**Your Roll No.....**

**Post Graduation Diploma Bio-informatics- Examination 2017**
**Paper-PBID-101**
**Introduction to Bio-Informatics**

Time: Three hours Maximum Marks 100

(Write your roll no. on the top immediately on the receipt of the paper)

## Section A

**Answer all questions** (10 X 2 =20)

1. How many complete sequences for genes are available in public data bases?
2. How does Hal (1987) define bioinformatics?
3. What are the well-defined divisions of Bioinformatics?
4. How many genes are there in human genome according to Human Genome Project?
5. What is computational biology?
6. Which private company participated in human genome project?
7. Who created the first recombinant DNA molecule?
8. What is the size of genome of Pseudomonas aeruginosa?
9. Which was the first protein to be sequenced?
10. Name the scientists who invented DNA cloning.

## Section B

**Attempt any 6 questions. Each question carry 5 marks each. (6 X 5 = 30)**

Q. 1. What is Bioinformatics.
Q. 2. What are the three major divisions of Bioinformatics?
Q. 3. What do you understand by technology shift in pharmaceutical industry?
Q. 4. What are the skills required by a Bio-informatician?
Q. 5. What do you understand by term Biotech Cash Cow?
Q. 6. Software development in bioinformatics can turn the table in biotechnology industry. Do you agree? Give your comments.
Q. 7. What are the various private companies, which are playing lead role in bioinformatics?
Q. 8. How do you relate genomics and bioinformatics?

## Section C

**Attempt any 5 questions. Each question carry 10 marks each. (10 X 5 = 50)**

Q. 1. What do you understand by Intelligent Information Integration.
Q. 2. Bioinformatics is a combination of sciences. Comment on it.
Q. 3. Knowledge Discovery and Data Mining is an important aspect of Bio-Informatics. Elaborate it.
Q. 4. How bio-informatics had expedited the production and research in the field of pharmaceutical industry?
Q. 5. What are the various challenges in front of a bio-informatics professional?
Q. 6. Software development or internet, which is more important for bioinformatics and why?
Q. 7. Gene annotation and drug design are important aspect of bioinformatics. Elaborate it.

**School of Open & Distance Learning**
Jamia Hamdard, New Delhi-110062

Annual Examinations 2017
PG Diploma in Bio-Informatics
Biostatistics PBID-102

Time : 3 hrs Max. Marks : 100

Use of simple calculator is allowed.

## Section-A

Answer all questions. (10 x 2 = 20)
Write "True" or "False" for the following statements :

1. Statistics deals with numerical facts only.
2. In quantitative classification, the non-measurable characteristics are classified.
3. The square root of variance is called standard deviation.
4. The median of a set of data is the most frequent value.
5. Sample space is the set of all possible outcomes of a random experiment.
6. In normal distribution, all the three measures of control tendency coincide i.e. mean = median = mode.
7. The maximum likelihood estimators are consistent.
8. F-statistic is defined as the ration of four $X^2$-variates.
9. The Sex ratio at birth is a better index of fertility than the overall sex ratio.
10. ANOVA stands for analysis of covariance.

## Section-B

Answer any six questions. (6 x 5 = 30)

1. Define discrete and continuous variable with examples.
2. Draw Histogram for the following data :

| Marks | 01-10 | 10-20 | 20-30 | 30-40 | 40-50 |
|---|---|---|---|---|---|
| No. of students | 8 | 10 | 22 | 16 | 6 |

3. Differentiate between simple random sampling and stratified random sampling.

4. Define chi-square test.
5. Two coins are tossed. What is the probability of getting :
   (i) Two heads (ii) one head and one tail (iii) at least one head or one tail
6. Calculate mean, median and mode from the following data :
   38, 42, 44, 43, 46,45,44,44,45,135,46
7. Can the following two samples obtained from two normal populations, be regarded to have some variances?

| Sample No. | Sample size | Sample mean | Sample variance |
|---|---|---|---|
| 1 | 10 | 15 | 10 |
| 2 | 12 | 14 | 9 |

(Given that $F_{0.05}(9,11) = 2.90$).

