MODEL PAPER – 5

Time : 3 Hours + 15 Minutes] **[Total Marks : 70**

Instructions to the Candidates :

1. Candidates are required to give their answers in their own words as far as practicable.
2. Figures in the right hand margin indicate full marks.
3. 15 minutes of extra time has been allotted for the candidate to read the questions carefully.
4. This question paper is divided into two sections : **Section–A** and **Section–B**.
5. In **Section–A**, there are **70 Objective Type Questions**, out of which only 35 objective questions be answers. Darken the circle with blue/black ball pen against the correct option on OMR Sheet provided to you. Do not use **Whitener/Liquid/Blade/Nail** on OMR Paper, otherwise the result will be invalid.
6. In **Section–B**, there are **20 Short Answer Type Questions** (each carrying 2 marks), out of which any 10 questions are to be answered. Apart from this, there are **6 Long Answer Type Questions** (Each carrying 5 Marks), our of which any 3 of them are to be answered.
7. Use of any electronic device is prohibited.

SECTION – A : Objective Type Questions

Directions : *There are 70 Objective Type Questions, out of which only 35 objectives questions to be answered. For each question, mark the correct option on the* ***OMR*** *answer sheet.*

35 × 1 = 35

1. Isogametes are present in :
   (A) Frog (B) Fucus
   (C) Bird (D) Cladophora
2. Movement of sperm is done by :
   (A) Acrosome (B) Middle piece
   (C) Head (D) Tail
3. Crossing over is charactristics of which stage ?
   (A) Leptotene (B) Zygotene
   (C) Pachytene (D) Diakinesis
4. Control of gene expression take place at the level of :
   (A) Transcription (B) Translation
   (C) DNA replication (D) Both (A) and (B)
5. Reagent used in ELISA test is :
   (A) Polymerase (B) Peroxidase
   (C) Ligase (D) Endonuclease
6. Somaclonal variations are obtained through :
   (A) Tissue culture (B) Gamma rays
   (C) Amphimixis (D) Chemical mutagens
7. The DNA fragments separated on an agarose gel can be visualise after staining with :
   (A) Aniline blue (B) Ethidium bromide
   (C) Bromophenol blue (D) Acetocarmine
8. Genetically modified crops can be produced by :
   (A) Micropropagation
   (B) Cross breeding
   (C) Recombinant DNA technology
   (D) Somatic hybridization
9. Which of the following utilizes inorganic meterials ?
   (A) Autotrophs (B) Saprophytes
   (C) Heterotrophs (D) Decomposers
10. Sanitary landfill was adopted as the substitute for :
    (A) Open-burning dumps (B) Eutrophication
    (C) Sewage (D) Biomagnification
11. Plant body is haploid in which of the following ?
    (A) Algae (B) Fungi
    (C) Bryophytes (D) All of these
12. When off spring is formed by single parent then it is called as :
    (A) sexual reproduction (B) asexual reproduction
    (C) both 'A' and 'B' (D) internal fertilization
13. Which one is diploid structure ?
    (A) Ovum (B) Sperm
    (C) Zygote (D) All of these
14. Self-pollination occurs in which among the following plants ?
    (A) Unisexual (B) Bisexual
    (C) Both 'A' and 'B' (D) None of these
15. What is the Function of Embryo sac ?
    (A) Formation of Embryo
    (B) Preside nutrition to Embryo
    (C) Determination of sex
    (D) All of these
16. The wall of pollen grain is :
    (A) Single layered (B) Double layered
    (C) Triple layered (D) Multi layered
17. Flowers of Vallisnria spp are :
    (A) Anemophilous (B) Entomophilous
    (C) Hydrophilous (D) Zoophilous
18. Aril is edible in which of the following fruits ?
    (A) Myristica (B) Litchi
    (C) Annona (D) All of these
19. Hydrophillic pollination occurs in :
    (A) Eichornea (B) Lotus
    (C) Hydrilla (D) Both 'B' and 'C'
20. Thalamus is edible part of :
    (A) Annoma (B) Apple
    (C) Orange (D) All of these

21. Middle piece of mammalian sperm contains :
(A) nucleus (B) vacuole
(C) mitochondria (D) centriole

22. Diploid is :
(A) Ovum (B) Pollen
(C) both 'A' and 'B' (D) Zygote

23. Male hormone is produced from :
(A) Ovary (B) Sperm
(C) Testis (D) Kidney

24. The first sign of growing human foetus may be noticed by
(A) Movement of foetus
(B) Listening to the heart sound through stethoscope
(C) Development of limbs
(D) None of these

