

CBSE 2019 Sample Question Paper

BIOLOGY

SOLUTION

Section A

1. The transgenic cow Rosie, produced human protein-enriched milk (2.4gm/L). It contained the human α - lactalbumin and was nutritionally more balanced for human babies than natural cow's milk.
2. *Saccharomyces cerevisiae* also, called brewer's yeast is the microbe used for fermenting malted cereals and fruit juices.
3. The meiocyte is a diploid cell and have 24 chromosome. Thus, its haploid chromosome number is 12.
Number of chromosome in endosperm is
 $12 \times 3 = 36$
4. Mobile genetic elements, i.e transposons are the possible source of RNA interference (RNAi) gene.
5. Differences between standing state and standing crop are :

Standing State	Standing Crop
Amount of nutrients such as nitrogen, phosphors, calcium, etc., present in the soil of an ecosystem at a given time	Amount of living biomass available at given trophic level at a given time.'
It is an abiotic component.	It is a biotic component.

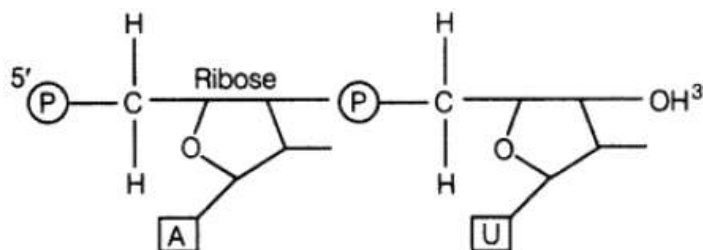


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Section B

6. RNA dinucleotide.



7.

- (i)
 - (a) Conidia – *penicillium*
 - (b) Zoospore – *Chlamydomonas*
- (ii) Similarity between conidia and zoospore is that the both are asexual reproductive structures. The difference between conidia and zoospore is that, the conidia are non-motile while zoospores are motile.

8.

- (i) The signals for parturition originate from the fully developed foetus and the placenta, which induce mild uterine contraction called foetal ejection reflex.
- (ii) Colostrum contains necessary antibodies (IgA) that provide protection against diseases to newborn infants.

9. Palaeontology is the study of past life based on fossil records. The study of fossils reveals the type of lifeforms occurring in the past and highlights the course of evolution of living organisms. The distribution of fossils in the rocks of different ages fully supports the concept of evolution. It shows that wing forms became more and more complex as we proceed from earliest to recent. From the fossil records it has concluded that evolution has taken place from simple to complex in a gradual manner.

10. During vaccination for a particular disease, an antigen or antigenic protein or pathogen which is in inactive form is introduced into the body which induces mild immune response. The vaccine generates antibodies that neutralise the toxin/pathogen and produce memory B or T-cells, which recognise the pathogen in the subsequent encounters and produce antibodies.

Section C

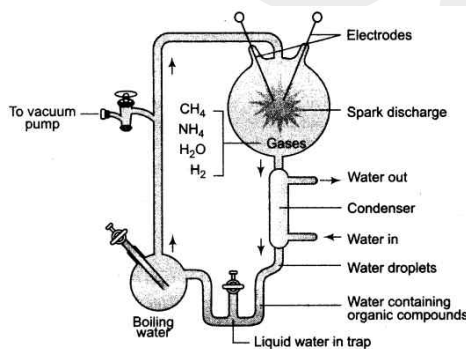
11.

- (i) Discharge of domestic sewage into a river water result in the rise of BOD because decomposers consume a lot of oxygen, If sewage quantity is large, then the dissolved oxygen will be completely consumed thus leaving nothing for aquatic organisms present in water body. However, as sewage is decomposed, there will be gradual rise in dissolved oxygen downstream.
- (ii) With depletion in level of dissolved oxygen, population of fresh water organism (plants and animals) would decline, But as levels of dissolved oxygen would increase, fish and other aquatic organisms reappear indicating the recovery of river from sewage pollution.

12. Comparison between narrowly utilitarian and broadly utilitarian.

Narrowly Utilitarian	Broadly Utilitarian
It includes most of the resources required for our day to life.	It includes most of the ecosystem services provides to us by nature.
Examples, food, Oil clothes, wood and drugs.	Examples, release of O_2 and fixation if CO_2

13. The theory of biogenesis was prosed by Oparin and Haldane. It sates that life could have come from pre-existing non-living organic molecules (e.g. RNA, protein, etc.) and that formation of life of diverse organic molecules from inorganic constituents.