8. What do you mean by age Specific Death Rate?
9. Write short note on ANOVA.

## Section - C

Answer any five questions. (10 x 5 = 50)

1. Calculate standard deviation from the following data:

| Protein Intake(Gm) | 15-25 | 25-35 | 35-45 | 45-55 | 55-65 | 65-75 | 75-85 |
|---|---|---|---|---|---|---|---|
| No. of families | 30 | 40 | 100 | 110 | 80 | 30 | 10 |

2. Define normal distribution. Write down the properties of normal probability curve.
3. IQ of 9 students was tested before and after training. State at 5% level of significance whether the training was effective from the following scores: (Given that $t_{0.05(8)}=2.31$).

| Before training | 10 | 15 | 9 | 3 | 7 | 12 | 16 | 17 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| After training | 12 | 17 | 8 | 5 | 6 | 11 | 18 | 20 | 3 |

4. Below are given the yield per plot for four varieties of seed cotton:

Varieties

| A | B | C | D |
|---|---|---|---|
| 20 | 25 | 24 | 23 |
| 19 | 23 | 20 | 20 |
| 21 | 21 | 22 | 20 |

Prepare one way ANOVA.

5. Explain any four of the following terms:
   i)Frequency distribution ii) Level of significance iii) Median
   iv) Skewness v) Crude Birth Rate vi) Quantitative data

6. What do you mean by the Maximum Likelihood Estimator(MLE)? Define the various properties of MLE.
7. What do you mean by Dispersion? Discuss the various types of measures of dispersions.
8. Discuss the various types of graphical representation of data.

**P G Diploma in Bio-Informatics**
**1st Year Examination – 2017**

**Paper: PBID-103**
**Biological Databases and their Management**

**Time: Three Hours** **Maximum Marks: 100**

*(Write your Roll. No. at the top immediately on receipt of this question paper. )*
*Answer as per the instructions given in each section.*

## SECTION –A

*Attempt **ALL** questions. Each carries equal marks.* *[10 x 2= 20]*

1. A database may have _____ users.
2. SQL consists of _____ relational operators.
3. The relational algebra operations enable a user to specify basic _____ requests.
4. The _____command is used to produce title on a page.
5. HOBAGEN stands for _____.
6. Annotation consists of the description of _____ protein.
7. The major protein sequences database are _____.
8. RCSB stands for _____.
9. 3DinSight is an integrated database and _____ structure.
10. A PL/SQL record is variable that contains a collection of _____ fields.

## SECTION-B

*Attempt any **FIVE** questions. Each carries equal marks.* *[5 x 6= 30]*

1. What are the different relational algebra operations? Explain.
2. Explain different types of JOIN operations in SQL.
3. What do you mean by CURSOR in PL/SQL? Explain.
4. Write short notes on GlycoSuiteDB and DinSight Database.
5. What is ICTV? What does it do?
6. Explain HUGE and SENTRA databases.
7. What is WBD? What type of information we can get from WBD?

## SECTION-C

*Attempt **FIVE** questions. Each carries equal marks.*

*[5 x 10= 50]*

1. Prepare an ER model library system for issue and return of books.
2. Explain the following in the context of SQL statements with the help of example:
   (i) LIKE clause (ii) ORDER BY clause (iii) GROUP BY clause.
3. Write a PL/SQL block which accepts two numbers from SQL* Plus variables. The first of these numbers should be "raised to the power" of the second number, within the block and the result written to a PL/SQL variable. Record this result in the MESSAGE table. State your assumptions (if any).
4. Write short notes on following:
   (i) Virus Genera (ii) Virus species (iii) Virus families
5. What do you mean by biodiversity? Also explain Genetic diversity and Taxonomic diversity.
6. Explain DR line, RX Line and RA Line.
7. Describe following microbial database:
   (i) Biodegradative Strain Database
   (ii) HIV Database
   (iii) GenProtEC

**POST GRADUATE DIPLOMA IN BIOINFORMATICS - 2017**
**Paper- PBID-104**
*COMPUTATIONAL BIOLOGY*

Time: Three hours Maximum Marks: 100

*(Write your roll number at the top immediately on receipt of this question paper)*

**1. Answer the following questions, (2x10)**

i. What is the difference between an iterated blast (psi-blast) search and a simple blast search?
ii. What is the different substitution matrices used in protein alignments?
iii. What is a GI number?
iv. If you want to align two sequences that are about 90% identical, which of the scoring matrices would be most appropriate: PAM or Blossom?
v. What is the difference between sequence homology and sequence identity?
vi. What is the use of UPGMA?
vii. Name three stop codons.
viii. What kinds of data are available on Swissprot?
ix. Name the different types of secondary structure in a protein.
x. Explain ORF.