25. What is the number of chromosomes in Down's syndrome ?
(A) 46 (B) 47
(C) 48 (D) None of these

26. The phenotypic ratio for F_2 generation in Incomplete dominance is :
(A) 3 : 1 (B) 2 : 2
(C) 1 : 2 : 1 (D) None of these

27. Mendel selected :
(A) Gram (B) Pinus
(C) Tomato (D) Garden pea

28. Genes located on Y-chromosome are :
(A) Mutant genes (B) Autosomal genes
(C) Holandric genes (D) Sex-linked genes

29. ZZ/ZW type of sex determination is seen in :
(A) platypus (B) snails
(C) cockroach (D) peacock

30. Which of the following Blood Group is Universal donar ?
(A) A (B) B
(C) AB (D) O

31. Genes present on same locus having different expre-ssions are called :
(A) Multiple allele (B) Polygene
(C) Oncogene (D) Codominant gene

32. Genotypic Ratio of Monohybrid cross is :
(A) 1 : 2 : 1 (B) 3 : 1
(C) 9 : 3 : 3 : 1 (D) None of these

33. Lac operon consists of how many structural ganes ?
(A) 1 (a) (B) 2 (y and z)
(C) 3 (z, y and a) (D) four

34. In a DNA molecule, the cytosine is 18%. The percentage of adenine is :
(A) 64 (B) 36
(C) 82 (D) 32

35. In which stage does crossing over take place ?
(A) Leptotene (B) Cytokinesis
(C) Pachytene (D) Diakinesis

36. Pyrimidines present in RNA are :
(A) Cytosine and Thymine (B) Adenine and Guanine
(C) Cytosine and Uracil (D) Thymine and Uracil

37. For induction of alien DNA in host cell we may use :
(A) Gene gun (B) Micro-pipette
(C) Both 'A' & 'B' (D) None of these

38. Purine bases of DNA are :
(A) Adenine and Cytosine (B) Cytosine and Thymine
(C) Adenine and Guanine (D) None of these

39. Operon Model is representation of :
(A) Gene synthesis (B) Gene expression
(C) Gene regulation (D) Gene function

40. 'The origin of species' was written by :
(A) Charles Darwin (B) Lamarck
(C) Miller (D) De Vries

41. Adaptive radiation in Australian mursupials are example of :
(A) Divergent evolution (B) Convergent evolution
(C) Saltation (D) None of these

42. 'AIDS' is a type of :
(A) Bacterial disease (B) Viral disease
(C) Fungal disease (D) Protozoan disease

43. Retroviruis is causal organism of which of the following diseases ?
(A) Syphilis (B) AIDS
(C) Filaria (D) Both (A) and (B)

44. Triple antigen vaccine is not used for :
(A) for diphtheria (B) for pertusis
(C) for typhoid (D) for tetanus

45. Sexually transmitted disease is :
(A) measles (B) T.B.
(C) gonorrhoea (D) typhoid

46. Chemical released due to allergy are :
(A) Histamine (B) Serotonin
(C) Both 'A' and 'B' (D) none of these

47. PCR is test for :
(A) HIV (D) Cancer
(C) Tuberculosis (D) Cholera

48. Cancer is caused by :
(A) Bacteria (B) Oncogenes
(C) Both 'A' and 'B' (D) None of these

49. Acetabularia is a type of :
(A) Bacteria (B) Algae
(C) Protozoa (D) Single cell protein

50. Which of the following disease is generated by allergens ?
(A) Skin canker (B) Hay fever
(C) Enteric fever (D) Goitre

51. Which type of protein is present in silk thread ?
(A) Fibroin (B) Albumin
(C) Globulin (D) Keratin

52. From which of the following 'Cocaine' is obtained ?
(A) Erythroxylum coca (B) Atropa belladonna
(C) Datura alba (D) All of these

53. Taichung is a variety of :
(A) Rice (B) Wheat
(C) Maize (D) Sugarcane

54. Blue green algae and Rhizobium are present in root nodules of plants of which family ?
(A) Apocynaceae (B) Asteraceae
(C) Leguminosae (D) Poaceae

55. Which of the following is an important source of biofertilizer ?
(A) Green algae (B) Yeast
(C) Bacteria (B) Red algae

