

BIOLOGY

MODEL PAPER – 1

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 objective questions to be answered. For each question, mark the correct option on the answer sheet.

35 × 1 = 35

1. When male differs from females in morphology, it is called :
(A) Homogamy (B) Sexual dimorphism
(C) Heterogamy (D) Harmaphroditism
2. The term 'Pistillate' is used for :
(A) Bisexual flower
(B) Unisexual female flower
(C) Unisexual male flower
(D) Staminate flower
3. Which one is a haploid structure in the following ?
(A) Zygote (B) Ovum
(C) Gamete (D) Both (B) and (C)
4. Variation appear during meiosis due to :
(A) Crossing over (B) Independent assortment
(C) Linkage (D) Both (A) and (B)
5. DNA and RNA are similar in :
(A) Being capable to replicate
(B) Having similar sugars
(C) Being polymers of nucleotides
(D) Having similar pyrimidine bases
6. Memory cells are formed from :
(A) Monocytes (B) Lymphocytes
(C) Eosinophil (D) Neutrophils
7. The queen honeybee arises from a fertilized egg and its larva feeds on :
(A) Honey (B) Pollen
(C) Royal jelly (D) Microbes
8. Herbicide resistance gene in plant is :
(A) Bt (B) Ct (C) Mt (D) Gst
9. In submerged plants, the stomata lie on :
(A) Equally on both surfaces (B) Upper surface
(C) Not on any surface (D) Lower surface
10. Which of the following is not a producer ?
(A) Agaricus (B) Nostoc
(C) Volvox (D) Spirogyra
11. Stomata and roots are lacking in which of the following ?
(A) Dracaena (B) Marsilea
(C) Hydrilla (D) Eichhornia
12. 'Tuber' is a modified form of :
(A) Bud (B) Stem
(C) Root (D) Root with stored food
13. Which one of the following is possible in micropropagation?
(A) Asexual reproduction (B) Sexual reproduction
(C) Both 'A' and 'B' (D) None of these
14. Yeast reproduces by means of :
(A) Budding (B) Fragmentation
(C) Pollination (D) All of these
15. Pollen grains represent :
(A) Sporophyte (B) Gametophyte
(C) Male Gametophyte (D) None of these
16. Amphibian among plants belong to :
(A) Algæ (B) Bryophytes
(C) Fungi (D) Pteridophytes
17. How many chromosomes are present in endosperm ?
(A) n (B) $2n$
(C) $3n$ (D) both 'A' and 'C'
18. Aril is edible part of :
(A) Annona (B) Apple
(C) Orange (D) All of these
19. Which one is hydrophytic plant ?
(A) Trapa (B) Opuntia
(C) Dulbergia (D) Acacia

