

# Assignment

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2<sup>nd</sup> year (Pre-Med)  
Biology

Question # 01:

MCQs

1. A. Unknown XAA
2. D. both "B" and "C"
3. B.  $\frac{1}{2}$
4. C. Three
5. D. Epistasis

Question # 02:

Short Question:

(ii-)

**Epistasis**

- When an effect caused by a gene or gene pair at one locus interferes with or hides the effect caused by another gene or gene pair at another locus, it is called epistasis.

**Pleiotropy**

When a single gene affects two or more traits, the phenomenon is called pleiotropy.



- Bombay phenotype shows epistatic effect. Such a gene with multiple phenotype effect is called pleiotropic.

(iii)

### Polygenetic traits:

- A continuously varying trait is encoded by alleles of two or more different gene pairs found at different loci, all influencing the same trait in an additive way.
- These quantitative traits are called polygenetic traits, and their genes are polygenes.

Example:

Genetics of wheat grain colour.

(i-)

### Parental and non-parental combinations

- Four types of gametes are formed two with parental combinations of linked genes, that is, AB and ab, and two with recombination of genes, that is Ab and aB.
- If crossing over does not occur, only the two parental types of gametes are formed. Parental types of gametes produce parental types of offspring while recombination gametes



produce recombinant types of offspring.

### Question # 03:

#### Long Question:

**Erythroblastosis Foetalis: (Maternal foetal Rh incompatibility):**

results when an  $Rh^-$  woman, married to an  $Rh^+$  man conceives a child who is  $Rh^+$ . If the man's genotype is  $DD$ , all of their offspring ( $Dd$ ) will be  $Rh^+$ . If the man's genotype is  $Dd$ , half of their offspring with  $Dd$  genotype will be  $Rh^+$ .

#### Effects:

- If **RBC** of  $Rh^+$  foetal cross the placental barrier and enter into  $Rh^-$  mother's blood stream, the mother's immune system reacts to foetal  $Rh$  antigen stimulus by producing a large number of anti- $Rh$  antibodies.
- When mother's **anti- $Rh$**  antibodies seep through placenta into blood circulation of foetus, they start hemolysis (break down) bursting of **RBC** of foetus.
- As this destruction continues, the foetus becomes anaemic. The anaemic foetus starts to release immature erythroblasts into his



## Blood stream.

- This anemia may lead to abortion or still birth. Even if the pregnancy continues, the **liver** and spleen of foetus swell as they rapidly produce RBC.
- The breakdown product of RBCs called **bilirubin** also accumulates in the foetus.
- Bilirubin damages his brain cells and turns his skin and whites of the eyes yellow.
- This condition is a jaundice. So the baby if born alive, suffers from severe hemolytic anemia and jaundice.
- Such baby's blood should be immediately replaced by Rh blood, free of anti Rh antibodies.

## Conditions:-

- The first Rh incompatible pregnancy may not ~~see~~ face much problems if very few of foetal antigens cross placenta into maternal circulation and the amount of maternal antibody production is not very high.
- When placenta detaches at birth, a large number of foetal cells enter mother's



blood stream and stimulate production of large amount of anti-Rh antibodies by the mother.

- These antiRh antibodies persist in mother's blood for a long time and are persistent risk for the next Rh<sup>+</sup> fetus.

### Treatment:

- Rh sensitization of Rh mother is avoided by a simple therapy. She is given an injection of Rh antiserum during early pregnancy and immediately after birth.
- The Rh antibodies in the Rh antiserum will destroy Rh<sup>+</sup> RBC of the fetus before they stimulate production of maternal anti-Rh antibodies. The injected antiserum disappears before the next pregnancy.