

- (b) Temperate and virulent phages
- (c) Micro and Macroevolution
- (d) Pairwise and multiple sequence alignment
- (e) LINES and SINES
- (f) Auxotrophs and prototrophs

(iii) Match the following – (6)

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|------------------------|-----------------------------|
| (a) Joshua Lederberg | (i) Jumping genes |
| (b) Barbara McClintock | (ii) Bacterial conjugation |
| (c) Francis Collins | (iii) Protein Database |
| (d) Margaret Dayhoff | (iv) Drosophila development |
| (e) Nusslein Volhard | (v) Natural selection |
| (f) Alfred Wallace | (vi) Human Genome Project |

(iv) Expand any five of the following – (5)

- (a) ITR
- (b) RTF
- (c) TIGR
- (d) Tn
- (e) ORF
- (f) OMIA

(v) The following *E.coli* Hfr strains donate genes to F⁻strain in the given order –

Strain1	lac ⁺	pro ⁺	ton ^r	azi ^r	leu ⁺
Strain2	bio ⁺	his ⁺	cys ⁺	leu ⁺	azi ^r
Strain3	str ^r	thr ⁺	gal ⁺	bio ⁺	his ⁺
Strain4	str ^r	lac ⁺	pro ⁺	ton ^r	azi ^r

All these Hfr strains were obtained from the same F⁺ strain. Give order of genes on original F⁺ strain. (3)

2. (a) Give an experimental evidence to prove that cell to cell contact is required for conjugation. (6)
- (b) Explain Benzer's complementation test in bacteriophages and give its significance. (6)
3. (a) What are transposable genetic elements ? Give the mechanism of their transposition. (6)
- (b) What are homeotic genes ? Compare homeotic genes of *Arabidopsis* with that of *Drosophila* giving suitable examples. (6)
4. (a) Highlight the important differences between shotgun and map-based cloning. (6)
- (b) Discuss the role of various genes in determining the segmentation of *Drosophila* embryo. (6)
5. (a) What is bioinformatics ? How this discipline has helped in studying genomes ? (6)
- (b) Describe the different types of sequence submission tools at NCBI. (6)

6. Write short notes on any three of the following – (4×3=12)
- (a) Swiss-Prot
 - (b) Eukaryotic genome features
 - (c) P elements
 - (d) Genetic drift
7. (a) State Hardy Weinberg law and apply this law to calculate allelic and genotypic frequencies in a population of 10,000 individuals in which 25 individuals were detected positive for a recessive disorder cystic fibrosis. (6)
- (b) Discuss the neutral theory of molecular evolution ? (6)