20. Blood and circulatory systems originate from which germinal layer ?
 (A) Ectoderm (B) Mesoderm
 (C) Endoderm (D) None of these
21. What is the number of chromosomes present in human gametes ?
 (A) 21 (B) 23
 (C) 44 (D) 46
22. Graafian follicle occur :
 (A) In human thyroid (B) In human female's ovary
 (C) In frog's ovary (D) In Rabbits testis
23. What is 'Saheli' ?
 (A) oral pills for pregnancy
 (B) non-steroidal pills
 (C) oral contraceptive for human female
 (D) Both 'B' and 'C'
24. The term 'Genetics' was proposed by :
 (A) Mendel (B) Morgan
 (C) Beteson (D) Johansen
25. Which of the following Mendel's Law is not universal ?
 (A) Law of Dominance
 (B) Law of Segregation
 (C) Law of Independent Assortment
 (D) None of these
26. How many characters were studied by Mendel ?
 (A) Five (B) Four
 (C) Seven (D) Three
27. Exception of Mendel's law is :
 (A) Dominance (B) Purity of gametes
 (C) Linkage (D) Independent assortment
28. Bacteria has :
 (A) Plasmid DNA (B) RNA
 (C) Both 'A' and 'B' (D) None of these
29. Inheritance of acquired characters was given by :
 (A) Darwin (B) Lamarck
 (C) Devries (D) Haeckel
30. Chromosome number in human female (Woman) is :
 (A) 44 + XX (B) 44 + XY
 (C) 44 + YY (D) None
31. Which one of the following is mobile genetic elements ?
 (A) Split gene (B) Transposon
 (C) Jumping gene (D) Both 'B' and 'C'
32. Which one is initiation codon ?
 (A) UAG and UGA (B) AUG and GUG
 (C) UAA and UAG (D) UAA and UGA
33. A gene pair hides the effect of another gene pair. The phenomenon is :
 (A) Epistasis (B) Dominance
 (C) Mutation (D) None of these
34. Anticodon found in :
 (A) on DNA (B) on tRNA
 (C) on rRNA (D) on mRNA
35. Nucleoside is :
 (A) Sugar + a nitrogenous base
 (B) Sugar + Phosphate
 (C) Nitrogenous base + Phosphate
 (D) None of these
36. Which of the nitrogenous base is not present in RNA :
 (A) Thymine (B) Cytosine
 (C) Guanine (D) Adenine
37. What is the scientific name of Modern man (Present Man) ?
 (A) Homo habilis (B) Homo erectus
 (C) Homo solensis (D) Homo sapiens
38. Which of the following is not an example of vestigial organ ?
 (A) Coccyx (B) Vermiform appendix
 (C) Nictitating membrane (D) Opacity of Eye
39. Which of the following factors is important in the formation of new species?
 (A) Competition (B) Mutation
 (C) Isolation (D) Continuous variation
40. Which of the following are cancerous cells ?
 (A) Plasma cells (B) HeLa cells
 (C) Memory cells (D) T-cells
41. Which of the following is a sexually Transmitted Disease ?
 (A) Typhoid (B) Cholera
 (C) Malaria (D) Syphilis
42. Widal test is done to confirm :
 (A) Malaria (B) Typhoid
 (C) AIDS (D) Cancer
43. Which of the following disease is spread by contaminated drinking water ?
 (A) Typhoid (B) Malaria
 (C) Filaria (D) Kala azar
44. In certain cases for early and accurate detection of disease we may use :
 (A) ELISA (B) Culture
 (C) Chemical (D) Analytical
45. Which of the following is not a viral disease ?
 (A) Mumps (B) Influenza
 (C) Diphtheria (D) Measles
46. Oncogene is responsible for :
 (A) Cancer (B) AIDS
 (C) Tuberculosis (D) Polio
47. Which of the following is a retro virus ?
 (A) Human Immuno Deficiency virus
 (B) Hepatitis Virus
 (C) Micro virus influenzii
 (D) All of these
48. Which of the following fish is not a Major Carp ?
 (A) Labeo rohita (B) Catla catla
 (C) Cirrhinus mrigala (D) Clarias batrachus
49. Sonalika and Kalyan Sona are varieties of :
 (A) wheat (B) rice
 (C) millet (D) tobacco
50. The first transgenic cow was named as :
 (A) Daisy (B) Maizy
 (C) Dolly (D) Rosie
51. Which bacteria are utilised in gobar gas plant ?
 (A) Nitrifying bacteria (B) Ammonifying bacteria
 (C) Denitrifying bacteria (D) Methanogens
52. The flour of Idli and Dosa is made by the use of which microbe ?
 (A) Bacteria (B) Lactobacillus
 (C) Virus (D) Yeast