In 1953 Urey and Miller conducted an experiment to prove this theory. They created the conditions of primitive earth-high temperature, volcanic stroms, reducing atmosphere Containing CH_4 NH_3 etc., at laboratory scale. They then stimulated electric discharge in a closed flask containing CH_4 , H_2 , NH_3 etc., at and water vapour at $800^\circ C$. they observed formation amino acids. In similar experiments, others observed formation of sugars, nitrogen bases, pigment and fats. These small organic molecules are the building blocks for proteins and other components. Hence, this experiment supported that life has came from pre-existing non-living organic molecules.


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14.

- (a) **Unambiguous and specific codon** These code for only one amino acid thus, making the genetic code unambiguous and specific, e.g UUU.
- (b) Some amino acid are coded by more than one codon, so the code is degenerate, e.g UUU.
- (c) Codon is nearly universal. some exception to the rule are mitochondrial codon and in some protozoans., e.g UUU
- (d) Initiator codon AUG has dual function. It codes for methionine and also acts as initiator.

15.

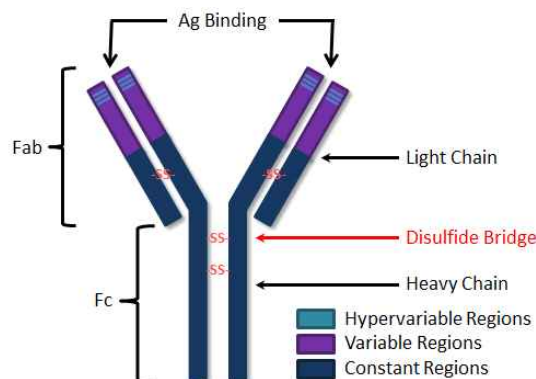
- (i) Parthenocarpy is development and production of seedless fruits in the absence of fertilisation, whereas apomixis refers to development of seeds and fruits, without fertilisation. So the main difference between apomixis and parthenocarpy is that seeds are formed in former, while absent in later.
- (ii) The two modes by which apomictic seeds can be produced are :
 - (a) **Agamospermy** In which the seed or embryo is derived from diploid egg cell, formed without meiosis and syngamy. This diploid egg cell develops into embryo without undergoing fertilisation, e.g apple Rubus.
 - (b) **Adventive embryony** the method in which diploid cell surrounding the embryo sac, e.g nucellus and integument protrude into the sac and develops into embryo. This may also lead to formation of more than one embryos in an embryo sac or ovule leading to condition called polyembryony, e.g citrus opuntia

16.

- (i) In the ovarian event from 13-15 days, onset of menstrual cycle occur a mature red ovum (egg cell) is released. Both LH and FSH attains maximum peak. LH surge induces rupture of Graafian follicle. Ovum covered by number of layer and yellow fat layer forms corpus luteum. It releases (secretes) progesterone.
- (ii) Ovarian hormone level from 16-23 days is called luteal phase (Secretory phase) The corpus luteum secretes large amounts of progesterone which is essential for maintenance of the endometrium.
- (iii) Uterine events from 24-23 days are under the influence of progesterone hormone. It influences the maintenance of the endometrium for any pregnancy the corpus luteum degenerates and endometrium sheds off

17. In this case zygote will be XXY and will develop into a male with Klinefelter's syndrome. Such individuals show feminine characters, gynaecomastia and are sterile. Due to this disorders, the woman was prescribed MTP.

18. Antibody is represented as H_2L_2 because each antibody molecule has four peptide chains, i.e two small light (L) Chains and two longer heavy (H) chains.



19. Steps involved in MOET programme are:

- (i) A cow is administered with hormones having FSH-like activity to induce follicular maturation and superovulation.
- (ii) The cow produces 6-8 eggs instead of one egg produced normally. This is known as multiple ovulation.
- (iii) Mating is done either with an elite bull or artificial insemination is carried out.
- (iv) When the fertilised eggs attain 8-32 cell stage, they are transferred to a surrogate mother. This is known as embryo transfer.
- (v) The genetic mother can be again superovulated now.

