MODEL PAPER – 3

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. Onion is propagated through :
   (A) Leaves (B) Rhizome
   (C) Seeds (D) Bulbs
2. Which of the following groups have haploid plant body ?
   (A) Angiosperms (B) Gymnosperms
   (C) Pteridophytes (D) Bryophytes
3. Which of the following is not hereditary disease ?
   (A) Cystic fibrosis (B) Haemophilia
   (C) Cretinism (D) Thalassaemia
4. A disease caused by an autosomal primary non-disjunction is :
   (A) Sickle cell anaemia (B) Klinefelter's syndrome
   (C) Turner's syndrome (D) Down's syndrome
5. Cranial capacity of Java Apeman was :
   (A) 900 c.c. (B) 1075 c.c.
   (C) 1450 c.c. (D) 1660 c.c.
6. What is droplet infection ?
   (A) Syphilis (B) Tetanus
   (C) Typhoid (D) Pneumonia
7. The enzyme that converts glucose into alcohol is :
   (A) Invertase (B) Lipase
   (C) Zymase (D) Diastase
8. Which of the following is not a restriction enzyme ?
   (A) Eco RI (B) Bam HI
   (C) Hind III (D) Pectinase
9. What will happen when fertilizer is added to fresh water pond ?
   (A) Increases in aquatic animals
   (B) Decreases in fish population
   (C) Death of hydrophytic plants
   (D) Eutrophication
10. Which one is an endangered species in the following ?
    (A) Nepenthes (B) Tecoma
    (C) Ixora (D) Both (B) and (C)
11. Gemmules are formed among which of the following :
    (A) Yeast (B) Hydra
    (C) Amoeba (D) Sponges
12. Vegetative propagation in ginger is carried out by means of :
    (A) Rhizome (B) Roots
    (C) Tuber (D) Bulb
13. Reproduction by 'budding' occurs in :
    (A) yeast (B) paramoecium
    (C) penicillium (D) all of these
14. Which one is not a hermaphrodite animal ?
    (A) Leech (B) Earth worm
    (C) Tae worm (D) House fly
15. Seed with endosperm is known as :
    (A) Apocarpic (B) Polyembryony
    (C) Endocarpic (D) Endospermic
16. Which one is a false fruit ?
    (A) Mango (B) Lemon
    (C) Rice (D) Apple
17. Pollen grain may be :
    (A) Gametophite (B) Articulated
    (C) Allergent (D) All of these
18. Which of the following is not called as vegetative propagate ?
    (A) Rhizome (B) Sucker
    (C) Offset (D) Zoospore
19. Which of the following is not Monoecious ?
    (A) Payapa (B) Mustard
    (C) Maize (D) China rose
20. In wheat, pollinating agent is :
    (A) Wind (B) Insect
    (C) Bird (D) Man
21. The process of formation of gametes is called :
    (A) Gametogenesis (B) Cytokinesis
    (C) Sporogenesis (D) Meiocytes

22. Acrosome is a part of :
(A) Head of human sperm
(B) Middle part of human sperm
(C) Primary oocyte
(D) Blastocyst

23. Number of deaths during a limited time period and place for a particular population is known as :
(A) Natality (B) Mortality
(C) Migratory (D) Integrity

24. Triticum aestivum is :
(A) Triploid (B) Tetraploid
(C) Hexaploid (D) Diploid

25. What is considered as father of genetics ?
(A) Hugo de Vries (B) Morgan
(C) Mendel (D) Darwin

26. Law of segregation is also known as :
(A) Law of dominance
(B) Law of independent assortment
(C) law of purity of gametes
(D) none of these

27. Human blood group *O* has :
(A) antigen absent (B) antibody absent
(C) antigen present (D) antibody *A* present

28. 1 : 2 : 1 Ratio is a cross show :
(A) Dominance (B) Incomplete Dominance
(C) Linkage (D) None of these

29. The human chromosome with highest and least number of genes are :
(A) Chromosome 21 and Y (B) Chromosome 1 and X
(C) Chromosome 1 and Y (D) Chromosome X and Y

