

CHAPTER - 1 HEREDITY & EVOLUTION (Blueprint – 1X1=1 & 3 X 2=6 Total Marks 7)
CHOOSE THE CORRECT ANSWER

1. Mendel observed 7 pairs of contrasting characters in *Pisum sativum*. Which one of the following is not a part of that?

- i) Tall and dwarf ii) Yellow and green seed colour iii) Terminal and axial flower iv) Smooth and rough stem

Ans: iv) Smooth and rough stem

2. Primitive man evolved in _____

- i) Africa ii) America iii) Australia iv) India

Ans : i) Africa

3. Which of the following is inheritable?

- i) an altered gene in sperm ii) an altered gene in liver cells iii) an altered gene in skin cells iv) an altered gene in udder cells

Ans : i) an altered gene in sperm

4. The theory of Natural Selection was proposed by _____.

- i) Charles Darwin ii) Hugo de Vries iii) Gregor Johann Mendel iv) Jean Baptise Lamarck

Ans : i) Charles Darwin

5. Somatic gene therapy causes _____.

- i) changes in sperm ii) changes in progeny iii) changes in body cell iv) changes in ovum

Ans : iii) changes in body cell

6. In a pea plant, the yellow colour of the seed dominates over the green colour. The genetic make up of the green colour of the seed can be shown as _____:

- i) GG ii) Gg iii) Yy iv) yy

Ans : iv) yy

7. Some people can roll their tongue and this is a genetically controlled auto-somal dominant character. [Roller = RR / Rr; Non-roller = rr] A child who can roll the tongue has one brother who is a non-roller and two sisters who are rollers. If both the parents are rollers, the genotypes of their parents would be _____.

- i) RR x RR ii) Rr x Rr iii) RR x rr iv) rr x rr

Ans : ii) Rr x Rr

8. Hydra, a multi-cellular invertebrate of phylum cnidaria (coelenterata) can give rise to new offspring by various methods. Choose the method by which the offspring are produced with significant variations.

- i) budding ii) regeneration iii) sexual reproduction iv) asexual reproduction

Ans : iii) sexual reproduction

9. The following are the events in the formation of the first cloned animal – the sheep Dolly.

- a) Removal of haploid nucleus from the ovum. b) Implantation of ovum with diploid nucleus into the surrogate mother.

c) Collection of udder cell from the sheep. d) Injection of diploid nucleus of udder cell into the enucleated ovum.

e) Development of a young clone.

The correct sequential order of these events is _____ . i) abcde ii) cabed iii) cadbe iv) edcba

Ans : iii) cadbe

10. The following are statements about stem cells:

a) There are unspecialised / undifferentiated cells. b) They can be transformed into any type of body cell.

c) They can multiply rapidly to form a large number of similar types of cells. d) They cannot transform into cardiac cells or nerve cells. e) They are obtained from reproductive progeny only.

The correct statements are _____:

- i) a,b,c only ii) c,d,e only iii) a,c,e only iv) b,c,e only

Ans : i) a,b,c only

11. In persons suffering from insulin-dependent diabetes, the cells of pancreas are degenerated.

- i) Alpha ii) Beta iii) Gamma iv) Delta

Ans : ii) Beta

12. Identical twins are born as a result of fertilization between _____.

- i) two eggs and two sperms ii) two eggs and one sperm iii) one egg and one sperm iv) one egg and two sperms

Ans : iii) one egg and one sperm

13. Identify the incorrect statement about identical twins.

- i) developed from a single zygote ii) always of the same sex iii) look alike in many aspects iv) differ in their blood groups

Ans : iv) differ in their blood groups

14. The correct statement about Neanderthal man is:

- i) the first human like hominid ii) started agriculture iii) ate meat and walked erectly iv) buried the dead

Ans : iv) buried the dead

15. The inheritance of characteristics through generation is called "heredity". In Mendel's *Pisum sativum* plant, the genetic material present is _____.

- i) DNA ii) RNA iii) Protein iv) Cytoplasm

Ans : i) DNA

PART - B

16. Mendel has observed Tallness as a dominant character in the garden pea plant. Similarly, tongue rolling is a dominant character in man. In a group of 60 students, 45 can roll their tongue and 15 are non-rollers.