**2. Write short notes on any SIX of the following, (5x6)**

i. Discuss the additive property in phylogeny.
ii. Give one example why the multiple alignment, as implemented in the software Clustal, needs a guide tree?
iii. If the sequences have different base composition or length, what parameter values would you choose in order to determine multiple alignments of the sequences? Justify your answer.
iv. Which algorithm would you choose for clustering sequence and gene expression datasets and why?
v. What are the problems associated with the efficient searching in large data sets?
vi. Explain the Needleman-Wunsch - Global Alignments.
vii. Explain the promoter. Why the knowledge of promoter is essential for gene prediction?
viii. List the name of gene expression databases.

**3. Explain any Five of the Following, (10x5)**

i. Discuss the Smith–Waterman algorithm. What are the complexity and the relationship with the problem of finding the longest common sequences?
ii. Explain the neighbourhood joining method to construct the phylogeny tree showing an example. Discuss the complexity of the Neighbour-Joining algorithm.
iii. How can you be reasonably confident that an amino acid multiple sequence alignment is optimal? Explain with a suitable example.
iv. We often use Hidden Markov Models (HMM) to predict a pattern (for instance the exons). How can you compute the number of True Positives, True Negatives, False Positives and False Negatives and use them to evaluate your HMM?
v. Discuss the space–time complexity of dynamic programming algorithms in sequence alignment.
vi. Describe the main differences between Parsimony, Distance and Likelihood-based algorithms.
vii. Compute the global alignment between the two strings s1 = ACCGTT and s2 = AGTTCA, considering the following scoring parameters: +1 for match, −1 for mismatch, and −1 for a gap.

(a) What is the maximum similarity score between the two sequences s1 and s2?
(b) Find an alignment with this similarity score.
(c) Is the alignment you found unique, or are there multiple alignments achieving the maximum similarity score?

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Annual Examinations 2017
PG Diploma in Bio-Informatics
Biochemistry PBID-105

Time : 3 hrs Max. Marks : 100

## Section-A

Give brief answers for all the questions. (10 x 2 = 20)

1. Why anabolism and catabolism can not occur simultaneously?
2. Why ammonia is toxic?
3. What are essential amino acids?
4. Name two polysaccharides and discuss their role.
5. Why Pentose Phosphate pathway is called "Secondary Pathway of Glucose Oxidation".
6. Discuss substrate level phosphorylation.
7. Define Homeostasis.
8. What do you understand by lactate fermentation?
9. What are energy rich bonds?
10. ATP is the cellular energy currency. Discuss.

## Section-B

Answer any six questions. (5 x 6 = 30)

1. With the help of flow sheet diagram describe glycogenesis.
2. Discuss the non-oxidative phase of HMP pathway.
3. Write down the thermodynamic principles involved in Biology.
4. Write down the general reactions and functions of Lipids.
5. Describe Kreb's cycle.
6. Discuss metabolic disorders.
7. Describe glycoside formation.
8. Explain Hereditary Orotic Aciduria.

## Section - C

Answer any five questions. (10 x 5 = 50)

1. Oxidative phosphorylation is a coupled process. Discuss.
2. Describe Urea cycle and its significance.
3. What is Gluconeogenesis? Describe the pathway taking various precursors.
4. Discuss regulation of carbohydrate metabolism.
5. Write down the synthesis of one essential and one non-essential amino acid.
6. Give a list of inborn errors in metabolism and discuss the diseases caused by them.
7. Discuss intra cellular protein degradation.
8. Describe nitrogen fixation in detail.

| | |
|---|---|
| **Course:** | **PGDBI – Examination 2017** |
| **Paper code:** | **PBID 106** |
| **Paper:** | **Microbiology** |
| **Time:** | **Three hours** |
| **Maximum Marks:** | **100** |

