain how does this process occurs during natural ageing of lake.

(b) Give the term used for accelerated ageing of water bodies. Also give the term used for the natural ageing of lake.

Ans. (a) The phenomenon is eutrophication. More nutrients in water , aquatic life increases organic remains deposited on lake bottom, lake grows shallower and warmer, gradually transforms into land due to deposition of silt and organic debris.

(b) Cultural or Accelerated eutrophication Natural ageing is Eutrophication.

2. In Arcata, the town's people have created an integrated waste water treatment process within a natural system. A citizen group called FOAM helps in upkeep of this project.

(a) What are the main steps in waste water management done in this way?

(b) 'Ecosan' in Kerala and Sri Lanka is also an initiative for water conservation. How?

Ans. (a) Conventional sedimentation, filtering and chlorine treatment. Absorption and assimilation of pollutants by algae fungi and bacteria.

(b) 'Ecosan' derived from ecological sanitation. Handling human excreta using dry composting toilets. Its practical, hygienic and cost effective method.

3. What are the contribution of Ahmed Khan in Bangalore and Ramesh Chandra Dagar

in Sonipat?

Ans. Integrated organic farming is a cyclical, zero-waste procedure, where waste products from one process are cycled in as nutrients for other processes. This allows the maximum utilisation of resource and increases the efficiency of production. Ramesh Chandra Dagar , a farmer in Sonipat, Haryana, is doing just this. He includes bee-keeping, dairy management, water harvesting, composting and agriculture in a chain of processes, which support each other and allow an extremely economical and sustainable venture. There is no need to use chemical fertilisers for crops, as cattle excreta (dung) are used as manure. Crop waste is used to create compost, which can be used as a natural fertiliser or can be used to generate natural gas for satisfying the energy needs of the farm. Enthusiastic about spreading information and help on the practice of integrated organic farming, Dagar has created the Haryana Kisan WelfareClub, with a current membership of 5000 farmers.

4.i) What is meant by ozone shield?

ii) Name two ozone depleting substances?

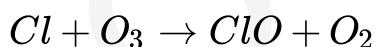
iii) How do ozone depleting substances affect ozone shield?

iv) Write one damaging effect of ozone – depletion on human & plants respectively?

Ans.i) The ozone layer present in the atmosphere acts as an ultraviolet absorbent thus protecting the earth from its harmful effect. The upper layer of atmosphere enveloped by ozone is called ozone layer or ozone shield.

ii) Chlorofluorocarbon used in aerosol propellant, fire extinguisher, refrigeration etc.

iii) During depletion, the chlorine, fluorine, bromine, of CFCs & halogens are converted into reactive free radical form by photochemical reaction Cl or F are free to react with ozone disintegrating it into $O_2 + O$



iv) In humans, it causes damage to DNA & mutations arise & also cause ageing of skin, damage to skin & skin cancer. In plants, it causes injury, premature death of plants & reduced growth & yield.