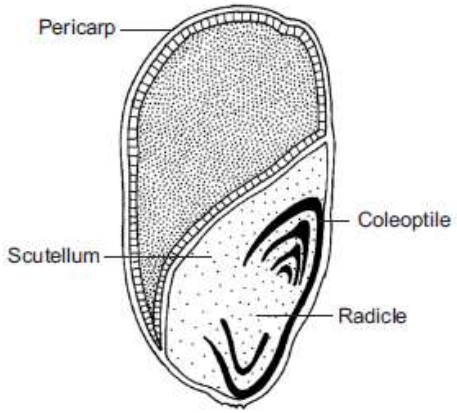
RJ Vision Pvt. Ltd.

Solution (BIOLOGY) BPT - 2B Full Syllabus 12th (CBSE) (15 FEB 2019)

SECTION–A

1. 'Tailing' of *hn*RNA take place during conversion of *hn*RNA into functional *m*RNA, it takes place at 3'-end.
2. Chasmogamous flowers.
3. Macrophages or Helper T-cells.
4. a → Fungi; b → Angiosperms
5. Change of frequency of allele in a population will result in natural selection leading to the evolution.
6. When the boy encounters a pathogen for the first time, his body produces antibodies which develop memory of the first encounter to protect the body in future.
7. *Saccharomyces cerevisiae*.
8. Bagging of the emasculated flower is essential to prevent the entry of unwanted pollen (pollination) during hybridisation experiments.

SECTION–B

9. The proteins produced by genetically altered gene in a host are called recombinant proteins. Bioreactors are considered as vessels in which raw materials are biologically converted into specific products by microbes. It provides optimum growth conditions such as temperature, pH, substrate, vitamins, oxygen and salts.
10. (a) Bone marrow
    (b) The lymphocytes produced migrate to secondary lymphoid organs like spleen, lymph nodes, etc. They trap the microorganism thereby activating the lymphocytes present in the lymph nodes and produce an immune response affecting the immunity.
11. 

V.S. of maize grain

OR

The regions outside the seminiferous tubules called interstitial spaces contain interstitial cells or Leydig cells. These synthesise and secrete male sex hormone (androgens) testosterone.

12. The dual function of AUG codon:
    (a) It codes for amino acid methionine.
    (b) It is an initiation codon.
    The sequence of bases from which it is transcribed is TAC. Its anticodon is UAC.
13. Domestic sewage and industrial effluents contain nutrients like nitrogen and phosphorus which favour the excessive growth of planktonic (free-floating) algae called algal bloom.
    Its harmful effects cause:
    (i) sharp decline in dissolved oxygen content in the water.
    (ii) deterioration of water quality and causes mortality of aquatic life forms.
14. Specific symptoms of typhoid are:
    (i) Constant high fever (39° to 40°C)
    (ii) Weakness
    (iii) Stomach pain
    (iv) Loss of appetite
    Its causative agent is *Salmonella typhi*.
15. Pioneer species—Phytoplanktons
    Climax species—Forest or trees.
    Biomass will be gradually increased and phytoplanktons are replaced by free-floating angiosperms then by rooted hydrophytes followed by different seral communities thus, biodiversity increases.
16. DNA, a genetic material is isolated in purified form by treating the bacterial cells with the enzymes such as lysozyme to remove the cell wall. The RNA thus released can be removed by treating them with ribonuclease and enzyme proteases is added to remove proteins. Finally, chilled ethanol is added to precipitate the purified DNA.
17. The cancerous cells are sloughed from the tumours and reach distant sites through blood, and whenever they get lodged in the body, they start a new tumour there. This property called metastasis is the most feared property of malignant tumours.
18. (a) The molecule 'X' is repressor. It gets inactivated when lactose (inducer) binds with the repressor molecule.
    (b) *z* gene codes for β-galactosidase.
    (c) Transcription of this gene stops when lactose is absent and thus repressor is free to bind with the operator.

