

[Time: 3 Hours]

[Marks:100]

Please check whether you have got the right question paper.

- N.B:
1. All questions are compulsory.
 2. Figures to the right indicate full marks for the question.
 3. Draw neat and labeled diagrams wherever necessary.
 4. Use of non-scientific calculator is allowed.

Q.1 A) Define / Explain the following terms:

1. Poisson probability distribution
2. Perfect Negative correlation
3. Regression equation
4. Unimodal curve
5. Simple event
6. Combination
7. Permutation

(07)

Q.1 B) Match the columns:

Column A	Column B
a) FLYBASE	i) 5'-3'
b) Entrez	ii) Protein database
c) Forward reading frame	iii) Biological sequence information comparison software tool
d) Information on Human genes and phenotypes	iv) SNP based drug development
e) FASTA format	v) Cross database search system at NCBI
f) Pharmacogenomics	vi) Drosophila database
g) Swiss-Prot	vii) OMIM

(07)

Q.1 C) Explain whether True or False:

1. Artificial selection gives the example of development of variety in corns.
2. 'Survival of fittest 'was the theory put forth by Charles Darwin.
3. Mutation is the primary source of new alleles in a gene pool.
4. Genetic Drift affects the population frequency.
5. Analogous Organs represent Convergent Evolution.
6. Alfred Russell Wallace completed his voyage on HMS Beagle.

(06)

Q.2 A) Answer **any one** of the following:

1. Explain the theory of Organic evolution.
2. Explain the Artificial Selection process with two suitable examples.

(10)

Q.2 B) Answer **any two** of the following:

1. Write a note on Founder's Effect.
2. Explain the Disruptive selection process.
3. Write a note on embryological evidences of evolution.
4. Discuss the Hardy Weinberg Principle.

(10)

Q.3 A) Solve **any one** of the following:

(10)

1. Data given below represent heights and weights of 6 different students,
 - a) Give your comment on correlation on two variables.
 - b) Determine probable weight when height happens to be 74 inches.

Heights in inches (X)	62	72	68	53	60	70
Heights in inches (Y)	50	65	63	55	57	60

2. Calculate Pearson's correlation coefficient using following data:

X	12	18	16	15	12	10	20	17
Y	6	10	9	8	9	8	12	10

Q.3 B) Answer **any two** of the following:

(10)

1. A bag contains 8 red, 3 white and 9 blue balls. Three balls are drawn random, determine the probability that none of the balls drawn are white.
2. Eight coins are thrown simultaneously. Find the probability of getting at least 6 heads.
3. State Binomial distribution law and list the conditions for application of Binomial distribution.
4. If 5% of electric bulbs manufactured by a company are defective. Use Poisson distribution to find the probability that in a sample of 100 bulbs will be defective. (Given $e^5 = 0.007$)

Q.4 A) Discuss **any one** of the following:

(10)

1. Applications of Bioinformatics.
2. Explain the concept of Internet/WWW with respect to data mining/data retrieval for Biological information.

Q.4 B) Describe **any two** of the following:

(10)

1. Biological databases and their importance.
2. NCBI and its services in studying biological information.
3. ORF finding as an important step in studying gene sequences.
4. Explain the following terms and its use in finding information on internet
 - a. IP address
 - b. URL

Q.5 Write short notes on **any four** of the following:

(20)

1. How many A and a alleles are present in a sample of organisms consisting of 12 AA, 17 Aa and 6 aa individuals? What are the allelic frequencies in this sample?
2. Thalessemia.
3. Standard Normal curve.
4. Addition and Multiplication theorems of probability.
5. PDB Database.
6. Sequence retrieval systems (SRS) and their importance in Bioinformatics.