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

31. Which among the following anticodon is meant for "GAC" codon of DNA ?
(A) CTG (B) CUG
(C) Both 'A' and 'B' (D) CAG

32. The function of polymerase chain reaction is :
(A) Transcription (B) Translation
(C) Both 'A' and 'B' (D) DNA amplification

33. Which part of the donor's eye is used for grafting in order to cure certain cases of blindness ?
(A) Lens (B) Retina
(C) Cornea (D) Choroid

34. Nucleic acids are polymers of :
(A) Nucleotides (B) Nucleosides
(C) Amino acids (D) Nucleoproteins

35. PCR method is useful for :
(A) DNA synthesis (B) Protein synthesis
(C) Amino acid synthesis (D) DNA amplification

36. Satellite DNA is useful tool in :
(A) Sex determination (B) Forensic science
(C) Genetic engineering (D) Organ Transplantation

37. Trisomy ($2n + 1$) causes retardation in child, which is known as :
(A) Philadelphia (B) Down's Syndrome
(C) Albinism (D) None of these

38. Which nitrogenous base is absent in DNA ?
(A) Thymine (B) Uracil
(C) Guanine (D) Cytosine

39. Wings of butterfly and birds are :
(A) Vestigial organs (B) Analogous organs
(C) Homologous organs (D) Both A and C

40. Dryopithecus is more similar to :
(A) Ape (B) Gorilla
(C) Chimpanzee (D) Man

41. Which one is related to sequential evolution ?
(A) Self pollination (B) Cross pollination
(C) Vegetative propagation (D) Hybridization

42. Name the types of cells that produce antibodies :
(A) A-Cells (B) B-Cells
(C) T-Cells (D) All of these

43. Which disease is found in hen ?
(A) Smut (B) Cholera
(C) Ranikhet (D) Both 'B' and 'C'

44. Virus is made up of :
(A) Protein (B) Protein and nucleic acid
(C) Lipid and protein (D) DNA and RNA

45. Elephantiasis is caused by :
(A) Ascaris (B) Taenia
(C) Wuchereria (D) Entamoeba

46. Which of the following protein is secreted by virus infected cell ?
(A) Interleukin (B) Interferon
(C) Tumour necrosis factor (D) All of these

47. Wuchereria bancrofti causes filaria in human being. It is of which group :
(A) Protozoa (B) Bacteria
(C) Virus (D) Helminth

48. Tuberculosis is transmitted by :
(A) Air (B) Water
(C) Insect (D) Contact

49. Malaria is caused by :
(A) Male culex mosquitoes
(B) Male Anopheles mosquitoes
(C) Female Anopheles mosquitoes
(D) Female Aedes mosquitoes

50. Which one is a bacterial disease?
(A) Leprosy (B) Tuberculosis
(C) Cholera (D) All of these

51. Which one is vector of filaria ?
(A) Male Culex mosquito
(B) Male Anopheles mosquito
(C) Female Culex mosquito
(D) Female Anopheles mosquito

52. Which one of the following is helpful in the improvement of soil :
(A) Insecticide (B) Biofertilizer
(C) Yeast (D) All of these

53. 'Leghorn' is the improved breed of :
(A) Cattle (B) Chicken
(C) Pig (D) Dog

54. Pisciculture is related culture of :
(A) Aquatic plants (B) Aquatic animals
(C) Silk worm (D) Lac worm

55. 'Flaver Savr' is a :
(A) Pesticide (B) Chicken breed
(C) Transgeneic Tomato (D) Insecticidal Protein

56. High amount of *E.coli* in water is an indicator of :
(A) Hardness of water (B) Industrial pollution
(C) Sewage pollution (D) All of these

57. Pasteurization is heating of :
(A) milk only
(B) any liquid at 100°C
(C) any liquid above 70°C
(D) any liquid between 70°C – 80°C followed by rapid cooling