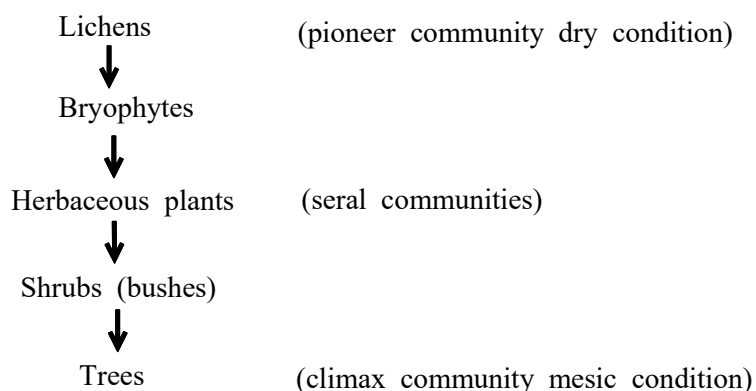
20.

- (i) ***Streptococcus*** Product is streptokinase. It is used as a clot-buster for removing the clots from the blood vessels of patients suffering from myocardial infarction.
- (ii) ***Lactobacillus*** Product is lactic acid. It is used to convert milk into curd and improves nutrient quality of curd by enriching it with vitamin-B₁₂.
- (iii) ***Saccharomyces cerevisiae*** Product is ethanol and it is used in making bread and beverages.

21. Xerarch succession occurs in dry areas and the series progresses from xeric to mesic condition.

The climax community remains stable as long as environment remains unchanged. With time the xerophytic habitat gets converted into a mesophytic one.

Stages of xerarch succession are



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22.

- (i) The three states through which the annual and biennial angiosperms pass during their life cycle are:
- Vegetative or Juvenile phase
 - Reproductive phase
 - Senescent phase

- (ii) Vegetative propagules are the parts/unit of a plant which can be used for vegetative propagation, e.g. roots, stems, leaves, etc.

Root propagules include the production of a new plant *via* roots, e.g. fleshy roots in case of sweet potato, tapioca and Dahlia.

Vegetative propagation through leaves, many plant leaves have adventitious buds which help in the development of a new plant, e.g. *Begonia*, *Bryophyllum*, etc.

Section D

23. Organ transplantation involves the removal of damaged/injured tissue or organs from the body of a person and their substitution by similar tissues/organs from a donor. Tissue matching blood group matching are essential clinical steps before undertaking any graft/transplant. Transplantation may result in the rejection of transplanted organs as the immune system recognises the protein in the transplanted tissue or organs as foreign and initiates cellular immunity we should raise and promote awareness about organ donation, about need of organ and tissue donors. There are lakhs of people waiting for organ donation and many people die daily while waiting for transplant. Organs and tissues from one donor can save upto 40-50 lives. So we should encourage and get registered for organ donation to save many lives.

Section E

24.

- (i)
- (a) s=Parents $I^A I^O$ $I^B I^O$
- \downarrow \downarrow
 A B
- (b) X individual $I^O I^O$ (B-type)
- (ii) Individual Y-blood groups can be O or A.
- (iii) I^A and I^B When say together, show the phenomena of codominance and express themselves in the presence of each other. In heterozygous hybrid, when both alternative alleles coexist, both the alleles show their effect. This is called codominance.

OR

- (i) Differences between Mendelian disorders and chromosomal disorders are:



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Mendelian disorder	Chromosomal disorder
These are due to alteration in a single gene.	These are caused due to the absence or excess of one or more chromosomes or abnormal arrangement of one more chromosomes.
They are transmitted to generations through Mendelian principles of inheritance.	They are not transmitted as the affected individual is sterile
e.g Colour blindness, phenylketonuria	e.g Down's syndrome Turner's syndrome

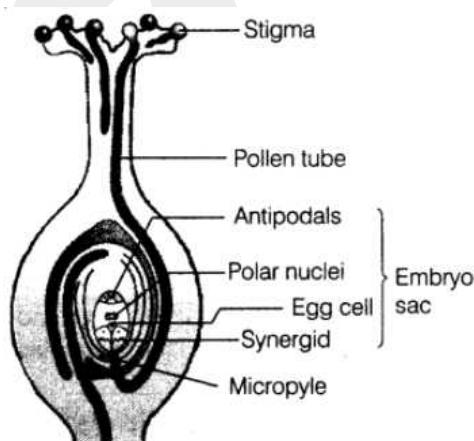
(ii) **Chromosomal disorders** Down's syndrome and Klinefelter's syndrome.

(iii) **Down's syndrome** The effected individual is short statured with small round head, furrowed tongue and partially open mouth. physical. psychomotor and mental development us also retarded.

Klinefelter's syndrome Occurs in males, which shows overall muscular development, but feminine development aslo occurs. Such individuals are sterile.

25.

