

3/H-77 (iii) (Syllabus-2015)

2 0 1 7

(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 any *four* questions : 3×4=12

(a) Explain the difference between colorimeter and spectrophotometer.

(b) Explain with the help of a diagram how a compound microscope functions.

(c) What are the significances of the blocking and washing steps in Western blotting?

(d) How will you detect the presence of a particular mRNA by Northern blotting?

(2)

- (e) What do you mean by (i) positive and negative, and (ii) linear and non-linear correlations?
- (f) Define range, mean deviation and standard deviation.
- (g) What do you mean by measures of central tendency? Discuss briefly the methods of measuring averages.
2. (a) State Beer-Lambert law and explain the term 'molar extinction coefficient'. 2+3=5
- (b) Describe briefly any one type of light dispersive element commonly used in spectrophotometers. 6
3. (a) Describe the procedure you will adopt to amplify a target region of 800 bp from a double-stranded DNA template by the polymerase chain reaction. 7
- (b) Why are monoclonal antibodies and enzymes used in ELISA? 4
4. (a) Compare the principles and applications of TEM and SEM. 8
- (b) What roles do buffers play in gel electrophoresis? Name two buffers commonly used in electrophoresis. 2+1=3

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(Continued)

(3)

5. (a) How are amino acids separated based on their isoelectric points? 7
- (b) How are relative molecular mass of proteins measured by molecular sieve chromatography? 4
6. (a) The expenditures of 1000 families are given below :

Expenditures	Number of families
40-59	50
60-79	?
80-99	503
100-119	?
120-139	50

The mean of the distribution is ₹ 87.50. Calculate the missing frequencies. 4

- (b) For the following distribution, determine correlation coefficient : 7

X	Y
10	30
11	45
12	50
13	60
14	48

7. (a) A candidate is selected for interview of management trainees for 3 companies. For the first company there are

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(Turn Over)

12 candidates, for the second there are 15 candidates and for the third there are 10 candidates. What is the chance of his getting selected in at least one of the companies?

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(b) Assuming the probability of a male birth as $\frac{1}{2}$, find the probability that a family of 3 children will have (i) at least one girl, (ii) two boys and one girl, and (iii) at most two girls.

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8. (a) The distribution of monthly incomes of 500 workers may be assumed to be normal with mean of ₹ 2,000 and standard deviation of ₹ 200. Estimate the number of workers with incomes (i) exceeding ₹ 2,300 per month and (ii) between ₹ 1,800 and ₹ 2,300 per month.

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(b) Two samples of 6 and 5 items respectively gave the following data :

Mean of the first sample = 40

Standard deviation of the

first sample = 8

Mean of the second sample = 50

Standard deviation of the

second sample = 10

Is the difference of the mean significant?

[Given $t_{0.05}(9) = 2.26$]

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