58. For Nitrogen fixation in soil we may use :
(A) Cyanobacteria (B) Protozoans
(C) Nematodes (D) Wheat plants

59. Chlorella is a type of :
(A) bacteria (B) virus
(C) protozoa (D) single cell protein

60. Recombinant Protein 'Hirudin' has therapeutic use as :
(A) Antivenom (B) Anticoagulant
(C) Antibiotics (D) All of these

61. The total gene and their alleles in a population is known as :
(A) Gene pool (B) Gene Bank
(C) Gene flow (D) Genetic drift

62. Which of the following is a plasmid ?
(A) Bam HI (B) Eco RI
(C) $_pBR^{322}$ (D) Hind III

63. Locust is :
(A) Producer (B) Primary consumer
(C) 'A' and 'B' both (D) None of these

64. Regulation of spermatogenesis is done by :
(A) oestrogen (B) L.H.
(C) androgen (D) none of these

65. Which types of the following pyramid are never inverted ?
(A) Pyramid of energy (B) Pyramid of biomass
(C) Pyramid of number (D) Pyramid of dry biomass

66. Flow of energy in food chain of an Ecosystem is :
(A) Unidirectional (B) Bidirectional
(C) Multidirectional (D) None

67. Gir sanctuary is famous for :
(A) Birds (B) Crocodiles
(C) Lions (D) Rhinoceros

68. The percentage of global species diversity of India is :
(A) Approximately 8.1 % (B) 2.4%
(C) 2.2% (D) None of these

69. Dodo is :
(A) Extinct species (B) Endangered species
(C) Threatened species (D) All of these

70. Rain is called acid rain, its pH is below :
(A) 7 (B) 6.5
(C) 6 (D) 5.6

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. **Define Global Warming.**
2. **What is Food Chain and Food Web ?**
3. **What are hot spots ? Explain.**
4. **Explain Hydrophily with the help of suitable examples.**
5. **Write the ecological adaptations among xerophytic plants.**
6. **What is multiple allelism ? Give its suitable example.**
7. **Write in brief on the following :**
   (i) B.O.D. (ii) Flocs
8. **Distinguish between Gene therapy and Molecular diagnosis.**
9. **Mention three advantages of sexual reproduction.**
10. **Why is the process of fertilization in a flowering plant referred to as double fertilization ?**
11. **What are the charaeteristics of wind pollinated flowers ?**
12. **What is meant by heredity ?**
13. **How did Mendel make sure that the pea plants were true breeding ?**
14. **What are the reasons for success of Mendel experiments on pea plants ?**
15. **Agrobacterium tumefaciens is a natural vector. How ?**
16. **Name the pathogen, vector and symptoms of diseases ascariasis.**
17. **Write a short note on 'withdrawal symptoms'.**
18. **What do you mean by Genetically Modified Organisms? Describe two benefits of these crops.**
19. **Differentiate between Monohybride and Dihybrid cross.**
20. **What is Vital Index ? Write the formula to derive it.**

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 is Cancer ? Write its causes, symptoms, control and prevention.**
22. **Define Transgenic Animals.**
23. **What is Pond ? Describe the components of a Pond ecosystem ?**
24. **What do you meant by Seed ? Describe the process for formation of a seed.**
25. **With the help of labelled diagram, describe the model of DNA as given by Watson and Crick.**
26. **What is the role of animal husbandry in human welfare ? Explain with example.**

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

SECTION – B

1. The increase in the level of greenhouse gases has led to considerable heating of Earth leading to **global warming.** During the past century, the temperature of Earth has increased by 0.6°C, most of it during the last few years. This is due to an enormous increases in fossil fuel burning that releases greenhouse gases.

   Effects :

   (a) The rise in temperature is leading to deleterious changes in the environment and resulting in odd climatic changes (e.g. El Nino effect).

   (b) It leads to increased melting of polar ice caps and the Himalayan snow caps.

   (c) This will result in a rise in sea level that can submerge many coastal areas.

   Control of global warming :

   (a) Minimising use of fossil fuel.