56. T-lymphocytes originate from :
(A) bone-marrow (B) stomach
(C) thymus (D) liver

57. Brewery is concerned with :
(A) Saccharomyces (B) Protozoans
(C) Pteridophytes (D) Marsupials

58. Which microbe is useful in the formation of curd from milk ?
(A) Clostridium (B) Lactobacillus
(C) Both 'A' and 'B' (D) Streptococcus

59. Recombinant DNA vaccine is :
(A) immunogenic lipid (B) immunogenic acid
(C) immunogenic protein (D) exogenic protein

60. The first human hormone produced by recombinant DNA technology is :
(A) Estrogen (B) Thyroxine
(C) Progesterone (D) Insulin

61. Which of the micro organism is used in alcohol industry ?
(A) Yeast (B) Lacto bacillus
(C) Amoeba (D) P.M.V.

62. Fusogen of protoplast culture is :
(A) liquid nitrogen (B) PEG
(C) lactic acid (D) all of these

63. Which plant does not grow in hydrophytic environment ?
(A) Hydrilla (B) Trapa
(C) Nelumbo (D) Acacia

64. Secondary productivity is related to :
(A) Producers (B) Herbivores
(C) Carnivores (D) None of these

65. Decomposers are :
(A) Autotrophs (B) Autohetrotrophs
(C) Organotrophs (D) Heterotrophs

66. Tiger is a consumer of :
(A) Primary (B) Secondary
(C) Tirtiary (D) None of these

67. Indian Rhinoceros is a natural inhabitant of which Indian state :
(A) Himachal Pradesh (B) Uttar Pradesh
(C) Assam (D) Uttarakhand

68. Red Data Book include list of :
(A) Endangered plants (B) Rare plants
(C) Threatened animals (D) All of the above

69. Chipko Movement is associated with :
(A) cultivation of trees
(B) protecting trees from felling down by human beings
(C) giving up tobacco abuse
(D) all of these

70. Which of the following causes biomagnification ?
(A) SO_2 (B) Mercury
(C) DDT (D) Both 'B' & 'C'

SECTION – B : Non-Objective Type Questions

SHORT ANSWER TYPE QUESTIONS

Directions : *Questions Nos. 1 to 20 are of short answer type. Each question carries 2 marks. Answer any ten questions of them in 50 words.* $10 \times 2 = 20$

1. **How are *T* and *B* lymphocytes formed ?**
2. **Define the terms :**
   (i) Immune system, (ii) Immunology
3. **What is micro injection ? How it is helpful in recombinant DNA technology ?**
4. **What are transgenic bacteria ? Illustrate using any one example.**
5. **Draw a neat, well lebelled diagram of a typical antibody.**
6. **Define ecology.**
7. **What is Red Data Book ?**
8. **Define Ecological Pyramids.**
9. **Define In vitro fertilisation.**
10. **Define :**
    (i) Sequential evolution
    (ii) Theory of recapitulation
    (iii) Genetic drift
11. **What are connecting links? Explain with examples.**
12. **Write the functions of blood.**
13. **Describe the functions of antibodies.**
14. **Write short notes on the following :**
    (i) Palindroms (ii) Cloning Vector
15. **Write short note on Oogenesis ?**
16. **Define clone. Give one advantage and one disadvantage of clones.**
17. **What are the name of component cell of embryo sac?**
18. **What is Southern blotting technique ? Give one example where it is applied.**
19. **Why is the Human Genome Project called a mega project ?**
20. **Write the Causes, Causal organism and Symptoms of typhoid.**

LONG ANSWER TYPE QUESTIONS

Directions : *Questions Nos. 21 to 26 are Long Answer Type Questions. Answer any 3 of them in 120 words.* $3 \times 5 = 15$

21. **What do you understand by Double Fertilization? Explain it with the help of diagrams.**
22. **Describe briefly the following :**
    (a) Transcription (b) Polymorphism
    (c) Translation (d) Bioinformatics
23. **What are the basic principles of Immunology and their applications?**
24. **What do you understand by crossing over ? Describe the mechanism of crossing over with suitable diagram.**
25. **What is forest conservation? Describe its process and importance.**
26. **Describe the different stages of xerosere with the help of suitable diagrams.**

