Solution

BIOLOGY

Class 12 - Biology

Section A

1.

(c) Parthenocarpy

Explanation:

Parthenocarpy

2.

(d) Vitamin- B_{12}

Explanation:

Vitamin- B_{12}

3. **(a)** Temporal segregation of breeding season.

Explanation:

Temporal segregation of breeding season.

4.

(b) comparing the size of the DNA fragment.

Explanation:

A molecular-weight size marker also referred to as a protein ladder, DNA ladder, or RNA ladder is a set of standards that are used to identify the approximate size of a molecule run on a gel during electrophoresis, using the principle that molecular weight is inversely proportional to migration rate through a gel matrix. Therefore, when used in gel electrophoresis, markers effectively provide a logarithmic scale by which to estimate the size of the other fragments (providing the fragment sizes of the marker are known).

5. **(a)** 34

Explanation:

34

6.

(d) External opening of the urinogenital duct

Explanation:

The urethra originates from the urinary bladder and extends through the penis to its external opening called the urethral meatus.

7.

(c) Biopiracy

Explanation:

Exploiting biological resources of other nation without proper authorization from the country or people concerned without compensatory payment is called biopiracy.

8.

(b) Released polypeptide chain

Explanation:

The figure shown above represents the translation process in which protein is produced. Ribosome provides the site for protein synthesis and t-RNA brings the amino acids. The ‘x’ is the polypeptide chain produced.

9.

(c) Cleistogamous

Explanation:

Some flowers do not open at all. Self-pollination is the only means of pollination in these flowers. These flowers are called Cleistogamous flower. The other flowers that open for pollination are called Chasmogomous flowers.

10. **(a)** X-linked recessive transmission
Explanation:
X-linked recessive transmission

11. **(c)** Thymine and Cytosine
Explanation:
Thymine and Cytosine

12. **(c)** B - denaturation at a temperature of about 98^{o}C separating the two DNA strands.
Explanation:
B - denaturation at a temperature of about 98^{o}C separating the two DNA strands.

13. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
In diploid cells, both chromosomes and genes occur in pairs. Two alleles of gene pairs are located on homologous sites on homologous chromosomes.

14. **(a)** Assertion and reason both are correct statements and reason is correct explanation for assertion.
Explanation:
Assertion and reason both are correct statements and reason is correct explanation for assertion.

15. **(d)** A is false but R is true.
Explanation:
In some RNA viruses (e.g. TMV, influenza, Mumps), the viral genome after entering host cell produces an enzyme called replicase. With the help of replicase the RNA genome synthesizes more RNA genomes directly without DNA formation. However, in retroviruses (RNA-DNA virus, Tumor or cancer viruses), the RNA forms single stranded copy of DNA with the help of reverse transcriptase. Reverse transcriptase has modified central dogma, i.e., DNA $\rightleftharpoons$ RNA $\rightarrow$ protein.

16. **(c)** A is true but R is false.
Explanation:
A is true but R is false.

Section B

17.
- Fats (lipids) are one of the three major food groups needed for proper nutrition. Lipase is the digestive enzyme needed to digest fat. Lipase is an enzyme that hydrolyzes lipids, the ester bonds in triglycerides, to form fatty acids and glycerol. Lipases are added in detergents for removing oily stains.Lipase is capable of removing fatty stains such as fats, butter, salad oil, sauces and the tough stains on collars and cuffs.
- Streptokinase is used as clot buster to dissolve blood clots that have formed in the blood vessels. It is used immediately after symptoms of a heart attack occur to improve patient survival. This medicine may also be used to treat blood clots in the lungs (pulmonary embolism) and in the legs (deep venous thrombosis)

18. The unlabelled areas are:

a. Fishes
b. Amphibians

19. (A) - Plasmid, (B) - Nucleoid
Plasmid is used as vector to transfer the gene of interest in the host cell.

20. 1. A-Spermatogonia,
B-Interstitial cells

C-Spermatozoa.

2. A-Spermatogonia produces a spermatogonium (plural: spermatogonia) is an undifferentiated male germ cell. Spermatogonia undergo spermatogenesis to form mature spermatozoa in the seminiferous tubules of the testes.

   D-Sertoli cells provide nutrition to sperms.

21. In genetic drift, when in a section of the migrated population the change in allele frequency is so different that they become a new species, the original drifted population becomes founders and the effect is called founder's effect.

OR

The example of commensalism is a bird making a nest in a tree. The tree provides shelter and protection to the bird without getting significantly harmed or affected by the bird. Another example of commensalism is the cattle egrets (birds) that feed upon the insects stirred up by the feeding cattle.

