

**Odd Semester, 2020**

( Held in March, 2021 )

**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) What is the function of monochromator in a spectrophotometer?
- (b) What roles do ethidium bromide and Coomassie Brilliant Blue play in gel electrophoresis?
- (c) What is relative centrifugal field (rcf)?
- (d) What are ampholytes?

- (e) Name the biomolecules generally used as probes in Northern Blotting.
- (f) What is a statistical hypothesis? Define null and alternative hypotheses.

**2.** (a) Write brief about the application of fluorescence spectroscopy in bio-science.                      5

(b) Draw a neat, labelled diagram of a compound microscope and explain functions of the different parts.                      6

**3.** (a) What are the general rules for designing PCR primers?                      5

(b) What roles do divalent cations such as magnesium ions play in PCR?                      2

(c) Define the terms enzyme activity unit and processivity of DNA polymerases.                      4

**4.** (a) Define the terms 'void volume', 'bed volume' and 'retention time' as used in molecular sieve chromatography.                      6

(b) How is protein size measured using gel filtration?                      5

( 3 )

5. (a) You need to measure the amount of a specific protein in a mixture of proteins and have facilities for Western Blotting and ELISA in your lab. Which of the two techniques will you use for the objective?  
Justify your choice and explain the principle of the techniques that you intend to utilize. 1+6=7
- (b) Explain free radical catalysis that occurs during formation of polyacrylamide gels. 4
6. Explain the principle of SEM and write briefly about its application in morphometry. 6+5=11
7. (a) Calculate the arithmetic mean of the following frequency distribution : 6

Marks Obtained in examination	No. of Students
10-20	1
20-30	2
30-40	3
40-50	5
50-60	7
60-70	12
70-80	16
80-90	10
90-100	4

( 4 )

- (b) Determine median for the following distribution : 5
- |                    |   |       |       |       |       |       |       |       |
|--------------------|---|-------|-------|-------|-------|-------|-------|-------|
| Marks              | : | 50-55 | 55-60 | 60-65 | 65-70 | 70-75 | 75-80 | 80-85 |
| No. of<br>Students | : | 6     | 10    | 22    | 30    | 16    | 12    | 15    |
8. (a) Calculate standard deviation from the following data : 6
- |                        |   |    |    |    |    |    |    |    |    |    |
|------------------------|---|----|----|----|----|----|----|----|----|----|
| Heights of<br>students | : | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 |
| No. of<br>students     | : | 2  | 0  | 15 | 29 | 25 | 12 | 10 | 4  | 3  |
- (b) Given below are the marks obtained by 10 students in Mathematics and Statistics :
- |                 |   |    |    |    |    |    |    |    |    |    |    |
|-----------------|---|----|----|----|----|----|----|----|----|----|----|
| Mathematics (X) | : | 32 | 38 | 48 | 43 | 40 | 22 | 41 | 69 | 35 | 64 |
| Statistics (Y)  | : | 30 | 31 | 38 | 43 | 33 | 11 | 27 | 76 | 40 | 59 |
- Determine the correlation co-efficient between X and Y by using Pearson's correlation coefficient formula. 5

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