ANSWER WITH EXPLANATION

SECTION – A

OMR ANSWER-SHEET

1.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	36.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
2.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	37.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
3.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	38.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
4.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	39.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
5.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	40.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
6.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	41.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
7.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	42.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
8.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	43.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
9.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	44.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
10.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	45.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
11.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	46.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
12.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	47.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
13.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	48.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
14.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	49.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
15.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	50.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
16.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	51.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
17.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	52.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
18.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	53.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
19.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	54.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
20.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	55.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
21.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	56.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
22.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	57.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
23.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	58.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
24.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	59.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
25.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	60.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
26.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	61.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
27.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	62.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
28.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	63.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
29.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	64.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
30.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	65.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
31.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	66.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
32.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	67.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
33.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	68.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
34.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	69.	Ⓐ	Ⓑ	Ⓒ	Ⓓ
35.	Ⓐ	Ⓑ	Ⓒ	Ⓓ	70.	Ⓐ	Ⓑ	Ⓒ	Ⓓ

ANSWER

1. (D)	2. (D)	3. (C)	4. (D)	5. (B)
6. (A)	7. (B)	8. (C)	9. (A)	10. (A)
11. (D)	12. (B)	13. (C)	14. (B)	15. (B)
16. (B)	17. (C)	18. (D)	19. (A)	20. (B)
21. (C)	22. (B)	23. (C)	24. (B)	25. (B)
26. (C)	27. (D)	28. (D)	29. (D)	30. (D)
31. (A)	32. (A)	33. (C)	34. (D)	35. (C)
36. (C)	37. (A)	38. (C)	39. (C)	40. (A)
41. (B)	42. (B)	43. (B)	44. (C)	45. (C)
46. (A)	47. (A)	48. (B)	49. (D)	50. (B)
51. (A)	52. (A)	53. (A)	54. (C)	55. (C)
56. (A)	57. (A)	58. (B)	59. (C)	60. (D)
61. (A)	62. (B)	63. (D)	64. (D)	65. (D)
66. (B)	67. (C)	68. (D)	69. (B)	70. (D)

SECTION – B

1. T lymphocytes develop from a common lymphoid progenitor in the bone marrow that also gives rise to *B* lymphocytes, but those progeny destined to give rise to *T*cells leave the bone marrow and migrate to the thymus. This is the reason they are called thymus-dependent (T) lymphocytes or *T* cells.
2. **(i) Immune system**—The system of animal body which protects it from various infectious agents and cancer is called immune system.

   (ii) Immunology—A branch of science, which deals with the study of the immune system, is known as immunology.
3. A technique of introducing foreign gene in a target cell by injecting of the DNA directly into the nucleus by micro needle is called micro injection.

   Microinjection is a technique of delivering foreign DNA into a living cell (a cell, egg, oocytes, embryos of Animal). Micro injection is helpful in rDNA technology because rDNA is directly injected into the nucleus of an animal cell.
4. Bacteria that have had their DNA modified to possess and express an extra (foreign) gene are known as transgenic bacteria.

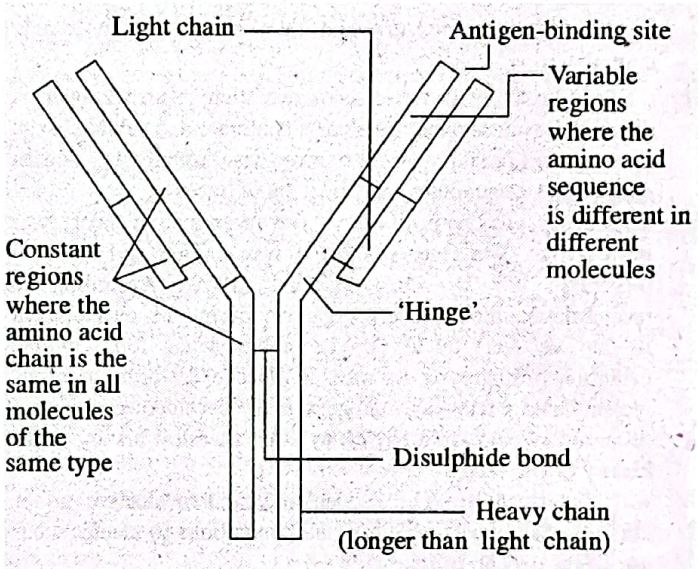
   Example : E coli with human insulin gene.
5. 

   Fig. : Diagram of the structure of an antibody molecule.
6. Ecology is the study of the relationship of living organisms with the abiotic (physico-chemical factors) and biotic components (other species) of the environment. It is concerned with four levels of biological organisation.