   (b) Improving efficiency of energy usage.

   (c) Reducing deforestation.

   (d) Increasing reforestation.

   (e) Controlling human population growth.

   (f) Becoming responsible in using resources conservatively.

2. **Food Chain and Food Web**—A straight line sequence of 'who eats whom' in an ecosystem is called a food chain. A network of cross connecting food chains involving producers, consumers and decomposers are termed as a food web.

3. Hot spots are the regions of high levels of species richness and high degree of endemism.

   ❑ Endemic species are confined only to a limited region.

   ❑ There are 34 hotspots in the world.

   Three of these Hotspots in India are :

   ❑ Western Ghats and Sri Lanka

   ❑ Indo–Myanmar

   ❑ Eastern Himalaya-cover-our country's exceptionally high biodiversity regions.

4. **Hydrophily :** Hydrophily is transfer of pollen grains from anther of a flower to the stigma of another flower through water. It is of two kind :

   (i) Hypohydrophily : It occurs in totally submerged plants. Ex-Zostera.

   (ii) Epihydrophily : It occurs in those plants where flowers remain at the surface of water. Ex-Vallisneria, Spirallis.

5. **Ecological adaptations of xerophytic plants :** (i) Plants have thick cuticle, succulent organs where water and mucilage are stored. (ii) Stomata are sunken. (iii) They have well developed branched root system. (iv) They prossess waxy coating on surface. (v) Crassilucean pathway of photosynthesis.

6. **Multiple allelism** is a phenomenon that occurs when more than two alleles exist at a given locus of a chromosome and in a given individual, only two of these alleles occur, one derived from each parent.

Example—ABO blood types in human is an example of multiple allelism where alleles I^A, I^B and i produce the four phenotypes (A, B, AB and O) of blood groups. In an individual, any two different alleles out of many (I^A, I^B and i) or the same allele in duplicate are present to represent any blood group.

7. **(i) B.O.D. :** Biological Oxygen Demand (B.O.D.) is the amount of dissolved oxygen needed by aerobic biological organism to break down organic material present in a given water sample at certain temperature over a specific time period.

   (ii) Flocs : The flocs are the groups of micro-organisms (mostly bacteria) which are used as biological digesters to break down all the organic matter found in sewage. To promote the growth of such flocs, the effluent tanks are pumped with air which facilitates their growth.

8. **Difference between Gene therapy and Molecular Diagnosis :**

Gene therapy	Molecular Diagnosis
(i) Gene therapy involves treatment of a hereditary disorder caused by single defective gene by replacing the defective gene by a normal gene.	(i) Molecular diagnosis is the process of diagnosis of a disease, early detection of a disease or predisposition for a disease.
(ii) This is being used to combat cysticfibrosis, muscular dystrophy, adenosine deaminase deficiency (ADA) or sever combined immuno-deficinecy (SCID).	(ii) Reecombinant DNA technology, polymerase chain reaction (PCR) and enzyme linked immunosorbent assay (ELISA) are the techniques for early diagnosis used presently.

9. Sexual reproduction involves formation and fusion of (sex called gametes). Its main advantages are :
   (i) The haploid (n) gametes fuse together and the chromosome number of the species (2n) is restored.
   (ii) Variations are produced in the off-springs.
   (iii) Off-springs are better adapted to the environment and it leads to evolution.

10. Fertilization in flowering plants is referred to as double fertilization because two male gametes from the same microspore takes part in fusion. One male gamete fuses with the egg to form a diploid zygote and the other male gamete fuses with the two polar nuclei or secondary nucleus to form the triploid primary endosperm nucleus.

11. Pollination by wind is called Anemophilous. It happens in coconut palm, date palm, maize, grasses etc. Their some characters are as such :
   (i) Flowers are inconspicuous and not showy.
   (ii) They are colourless and odourless.
   (iii) Produce large quantities of dusty pollens.
   (iv) Flowers grow in large groups.
   (v) Stigmas are sticky, hairy, feathery or branched.

