

**GRADE-XII PERIODIC TEST -III MARK: 40**

**DATE: 26/8/22 BIOLOGY (044) TIME: 1½ hrs**

**GENERAL INSTRUCTIONS:**

**SECTION A**- Questions 1 to 5 carries 1 mark each.

**SECTION B**- Questions 6 to 10 carries 2 marks each.

**SECTION C**- Questions 11 to 15 carries 3 marks each.

**SECTION D** -questions 16 to 17 carries 5 marks each.

**SECTION-A**

1. Which of the following statements indicates parallelism in genes and chromosomes?

(i) They occur in pairs

(ii) They segregate during gamete formation

(iii) They show linkage

(iv) Independent pairs segregate independently

A. (i) and (iii) B. (ii) and (iii)

C. (i), (ii) and (iii) D. (i), (ii) and (iv)

2. In human beings, where genotype AABBCC represents dark skin colour, aabbcc represents light skin colour and AaBbCc represents intermediate skin colour; the pattern of genetic inheritance can be termed as:

A. Pleiotropy and codominance

B. Pleiotropy and incomplete dominance

C. Polygenic and qualitative inheritance

D. Polygenic and quantitative inheritance

3. Rajesh and Mahesh have defective haemoglobin due to genetic disorders. Rajesh has too few globin molecules while Mahesh has incorrectly functioning globin molecules. Identify the disorder they are suffering from.

|  |  |  |
| --- | --- | --- |
|  | Rajesh | Mahesh |
| A. | Sickle cell anaemia- an autosome linked recessive trait | Thalassemia – an autosome linked dominant trait |
| B. | Thalassemia – an autosome linked blood disorder | Sickle cell anaemia- an autosome linked recessive trait |
| C. | Sickle cell anaemia- an autosome linked recessive trait | Thalassemia – an autosome linked blood disorder |
| D. | Thalassemia – an autosome linked blood disorder | Sickle cell anaemia- an autosome linked dominant trait |

4. **All genes located on the same chromosome   
(a) Form different groups depending upon their relative distance   
(b) Form one linkage group  
(c) Will not form any linkage groups   
(d) Form interactive groups that affect the phenotype.**

5. **Assertion:** The progeny produced have both the characters of parents. **Reason:** The process by which characters pass from parent to progeny is known as inheritance.

(a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(c) If Assertion is true but Reason is false.

(d) If both Assertion and Reason are false.

**SECTION-B**

6. The child has a blood group of O. If the father has blood group A and mother has blood group B, work out the genotypes of the parents and the possible genotypes of the other offsprings.

7. In Snapdragon, a cross between true-breeding red-flowered (RR) plants and true-breeding white-flowered (RR) plants showed a progeny of plants with all pink flowers.  
 (i) The appearance of pink flowers is not known as blending. Why?

(ii) What is this phenomenon known as?

8. A true-breeding pea plant, homozygous for inflated green pods (FFGG) is crossed with another pea plant with constricted yellow pods (ffgg). What would be the phenotype and genotype F1 and F2 genotype? Give the phenotype ratio of F2 generation.

9. **“Genes contain the information that is required to express a particular trait.” Give reason.**

10. **In Mendels breeding experiment on garden pea, the offspring of F2 generation are obtained in the ratio of 25% pure yellow pod, 50% hybrid green pods and 25% green pods State**

**(i) Which pod colour is dominant?**

**(ii) The Phenotypes of the individuals of F1 generation. (iii) Workout the cross.**

**SECTION-C**

11. A dihybrid heterozygous round, yellow seeded garden pea *(Pisum sativum*) was crossed with a double recessive plant.

(i) What type of cross is this?

(ii) Work out the genotype and phenotype of the progeny.

(iii) What principle of Mendel is illustrated through the result of this cross?

12. (i) What is polygenic inheritance? Explain with the help of a suitable example.

(ii) How are pleiotropy and Mendelian pattern of inheritance different from the polygenic pattern of inheritance?

13. Contrast between the following:

i. Dominant trait and recessive trait

ii. Homozygous and heterozygous

14. When a cross is made between a tall plant with yellow seeds (TtYy) and tall plant with green seeds (Ttyy), what proportions of phenotype. In the offspring could be expected to be  
 (i) tall and green  
 (ii) dwarf and green?

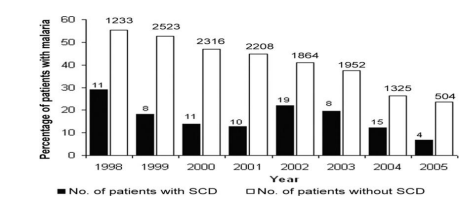
15. A red eyed male fruit fly is crossed with white eyed female fruit fly. Work out the possible genotype & phenotype of F1 & F2 generation. Comment on the pattern of inheritance in this cross?

**SECTION-D**

16. **Read the following and answer the questions from 1 to 5 given below:** Sickle cell anemia is a genetic disorder where the body produces abnormal hemoglobin called hemoglobin S. Red blood cells are normally flexible and round, but when the hemoglobin is defective, blood cells take on a “sickle” or crescent shape. Sickle cell anemia is caused by mutations in a gene called HBB. It is an inherited blood disorder that occurs if both the maternal and paternal copies of the HBB gene are defective. In other words, if an individual receives just one copy of the defective HBB gene, either from mother or father, then the individual has no sickle cell anemia but has what is called “sickle cell trait”. People with sickle cell trait usually do not have any symptoms or problems but they can pass the mutated gene onto their children. 44 There are three inheritance scenarios that can lead to a child having sickle cell anemia: - Both parents have sickle cell trait - One parent has sickle cell anemia and the other has sickle cell trait - Both parents have sickle cell anemia.

**a. Why does sickle-cell anemia persist in the human population when it is believed that the harmful alleles get eliminated from the population after a certain time?**

**b.** If both parents have sickle cell trait, workout the possible percentage of child having sickle cell anemia.

**c.**

The following statements are drawn as conclusions from the above data (Kenya)

I. Patients with SCD (Sickle Cell Disease) are less likely to be infected with malaria.

II. Patients with SCD (Sickle Cell Disease) are more likely to be infected with malaria.

III. Over the years the percentage of people infected with malaria has been decreasing

IV. Year 2000 saw the largest percentage difference between malaria patients with and without SCD.

Choose from below the correct alternative.

(a) Only I is true

(b) I and IV are true

(c) III and II are true

(d) I and III are true

17. In a dihybrid cross, white eyed, yellow bodied female Drosophila was crossed with red eyed, brown bodied male Drosophila. The cross produced 1.3 percent recombinants and 98.7 progeny with parental type combinations in the F2 generation. Analyze the above observation and compare with the Mendelian dihybrid cross.