   (i) organisms (ii) populations (iii) communities (iv) biomas
7. Red Data Book is a catalogue of taxa that are facing the risk of extinction. Its main aim is to give information about the urgency and scale of conservation problem to the public and policy makers.

Users :

(i) Developing awareness about the importance of threatened biodiversity.

(ii) Identification and documentation of endangered species.

(iii) Providing a global index of the decline of biodiversity.

8. (i) The trophic structure of an ecosystem is represented in the form of ecological pyramids.

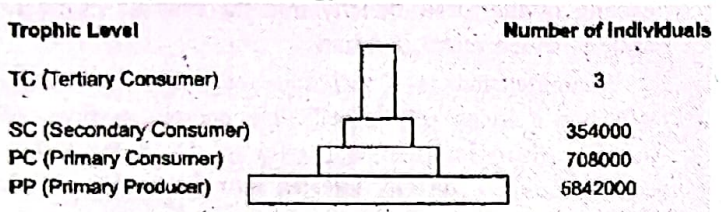
(ii) The base of each pyramid represents the producers or the first trophic level, while the apex represents tertiary or top level consumer.

(iii) The three types of ecological pyramids are :

(a) Pyramid of number

(b) Pyramid of biomass

(c) Pyramid of energy



Pyramid of numbers in a grassland ecosystem

(iv) Pyramid of number shows relationship between producers and consumers in an ecosystem in terms of numbers.

9. In vitro fertilisation to propagage endangered species. Offsprings can be produced by using preserved sperm to fertilise the eggs in vitro and then implanting in female animals.

10. **(i) Sequential evolution**—Micro evolution is also known as sequential evolution that involves a continual and subtle change in reciprocal population, that gives rise usually to modern species and geographical and inter racial races.

(ii) Theory of Racapitulation—The racapituation theory was proposed by Von Baer (1828). It was revised and renamed biogenetic law by Ernst Haeckel (1868). According to recapitulation theory, every organism during its development repeats or recapitulates in an abbgreviated form in the evolutionary history of its race. In Haeckel's words, ontogeny recapitulated phylogeny. Ontogeny is the developmental history of an individual, while phylogeny is its ancestral history or the history of the race.

(iii) Genetic drift—The sudden and random changes in the allele frequency occurring in small populations by change alone are called genetic drifts.

According to this concept, mutations arising in a small population may be either fixed or lost just by change irrespective of its being beneficial or harmful.

11. **Connecting links**—Certain animals are found which indicate the evolution of one from another because in those the characteristics of both the groups are represented. For examples, platypus, lung fishes, oviparous mammals. These animals are called connecting links.

12. **Functions of blood**—(i) It supplies oxygen to cell and tissues. (ii) It supplies essential nutrients to cells, such as amino acids, fatty acids, and glucose. (iii) It removes carbon dioxide, urea and lactic acid. (iv) Its white blood cells have antibodies which defend us from infection and foreign bodies. (v) It has specialized cells, such as platelets, which help the blood to clot (coagulate) when we are bleeding. (vi) It transports hormones-chemicals released by a cell in one part of the body that sends out messages that affect cells elsewhere in the body. (vii) It regulates our acidity (pH) levels.

13. Major functions of the antibodies are :

(i) Neutrilization of infectivity

(ii) Phagocytosis

(iii) Antibody-dependent cellular cytotoxicity (ADCC)

(iv) Complement-mediated lysis of pathogens or of infected cells : Antibodies activate the complement system to destroy bacterial cells by lysis.

14. **(i) Palindroms :** The palindroms in DNA are base pair sequences that are the same when read forward (left to right) or backward (right to left) from a central axis of symmetry. For example

5'–GAATTC–3'

3'–CTTAAG–5'

(ii) Cloning Vector—The vector DNA molecules that can carry a foreign DNA segment and replication inside the host cell. Vectors may be plasmids, Bacteriophages (viruses that attack bacteria) and cosmids. There are also some shuttle vectors.

15. In girl child during embryonic stage primordid germ cells repeatedly divide mitotically forming several oogonia. Only few of them become primary oocytes and the rest degenerate. These divide by Ist reductional division which remains incomplete and as such lacs of primary oocytes are present but only about 400 mature in oocytes during her life period. The maturity of oocytes by primary oocytes is called oogenesis.