53. Agarose is extracted from:
 (A) Maize (B) Sea weeds
 (C) Cycas (D) None of these
54. Bio Fertilizer is present in root nodules of which non-leguminous plant?
 (A) Azotobacter (B) Clostridium
 (C) Frankia (D) None
55. Restriction enzymes are :
 (A) Exonuclease (B) Endonuclease
 (C) Ligase (D) Polymerase
56. Restriction enzymes are known as :
 (A) Biological guns (B) Molecular scissors
 (C) Plasmid (D) Micro Pipette
57. GAATTC is recognition site for which restriction endonuclease ?
 (A) Hind III (B) Eco RI
 (C) Bam I (D) Hae III
58. Which one of the following is not used as bio-fertilizer ?
 (A) Bacillus thuringiensis (B) Anabaena
 (C) Nostoc (D) Rhizobium
59. Which type of bonding is present in between nitrogenous bases of nucleic acid ?
 (A) Peptide bond (B) Ester bond
 (C) Both 'A' and 'B' (D) Hydrogen bond
60. Transgenic mice may be used for testing of :
 (A) The safety of vaccines (B) Efficiency of fertilizers
 (C) Doses of antibiotics (D) All of these
61. Oviparous are :
 (A) hen (B) snake
 (C) crocodile (D) all of these
62. Which among the following is an example of xerophytic adaption ?
 (A) Moss (B) Zinnia (C) Rose (D) Opuntia
63. Green plants in an ecosystem are :
 (A) Producers (B) Consumers
 (C) Decomposers (D) None of these
64. Which of the following is the correct food chain ?
 (A) Grass, Wheat & Mango (B) Goat, Cow and Grass
 (C) Grass, Goat and Lion (D) Grass, Fish and Goat
65. Which of the following is an example of *ex-situ* conservation ?
 (A) Sacred groves (B) National park
 (C) Seed bank (D) All of these
66. Kanha National Park is famous for :
 (A) Birds (B) Rhinoceros
 (C) Tigers (D) Crocodiles
67. Presently, total number of biodiversity hot spots in the world is :
 (A) 25 (B) 34 (C) 37 (D) 40
68. Biogas contains :
 (A) CO₂ (B) H₂S
 (C) CH₄ (D) All of these
69. World's most problematic aquatic weed is :
 (A) Azolla (B) Wolffia
 (C) Eichornia (D) Trapa
70. Factors of acid rain are :
 (A) CO and CO₂ (B) NO₂ and SO₂
 (C) CO₂ and NO₂ (D) N₂ and NO₃

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. $10 \times 2 = 20$

- Write a short note of Adenosine deaminase.
- List few preventive measures of AIDS.
- What is Genetic Engineering ?
- What is gene therapy ? Illustrate using the example of adenosine deaminase (ADA) deficiency.
- Answer the following in brief :
 (a) What is acid rain ?
 (b) What is the effect of radiation pollution on humans ?
- Define Ecosystem.
- Define Pyramid of biomass.
- What is Carbon Cycle ? Define it.
- Define Coupling and Repulsion.
- What is M.T.P. ? Write its safety and fatal periods.
- What are test tube babies ?
- What do you mean by Ozone Hole? What are main reasons of Ozone Depletion ?
- Define the following :
 (i) Linkage (ii) Linkage group
 (iii) Direct linkage (iv) Indirect linkage
- What do you understand by budding ? Write with examples.
- Define gametogenesis. List two types of gametogenesis. Tabulate the differences between them.
- Write a note on puberty.
- Mention the laws of Inheritance, proposed by Mendel.
- Differentiate between DNA and RNA.
- What do you understand by the following ?
 (a) Micro Mutation
 (b) Macro Mutation
 (c) Chromosomal Mutation
- Describe the bee-keeping (Apiculture) in brief.

LONG ANSWER TYPE QUESTIONS

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

- What is food web? Explain it with the help of suitable examples.
- What do you mean by menstrual cycle ? Discuss different phases of menstrual cycle with the help of diagrammatic representation.
- What are the chromosomal basis of sex determination in human being ?
- What is tuberculosis ? For which bacteria is it caused ? Write about its control.
- Explain the role of Biotechnology in the field of agriculture.
- Describe the importance of Bacterium in Bio-technology ?