12. It is the transference of characters, resemblances as well as variations from one generation to the subsequent generations. Every living organism produces the offspring like its own (like begets like). The cat always produces the cat offspring but this offspring does not completely resemble to its parents. Variations are observed in sexually reproducing organisms and not in asexually produced clones. Thus, every living organism transmits its characters to the offsprings for maintaining the continuity of life.

13. Mendel made himself sure on the basis of pure line. Pure line is a strain of genetically pure true breeding individuals, which on self-pollination produce the offsprings of the same kind. These pure lines are homozygous and do not show any variations on continued selfing. So, these organisms are called as true breeding. Mendel grew the seeds of white flower plants and obtained only white flower plants and so on. He further ensured by allowing successive generations of each variety to self-pollinate to eliminate any offspring that was not true to the form of the trait. Then these true breeding plants were grown separately and cross-pollinated with desired characters.

14. (i) He studied one or two characters at a time for his breeding experiments.
   (ii) He selected only those traits for his studies which did not exhibit linkage or incomplete dominance.
   (iii) He performed the reciprocal crosses to confirm the validity of correct ratio.
   (iv) He performed his experiments to F_2 and F_3 generations.
   (v) He selected true breeding varieties of pea plants for cross-pollination.
   (vi) He performed emasculation process to prevent self-pollination.
   (vii) He maintained complete records of all his experiments and used statistical methods and law of probability for analyzing his result.
   (viii) He took great care in finding and choosing the true breeding plants genetically.

15. Agrobacterium tumefaciens causes crown gall disease of a wide range of dicotyledonous plants especially members of the rose family such as apple, pear peach, cherry and roses etc. Basically the bacterium transfers parts of its DNA to the plant and this DNA integrades into the plants genome, causing the producing of turmours so it is called natural vector.

16. **Pathogen**—Round worm (Ascaris)—an intestinal parasite.
   Mode of transmission—Contaminated water, vegetable and fruits etc.
   Symptoms—Internal bleeding muscular pain, fever, anaemia, and blockage of the intestinal passage.
   (The eggs of parasite are excreted along with Faeces of infected persons which contaminate soil water and plants etc.)

17. The addicts depends largely on drugs and other substances physically and mentally. Whenever, these drugs or substances are not available to the addict, then he shows unpleasant 'withdrawal symptoms' and these include vomiting, diarrhoea shivering, twitching, perspiration, abdominal and muscular cramps etc. Under proper treatment, these symptoms can be gradually subside and the body becomes normal.

18. Plants, bacteria, fungi and animals whose genes have been altered by manipulation are called **Genetically Modified Organisms** (GMOs).

GM plants are better in following ways :

(i) are more tolerant to abiotic stresses (cold, drought, salt and heat).

(ii) have reduced reliance on chemical pesticides (pest-resistant crops).

(iii) show increased efficiency of mineral usage prevents early exhaustion of fertility of soil.

(iv) have enhanced nutritional value of food, e.g., Vitamin-A enriched rice.

19. Difference between monohybrid and dihybrid cross :

Monohybrid	Dihybrid
(i) It is a cross between two pure organism in order to study the inheritance of a single pair of alleles.	(i) It is a cross between two pure organism of a species in order to study the inheritance of a two pairs of alleles belonging to two different characters.
(ii) It produces a phenotypic monohybrid ratio 3 : 1 in F_2 generation.	(ii) It produces a phenotypic monohybrid ratio of 3 : 1 in F_2 generation.
(iii) It produces genetopic ratio of 1 : 2 : 1 in F_2 generation.	(iii) It produces genetopic ratio of 1 : 2 : 1 : 2 : 4 : 2 : 1 : 2 : 1
(iv) Test cross ratio 1 : 1	(iv) Test cross ratio 1 : 1 : 1 : 1

20. Vital Index—The ratio of birth to deaths within a population during a given time is called vital index formula for vital index, $\boxed{V.I. = \frac{B}{D}}$

If V.I < 100, Then population is decreasing.

