Brain International School

Vikas Puri, New Delhi

ASSIGNMENT NO:3

SUBJECT: BIOLOGY **CLASS-XII** **JULY,2025**

CHAPTER 4: PRINCIPLE OF INHERITANCE AND VARIATION

2 Marks Each

1. Why is X-chromosome called sex-chromosome?
2. Differentiate between thalassemia and sickle-cell anaemia.
3. Write the percentage of the pea plants that would be heterozygous tall in the F 2 generation, when tall heterozygous F 1 pea plans are selfed.

3 Marks each

1. A haemophilic man marries a normal homozygous woman. What is the probability that their daughter will be haemophilic
2. Which law of Inheritance of Mendel is universally accepted and without any exception?
3. When the cross is made between tall plant with yellow seeds (TtYy) and tall plant with green seed (Ttyy), what proportions of phenotype in theoffspring could expected to be?

   i.Tall and green
   ii.Dwarf and green
4. If a father and son are both defective in red-green colour vision, is it likely that the son inherited the trait from his father. Comment
5. A cross was carried out between two pea plants showing contrasting traits of height of the plants. The result of the cross showed 50% parental characters.
   i)Work out the cross with the help of Punnett square
   ii)Name the type of the cross carried out.

6. CASE-STUDY

Read the following passage and answer the given questions:

Mendelian disorders are mainly determined by alteration or mutation in the single gene. These disorders are transmitted to the offspring on the same lines as we have studied in the principle of inheritance. The pattern of inheritance of such Mendelian disorders can be traced in a family by the pedigree analysis. Most common and prevalent Mendelian disorders are Haemophilia, Cystic fibrosis, Sicklecell anaemia, Colour blindness, Phenylketonuria, Thalassemia, etc.

I. Which of the following disorder is also called the Royal disease?

a) Colour blindness
b) Haemophilia
c) Sickle cell anaemia
d) Alzheimer's disease

II. Which of the following genotypes and phenotypes in a man may be the correct result of aneuploidy in sex chromosomes?

a) 22 pairs + Y females
b) 22 pairs + XY females
c) 22 pairs + XXY females
d) 22 pairs + XXXY females

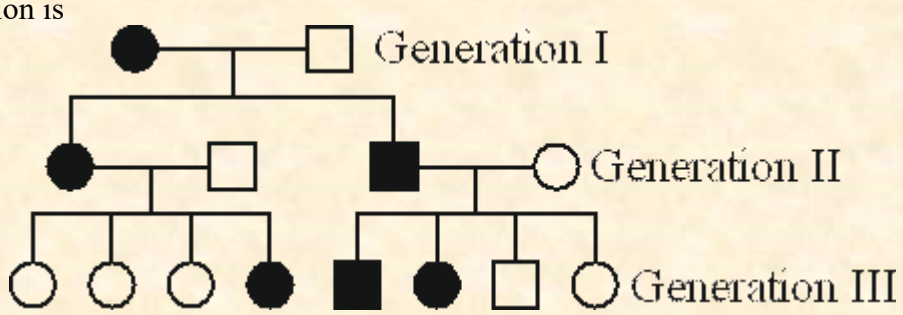
III. Cystic fibrosis is an autosomal recessive genetic disorder. What are the chances that the child would have the disease if any one of the parent (either mother or father)is a carrier of the faulty cystic fibrosis gene (Cc)?

a) 100 per cent
b) 50 per cent
c) 25 per cent
d) 0 per cent

IV. If the father in a family has a disease while the mother is normal, the daughters only are inherited by this disease and not the sons. Name this type of disease?

a) Autosomal recessive
b) Autosomal dominant
c) Sex-linked recessive
d) Sex-linked dominant

7. A pedigree is shown below for a disease that is autosomal dominant. The genetic made up of the first generation is



I. AA, Aa
II. Aa, aa
III. Aa, AA
IV. Aa, Aa.

CHAPTER-5 : MOLECULAR BASIS OF INHERITANCE

2 Marks Each

1. Write the full form of VNTR. How is VNTR different from Probe?
2. How is the translation of mRNA terminated? Explain
3. Name the category of codons UGA belongs to. Mention another codon of the same category.

3 Marks Each

1. Comment on the statement "Retroviruses do not follow central dogma.
2. What is an operon? Explain an inducible operon.
3. The sequence of the coding strand of DNA in a transcription unit is mentioned below

3' AATGCAGCTATTAGG 5'

Write the sequence for :

It's complementary strand

4. (i) Name the enzyme responsible for transcription of tRNA and the amino acid, the initiator tRNA gets linked with.

(ii) Explain the role of initiator tRNA in initiation of protein synthesis.

5 **CASE-STUDY:**

Read the following passage and answer the given questions:

The process of copying genetic information from template strand of DNA and RNA is called transcription. It is mediated by RNA polymerase. Transcription takes place in the nucleus of eukaryotic cells. In transcription only a segment of DNA and only one of the strands is copied into RNA.

I. What are regions of transcription unit in a DNA molecule?

a) Promoter
b) Structural gene
c) Terminator
d) All of the above

II. Monocistronic structural genes are found in which organisms?

a) Prokaryotes
b) Bacteria
c) Viruses
d) Eukaryotes

III. **Assertion:** A single RNA polymerase in prokaryotes synthesis all types of RNAs

Reason: Prokaryotic RNA polymerase has sigma factor.

a) Both assertion and reason are true and reason is the correct explanation of assertion
b) Both assertion and reason are true but reason is not the correct explanation of assertion
c) Assertion is true but reason is false
d) Both assertion and reason are false.

IV. Read the given list of materials

1. RNA polymerase enzyme
2. DNA templates
3. RNA primers
4. Okazaki segments
5. Four types of ribonucleic triphosphate
6. Divalent metal ions Mg^{2+} as a cofactor.

