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(October)

BIOTECHNOLOGY

(Honours)

(Biostatistics and Biological Techniques)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer Question No. **1** which is compulsory and *any* **four** from the rest

1. Answer the following questions :   2×6=12

   (a) Define the term 'probe' as used in FISH and Northern blot techniques.

   (b) What is the function of amplification buffer in polymerase chain reaction?

   (c) What role does the secondary antibody play in indirect ELISA?

   (d) Why is the blocking step essential in Western blotting?

(*Turn Over*)

(e) Write a note on stratified random sampling.

(f) Distinguish between primary and secondary data.

2. *(a)* How is free radical catalysis involved in formation of polyacrylamide gels? 5

(b) What is electroendosmosis (EEO)? 3

(c) What is the function of stacking gel in SDS-PAGE? 3

3. *(a)* How will you use column chromatography to separate amino acids based on their net charges? 8

(b) How is the appropriate annealing temperature in polymerase chain reaction determined? 3

4. *(a)* State Beer-Lambert law and explain how it is applied in measuring the concentration of biomolecules. 8

(b) Write down the general expression for calculating the magnification provided by an optical microscope and explain the terms. 3

5. *(a)* Calculate the arithmetic mean of the following data by step deviation method : 6

Height of students (in cm)	No. of students
120–130	7
130–140	15
140–150	18
150–160	34
160–170	21
170–180	10
180–190	2

(b) The following table gives the marks obtained by the students in Botany :

Marks	No. of students
0–20	5
20–40	12
40–60	15
60–80	19
80–100	9

Find the median. 5

6. *(a)* Calculate the standard deviation and variance from the following data in presence of urea nitrogen in the blood samples of 80 patients : 6

Urea Nitrogen (mg/dl)	No. of patients
20–30	11
30–40	23
40–50	28
50–60	15
60–70	3

(b) 7 pairs of items X and Y are given below :

X	Y
21	23
22	35
23	37
24	41
25	45
26	50
27	55

Find the Karl Pearson's coefficient of correlation between X and Y. 5

7. *(a)* Define conditional probability and state the theorem on total probability. 4

(b) What is the probability that all the 4 children in a family have birthdays falling on different dates (1 year = 365 days)? 4

(Continued)

(c) If A and B are two independent events and $P(A) = \dfrac{2}{3}$, $P(B) = \dfrac{3}{5}$, find $P(A \cup B)$. 3

8. *(a)* The probability of suffering from a side effect of a certain drug is 0·05. If 100 persons are administered with that drug, find the probability that—

   (i) at least one person suffers;

   (ii) exactly 5 persons suffer. 2½+2½=5

   [Given : $e^{-5} = 0·007$]

(b) A certain stimulus administered to each of the 12 patients resulted in the following increase of blood pressure :

   5, 2, 8, –1, 3, 0, –2, 1, 5, 0, 4 and 6

   Can it be concluded that the stimulus will, in general, be accompanied by an increase in blood pressure? 6

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3/H–77 (iii) (Syllabus–2015)