If V.I > 100, Then population is increasing

21. Cancer Diseases : Cancer is a dreadful disease. It is most common in people between 35 to 60 years of age, but may occur at younger ago also. It is a major causes of death all over the world. It commonly originates in the tissues in which the cellsare regularly replaced by mitosis. These tissues include skin, lining of digestive tract, reproductive organs, lungs and liver

Cancer is an abnormal and uncontrolled division of cells that invade and destroyed the surround tissues. Generally, cancer is defined as uncontrolled proliferation of cells without any differentiation. Cancer cells are different from normal cells in some aspects. They do not remains confined to one part of the body. They pennated and infiltrate into the adjoining tissues. Some of the cancer cells get detached from the main site of organ and travel by blood and lymph to sites distant from the original tumour and form fresh calories, called *metastasis* or *secondary growth.*

Cancer Causing Agents : There is no clear causes of cancer. Cancer is neither herediatary nor contagious. However, many causes are considered responsible for the development of cancer. These are called *carcinogenic agents or carcinogens.* Anything which affects mitotic rate can be a carcinogen. The causes of cancer are briefly described :

(1) Continues Physical Irritation :

(i) Beetel and Tobacco Chewing : Oral cancer is caused by the irritation in the buccal cavity epithelium by the regular chewing of beetle and tobacco.

(ii) Heavy Smoking : Heavy smoking causes lung cancer and may also causes cancer of ral cavity, pharynx (throat) and larynx.

(iii) Jagged teeth may causes tongue cancer.

(iv) Excessive exposure to sun light can causes sking cancer (in farmers and labourers).

(2) Chemical Agents : Several chemicals are known to causes cancer. These are caffeine, nicotiana, products of combustions of coal and oil and pesticides, constant use of artificial sweetener.

(3) Radiations : The X-rays, cosmic rays ultraviolet rays, etc., are carcinogenic, can causes cancer by damaging DNA leading to neoplastic transformation.

(4) Virus : At present there is no definite evidence that any human cancer is caused by a virus. But certain virus may causes cancer. The virus that causes cancers are called *once viruses* or *oncogenic viruses*. Oncogenic viruses have genes called *viral oncogenes.* Certa animal cancers are knwons to be induced by a virus.

Symptoms : On the basis of following symptoms cancer can be indentitifed :

1. A wound on body does not heal in normal time.
2. Excessive and rapid growth of wart or mole;
3. Unexplained loss of weight.
4. Unexplained loss or reduction of appetite.
5. Unexplained low-grade fever.
6. Bleeding from any body-opening.
7. A hard tissue of lump which changes or grows larger.
8. Persistent indigestion of difficulty in swallowing.
9. Persistent changes in the bladder or bowel habits.
10. Persistent cough or hoarseness.
11. Excessive loss of blood during menstrual cycle in women or loose of blood outside the normal date.
12. A swollen or sore throat which does not heal easily.

Prevention :

1. Environment should be neat and clean, should not be polluted.
2. No smoking.

3. Battle and Tobacco should not be chewed.
4. Consult physician, if there is any gland present on body.
5. consult physician, if there is any leakage from wart or mole.
6. Time to time checkup of the gland in our the body.
7. Women should consult the physician about their cervix time to time.

22. Transgenic Animals :

(i) Animals that have had their DNA modified to possess and express an extra gene (from a different species), are known as transgenic animals.

(ii) Majority of transgenic animals are mice. However, transgenic rats, rabbits, pigs, sheep, cows and fish have also been produced.

(iii) Transgenic animals are useful as the disease models and producers of substances for human welfare.

Benefits :

(a) **Study of gene regulation and its effects** can be done by introducing genes from other species that alter the formation of a hormone or a growth factor and studying the biological effects that result.

(b) **Study of how genes** contribute to the development of a disease. Transgenic animals can serve as models for human diseases.

Today, transgenic models exist for cancer, cystic fibrosis, rheumatoid arthritis and Alzheimer's and many more.

