

Board of Secondary Education Rajasthan, Ajmer
Practice Question Paper Sr. Secondary Examination-2022

SUBJECT: BIOLOGY

CLASS-XII

SOLUTION

1. MCQ

- (i) (C) Cow
- (ii) (B) Male gametophyte
- (iii) (B) 14
- (iv) (A) Watson and Crick
- (v) (C) Typhoid
- (vi) (C) Fungi
- (vii) (D) Restriction endonuclease
- (viii) (A) Hirudin
- (ix) (C) Hinny

2. Fill in the blanks.

- (i) lysine, tryptophan
- (ii) $x = 2.4\%$, $y = 8.1\%$
- (iii) 2%
- (iv) $x = \text{gm/m}^2$, $y = \text{gm/m}^2/\text{yr}$

3. (i) Pachytene phase of Meiosis-I

- (ii) 3.3×10^9 base pairs
- (iii) Macrophages cells, Helper T-lymphocytes
- (iv) Himgiri variety
- (v) Eco RI, Hind III
- (vi) *Bacillus thuringiensis*
- (vii) (a) In cactus the leaves are transformed into spines or reduced in size, so transpiration is minimised.
(b) Provide defense against grazing animals.

(viii) Genetic diversity

4. 12 weeks or three months.

5. After birth a period of about 6 months is the period of breast feeding to child. During this phase menstruation and ovulation do not occur or remain suspended.

6. Inbreeding reduces fertility and even productivity, it is called inbreeding depression.

To overcome this problem, the selected animals of the breeding population should be mated with unrelated superior animals of the same breed.

7. Two uses of LAB are as following:

- (i) Curdling of milk.
- (ii) Increase B₁₂ quantity

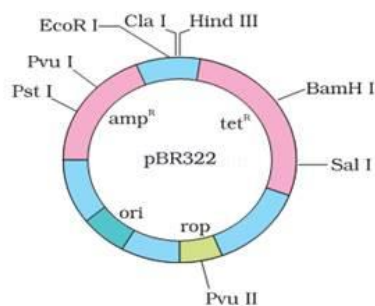
8. (i) Identify all the approximately 20,000-25,000 genes in human DNA.

(ii) Determine the sequences of the 3 billion chemical base pairs that make up human DNA.

(iii) Store this information in databases.

(iv) Improve tools for data analysis.

9. The following is the diagram of pBR322.



10. **Genetically modified organisms (GMO) :-** These are plants, bacteria, fungi, and animals whose genes have been altered by manipulation.

Significance of GM plants :

- (i) Made crops more tolerant to abiotic stresses (cold, drought, salt, heat).
- (ii) Reduced reliance on chemical pesticides (pest-resistant crops).
- (iii) Helped to reduce post harvest losses.
- (iv) Increased efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soil).
- (v) Enhanced nutritional value of food, e.g., golden rice, i.e., Vitamin 'A' enriched rice.

11. (i) Human protein α -1-antitrypsin used to treat emphysema.

(ii) The first transgenic cow, Rosie, produced human protein-enriched milk (2.4 grams per litre).

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

12. The pioneer community in xeric condition is Lichens

The pioneer community in hydrarch condition is phytoplanktons.

13. (i) Pyramid of Numbers (ii) Pyramid of Biomass (iii) Pyramid of Energy

E.g. Tree ecosystem.

14. The rivets of wings of airplane are compared with the main species of ecosystem. As the loss of rivets on the wings causes serious threat to flight safety of airplane. Similarly the loss of main species may cause serious threat to the safety of ecosystem.
15. Causes of biodiversity losses
- (i) Habitat loss and fragmentation (ii) Over-exploitation
 (iii) Alien species invasions (iv) Co-extinctions
16. Syngamy occurs inside the body of the organism, hence the process is called internal fertilisation.

Asexual reprouction	Sexual reprouction
1. It is always uniparental and does not involve gamete formation.	1. It is generally biparental and always involves the formation and fusion of gametes..
2. It involves only mitotic cell divison.	2. It involves only meitotic cell divison during gamete formation.

OR

The female gamete undergoes development to form new organisms without fertilisation. This phenomenon is called parthenogenesis.

Example :- Rotifers, Honeybees and even some Lizards and Birds (Turkey) etc.

Oviparous	Viviparous
1. The animals in which development of young one outside the female parent are called oviparous.	1. The animals in which the development of zygote into a young one takes place inside the body of the female parent, are called viviparous.
2. They zygote takes lay fertilised eggs covered with hard calcareous shell in a safe place in the environment, e.g. reptiles and birds.	2. After attaining a certain stage of growth, the young ones are delivered out of the body of the female organism, e.g. most of mammals.

17. **Klinefelter’s Syndrome:** This genetic disorder is caused due to the presence of an additional copy of X chromosome resulting into a karyotype is 44 +XXY or 47.

Symptoms:

- (i) Such an individual has overall masculine development, however, the feminine development (development of breast, i.e., Gynaecomastia) is also expressed
 (ii) Such individuals are sterile.

OR

Turner’s Syndrome: Such a disorder is caused due to the absence of one of the X chromosomes, i.e., 45 with XO

Symptoms:

- (i) Such females are sterile as ovaries are rudimentary besides other features including
 (ii) Lack of other secondary sexual characters.

18. AIDS is caused by the Human Immuno deficiency Virus (HIV), a member of a group of viruses called retrovirus.
- Making blood (from blood banks) safe from HIV,
 - Use of only disposable needles and syringes in public and private hospitals and clinics.
 - Free distribution of condoms, advocating safe sex.
 - Controlling drug abuse
 - Promoting regular check-ups for HIV in susceptible populations, are some such steps taken up.

