DELHI PUBLIC SCHOOL, JAMMU
QUESTION BANK (Pre-BoardII) (2018-19)

Subject: Biology **Class: XII**

Topics included are: Reproduction, Genetics and Evolution, Biology in Human welfare and Biotechnology and its Application, Ecology.

SECTION – A

(Q. Nos. 1 - 5 are of one mark each)

1. Write the dual purpose served by Deoxyribonucleoside triphosphates in polymerisation.

Ans. Acts as a substrate , provide energy (from the terminal two phosphates).

2. Name two diseases whose spread can be controlled by the eradication of *Aedes* mosquitoes.

Ans. Dengue , Chikunguniya.

3. How do cytokine barriers provide innate immunity in humans ?

Ans. Interferon (proteins) , secreted by virus infected cells (protect non - infected cells from further viral infection).

4. Write the names of the following :

(a) A 15 *mya* primate that was ape-like

(b) A 2 *mya* primate that lived in East African grasslands

Ans. (a) *Dryopithecus*.

(b) *Australopithecines / Australopithecus / Homo habilis*.

5. Mention the chemical change that pro-insulin undergoes, to be able to act as mature insulin.

Ans. Removal of C - peptide (from pro-insulin).

SECTION-B

(Q. Nos. 2 - 10 are of two marks each)

6. Your advice is sought to improve the nitrogen content of the soil to be used for cultivation of a non-leguminous terrestrial crop.

(a) Recommend two microbes that can enrich the soil with nitrogen.

(b) Why do leguminous crops not require such enrichment of the soil ?

Ans. (a) *Azospirillum / Azotobacter / Anabaena / Nostoc / Oscillatoria / Frankia* .

(b) They can fix atmospheric nitrogen , due to presence of *Rhizobium* / N_2 fixing bacteria in their root nodules.

7. With the help of an algebraic equation, how did Hardy-Weinberg explain that in a given population the frequency of occurrence of alleles of a gene is supposed to remain the same through generations ?

Ans. In a population of diploid organisms

If frequency of allele A = p and frequency of allele a = q

Expected genotype frequency under random mating are

AA = p^2 (for the AA homozygotes)

a = q^2 (for the aa homozygotes)

Aa = 2pq (for the Aa heterozygotes) = ½

(In absence of selection , mutation , genetic drift or other forces allelic frequency p and q are constant through generation).Therefore $p^2 + 2pq + q^2 = 1$.

8. How did a citizen group called Friends of Arcata Marsh, Arcata, California, USA, help to improve water quality of the marshland using Integrated Waste Water Treatment ?

Ans.- Water is treated by conventional method // sedimentation / filtration / chlorination

- Water flows to six connected marshes

- The water in marshes is seeded with appropriate plants / algae / fungi / bacteria

- Which helps to neutralise the pollutants / assimilate the pollutants / absorb pollutants / Remove heavy metals

9. You have obtained a high yielding variety of tomato. Name and explain the procedure that ensures retention of the desired characteristics repeatedly in large populations of future generations of the tomato crop.

Ans. - Tissue culture / micropropagation / somaclonal propagation / apomixis

- Explant / any part of plant taken out and grown (in a test tube / vessel) ,
- under sterile condition ,
- in special nutrient medium (containing carbon source / sucrose , inorganic salt vitamins / amino acids and growth regulator)

10. (a) Name the source plant of heroin drug. How is it obtained from the plant ?

(b) Write the effects of heroin on the human body.

Ans. (a) - *Papaver somniferum* / Poppy plant = ½

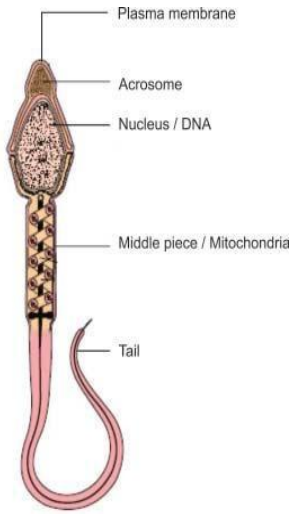
- Extracted from latex of the plant / acetylation of morphine (obtained from the latex of plant) =½

(b) Depressant , slows down body function = ½ + ½

SECTION C

(Q. Nos. 11 - 23 are of three marks each)

11. Draw a diagram of a mature human sperm. Label its parts.



12. (a) Expand VNTR and describe its role in DNA fingerprinting.

(b) List any two applications of DNA fingerprinting technique.

Ans. (a) VNTR - Variable Number of Tandem Repeat(s) and are used as a probe (because of its high degree of polymorphism)

(b) Forensic science / criminal investigation (any point related to forensic science) / determine population and genetic diversities / paternity testing / maternity testing/ study of evolutionary biology.