ANSWER WITH EXPLANATION

SECTION - A

OMR ANSWER-SHEET

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

ANSWER

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

SECTION - B

1. Adenosine deaminase (ADA) is an enzyme involved in purine metabolism. It is needed for the breakdown of adenosine from food and for the turnover of nucleic acids in tissues.
2. (i) Making blood from blood banks safe from HIV.
(ii) Ensuring the use of only disposable needles and syringes in public and private hospitals and clinics.
(iii) Free distribution of condoms.
(iv) Controlling drug abuse, advocating safe sex and promoting regular check ups for HIV in susceptible population.
3. Genetic engineering is a deliberate modification of an organism's DNA, using various techniques. This altered DNA (recombined DNA) is then introduced into the same or different organism to change its phenotype. This is followed by growing this genetically modified microbe/eukaryotic cell in large quantities, maintaining sterile (microbial contamination-free) environment, for the manufacture of biotechnological products like antibiotics, vaccines, enzymes, etc.
 - (i) **Traditional hybridisation** procedures used in plant and animal breeding, often result in inclusion and multiplication of undesirable genes along with the desired ones.
 - (ii) **Genetic engineering** overcomes this problem as it creates a recombinant DNA, by introducing only one or few desirable genes into the target organism. Technique of genetic engineering includes
 - (a) construction of recombinant DNA.
 - (b) gene cloning.
 - (c) gene transfer.
4. Gene therapy is a replacement of a defective or absent gene with a normal healthy gene, to correct a genetic disorder. Adenosine deaminase (ADA) deficiency is caused due to the deletion of gene, coding this enzyme. To correct this disorder :
 - (i) Lymphocytes are isolated from the blood or bone marrow of the patient and grown in a culture outside the body.
 - (ii) A functional ADA gene is then introduced into these lymphocytes, which are subsequently returned to the patient.
 - (iii) Since, these cells have a limited life, the patient requires repeated infusion of such genetically engineered lymphocytes.
 - (iv) However, if the gene isolate from marrow cells producing ADA is introduced into cells at early embryonic stages, it could be a permanent cure.
5. (a) **Acid rain**—It is a rain or any other form of precipitation that usually acidic. It possesses elevated levels of hydrogen ions (low pH). It can have harmful effects on

plants aquatic animals and infrastructure. Acid rain is caused by emissions of sulphur dioxide and nitrogen oxide, which react with water molecules in the atmosphere to produce acids. In chemical the acid rain can cause point to peel, corrosion of steel structures such as bridges and erosion of stone statues.

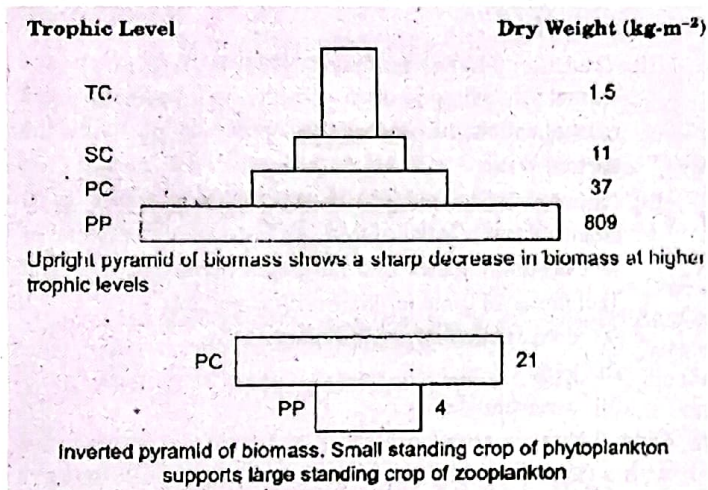
(b) Harmful effect of radiation on human are following :

- (i) X-rays, ultraviolet ray in long use cause genetic changes and mutations in living organisms. At the same time they are used for preservation of food stuffs, treatment of cancers of blood etc.
- (ii) U.V. rays can cause skin diseases in human and exhibit a role in promotion of skin of cancer and mutations.

6. Ecosystem is a functional unit of nature, an association of organisms and their physical environment, interconnected by a continuous flow of energy and a cycling of nutrients.

7. **Pyramid of biomass** shows relationship between producers and consumers in an ecosystem terms of biomass. It can be

- (a) Upright, e.g., in case of grass land ecosystem.
- (b) Inverted, e.g., in case of food ecosystem.