(c) **Biological products** made by using transgenic animals are :

- Human protein (α-1-antitrypsin) used to treate emphysema.
- Proteins to treat phenylketonuria (PKU) and cystic fibrosis.
- Human protein-enriched milk (2.4 g/L) containing human alpha-lactalbumin.

(d) **Testing vaccine safety before human use**—Transgenic mice are being used to test the safety of the polio vaccine.

If successful and found to be reliable, they could replace the use of monkeys as test animals.

23. Pond—A pond is body of standing water, either natural or man-made. That is usually they contain shallow water with marsh and aquatic plants and animals. It is made mainly to restore habitat or water treatment. There are many type of ponds such as Fish pond, solar ponds designed to store them as energy.

Components of a pond ecosystem—There are two type of component of pond ecosystem—(a) Abiotic (b) Biotic

(a) Abiotic Component—The abiotic components are formed as a result of the mixture of some organic and inorganic material. The basic component are water, oxygen, carbon-dioxide, salts of calcium and nitrogen etc. Only a small amount of these elements are present in soluble state in pond water but a large amount is held in reverse solid form in the bottom sediments as well as with in the organisms, various organisms get their nourishment from these abiotic substances.

(b) Biotic component—Following type of Biotic component

(i) Producers—The producers are of two types-larger rooted and floating vegetations together termed macrophytes and phytoplanktons which are microscopic algae phytoplanktons are available upto the depth of water where light penetrates. Example of this-ulothrix, oedogonium, sprigyra, Anabena, oscill atoria etc. Macrophytes like Hydrilla, utricularia, Trapa, Mymphrea etc.

(ii) Consumers—Consumers of pond ecosystem are heterophs, which depend for their nutrition on other organs, Zooplankton rom primary consumers, include Brachious, Asplanchna, Lechane etc, who feed on phytoplakton, Nectic animal like insects, fishes from secondary consumers as they feed on zooplanktons. Benthic animal like snakes, big fishes live on nectic animals and are termed tertiary consumers.

(iii) Decomposer—Most of decomposer of pond ecosystem are saprophytes but some parasites are saprophytes but some parasites are also found, Bacteria fungi like Aspergillus, clad osporium, Rhizopus, Alternaria etc are decomposer. Generally the decomposers either live in the soil layer, be heath water or in the mud. They act on dead animals and supply raw materials to the producers.

24. Seed—This is the grains or ripened ovules of plants. This fertilized ripened ovule of a flower plant containing an embryo and capable normally of germination to produce a new plant. The formation of the seed completes the process of reproduction in seed plants (started with the development of flowers and pollination) with the embryo developed from the zygote and the seed coat from the integuments of the ovule.

Process of pollen seed formation :

(i) The cells within the pollen sac are microspore mother cells.

(ii) Each microspore mother cell is diploid.

(iii) Each microspore mother cell is divided by meiosis to produces four micropores.
  (a) This culture of four microspores.
  (b) Each microspore in the tetra is haploid.

(iv) Each microspore divides once by mitosis to form either a 2-celles microspore or a binucleated microspore depending upon the species of plant.

(v) Each microspore differentiate into a pollen grain by developing a heavy thick and sculptured wall around itself.

25. Watson and Crick proposed a structure of DNA molecule. It is double helix and is formed of two polynucleotide chains which are coiled with one another in a spiral. The nucleotides in a polynucleotide chain are linked together by phosphodiester bond. These chains remain held together by weak bonds in their helical configuration by hydrogen bonding. These two chains run in an antiparallel directions with carbon atom at 5' position in the sugar molecule in one direction in one chain and in the opposite direction in the other chain. So, they are assigned as 5'-3' orientation in one chain and with 3'-5' orientation in other chain. The sugar and phosphate form a backbone and side railing from which bases project out at the right angles. The base pairs are stacked between the two chains perpendicular to the axis of

the molecule like the steps of a spiral staircase Adenine (A) pairs with thymine (T) and guanine (G) pairs with cytosine (C) Both the chains are complementary to each other and are helically coiled.