(i)



(ii) The events that occur when compatible pollen grains fall on stigma in the sequence are as follow:

- Pollen-pistil interactions** One the compatible pollen garins fall in stigma which is receptive, it recognise and accepts the pollen with the aid of chemical components interacting with pollen.
- Germination of pollen grain** One the pollen is recognised, it germinates on the stigma of flower. The tube cell of pollen grain protrudes out through germ pores to form a pollen tube. the generative cell divides to form two male gametes and are released into the tube
- Growth of pollen tube** The pollen tube grows down through the tissues of stigma and style and enters ovule, usually through micropyle. Inside ovule, the filiform apparatus guides the pollen tube, carrying gametes to the egg
- Double fertilisation** After releasing th two male gametes into the synergids, one of them fuses with egg to form a diploid zygote (syngamy) and other male gamete fuses with 2 polar nuclei to form triploid primary endosperm cell (triple fusion). Because of occurrence of these two types of fusions, it is called double fertilisation.



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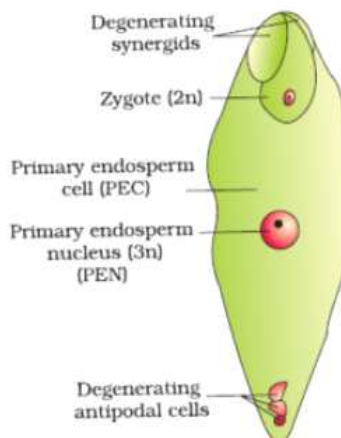
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OR

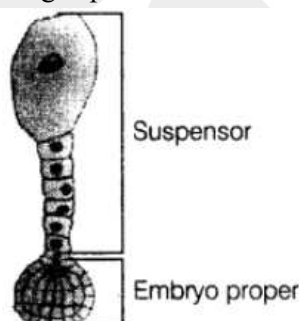
- (i) In fertilisation (in angiosperm), two types of fusion occur, i.e. syngamy and triple fusion in the embryo sac. That is why it is called double fertilisation:

Ploidy of cells involved in double fertilisation: zygote is diploid ($2n$). It is formed as a result of syngamy, i.e. fusion of two haploid gametes (male gamete + egg). Primary endosperm nucleus ($3n$) is formed as a result of triple fusion i.e. fusion of two haploid polar nuclei with male gamete.

- (ii) Fertilised angiospermic embryo sac with label is given below:



- (iii) Globular embryonic stage of an angiosperm.



26.

(i)

- (a) When large-size habitats are broken or fragmented due to human settlements, fragmented due to human settlements, building of roads, digging of canals, etc. animals with migratory habitats are badly affected.
- (b) The Amazon rain forest (called the “lungs of the planet”) is being cut and cleared conversion into grasslands for raising beef cattle.

- (ii) There are two basic approaches for conservation of biodiversity.

- (a) ‘In situ’ conservation (on-site conservation)
- (b) ‘Ex situ’ conservation (off-site conservation)

In situ conservation It is conservation and protection of biodiversity in its natural habitat.

- It helps in recovering population in the surroundings where they have developed their distinctive features.

Example, national parks, biosphere reserves, wildlife sanctuaries.

Ex situ conservation It is conservation of selected rare plant animals in places outside their natural habitat.



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- It helps in recovering population or preventing their extinction under conditions that closely resemble, botanical gardens, zoological parks, with life safari, gene banks, etc.

OR

Biodiversity is more in tropical latitudes than in temperate ones. The reasons are:

- (i) Specification is function of time The temperate regions were subjected to frequent glaciation in the past, while the tropics have remained undisturbed and so had longer time to evolve more species diversity.
- (ii) More solar radiation is available in tropical region. This leads directly more productivity and indirectly to greater species diversity.
- (iii) The environment of tropics is less seasonal and relatively more constant and predictable, which encourages niche specialisation and species diversity

Rivet popper hypothesis

- (i) The hypothesis was proposed by paul Ehrlich.
- (ii) In an airplane (ecosystem), all parts are joined together using thousands of rivets (species)
- (iii) If every passenger travelling in it, starts popping a rivet to taken home (Causing a species to become extinct). it may not affect the flight safety (proper functioning of ecosystem) initially, but as more and more rivets are removed, the plane becomes dangerously weak after some time.
- (iv) Further, which rivet is removed may also be critical loss of rivet on the wings. (Key species that drive major ecosystem function) is obviously a more serious threat to flight safety than loss of a few rivets on the seats or windows inside the plane.



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