8. **Carbon Cycle**—In living organisms, carbon constitutes 49% of their dry weight. Out of total quantity of global carbon, 71% carbon is found dissolved in oceans. This oceanic reservoir regulates the amount of carbon dioxide in the atmosphere. Fossil fuel also represent a reservoir of carbon. Carbon cycling occurs through atmosphere, ocean and through living and dead organisms. It is estimated that about 4×10^{13} kg of carbon is fixed in the biosphere through photosynthesis annually. A large amount of carbon returns to the atmosphere as CO₂ through

- (a) Respiratory activities of the producers and consumers.
- (b) Breakdown activities of decomposers. (c) forest fire and combustion of organic matter. (d) Volcanic activity. (e) Rapid deforestation. (f) Burning of wood and fossil fuel.

Human activities have influenced the carbon cycle by significantly increasing the rate of release of carbon dioxide into the atmosphere, leading to many harmful effects on the environment.

9. **Coupling**—Coupling refers to the case where dominant alleles are on the same homologue chromosomes and both recessive alleles are on the other homologue chromosome.

Repulsion—Repulsion refers to the case where each homologous chromosome has one dominant and one recessive allele from the two genes.

10. **MTP**—It stands for medical termination of pregnancy. It is also called induced abortion. It is the medical way of getting rid of unwanted pregnancy. Any qualified gynaecologist can perform MTP.

Safety Period—10 or 11 weeks; Fatal Period—12 weeks.

11. A women who cannot conceive can have a baby by special technique. Ovum from mother is taken out, fertilized in the lab, the embryo is reimplanted into the uterus. Embryo develops into a normal baby. The offspring thus produced is called a test tube baby. It is done by (IVF) invitro fertilization and embryo transfer techniques.

12. The Aerosoles like C.F.C. (Chloro Fluoro Carbon) release into the atmosphere from the refrigerators, air conditioners and jet planes deplete or reduce the Ozone layer.

This is called Ozone depletion and these substances are called ozone depleting substances (O.D.S.).

This thin layer is also known as ozone hole.

Reason of Ozone Depletion :

- (i) Ozone degradation has increased due to CFCs (Chlorofluoro Carbons).
- (ii) Chloride atom acts as catalyst to degrade Ozone and release molecular oxygen.
- (iii) CFCs are refrigerants which react with UV in stratosphere to release chloride atoms.

13. (i) **Linkage**—Linkage is the close association of genes or other DNA sequences on the same chromosome. The closer two genes are to each other on the chromosome, the greater the probability that they will be inherited together.

(ii) **Linkage Group**—All the genes which are located in a single chromosome form one linkage group. The total number of linkage groups in an organism corresponds to the haploid number of chromosomes.

(iii) **Direct Linkage**—The genes which are present on 50 or less than 50 map units show direct linkage.

(iv) **Indirect linkage**—The genes which are present beyond from 50 map units show indirect linkage.

14. **Budding**—Budding is a form of asexual reproduction in which a new organism develops from on outgrowth or bud on another one due to cell division at one particular site. The new organism remains attached as it grows, separating from the parent organism only when it is mature, leaving behind scar tissue. Since the reproduction is asexual, the newly created organism is a clone and is genetically identical to the parent organism Ex-(Hydra).

15. Gametogenesis is the process of formation and differentiation of haploid gametes (sperms and ova) from the diploid primary germ cells, gametogonia present in primary sex organs called gonads.

Its of two types (i) Spermatogenesis and (ii) Oogenesis.

Difference :

Spermatogenesis	Oogenesis
1. It occurs in seminiferous tubules of testes.	1. It occurs in ovaries.
2. One spermatogonia forms 4 haploid sperms.	2. One oogonium forms only one ovum.
3. No yolk is synthesized in growth phase.	3. Vitellogenesis occurs in growth phase.
4. Sperm is much smaller than spermatogonium.	4. Ovum is much larger than oogonium.
5. Nucleus becomes condensed.	5. Nucleus is bloated.

16. Puberty is the period of sexual maturity. It comes between 13 to 16 years in the male and between 10 to 14 years in the female. It is controlled by testosterone in the male and estrogens in the female. It is characterized by the development of secondary sexual characters.

17. **Mendels law of Inheritance**—Based on his hybridisation experiments, mendel proposed the law of Inheritance.

(i) **Law of Dominance (Ist Law)**—This law states that when two alternative forms of a trait or character (gene or alleles) are present in an organism. Only one factor expresses its self in F_1 progeny and is called dominant while that remains called Recessive.