16. **Clone**—Clone is the product of living structures genetically identical to their parent structure. It occurs naturally in asexually reproducing microbes, some lower animals like Amoeba and also in monozygotive identical twins thus clone is exact carbon copy of a single living parent.

Advantages—Cloning of human tissues is extremely beneficial as it can be used to replace malfuncting organs.

Disadvantage—Cloning is 'playing god'.

17. The name of component cell of embryo sac are following :

(i) egg (n)

(ii) Secondary nucleus (2n)

(iii) Synergids (n)

(iv) andipodal cells (n)

18. During DNA fingerprinting, the fragments of DNA are separated by electrophoresis and then these separated DNA sequences are transferred to a nylon or nitrocellulose sheet placed over the gel. This is called southern blotting after its inventor E.M. Southern.

This technique is applied in DNA fingerprinting.

19. Human Genome Project is called a mega project because it is aimed to sequence every base in human genome. It has developed the ways of mapping the human genome at increasing fine level of precision and to store this information in database and develops tools for data analysis. The magnitude and the requirements for this project are more for opening up new areas and avenues.

20. **Symptoms of typhoid :**
- ❑ Headache, backache, diarrhoea, constipation, loss of appetite.
- ❑ Temperature rises and remains high for about 10–14 days.
- ❑ Skin eruptions appear, tongue becomes dry and gets white patches in the centre.
- ❑ Casual organism for Thyphoid-Salmonella typhi.
- ❑ Cause
- ❑ Poor sanitation, contaminated water and infected milk.
- ❑ Wrong dieteary habits and faulty life style.

21. **Double Fertilisation**—After entering one of the synergids the pollen tube releases the two male gametes into the

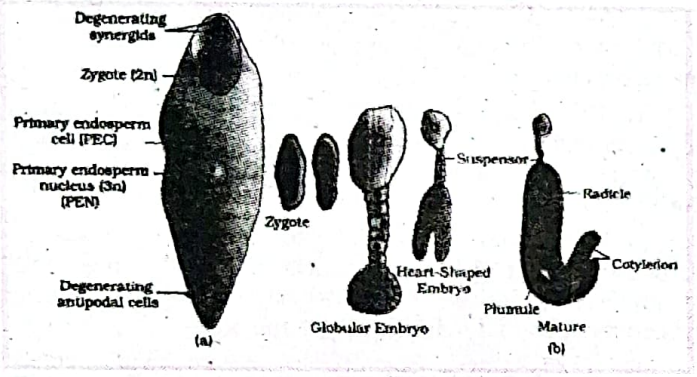


Figure : (a) Fertilised embryo sac showing zygote and Primary Endosperm Nucleus (PEN);
(b) Stages in embryo development in a dicot [shown in reduced size as compared to (a)]

cytoplasm of the synergid. One of the male gamets moves towards the egg cell and fuses with its nuclear thus completing the **syngamy**. This results in the formation of a diploid cell, the **zygote**. The other male gamete moves towards the two polar unclei located in the central cell and fuses with them to produce a triploid **primary endosperm nucleus** (PEN) (fig). 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**, an event unique to flowering plants. The central cell after triple fusion becomes the **primary endosperm cell** (PEC) and develops into the **endosperm** while the zygote develops into an **embryo**.

22. **(a) Transcription**—It is the formation of m-RNA from DNA in the process of protein synthesis. It takes place in the presence of enzyme-RNA Polymerase. One of the strands of DNA acts a template to direct the synthesis of m-RNA. In bacteria, the transcribed m-RNA is functional but in eukaryotes, the gene is split and exons are interrupted by non-coding sequence, introns which are removed.

(b) Polymorphism—It means variation at genetic level which arises due to mutations. The polymorphism in DNA sequence is the basis of the genetic mapping of human genome as well as DNA fingerprinting. The allele sequence variation is called as DNA polymorphism if more than one variant (allele) at a locus occurs in human population. The probability of such variation to be observed in non-coding DNA sequence is higher as mutations in these sequences may not have any immediate effect. These mutations keep on accumulating in each generation and form one of the basis of polymorphism. It has an important role in evolution and speciation.

(c) Translation—It is the synthesis of protein in the Cytoplasm of the cell due to coded information carrying from DNA through m-RNA. It occurs on the ribosomes using m-RNA and t-RNA.