SECTION–C

19. (i) In the members of family *Asteraceae*, seeds develop without fertilisation. This process is called apomixis.
    (ii) Two ways by which seeds develop without fertilisation:
    (a) In some species, the diploid (2n) egg cell is formed without reduction division and develops into embryo without fertilisation.

(b) In many varieties of *Citrus* and *Mango* fruits some of the nucellar cells surrounding the embryo sac starts dividing, protrudes into the embryo sac and develops into embryos.

20. Three measures to control vehicular air-pollution in Indian cities are:

(i) Use of CNG as fuel in the automobiles because it burns more efficiently and little of it is left unburnt. It is also cheaper.

(ii) Use of unleaded petrol.

(iii) Use of catalytic converter in the vehicles as it reduces emission of poisonous gases.

21. (a) Malarial parasite completes its asexual cycle in liver cells and then it attacks the red blood cells (RBCs) resulting in their rupture. The ruptured RBCs release toxic substance called haemozoin that is responsible for the symptoms of malaria like chill and high fever. Thus, no symptoms appear in the infected person between the period the parasite enters the body till RBCs release haemozoin.

(b) *Plasmodium falciparum*

22. (a) Nucleosomes

(b) a – Histone octamer

b – DNA

c – H_1 histone

(c) In bacterial cell, DNA in nucleoid is organised in large loops held together by proteins.

23. DDT must have entered the trophic levels of food chain (biomagnification). It was accumulated in the birds as it can neither be metabolised nor be excreted. High concentration of DDT disturb calcium metabolism in birds which causes thinning of the eggshells and their premature breaking, ultimately causing decline in bird populations.

24. It is possible to have a haemophilic girl when a cross is made between a carrier woman and haemophilic man.

Parents (Carrier woman) (Haemophilic man)

Genotypes XX^h × X^hY

Gametes X, X^h and X^h, Y

F_1 generation		X	X^h
	X^h	XX^h (Carrier girl)	X^hX^h (Haemophilic girl)
	Y	XY (Normal boy)	X^hY (Haemophilic boy)

OR

A small stretch of DNA sequence repeats many a time, shows a high degree of polymorphism and form a bulk of DNA in a genome called as satellite DNA. DNA are very specific in each individual and vary in number from person to person but are inherited. Each individual inherits these repeats from his/her parents which are used as genetic markers in DNA fingerprinting.

25. (a) From the original seed-eating features, many other forms with altered beaks arose, enabling them to become insectivorous and vegetarian finches.

(b) Darwin explained it as 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), called adaptive radiation.

26. Gel electrophoresis: The DNA fragments are negatively charged molecules and they can be separated by forcing them to move towards the anode under the influence of an electrical field through a medium or matrix. The DNA fragments separate according to size, *i.e.*, smaller the size the farther it moves. The separated DNA can be seen only after staining the DNA by ethidium bromide (EtBr) followed by exposure to UV radiation. The separated bands of radiation are cut out and extracted from the gel piece by elution.

27. (i) 'a' depicts conformers

(ii) Response of the regulators.

(iii)

Conformers	Regulators
Aquatic animals and plants in which the osmotic concentration of body fluids changes according to the ambient conditions of water are called conformers.	Some organisms are able to maintain homeostasis by physiological means which ensures constant body temperature, constant osmotic concentration, etc.

(iv) Regulators.

SECTION—D

28. Procedure:

(i) Hershey and Chase grew some bacteriophage virus on a medium that contained radioactive phosphorus (^{32}P) and some in another medium with radioactive sulphur (^{35}S).

(ii) Viruses grown in the presence of radioactive phosphorus (^{32}P) contained radioactive DNA.

(iii) Similar viruses grown in presence of radioactive sulphur (^{35}S) contained radioactive protein.

(iv) Both the radioactive virus types were allowed to infect *E. coli* separately.

(v) Soon after infection, the bacterial cells were gently agitated in blender to remove viral coats from the bacteria.

(vi) The culture was also centrifuged to separate the viral particle from the bacterial cell.

Observations and Conclusions:

(i) Only radioactive ^{32}P was found to be associated with the bacterial cell, whereas radioactive ^{35}S was only found in surrounding medium and not in the bacterial cell.