(ii) **Law of Segregation (Second Law)**—This law states that the factor or alleles of a pair segregate from each other during gamete formation such that a gamete receive only one of the two factors. They do not show any blending.

(iii) **Law of Independent Assortment**—According to this law when two pairs of traits are combined in a hybrid, segregation of one pair of traits is independent of the other pair of traits.

18. **Difference between DNA and RNA :**

DNA	RNA
1. It is de-oxiribose nucleic acid.	1. It is ribose nucleic acid.
2. It is double helical structure.	2. It is single helical structure.
3. Nitrogen base present are adenine, guaninè, thymine & cytosine.	3. Nitrogenous base present are ademine, guanine, cytosine and Uracil.

19. (a) **Micro-mutation**—It is also called point mutation or single base mutation. It is a type of mutation that causes the replacement of a single base nucleotide with another nucleotide of genetic material, DNA or RNA.

(b) **Macro-mutation**—A mutation that has a profound effect on the resulting organism, as a change in a regulatory gene that controls the expression of many structure genes.

(c) **Cromosomal mutation**—Any event that changes genetic structure any alteration in the inherited nucleotic acid sequences of the genotype of an organism.

20. Apiculture or Bee-keeping is the rearing of honey bees for the production of honey. It has been an age-old cottage industry. Honey is a food of high nutritive value and also finds use in the indigenous systems of medicine. Honeybee also produces beeswax, which finds many uses in industry, such as in the preparation of cosmetics and polishes of various kinds. The increases demand of honey has led to large scale bee-keeping practices. It has become an established income generating including, whether practiced on a small or on a large scale.

Bee-keeping can be practiced in any area where there are sufficient bee posture of some wild shrubs, fruits or chards and cultivated crops. Apis indica is the most common species which is domesticated easily.

The following points are important for successful bee-keeping :

- Knowledge of the nature and habits of bees.
- Selection of suitable location for keeping the beehives.
- Catching and hiving of swarms (group of bees)
- Management of beehives during different seasons and
- Handling and collection of honey & beeswax

21. Food web is network of food chains which become interconnected at various trophic levels to form a number of feeding connections among different organisms of a biotic community. Food webs provide stability to the ecosystem.

Example—Grass or plants may be eaten by grasshoppers as well as rabbit, cattle and deer. Each of these herbivores may be eaten by number of carnivores like frogs, birds, snakes and tiger depending on their food habits (fig.)

A food web shows the complex interrelationship among organisms.

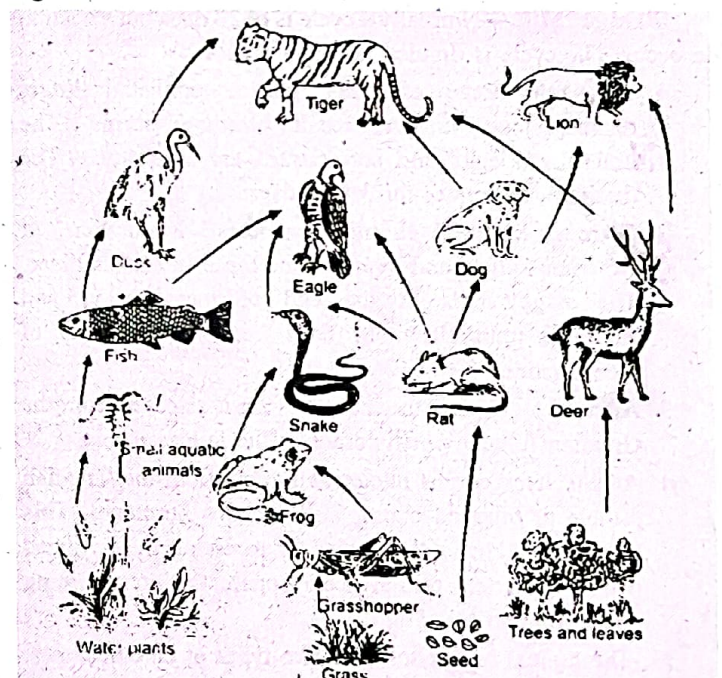
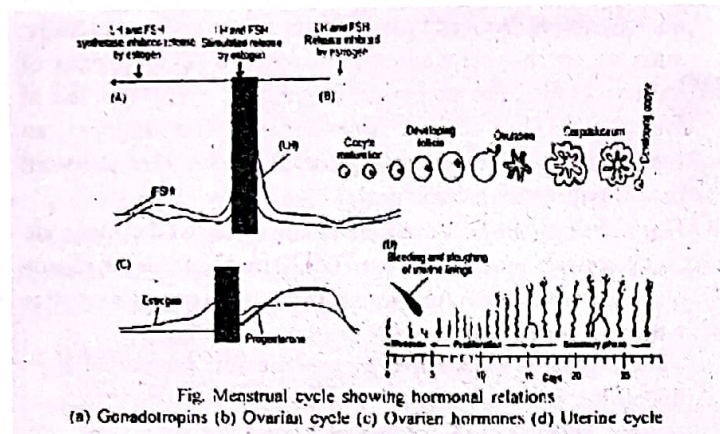


