This question paper contains 4 printed pages]

Roll No. | | | | | | | | | | |

S. No. of Question Paper : **5793**

Unique Paper Code : **3182011202**

Name of the Paper : **Principles of Genetics**

Name of the Course : **B.Sc. (H) Biomedical Sciences (NEP)**

Semester : **II**

Duration : **3 Hours** Maximum Marks : **90**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt *five* questions in all.

Question No. **1** is compulsory.

Subparts of the questions should be attempted together.

Draw illustrations or diagrams wherever necessary.

1. (*i*) Answer the following in *one* word : 6×1=6

(*a*) What is the major source of genetic diversity in the DNA, which is spontaneously occurring in nature ?

(*b*) What terminology is used for a genetic cross involving the mating of an individual with any *one* of its parents ?

(*c*) Which theory connects chromosomal behaviour during cell division to inheritance patterns ?

(*d*) Process of genetic exchange between homologous chromosomes.

P.T.O.

(*e*) Specialized chromosomes found in amphibian oocytes.

(*f*) What term describes traits determined by genes on sex chromosomes ?

(*ii*) Mention the contribution of any *four* scientists given below : 4×1=4

(*a*) Roger Kornberg

(*b*) Lyon

(*c*) Édouard-Gérard Balbiani

(*d*) Theophilus Painter

(*e*) T.H. Morgan.

(*iii*) Draw the following genetic crosses : 2×2=4

(*a*) Draw a dihybrid cross with any *two* genes and mention their phenotypes.

(*b*) Draw a cross by considering sex linked gene.

(*iv*) State whether given statement is true *or* false and justify your answer : 2×2=4

(*a*) Sex-influenced traits are found on the sex chromosomes.

(*b*) The law of independent assortment is universally applicable to all genes.

2. Differentiate between the following (any *four*) : 4×4.5=18

(*a*) Sex-limited and sex-influenced dominance

(*b*) Incomplete dominance and codominance

(*c*) Prokaryotic and Eukaryotic genomes

(*d*) Euchromatin and heterochromatin

(*e*) Inheritance of chloroplast DNA and mitochondrial DNA.

3. Write short notes on the following (any *four*) : 4×4.5=18

(*a*) Aneuploidy

(*b*) Translocation leading to structural abnormalities on chromosomes

(*c*) Packaging of chromatin material

(*d*) Different forms of DNA

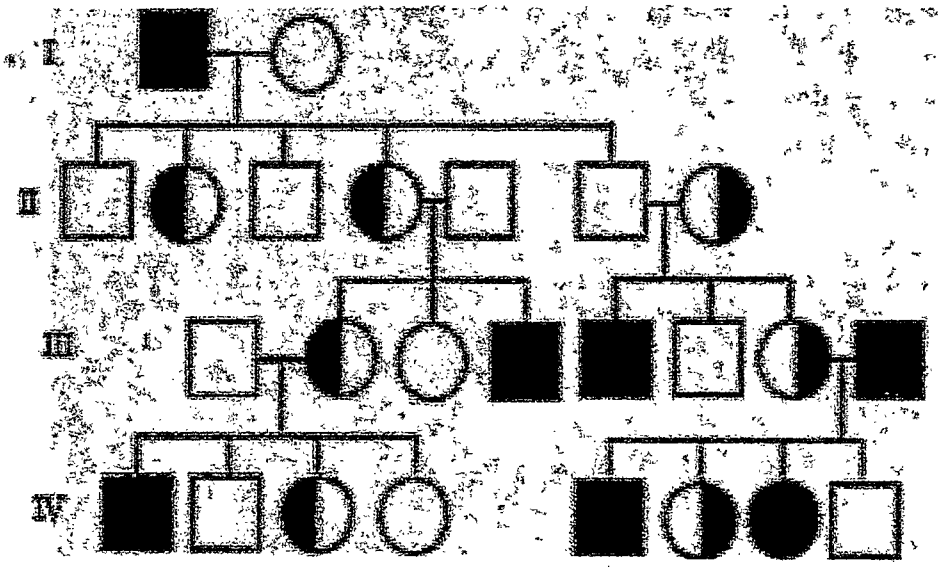
(*e*) Transposable genetic elements in maize.

4. (*a*) A test cross was performed between ABC/abc and abc/abc. Eight different phenotypic classes were obtained. Give gene order, gene distances, interference and coefficient of coincidence. 9

Genotypic classes	*Phenotypic classes*	*Assumed frequencies*
ABC/abc	ABC	349
abc/abc	abc	360
Abc/abc	Abc	114
aBC/abc	aBC	116
ABc/abc	ABc	128
abC/abc	abC	124
AbC/abc	AbC	5
aBc/abc	aBc	4
Total		1200

P.T.O.

(*b*) Explain whether pedigree given below is autosomal or sex-linked. Also mention whether the trait is dominant or recessive and write the genotypes of all individuals. Justify your answer and give the most probable genotypes of all the individuals. 9



5. (*a*) Explain how environmental factors can help in determining sex ? Elaborate phenomenon of sex determination in humans and drosophila. 9

(*b*) Describe different types of point mutations with help of suitable examples. 9

6. Briefly explain the following :

(*a*) Model for replication of DNA 6

(*b*) Karyotyping and different banding patterns of chromosomes 6

(*c*) Epistasis : dominant and recessive. 6