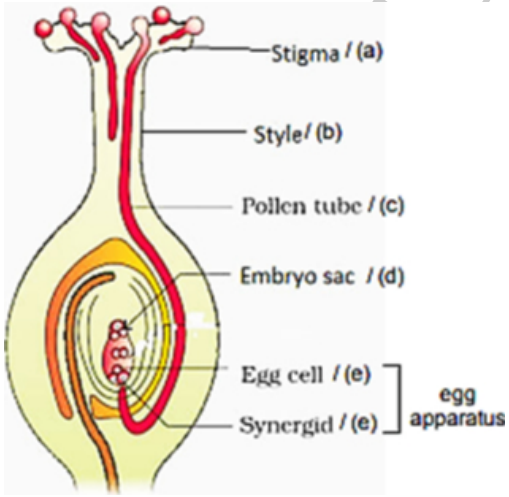
Section C

22. The nutrients present in the soil are absorbed by the plants. They are metabolised both by plants and animals. Some of the nutrients are lost by overcropping, use of high yielding varieties, precipitation due to change in pH, leaching and others are washed away along with surface runaway water. Nitrogen is one of the main nutrients that are most often limiting in the soil because it is fixed in the soil by various microorganisms. Therefore, it is essential to restore these nutrients by adding farmyard manure or by green manuring or addition of artificial fertilisers. The use of artificial methods for maintaining soil fertility is because the natural restoration of mineral fertility is a slow process and takes a long time. Moreover, by this method, higher quantity requirement of minerals by high yielding varieties cannot be met/fulfilled.

23. i. **X-Testis:** It is located outside the abdominal cavity within a pouch called scortum.
    ii. **Y-Seminal vesicle:** It produces an alkaline secretion constituting 60% of the volume of the semen.
    iii. **Z-Epididymis:** It stores the sperms and secretes a fluid which nourishes the sperms.

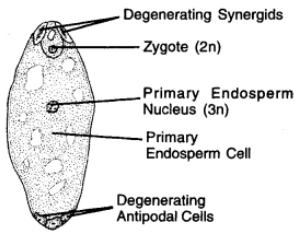
24. The sickle cell anemia is controlled by a single pair of allele; HbA and HbS. If both the parents are heterozygous (HbAHbS) then the offspring can suffer from this disease. The offspring should be homozygous (HbSHbS). Heterozygous individuals are carriers of this of this disease. Heterozygous individuals are advantageous in terms of adaptation. Due to this, sickle cell anemia is persisting in human population.

25. a. Species richness increased with increasing explored area up to a limit.
    b. S = Species richness
    Z = Slope of the line /regression coefficient
    A = Area
    C = Y-intercept

26. 

OR

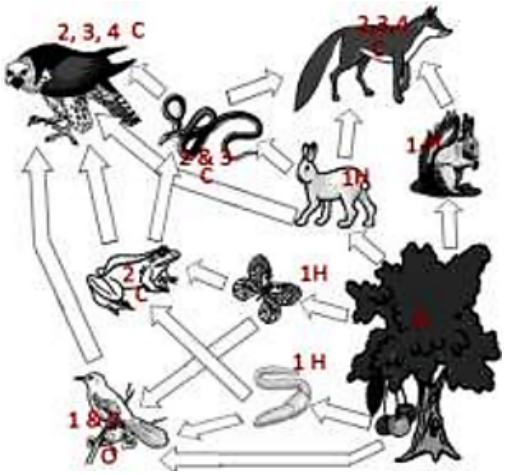
i. Diagram showing Embryo sac after Double fertilization



ii. Seed formation in angiosperms offers many advantages such as:

a. Helps to perennate during unfavourable conditions.
b. Remains viable for several years by reducing their rate of metabolic activities this is known as dormancy.
c. Seeds (in fruits) possess special structures for dispersal, thus helping in introducing the species into new areas.
d. Due to low water contents, seeds can be stored for consumption by animals and man.
e. Seed banks have been established for genetic conservation of plants.
f. Their formation is independent of water.
g. During their production there is scope of variation.

27. i. Yes. He protected the snake from being caught or killed by the snake charmer for his own selfish interest. Jazman showed values such as scientific attitude, kindness, obligation to maintain the biodiversity of nature.
ii. Snake is an important member in the food chain and food web.
iii. 2 & 3



28. The function of the ovum and sperm is done outside the woman's body to form a zygote under stimulated conditions in the laboratory. The zygote is then allowed to divide to form embryo. The embryo is then implanted in uterus where it develops into a foetus, which in turn develops into a child. A baby produced by this technique is called test tube baby.

Section D

29. a.
- hnRNA/ heterogeneous nuclear RNA
- RNA polymerase II

b. hnRNA undergo capping at 5' end (methyl guanosine triphosphate/mGppp), and tailing at 3' end (with poly A tail or adenylate residue), further splicing is carried out, where non coding sequences or introns are removed and coding sequence or exons are joined together/diagrammatic representation with given markers can also be considered.

c.
- In prokaryotes- 1
- In eukaryotes- 3

OR

The main difference in the site of transcription in a prokaryote and eukaryote cell is that transcription in prokaryotes occurs in the cytoplasm, while transcription in eukaryotes occurs in the nucleus.