Fig : Food web consisting of many food chains (Forest ecosystem)

22. The reproductive cycle of human female starts from the age of 13-15 at puberty and stops at the age of 45-49 on the onset of menopause. After the menopause the ovarian cycle stops and the woman is not able to bear children. In this span of reproductive life the ovary goes through a cycle of change every month.



This cycle is called the menstrual cycle which is characterised by menstruation, a process in which blood, mucus and uterine tissues are eliminated. The menstrual cycle is regulated by the action of hormones oestrogen and progesterone on the uterine tissue. Oestrogen stimulates the growth of myometrium and endometrium which consists of uterine epithelium glands and connective tissues. Progesterone acts upon the oestrogen primed endometrium to convert it into actively secreting tissues which provides favourable environment for implantation of the fertilized ovum. The endometrial changes throughout the normal non-pregnant menstrual cycle which are regulated by the action of oestrogen and progesterone.

States of M.C.—Normally a cycle is of 28 days but variation do occur. The cycle is divided into four stages.

1. The soft tissue of inner uterine epithelial lining disintegrates with the result bleeding occurs. The unfertilized eggs and soft tissues are discharged. The discharge continues for 3 to 5 days.
2. Uterine epithelial lining reappears. Maturation of Graafian follicle and ovum inside the ovary takes place. The stage starts at the end of menstruation and continues upto 10 to 14 days from the first day of menstruation.
3. After 10 to 14 days the mature ovum is released from the Graafian follicle which comes in the fallopian tube.
4. At this stage corpus luteum is formed from the Graafian follicle of released ovum. This secretes hormones. This hormones prepares the uterus for receiving the fertilized ovum. If no fertilization occurs again the uterus lining breaks up and bleeding occurs.

23. The diploid organisms bear two types of chromosomes. Sex chromosomes and autosomes. The sex chromosomes are generally a pair of chromosomes that are responsible for sex

determination. The remaining pairs of homologous chromosomes that are not involved in determining the sex, are called as autosomes. If an organism produces only single type of similar gametes (XX chromosomes), then it is referred as homogametic and if it produces two types of gametes (XY-chromosomes), then it is referred as heterogametic. Chromosomes determine the sex of an organism by the following methods :

(i) **XX-XY type**—In this type, the two sex chromosomes in a female are similar (XX-homomorphic) and in the male, they are different (XY-heteromorphic) from one another. In the human beings, the female bears 22 pairs of autosomes and XX sex chromosomes and hence is referred to as homogametic sex. The males have 22 pairs of autosomes and XY sex chromosomes and are referred to as the heterogametic sex. In *Drosophila*, there are 3 pairs + XY chromosomes in male and 3 pairs + XX chromosomes in female.

(ii) **XX-XO type**—In this type, the males bear only one X chromosome and produce only half the sperms with X chromosomes and remaining half remains without X-chromosomes. The males are, therefore, referred to as XO. The females bear XX chromosomes and produce only one type of similar eggs. The females are, therefore, referred to as homogametic XX. If the female egg (X) is fertilized with a sperm lacking X chromosome, then the progeny will be male because male are designed as XO. This type of chromosomes are found in roundworms and in some insects like bugs, grasshoppers and cockroaches etc.