DNA $\xrightarrow{\text{Transcription}}$ mRNA $\xrightarrow{\text{Translation}}$ Protein

(d) Bioinformatics—It is the discipline in which database of biological information are created and maintained. Bioinformatics is the field in which information science is applied to biology. The huge amount of genomic sequences information has been generated through years of research. The most of this information is in the form of sequences, images, intensities and structures. The representation, modelling and stimulation of biological systems is dealt with, at an advanced level, in bioinformatics.

Bioinformatics throws light on the evolution of several species on the earth and helps mankind to unearth the several mysteries of genetics. Bioinformatics is increasingly being utilized in pharmaceuticals, textiles, agricultural and biotech companies.

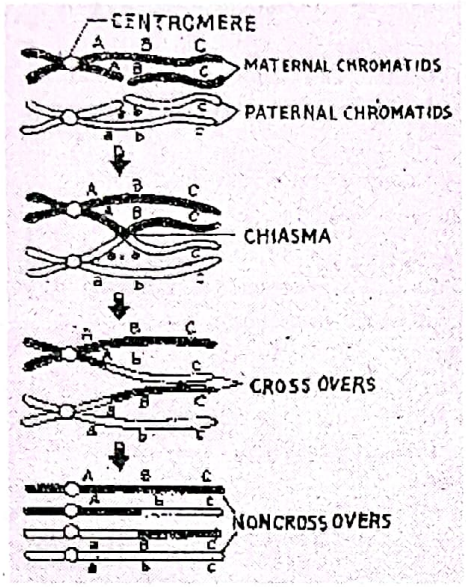
23. Immunology is a branch of biology that covers the study of immune systems in all organism. It was the Russian biologist Ilya Ilyich Mechnikov who boosted studies on immunology, and received the Novel Prize in 1908 for his work. He jabbed the thron of a rose on a starfish and noted that, 24 hours later, cells were surrounding the tip. It was an active response of the body, trying to maintain its integrity. It was Mechnikov who first observed the phenomenon of phagocytosis, in which the body defend itself against a foreign body, and coined the term. It charts measures, and contextualized the physiological functioning of the immune system in states of both health and disease, malfunctions of the immune system in immunological disorders (such as autoimmune diseases, hypersensitivities immune deficiency, and transplant rejection); the physical, chemical and physiological characteristics of the components of the immune system in vitro, in situ, and in vivo.

Immunology has application in numerous disciplines of medicine, particularly in the fields of organ tansplantation, oncology, virology, bacteriology, parasitology, psychiatry and dermatology.

Many components of the immune system are typically cellular in nature and not associated with any specific organ; but rather are embedded or circulating in various tissues located throughout the body.

24. Crossing over is the exchange of genetic material between homologus chromosomes that results in recombinant chromosomes sexual reproduction.

Mechanism : During the zygotene stage of the first prophase of meiosis the homologous material and paternal Chromosomes start pairing and lie closely side by side. This phenomenon is called synapsis. This pairing of homologous chromosomes is brought about by the mutual attraction between the allelic genes. The paired chromosomes are known as bivalent. A recent study reveal that synapsis and chiasma formulation is facilitated by a highly organises structure at filament called synaptonemal complex synapsis is followed by the duplication of chromosomes.



Which change the bivalent nature of chromosomes pair into tetravalent. In crossing over two or three chromatid are involved and accordingly two or more chiasmate are formed. At each chiasma the chromatids breaks and the broken segment rejoin a new chromatid. Thus exchange of parts of chromatid brings about alternation of original sequence of genes in the chromosome.

25. Forest conservation is the practice of planning and maintaining forested areas for the benefit and sustainability of future generation. Forest conservation involves the up keep of the natural resource within a forest that are beneficial to both humans and the ecosystems.

Process and methods of Forest conservation :

(i) Regulated and planned cutting of trees—One of the main reasons of deforestation is commercial felling of trees. According to an estimate about 1600 million cubic meters of wood have been used for various purpose in the world. Although resources, when exploited on a very large scale, their revival cannot be possible.

(ii) Control over Forest Fire—Destruction or loss of forest by fire is fairly common, because trees are highly exposed to fire and once started it become difficult to control. Sometimes, the fire starts by natural process *ie.* by lightning or by friction between trees during speedy winds, while in most cases it is also by man either intentionally or unitentionally.

(iii) Reforestation and Afforestation—The sustained yield concept dictates that whenever timber is removed, either by black cutting or by selective cutting, the denuded area be reforested. This may by done by natural and artificial methods.