- i) In the above context, calculate the percentage of dominant and recessive characters.

Ans : Total number of students = 60
Tongue rollers (Dominant Characters) = 45
Non-rollers (Recessive Characters) = 15
Percentage of tongue rollers = $45/60 \times 100 = 75\%$
Percentage of Non-rollers = $15/60 \times 100 = 25\%$

The percentage of **dominant** and **recessive** character is **75 : 25** or **3 : 1**

17. The inheritable characters vary in different species and within the same species. Name the variation in the following cases.

- i) The eye colour among the human beings are varied as blue, black, brown, green, etc. This is called as _____ variation.

- ii) The dentition in the rabbit and the elephant are not the same. This is called as _____ variation.

Ans : i. Intraspecific Variation

ii. Intergeneric Variation

18. Sexually reproducing organisms produce offspring with marked, significant and visible variation. Asexually reproducing offspring show minor variations.

- i) Do you agree with the above statements?

- ii) Among the following organisms point out the asexually reproducing organism.

(Cockroach, Euglena, Earthworm and Bird)

Ans : a) Yes, I agree with the above statements.

b) Asexually reproducing organisms are Paramecium and Euglena

19. Here are certain important hereditary terms. Fill in the blanks by choosing a suitable one from the list given. (allele, variation, speciation, gene, allelomorphs)

- i) _____ are the factors which form the physical basis of inheritance.

- ii) _____ is the alternate forms of the same gene.

- iii) _____ are the expressions of contrasting pair of alleles.

Ans : i. Gene

ii. Allele

iii. Allelomorphs

20. A change that affects the body cell is not inherited. However, a change in the gamete is inherited. The effects of radiation at Hiroshima have been affecting generations. Analyze the above statements and give your interpretation.

Ans : The radiation effects of Hiroshima had altered the **genes** of the **germ cells** or **gametes** and it is **inheritable**. That is why the radiation effects of Hiroshima have been affecting generations.

21. Sequentially arrange the different species of man from primitive to modern man.

(Neanderthal man, Homo habilis, Homo erectus, Homo sapiens)

Ans :

Homo habilis
↓
Homo erectus
↓
Neanderthal man
↓
Homo sapiens

22. Bio-technology, the modern science in biology, has helped in producing different types of products. One of the following groups does not have a product of bio-technology. Pick out and give reasons.

- i) enzymes, organic acids, steroids, vaccines ii) vaccines, enzymes, antibiotics, inorganic acids

- iii) antibiotics, hormones, steroids, vaccines iv) steroids, enzymes, antibodies, vaccines.

Ans : ii) Vaccines, Enzymes, Antibiotics, inorganic acids

Reason: Inorganic acid are derived from one or more inorganic compounds. **Inorganic acids** could not be produced by biotechnology.

Ans : Gene therapy is the means to treat or even cure genetic and acquired diseases like cancer and AIDS by using a normal gene to supplement or replace the defective gene. It can be used to treat defects in Somatic i.e. (body) or gametic (sperm or egg) cell.

Types of Gene Therapy

1. Somatic gene therapy:- The defective gene in somatic cells is replaced with a corrective gene. This change is not passed to the next generation.
2. Germ line gene therapy:- Egg and sperm of the parents are changed for the purpose of passing the changes to the next generation.

32. Find the unmatched pairs:

- Nif genes -Nitrogen Fixation
- tt -Alleles
- Bio-chips -Biological computer manufacturing
- Interferon -Antiproteins of Bacteria
- Stem cells -Unspecialised mass of cells

Ans : Interferon -Antiproteins of Bacteria

33. For the experimental research Dr. Ian Wilmut used the nucleus of the udder cell from a six year old Finn Dorset white sheep and preserved the diploid nucleus (2n). He took an ovum from the ovary of another sheep. The haploid ovum was removed. The diploid nucleus of the udder cell was injected into the cytoplasm of the enucleated ovum. Then the diploid nucleus ovum was implanted into the uterus of the surrogate mother sheep. The diploid ovum developed into a young one, named “Dolly” .

i) Why did Wilmut select the udder cell? ii) Define the terms haploid and diploid.

