RBC-002

Ph.D. IN BIOCHEMISTRY (PHDBC)

00171 Term-End Examination

December, 2017

RBC-002 : BIOSTATISTICS AND BIOINFORMATICS

Time : 3 hours   *Maximum Marks : 100*

Note : *Question paper consists of three sections, A, B and C. Answer all the sections. Calculators are **not** allowed.*

SECTION A

*Answer **all** the questions.*

1. The intersection of a column and a row in an Excel sheet is known as _____ . *1*

2. The _____ test is used to determine "whether two population means are equal", when the variances are known and the sample size is large. *1*

3. Statistical error refers to : *1*

   (a) Original Value – Approximate Value

   (b) Actual Value – Estimated Value

   (c) $\dfrac{\text{Actual Value – Estimated Value}}{\text{Estimated Value}}$

   (d) $\dfrac{\text{Actual Value – Estimated Value}}{\text{Actual Value}}$

4. Explain the term ANOVA. *1*

5. What are the sources of primary data ? *1*

6. PyMOL is used for *1*

    (a) Structure prediction

    (b) Modelling

    (c) Both (a) and (b)

    (d) Docking

7. Arrange the following values in increasing order of their storage capacity (low to high) : *1*

    (a) 100 KB

    (b) 1 MB

    (c) 10 TB

    (d) 64 GB

8. What is RAM ? *1*

9. Define LAN. *1*

10. A FASTA sequence of a given protein represents information about _____ . *1*

11. Match the following : *2*

Group A		Group B	
(a)	Mac	(i)	Input
(b)	Mouse	(ii)	Binary digit
(c)	Machine language	(iii)	IOS

12. Write the full forms of WAN and HTML.   *2*

13. Define the terms 'Mean' and 'Mode'.   *2*

14. Are the following *true* or *false* ?   *4×1=4*

     (a)   Null hypothesis describes a basic assumption that there is no significant difference between specified population parameters which is due to sampling or experimental error.

     (b)   't'-test can be used to determine if the parameters of two sets of data are significantly different from each other.

     (c)   'Mic' is an output device.

     (d)   'Floppy' is an input device.

SECTION B

Answer any five questions.

15. What is a Database ? Briefly explain the different types of biological databases.   6

16. What is an Operating System ? Explain any two operating systems with their applications.   6

17. The probability of a person hitting a target is 1/4. She fires '5' times. What is the probability of her hitting the target two times ?   6

18. The following table shows the values of hematological parameters of a sample. Draw a suitable diagram of the given data :   6

Month	July	August	September
RBCs (Lac/mm^3)	2·5	3·0	3·5
Hb% (mg/100 ml)	8·0	9·0	10·0
PCV (%)	14·0	14·5	16·5

19. Define the term 'Correlation'. Describe the different types of correlation in data, with examples.   6

20. (a)   Define 'Compiler' and 'Assembler'.   *3*

(b)   Write a short note on the 'Binary' system.   *3*

21. Distinguish between Intranet and Internet. Explain how the Internet is useful in your research work.   *6*

SECTION C

*Answer any **five** questions.*

22. (a) Write short notes on Protein and DNA Databases. 5

    (b) What is a Search Engine ? Describe in detail about any one search engine. 5

23. What is 'Sequence Alignment' ? Explain the Pairwise and Multiple sequence alignment methods. 10

24. What is Phylogeny ? List the different types of phylogenic trees and briefly explain each type. 10

25. Explain 'BLAST'. How can Protein BLAST output be used for defining protein characteristics ? 10

26. (a) What are the advantages of Sampling over Census ? Describe Stratified Random Sampling method. 5

    (b) Describe different methods of collecting primary data. 5

27. 1000 students at school level were graded according to their IQ level and their economic status.

Economic Condition	IQ Level	
	High	Low
Poor	240	160
Rich	460	140

Test that the IQ level of students is independent of the economic condition of their parents at 5% level of significance. Given that $\chi^2_{5\%}$ (1 d.f.) = 3·84 . **10**

28. Five samples of water were collected from different sites of a channel near an industry in winter and summer from the same sites. These samples were tested for mercury and the data were recorded in the following table :

Site No.	1	2	3	4	5
Residual Hg in Winter (in mm)	1·6	1·8	2·5	2·1	2
Residual Hg in Summer (in mm)	2·5	2·5	3·2	3·5	3·3

Calculate the following for both the seasons : **10**

(a) Mean

(b) Standard Deviation

(c) Coefficient of Variation