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B.Sc. (Part—II) Semester—III Examination

BIOTECHNOLOGY (R/V)

(Essential Mathematical, Biostatistics, Bioinformatics and Biophysical Methods)

Time : Three Hours] [Maximum Marks : 80

Note :— (1) **All** questions are compulsory.

(2) Draw well labelled diagrams wherever necessary.

1. (A) Fill in the blanks :

(i) The mode is a set of _____.

(ii) Primary database is also known as _____.

(iii) Strong bases are bases which completely dissociate in water into the cation and _____.

(iv) ANOVA stands for _____. 2

(B) Choose correct alternative :

(i) pH is an abbreviation of :

(a) Philosophy of Humans (b) Power of Human

(c) Power of Hydrogen (d) Power of Hydroxonium ion

(ii) What is the full form of WWW in web address ?

(a) World Wide Web (b) World Wide Word

(c) World Wide Wood (d) World Wide Window

(iii) The free energy is the :

(a) Internal energy (b) Functional energy

(c) State energy (d) Work energy

(iv) In a throw of coin what is the probability of getting head :

(a) 1 (b) 2

(c) 1/2 (d) 0 2

(C) Answer in **one** statement :

(i) Universal set

(ii) pH

(iii) Free energy

(iv) Primary database. 4

2. Answer the following :

(a) In a college there are 40 teachers who teach Mathematics or Physics. Of these 24 teach Mathematics and 8 teach both Physics and Mathematics. How many teachers teach Physics ? 4

(b) Explain the concept of Limit. 4

(c) Explain product rule in derivative. 4

OR

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(p) Explain binomial theorem. 4

(q) Let U = {1, 2, 3, 4, 5, 6, 7, 8}, A = {2, 3, 7}, B = {3, 4, 5, 8}. Find A′, B′, A′ ∩ B′, A ∪ B. 4

(r) Explain integration as anti-differentiation. 4

3. Describe the following :

(a) Probability of an event 4

(b) Simple sampling with an example. 4

(c) Additive rule of probability. 4

OR

(p) Random sampling with an example. 4

(q) Stratified sampling with an example. 4

(r) Random experiment. 4

4. Explain the following :

(a) Standard deviation of grouped and ungrouped data. 4

(b) Any one test of significance. 4

(c) Mode. 4

OR

(p) Median of ungrouped data. 4

(q) Assumptions of an ANOVA. 4

(r) Measures of deviation. 4

5. What are Nuclear radiations ? Explain properties of alpha, beta and gamma particles in detail. 12

OR

Explain pH and pOH ? What is pH scale and what's its range ? How is it related to hydronium ion concentration ? 12

6. Explain the following :

(a) Gibb's free energy with example. 4

(b) Any two laws of thermodynamics. 4

(c) Redox potential. 4

OR

(p) Half cell potential. 4

(q) Standard free energy change on state of reaction. 4

(r) Bioenergetics of mitochondria. 4

7. Define Bioinformatics. Describe in detail its goal, scope and applications in Biology. 12

OR

What are databases ? Explain primary, secondary, composite and structural databases with one example each. 12

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