OR

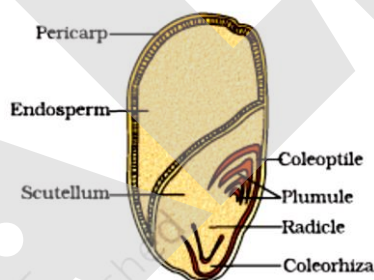
Salmonella typhi is a pathogenic bacterium which causes typhoid fever in human beings.

Symptoms

- Constant high fever (39°C to 40°C)
- Weakness
- Stomach pain
- Loss of appetite
- Constipation
- Headache
- Intestinal perforation and death may occur in severe cases.

Transmit: It is spread by contaminated food and water.

19. After entering one of the synergids, the pollen tube releases the two male gametes into the cytoplasm of the synergid. One of the male gametes moves towards the egg cell and fuses with its nucleus thus completing the syngamy. This results in the formation of a diploid cell, the zygote. The other male gamete moves towards the two polar nuclei located in the central cell and fuses with them to produce a triploid primary endosperm nucleus (PEN). As this involves the fusion of three haploid nuclei it is termed triple fusion. Since two types of fusions, syngamy and triple fusion take place in an embryo sac the phenomenon is termed double fertilisation.

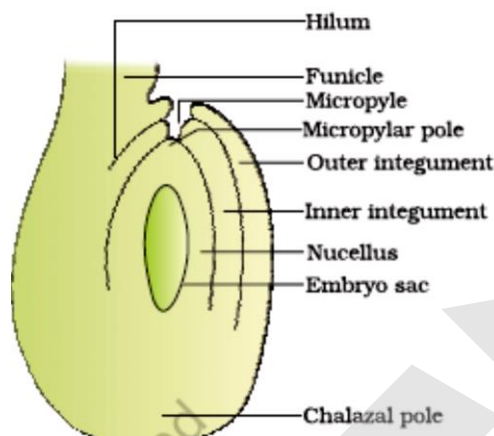


OR

The Megasporangium (Ovule): Let us familiarise ourselves with the structure of a typical angiosperm ovule.

- The ovule is a small structure attached to the placenta by means of a stalk called funicle.
- The body of the ovule fuses with funicle in the region called hilum. Thus, hilum represents the junction between ovule and funicle.
- Each ovule has one or two protective envelopes called integuments.
- Integuments encircle the nucellus except at the tip where a small opening called the micropyle is organised.

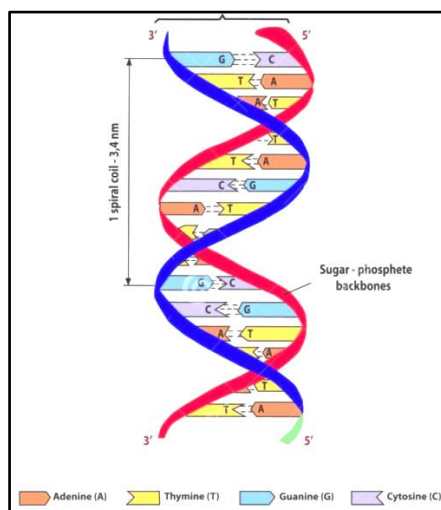
- Opposite the micropylar end, is the chalaza, representing the basal part of the ovule. Enclosed within the integuments is a mass of cells called the nucellus.
- Cells of the nucellus have abundant reserve food materials, it located in the nucellus is the embryo sac or female gametophyte. An ovule generally has a single embryo sac formed from a megaspore.



20. The negatively charged DNA is wrapped around the positively charged histone octamer to form a structure called nucleosome .

The salient features of the Double-helix structure of DNA are as follows:

- It is made of two polynucleotide chains, where the backbone is constituted by sugar phosphate, and the bases project inside.
- The two chains have anti-parallel polarity. It means, if one chain has the polarity 5'–3', the other has 3'–5'.
- The bases in two strands are paired through hydrogen bond (H-bonds) forming base pairs (bp). Adenine forms two hydrogen bonds with Thymine from opposite strand and vice-versa. Similarly, Guanine is bonded with Cytosine with three H-bonds. As a result, always a purine comes opposite to a pyrimidine. This generates approximately uniform distance between the two strands of the helix.
- The two chains are coiled in a right-handed fashion. The pitch of the helix is 3.4 nm and there are roughly 10 bp in each turn. Consequently, the distance between a bp in a helix is approximately 0.34 nm.
- The plane of one base pair stacks over the other in double helix. This, in addition to H-bonds, confers stability of the helical structure.



OR

The semiconservative mode of DNA replication was originally documented through the classic density labeling experiments of Matthew Meselson and Franklin W. Stahl. Their experiment is described below:

- (i) They grew *E. coli* in a medium containing $^{15}\text{NH}_4\text{Cl}$ (^{15}N is the heavy isotope of nitrogen) as the only nitrogen source for many generations. The result was that ^{15}N was incorporated into newly synthesised DNA (as well as other nitrogen containing compounds). This heavy DNA molecule could be distinguished from the normal DNA by centrifugation in a cesium chloride (CsCl) density gradient (Please note that ^{15}N is not a radioactive isotope, and it can be separated from ^{14}N only based on densities).
- (ii) Then they transferred the cells into a medium with normal $^{14}\text{NH}_4\text{Cl}$ and took samples at various definite time intervals as the cells multiplied, and extracted the DNA that remained as double-stranded helices. The various samples were separated independently on CsCl gradients to measure the densities of DNA.