(iii) **ZW-ZZ type**—In this type, the female bears heteromorphic sex chromosomes (ZW) and male contains homomorphic sex chromosomes (ZZ). Hence, the sex determination lies on the type of egg (carrying Z or W chromosome) that is fertilized. It is found in birds and in some reptiles.

(iv) **ZO-ZZ type**—In this type, the females bear only one Z chromosome and produce half the egg with Z chromosomes and the remaining half remains without Z chromosomes. They are, therefore, referred to as ZO type (heterogametic). The males bear ZZ chromosomes and produce only one type of similar sperms. The males are, therefore, referred to as homogametic-ZZ is found in butterflies and moths.

(v) **Haplodiploidy**—In this type, the males are haploid because they are developed from the unfertilized egg by the process of parthenogenesis. The females are diploid because they are produced by the fusion of fertilized egg and sperms. This type of sex determination occurs in bees, ants and wasps.

24. Tuberculosis : Tuberculosis (TB) is an infectious disease that is caused by a bacterium called *Mycobacterium tuberculosis*. TB primarily affects the lungs but it can also affect organs in the central nervous system, lymphatic system, and circulatory system among other.

When a person becomes infected with TB the bacteria in the lungs multiply causing pneumonia the patient experiences chest pain and has a persistent cough which often brings up cough.

Controlling of TB : (i) BCG vaccination is recommended where risk of tuberculosis is high. (ii) Those with pulmonary tuberculosis are contagious upto about two to three weeks once their treatment is begun. (iii) isolation from workplaces, schools and colleges and areas with crowd who are infected. (iv) Covering one's mouth and nose while coughing or sneezing. (v) Sharing beds and rooms with uninfected persons while sleeping should be avoided.

25. Role of Biotechnology in agriculture is following :

(i) **Plant and Animal reproduction**—Enhancing plant and animal behaviour by traditional method like, cross-pollination, grafting and cross-breeding is time-consuming. But biotech advance let for specific changes to be made rapidly, on a molecular level through over-expression or removal of genes or the introduction of foreign gene.

(ii) **Pesticide**—Resistant crops first introduced in 1998 as GM Soybeans, Roundup-Ready Plants are unaffected by the herbicide glyphosate, which can be applied in copious quantity to get rid of any other plants in the field. The profit is saving in time and cost associated.

(iii) **Nutrient Supplementation**—Biotechnology is very helpful to get better health mainly in immature countries, scientists are creating hereditarily distorted food that hold nutrients know to help fight disease or starvation.

(iv) **Manufacturing power fibers**—Spider silk is made with the help of this technology.

(v) **Biofuels**—The agriculture industry plays a big role in the biofuels industry as long as the feed stocks for fermentation and cleansing of bio-oil, bio-ethanol.

26. Importance of Bacterium in Bio-technology :

(i) **Bio-fertilizers**—These are nitrogen fixing microorganism which are found either in the soil or associated with the plants. The biofertilizers are likely to reduce the needs of chemical fertilizers.

(ii) **Alcoholic Beverages**—Increase in the production of beer, wine, whisky etc.

(iii) **Enzyme**—Enzyme required for industrial and medicinal use are obtained by microbial processes.

(iv) **Vitamins**—Vaccine used for providing immunity against various disease, are produced by micro-organism.

(v) **Antibiotics**—A number of Antibiotics are derived from the fermentation of organic compounds, brought about by micro-organism.

(vi) **Interferon**—In 1980 famous scientist Biogen formed Interferon with the help of genetic engineering and biotechnology.

(vii) **Steroids**—These are derivatives of fats and commonly used as antifertility formation. These are formed by biotechnology.

(viii) **Organic acid**—Organic acids like Lactic acid, Gluconic acid, Acetic acid and citric acid are obtain by biotechnology.

(ix) **Monoclonal Antibodies**—Antibody against pathogens can be obtained from clonal culture of microbes.