(iv) Check over forest clearance for Agricultural and Habitation purposes—Most of the present-day agricultural land was once forested and then cleared for the use of agriculture. But now it has reached the stage where further clearance will be dangerous for the entire ecosystem.

(v) Protection of Forests—The existing forests should be protected. Apart from commercial cutting, unorganised grazing is also one of the reasons.

(vi) Forest Management—Management of forest resources is the key of all conservation efforts.

26. Xerosere is a plant succession which is limited by water availability. It includes the different stages—

(a) Crustose Lichen stage—A bare rock consists of solid surface or very large boulders and there is no place for rooting plans to colonize.

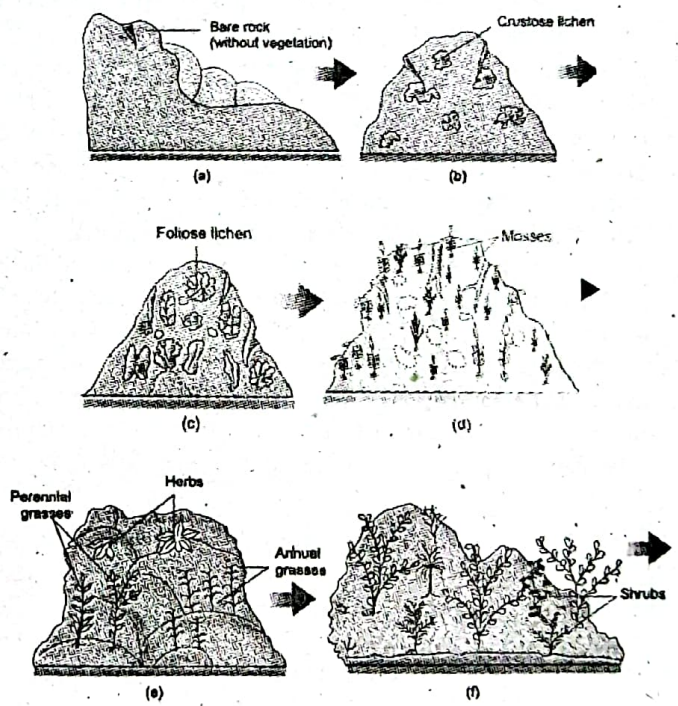
(b) Foliose and Fruitcose Lichin stage—Foliose have leaf like thalli while the fruticose lichens are small bushes. They are attached by the substratum at one point only.

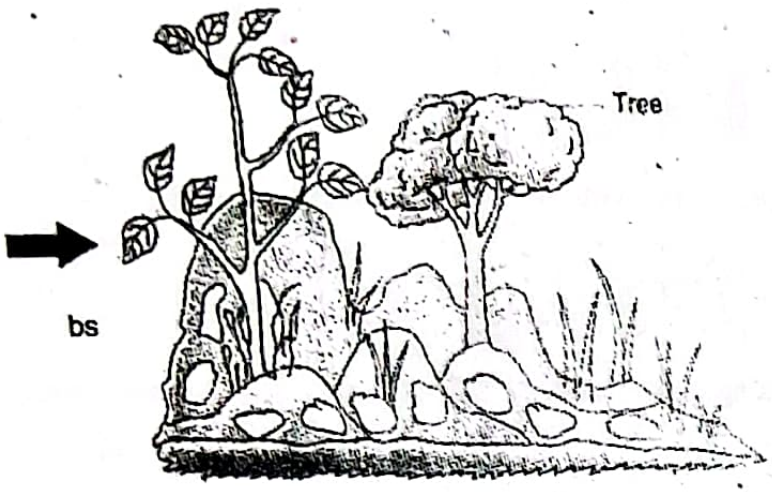
(c) Moss stage—The spores of xyrophytic mosses such as Tortula and Grimmia are brought to the rock whether they succeed lichen.

(d) Herb stage—Herbaceous weeds mostly annuals such as asters and evening primrose invade the rock. Their roots penatrate deep down, secret acids and enhance the process of weathering.

(e) Shrub stage—Herb and grass misture is invaded by scrub species such as Rhus and others. Early invasion of scrub is slow but once a few bushes have become established birds invade the area and help disperse scrub seeds.

(f) Tree stage—Change in environment factors colonization of three species. The tree saplings begin to grow among the scrubs and establish themselves.





(g)

(g) Forest stage or Climax stage—The succession culminates in a climax community, the forest. Many intermediate tree stages develop prior to establishment of a climax community. The forest type depends upon climatic conditions.

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