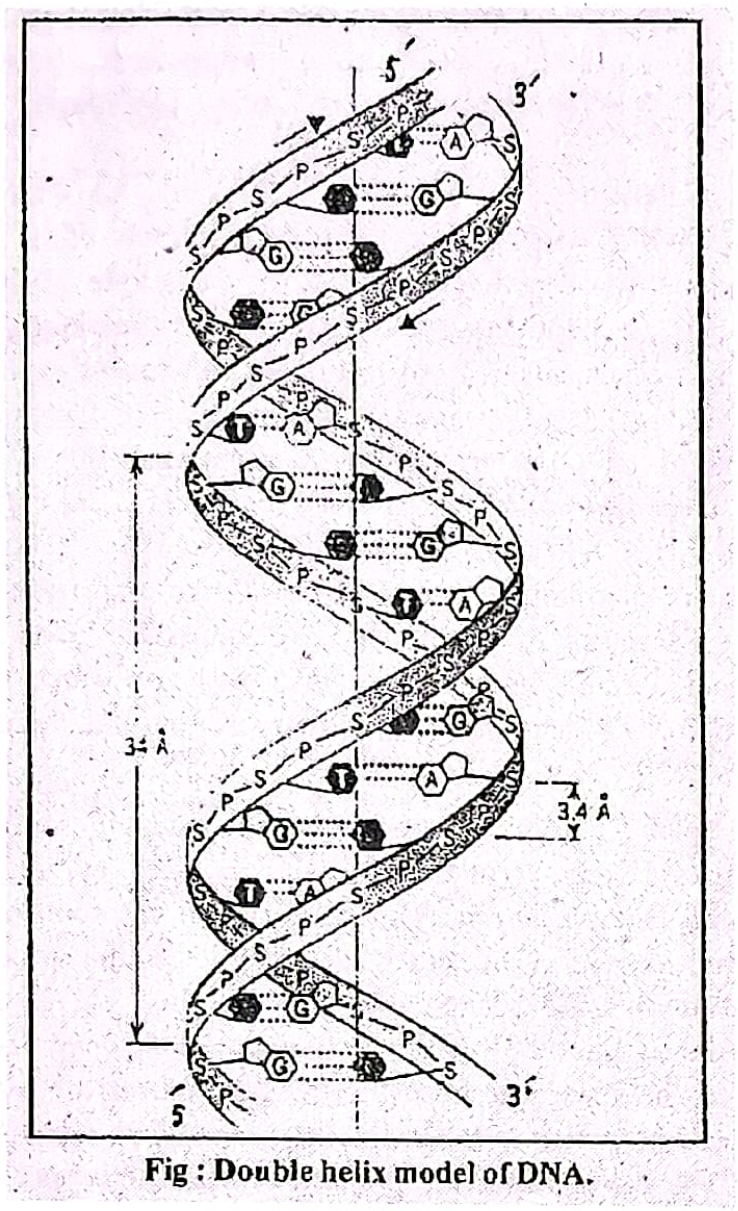

Fig : Double helix model of DNA.

The helix has a constant diameter of 20 Å (2 nm) throughout its entire length. Its one turn is about 34 Å (3.4 nm) long and it carries stacks of 10 bases. So, these bases are stacked apart by 0.34 nm in a ladder.

26. Animal husbandry—It is the method of taking care of the animal using scientific methods. For example many farmer don't known how to organize their form so that the animals are comfortable.

Advantage of animal husbandry for farmer :

(i) Animal husbandry help us in providing proper feed, proper shelter and protection against diseases to domestic animals. Thus It helps in proper management of the domestic animals.

(ii) Animal husbandry helps us in developing high yielding breeds of various domestic animals through cross breeding.

(iii) Animal husbandry helps in systematic disposal of animal wastes. Thus it helps in maintaining healthy environment.

(iv) Animal husbandry help in rising the living standards of farmers. As a result of higher production of animal products the income of farmer increases.

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