13. Differentiate between Parthenocarpy and Parthenogenesis. Give one example of each.

Ans.

Parthenocarpy	Parthenogenesis
- Formation of fruit without without fertilization	- New organism develops fertilization
- e.g. banana / grapes / turkey	e.g. Drones /male honey bee

14. Medically it is advised to all young mothers that breastfeeding is the best for their newborn babies. Do you agree ? Give reasons in support of your answer.

Ans. Yes, provides nutrition (calcium , fats , lactose) / provides (passive) immunity / provides antibodies / Ig A.

15. (a) Describe any two devices in a flowering plant which prevent both autogamy and geitonogamy.

(b) Explain the events upto double fertilisation after the pollen tube enters one of the synergids in an ovule of an angiosperm.

Ans. (a) - Dioecy / production of unisexual flowers (in different plants)

- Self incompatibility

(b) - Pollen tube releases 2 male gametes in the cytoplasm of synergid

- One male gamete fuses with egg cell (syngamy) resulting in diploid zygote
- Other male gamete fuses with polar nuclei / triple fusion , to form triploid PEN (Primary Endosperm Nucleus) / PEC (Primary Endosperm Cell)

16. (a) How has the development of bioreactor helped in biotechnology?
(b) Name the most commonly used bioreactor and describe it's working.

Ans. (a) Larger biomass / large volume of culture can be processed leading to higher yields of desired specific products (protein / enzymes) , under controlled condition.

(b) Stirring type .

1. Mixing of reactor contents evenly (with agitator system or a stirrer)
2. Facilitates oxygen availability
3. Temperature / pH / foam control // under optimum conditions

17. Explain the roles of the following with the help of an example each in recombinant DNA technology:

(a) Restriction Enzymes
(b) Plasmids

Ans. (a) It recognises a specific sequence of base pairs / pallindromes, and cuts the DNA strand at a specific site.eg. EcoRI / Hind II.

(c) Act as vectors / cloning of desired alien gene / foreign gene eg. pBR322 / plasmid of *Salmonella* / plasmid of *Agrobacterium* / Ti Plasmid / Tumour inducing Plasmid.

18. Explain out-breeding, out-crossing and cross-breeding practices in animal husbandry.

Out breeding – Breeding of unrelated animals (which may be between individual of same breed or between individuals of different species)

Out crossing – (a kind of out breeding) Mating of animals within the same breed but having no common ancestors on either side of their pedigree upto 4 – 6 generations

Cross breeding – (another type of out breeding) Superior males of one breed are mated with superior females of another breed

19. Organic farmers prefer biological control of diseases and pests to the use of chemicals for the same purpose. Justify.

Ans. - Reduces dependence on toxic chemicals

- Protects our ecosystem or environment

- Protects and conserves non-target organisms / they are species - specific

- These chemicals being non-biodegradable may pollute the environment permanently

- These chemicals being non-biodegradable may cause biomagnifications.

20. Differentiate between analogous and homologous structures.

Ans. Analogous - Anatomically not similar though perform similar functions / are a result of convergent evolution

Homologus - Anatomically similar (but perform different functions) / are a result of divergent evolution

21. (a) "India has greater ecosystem diversity than Norway." Do you agree with the statement ? Give reasons in support of your answer.

Ans. (a) Yes, India / tropical region are less seasonal, more constant, and more predictable hence promote niche specialisation leading to greater bio-diversity. Species diversity increases as we decreases as we move towards equator more number of species exist.

22. How has the use of *Agrobacterium* as vectors helped in controlling *Meloidegyne incognitia* infestation in tobacco plants?

Ans. - Using *Agrobacterium* vector nematode specific gene is introduced in host plant

- Sense and antisense strands of mRNA are produced
- ds RNA is formed
- ds RNA initiates RNAi
- Prevents translation of mRNA / silencing of mRNA of parasite / nematode
- Parasite will not survive

23. Explain menstrual cycle in human females.

Ans. - Menstrual Phase - Menstrual flow occurs / due to breakdown of endometrial lining of uterus , when fertilization does not occur

- Follicular Phase - Primary follicles grow into mature graafian follicles and endometrium regenerates through proliferation , changes

induced by pituitary and ovarian hormones

- Ovulatory Phase - LH surge , induces rupture of graafian follicle and release of secondary oocyte / ovum during middle of cycle (i.e. 14th day)

- Luteal phase - Ruptured graafian follicle transforms into corpus luteum which secrete large amount of progesteron , essential for maintaining endometrium