**Write your Roll No. on top immediately on receipt of this question paper**

## Section – I

(Attempt **all** questions)

**[20 Marks]**

Q1 Answer the following questions as directed

(a) Expand the following abbreviations (**any five**):

**[1 each]**

i. DNA
ii. INH
iii. T, one of the bases of our nucleic acid
iv. CFU
v. ATP
vi. HIV

(b) State which of the following statement is TRUE, and which is FALSE

**[1 each]**

i. Ethylene oxide gas, which is an alkylating agent, is used to sterilize human skin
ii. Silver nitrate, which precipitates proteins, is generally used as an antiseptic in the eyes of newborn
iii. Tincture of iodine is usually 2–7% elemental iodine, along with potassium iodide or sodium iodide, dissolved in absolute alcohol.
iv. Sodium diacetate in general is used as an anti-microbial agent in baked goods and other foods
v. Pasteurization (batch method) is used to kill vegetative bacterial cells as well as their spores (endospores)

(c) Explain why:

**[2 each]**

i. *Escherichia coli* stains pink or red in gram staining.
ii. Stationary phase occurs in the bacterial growth curve.
iii. Biological membrane is a two dimensional fluid.
iv. Milk becomes lumpy when poured from an outdated jug or lemon juice added to warm milk.
v. Coulter Counter which is used to measure total cell count for larger microorganisms, fungi, yeast, protozoa, is not so useful with bacteria.

## Section – II

(Attempt **any five** questions)

**[Each question carries 6 marks]**

(a) What are the microorganisms? Discuss various types of microorganisms.

(b) What are the following: Spread plate and Pour plate techniques. Discuss the advantages and disadvantages of each.

(c) Enumerate the various ways a prokaryotic cell differs from eukaryotic cell. Are all microorganisms prokaryote?

(d) Briefly describe the composition of bacterial cell wall.

(e) List any three pathogenic microorganisms and name the disease caused by each of them.

(f) Draw a labeled diagram of **any one** of the following and briefly describe its characteristic features

i. Endospore
ii. Different types of bacterial flagella
iii. Representative structure of a Gram-negative bacterium

## Section –III

(Attempt **any three** questions)

**[Each question carries 10 marks]**

(a) What do you understand by the control of microbial growth? What are various methods of sterilization?

(b) What are the antibiotics? Discuss the various types of antibiotics and their mechanisms of actions giving examples. What are macrolides?

(c) Discuss in detail the mechanism of gene transfer in bacteria

(d) Write short notes on the following (**any one**):

i. Scope of microbiology
ii. Components of a microscope, its types and resolving power

**—END OF THE QUESTION PAPER—**

**Final Examination-2017**
**Post Graduate Diploma in Bioinformatics**
**Subject: Basics of Biocomputing**

Time: 3 Hours | **Paper Code: PBID-107** | Marks: 100

**Section-A (2x10=20)**

**Fill in the blanks:**

1. The largest type of computer commonly used is.....
2. Full form of DOS.....
3. HTML is a way to define the formats of text in a .....page.
4. Ctrl + V is used for .....
5. An excel work book has maximum .....rows in a worksheet.
6. Data is stored as a unit of ..... bits in a register.
7. In unix,the ..... command lists the users that are currently logged into the system.
8. .....statement of DDL(Data Definition Language) is used to create table.
9. Tab is used for.....
10. Compiler translates the source code into.....

**Section-B (6x5=30)**

**Answer any FIVE questions:**

1. What do you mean by search engine? Name any three popular search engines.
2. Discuss any five Unix commands and their function.
3. Define computer and give the basic operations which it performs.
4. How do you convert a text into table?
5. Discuss about the construction of formulas in M/s Word.
6. Write short notes on:
   (a) Debugging (b) Storage devices

**Section-C (10x5=50)**

**Answer any FIVE questions:**

1. How is query defined in Visual Basic? How is it created?
2. What are the features of Unix? How is it different from Ms Window operating system?
3. What are the different types of slides in M/S Power Point?
4. Discuss advantages and disadvantages of e-mail.
5. What are the different types of network topologies?
6. Write short notes on any TWO:
   (a) Web browser (b) ISDN (c) Header and Footer in M/s Word
   (d) Unix shell (e) Loops in Visual Basic.