Progressive Education Society's

Seat No.

Modern College of Arts, Science and Commerce (Autonomous)

Shivajinagar, Pune -5

[Total no. of questions:5] [Total number of pages:3]

First Year B.Sc. Biotech (Mar-2020)

End Semester Backlog Examination, (2019 Pattern) Semester – I

Course Code: 19ScBioU105 **Course Name: Mathematics and Statistics I**

Date: 16-03-2020 **Time: 10.00 a.m.-12.00 p.m.**

[Time: 2 Hours] [Max Marks: 60]

Instructions to the candidates:

1. ***All questions are compulsory.***
2. ***Neat diagrams must be drawn wherever necessary.***
3. ***Figures to the right indicates full marks.***
4. ***For Statistics solve any two questions from Q.2 to Q.4.***
5. ***Use seperate answersheets for section-I and section-II.***

Section- I
(Mathematics)

Q.1. Answer the following question(Any Five). **[5x2=10]**

1. Draw the graph of $f(x) = \cos x$.
2. If $A = \{1, 2, 3\}$ and $B = \{2, 3, 6, 7\}$ then find $A \cup B$ and $A \cap B$.
3. Find the sum of the series $\sum \frac{1}{3^n}$.
4. Define set. Is the collection of all rivers in India is a set?
5. Evaluate $\int (e^x + x^3)dx$.
6. Show that $\sin(\frac{\pi}{2} - \theta) = \cos\theta$.
7. Find $f'(x)$ for the function $f(x) = \tan x + \cot x$.

Q.2 Answer the following questions (Any Two). **[2x5=10]**

1. i) Evaluate $\lim_{x\to 0} \frac{\sqrt{4+x}-2}{x}$.
   ii) Eliminate θ if $x = r\cos\theta, y = r\sin\theta$.
2. Find the derivative of $f(x) = \cos x$ using the definition of derivative.
3. If $\sec\theta = \frac{-13}{5}, \frac{\pi}{2} < \theta < \pi$ then find the values of $\sin 2\theta$ and $\cos 2\theta$.

Q.3 Answer the following questions (Any Two). [2x5=10]

1. State and prove Pythagoras theorem.

2. i) If $f(x) = \tan x + \cot x$. Find $f'(\frac{\pi}{4})$.
   ii) Evaluate $\int \cot^2 x dx$.

3. i) Write the $\epsilon - \delta$ definition of continuity.
   ii) The value of k so that

$$f(x) = \begin{cases} kx^2, & x \leq 2. \\ 3, & x > 2. \end{cases} \quad (1)$$

   becomes continuous.

Section-II
(Statistics)

Q.1. Answer the following question(Any Five). [5x2=10]

1. Define the following terms: i) Variable ii) Sample

2. Define Median and state the formula for each, in case of individual observations and frequency distributions.

3. If $\sigma_{x^2} = \sigma_{y^2} = 3$, Cov(X, Y) = 2, Find Corr (X, Y).

4. Distinguish between Primary and Secondary data.

5. Explain simple random sampling with an example.

6. Calculate arithmetic mean of marks scored by a student in 7 subjects given below: 61, 68, 69, 70, 63, 60, 78

7. Show that Corr(X, X) = 1.

Q.2 Answer the following question. [10]

1. Define Statistics and explain need of statistics in biology.

2. Using coefficient of variation find which of the following batsman is more consistent in scoring

Scores of A	42	115	6	73	7	19	119	36	48	130
Scores of B	47	12	76	42	4	51	37	48	13	0

Q.3 Answer the following question. [10]

1. Write note on Kurtosis and explain types of kurtosis.

2. i) Define raw moments.
   ii) The first four raw moments of a distribution are 2, 20, 40, 200 respectively. Find first four central moments.

Q.4 Answer the following question. **[10]**

1. Explain the term Skewness.

2. For the following frequency distribution of marks of candidates. Find Bowley's coefficient of Skewness.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of candidates	5	25	40	70	90	40	20	10