V. Which of the given materials are required for transcription.

a) (1), (2), (3) and (4).
b) (1), (2), (3), (5) and (6).
c) (1), (2), (5) and (6).
d) All of these.

CHAPTER-6 : EVOLUTION

2 Marks Each

1.Name the following

a. Organic molecule formed in S.L.Miller experiment .
b. Placental mammal that shows Convergent evolution with spotted cuscus
c. Reptile that went back into water to evolve in to fish like reptiles probably 200 mya.
d. The plant which helped De vries to give the mutation theory . e.Industrial pollution indicator .

2. Define the following term :

Gene pool , Saltation ,Genetic drift ,Adaptive radiation .

3. Give the brief account of human evolution .

4. State the essence of Darwinian theory of evolution .

5. Give examples of evolution by anthropogenic action.

3 Marks Each

1. With an example explain that during evolution by natural selection, no variant is completely wiped out .

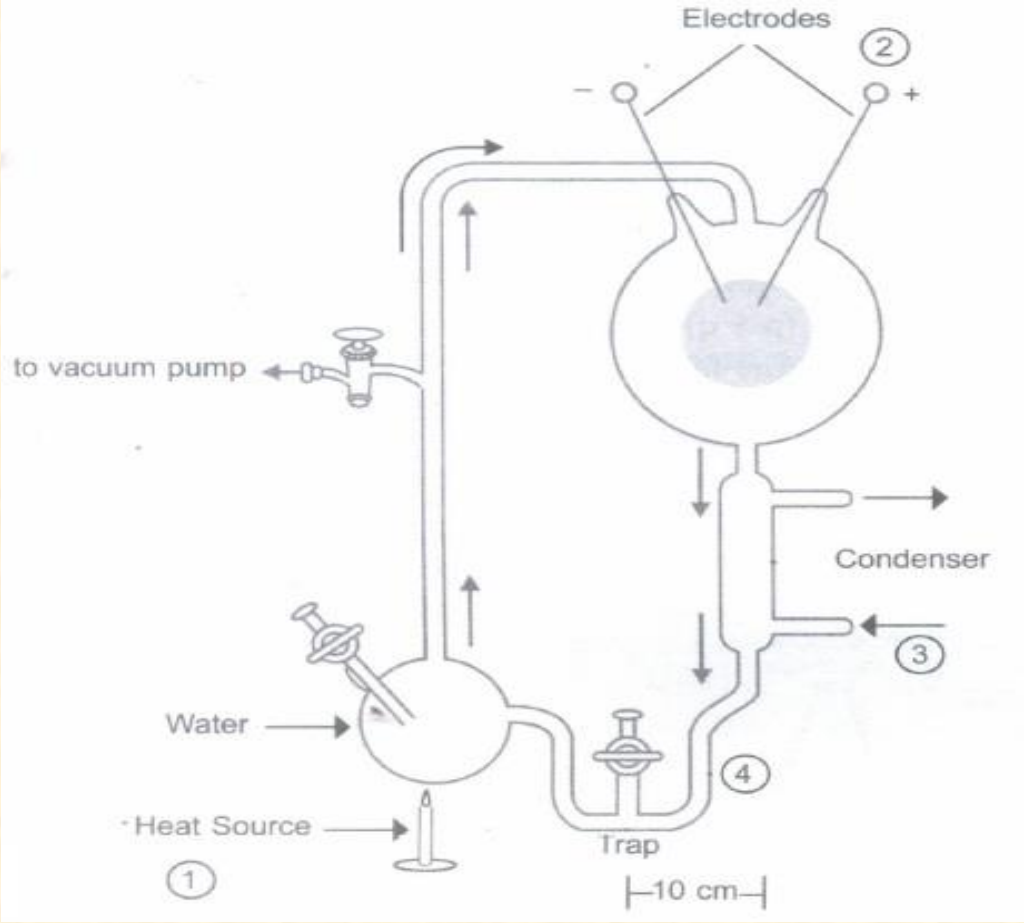
2.Give a graphical representation of the operation of natural selection when it selects individuals with peripheral character.

3. Name the 2 groups of seed ferns.

4.“There is a genetic basis for getting selected and to evolve “.How did Darwin explain this process about evolution?

5.What are the 3 connotations of the theory of special creation?

6.CASE-STUDY



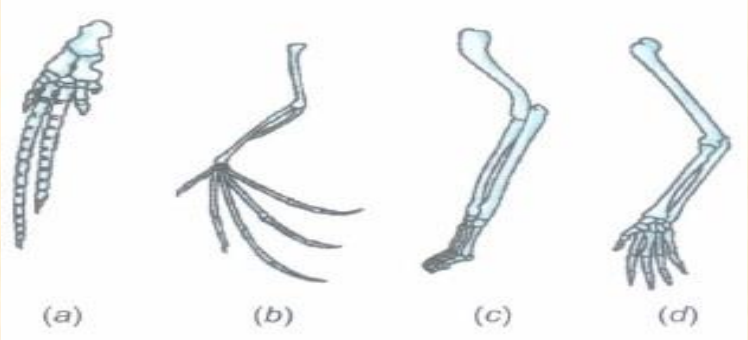
(a) State the hypothesis which S.L. Miller tried to prove in the laboratory with the help of the set up given above.

(b) Name the organic compound observed by him in the liquid water after running the above experiment.

(c) A scientist simulated a similar set up and added CH_4, NH_3 and water vapour at 800°C.

(d) Which important component is missing in his experiment?

8:



The forelimbs of four vertebrates are shown in the diagram shown above

(a) What type of evolution is exhibited by the similarity among these organs in those organisms?

(b) What are such organs known as?

(c) What do they indicate?