(ii) This indicates that only DNA and not protein coat entered the bacterial cell.

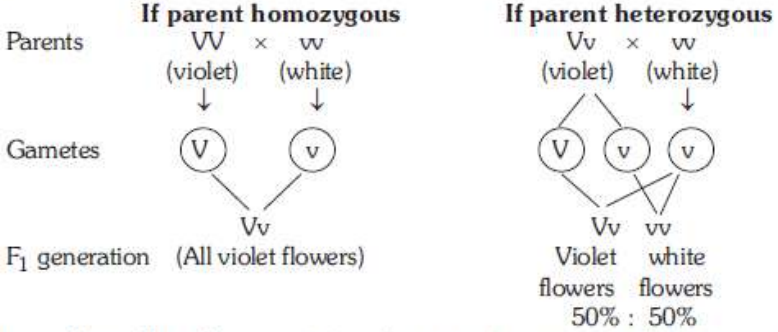
(iii) This proves that DNA is the genetic material which is passed from virus to bacteria and not protein.

Note: *Students either draw the labelled diagram or explain (both not necessary).*

OR

(a) It could be homozygous dominant or heterozygous dominant.

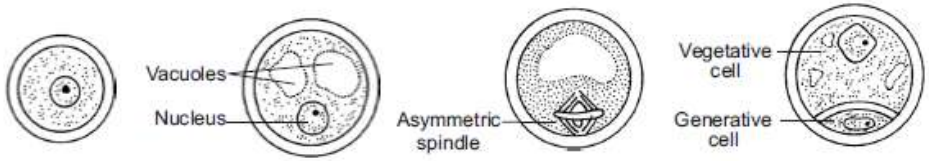
(b) By performing test cross, genotype can be determined.



29. Pollen mother cells undergo meiosis to form a microspore tetrad (microspores arranged in a cluster of four cells) by the process called microsporogenesis.

— The microspores dissociate from each other and develop into pollen grains.

— The protoplast (pollen grain) then divides mitotically to form two unequal cells – the bigger vegetative cell and smaller generative cell.



OR

- Gonadotropin releasing hormone (GnRH) is a hypothalamic hormone and is secreted by the hypothalamus.
- It stimulates the anterior lobe of pituitary gland to secrete luteinising hormone (LH) and follicle stimulating hormone (FSH).
- They stimulate the growth of ovarian follicles and development of egg/oocyte within the follicle.
- After ovulation, remaining parts of the Graafian follicle transform as the corpus luteum.
- Corpus luteum secretes a large amount of progesterone which is essential for the maintenance of endometrium which is required for implantation of the embryo and other events of pregnancy.

30. *Meloidegyne incognitia*, a nematode, infects the roots of tobacco plants thereby causing reduction in yield. RNA interference (RNAi) process is used to develop transgenic tobacco plant that protects the plant from *Meloidegyne incognitia*. This method involves silencing of a specific mRNA due to complementary dsRNA molecule that binds to and prevents translation of the mRNA (silencing). Using *Agrobacterium* vectors, nematode-specific genes were introduced into the host plant and produces both sense and anti-sense RNA in the host cells. These two RNAs being complementary to each other form dsRNA that initiated RNAi and thus, silenced the specific mRNA of the nematode. The parasite could not survive in a transgenic host because no protein is synthesised.

OR

(a) A bacterium, *Thermus aquaticus* is the source of *Taq* polymerase. It is a thermostable DNA polymerase that remains active even at high temperature and does not get denatured during denaturation of double stranded DNA in PCR.

(b) ADA–Adenosine deaminase.

This enzyme is essential for immune system to function. ADA deficiency can be cured by gene therapy. Lymphocytes from the blood of the patients are extracted and cultured outside the body. A functional ADA cDNA (using a retroviral vector) is introduced into these lymphocytes and these lymphocytes are then returned to the patient's body. However, as these cells are not immortal, the patient requires periodic infusion of such genetically engineered lymphocytes.