Ans : i. Wilmut selected the udder cell because the diploid nucleus of the udder cell somewhat resembled the diploid nucleus of zygote of sheep.

ii. **Haploid:** A cell or organism having a single set or half number of chromosomes is known as haploid.

Diploid: A cell or organism having a two sets or double number of chromosomes is known as diploid.

34. Match the following by identifying the pair :
(medicines, fuel, microbes, metabolism, organic acids)

i) vaccine ii) natural gas iii) citric acid iv) monoclonal antibodies v) vitamins

Ans :

i. Vaccine	Microbes
ii. Natural Gas	Fuel
iii. Citric Acid	Organic acids
iv. Monoclonal Antibodies	Medicines
v. Vitamins	Metabolism

35. Mention the dominant and recessive traits observed by Mendel in the garden pea plant with respect to the seed and flower.

- Ans :**
1. Seed shape - Round / Wrinkled
 2. Seed colour - Yellow / Green
 3. Flower colour - Violet / White
 4. Flower position - Axillary / Terminal

36. Name the different species of mankind in chronological order from primitive to modern man.

- Ans :**
- Fifteen million years ago - Gorilla and Chimpanzees
 - 3-4 million years ago - Homo habilis (Hominids).
 - 1.5 million years ago - Homo erectus.
 - 1 million years ago - The Neanderthal man
 - Between 75,000 and 10,000 years - The modern Homo sapiens

37. i. When were the primitive caves developed?

ii. Name cholesterol containing steroid obtained from bread mould.

- Ans :**
- i. The primitive caves were developed about 18,000 years ago
 - ii. Cholesterol containing steroid obtained from bread mould is prednisolone.

38. Narrate the life led by early man like hominids.

Ans : 1. **3-4 million** years ago, men like hominids, walked into **Eastern Africa**.

2. Evidence shows that they hunted with **stone weapons** but were mostly **fruit eaters**.

3. They were probably **not taller** than **four feet** but, **walked upright** in the grass lands of East Africa.

4. These creatures were called the **First human** like being – the **hominid**. The hominid was called **Homo habilis**.

39. Find out who I am?

i) I am an acid used as a preservative and I have a sour taste. ii) I am organic and present in citrus fruits and I give immunity.

Ans : i. Vinegar ii. Citrus fruit

40. Find out who I am?

i) I am an enzyme and I cut DNA at specific sites. ii) I am the paste enzyme that joins segments of DNA.

Ans : i. Restriction Endonucleases ii. DNA Ligases

41. State whether true or false. Correct the statements that are false.

i) Variations give the organisms an individuality of their own.

ii) Charles Darwin postulated the use and disuse theory.

Ans : i) Variations give the organisms an individuality of their own. - **True**

ii) Charles Darwin postulated the use and disuse theory. – **False**

Corrected Statement : ii) Charles Darwin postulated **the theory of Natural Selection..**

42. State whether **true or false**. Correct the statements that are false.

i) To understand evolution, a branching diagram or a tree diagram is used to show the inferred evolution and the relationship among various biological species.

ii) Genetic engineering is the modification of the genetic information of living organisms by manipulation of DNA by adding, removing or repairing part of the DNA and changing the phenotype.

Ans : i) To understand evolution, a branching diagram or a tree diagram is used to show the inferred evolution and the relationship among various biological species. - **True**

ii) Genetic engineering is the modification of the genetic information of living organisms by manipulation of DNA by adding, removing or repairing part of the DNA and changing the phenotype. - **True**

43. Define evolution.

Ans : Evolution may be defined as a gradual development of more complex species from pre-existing simpler forms.

44. What are the uses of Bio-Sensor in medical field?

Ans : Uses of Bio-Sensor in medical field

1. Blood glucose level can be detected.

2. Production of any toxin in the body due to infection can be detected.

45. **Match the following.**

i. Gregor Johann Mendel	- Cloning
ii. Jean Baptise Lamarck	- Vaccine
iii. Edward Jenner	- Natural Selection
iv. Charles Darwin	- Genetics
v. Ian Wilmut	- Use and Disuse theory

Ans:

i. Gregor Johann Mendel	- Genetics
ii. Jean Baptise Lamarck	- Use and Disuse theory
iii. Edward Jenner	- Vaccine
iv. Charles Darwin	- Natural Selection
v. Ian Wilmut	- Cloning

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