30. i. Mammary gland
ii. Short oestrus cycle.
iii. a. All of these Identification and separation of desired gene.
b. Combining the desired gene with appropriate vector.
c. Introduction of vector in cells, tissues or embryos.

OR

(a) Both A and R are true and R is the correct explanation of A.

Section E

31.
- **Experiment:** S.L. Miller, in 1953, created electric discharge in a closed flask containing CH_4, H_2, NH_3 and water vapour at 800°C and observed the formation of amino acids.
- **Contribution towards the origin of life on earth:**

i. In similar experiments, others observed the formation of sugars, nitrogen bases, pigment, and fats and analysis of meteorite content also revealed similar compounds indicating that similar processes are occurring elsewhere in space.
ii. Hence, with his contribution, chemical evolution i.e., the formation of diverse organic molecules from inorganic constituents was more or less accepted.

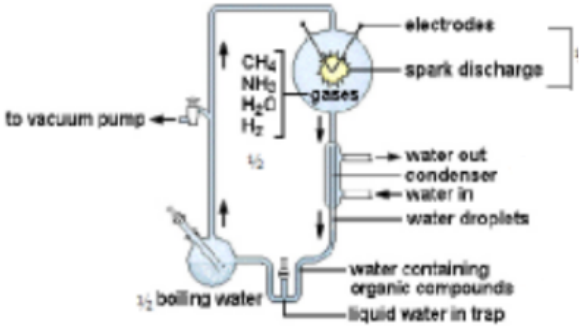
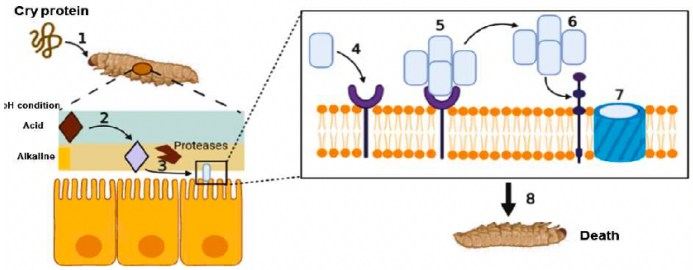


Fig: Diagrammatic representation of Miller's experiment

OR

A study was conducted on moths in England in 1850s before and after the industrialization. It was observed that there were more white-winged peppered moths on trees than dark wings or melanized moths before industrialization. The reason was that the white moths could hide among the similarly colored lichens on the trees. However, after industrialization, there were more dark-winged moths in the same area i.e. the proportion was reversed. The reason for this observation was the pollution and industrial smoke which darkened the tree trunks resulting in the disappearance of lichens. Under these conditions, the white-winged moths became conspicuous and were consumed in more numbers by the predators while the dark-winged or melanized moths survived. Hence, the moths able to camouflage themselves i.e., hide in the background, survived and thus were selected by the nature.

32. 

- Cry proteins refer to the protein crystals containing a toxic insecticide.
- It is produced by a soil bacterium, Bacillus thuringiensis
- The genes encoding cry proteins called Bt toxin genes were isolated from B. thuringiensis and incorporated into several crop plants such as Bt cotton, Bt corn etc. to provide resistance against insect pests.

OR

a. Cotton bollworm is the insect that attacks cotton crops and causes a lot of damage to the crop.
   The Bt cotton crop is resistant to bollworm due to the presence of the cry gene in its genome. This gene produces a toxin that kills the bollworm.
b. Cry I Ab is one of the most studied insecticidal proteins produced by Bacillus thuringiensis during sporulation. This toxic effect of the separate protoxin domains was found against its original host B. Thuringiensis, as well as to two other bacteria, Escherichia coli, and Agrobacterium tumefaciens.
   The Bt toxin is encoded by a gene named cry. The protein encodes by cry **I Ab** control corn borers.

33. Overcrowded human settlements are usually unhygienic because of overload on the infrastructure and on hygiene workers. Let us compare two situations to understand this. A person has a bathroom for his exclusive use. He can easily maintain a high level of cleanliness in his bathroom. Another person has to share a bathroom with fifty other people. Maintaining a good hygiene level in such a bathroom would be almost impossible. This will lead to higher risk of getting communicable diseases. Even a simple disease like common cold has more chances of spreading to many people in overcrowded places because the germs would be able to infect more number of people in shorter time span.

OR

i. The chemical name of samck is Diacetylmorphine
   The consumption of samck is considered as abuse because as it is highly addictive, and being a depressant it slows down body functions.

ii. I. Cannabis sativa, affects the cardiovascular system of the body.
   II. Erythroxylum coca/coca plant, interferes with the transport of neurotransmitter dopamine/produces sense of euphoria/increased energy.
   III. Papaver somniferum, acts as depressant/slows down body function/ reduces pain/sedative.