NBG-1603220001020200 Seat No. _____

B. Sc. (Bio-Informatics) (Sem. II) (CBCS) Examination

April / May - 2017

BI-202 : Mathematics & Statistics

[New Course]

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

1. (a) Attempt all the questions. **[4]**

(1) Write the expansion of e^x.

(2) State the Lagrange's mean value theorem.

(3) Is $f(x) = x - 1/x$ always an increasing function for all x in **R?**

(4) State the Rolle's mean value theorem.

(b) Attempt any **ONE** questions. **[2]**

(1) If $z = x^2 + x^2y^2 + y$ then find $\frac{\partial z}{\partial y}$.

(2) If $z = x^3 + 3x^2y^2 + y^3$ then find $\frac{\partial^2 z}{\partial x \partial y}$.

(c) Attempt any **ONE** questions. **[3]**

(1) If $u = y \log\left(\frac{1}{x-y}\right)$ then find $\frac{\partial u}{\partial x}$.

(2) If $z = a^x e^y + x^2 \log y$ then find $\frac{\partial^2 z}{\partial y^2}$.

(d) Attempt any **ONE** questions. **[5]**

(1) If u = log (tan x + tan y) prove that $\sin 2x \frac{\partial u}{\partial x} + \sin 2y \frac{\partial u}{\partial y} = 2$.

(2) Verify Lagrange's mean value theorem for $f(x) = \sqrt{x^2 - 4}$, $x \in (2,3)$.

2. (a) Attempt all the questions. **[4]**

(1) Evaluate $\int \frac{1}{ax+b}\,dx$

(2) Evaluate $\int x^4 + \frac{3}{x}\,dx$

(3) Evaluate $\int (4x+7)^6 \, dx$

(4) Evaluate $\int \frac{x^2+2x+1}{x+1} \, dx$

(b) Attempt any **ONE** questions. **[2]**

(1) Evaluate $\int (x^2 + 2^x + e^x + x^e) \, dx$

(2) Evaluate $\int (a^x + x^b) dx$

(c) Attempt any **ONE** questions. **[3]**

(1) Evaluate $\int \frac{\log x}{x} \, dx$

(2) Evaluate $\int \log x \, dx$

(d) Attempt any **ONE** questions. **[5]**

(1) Evaluate $I = \int_8^{27} \frac{dx}{x - \sqrt[3]{x}}$

(2) Evaluate $\int \frac{x}{(x-1)(2x+1)} dx$

3. (a) Attempt all the questions. **[4]**

(1) What is the unit vector parallel to 3i + 4j ?

(2) Find the distance between the points (–1, –4) and (3, 5).

(3) Find the equation of the line passing through (0, –3) and (5, 0).

(4) Find the equation of the line passing through (–1, –2) and slope 4/7 .

(b) Attempt any **ONE** questions. **[2]**

(1) If **A** = 2i – 3j + 5k and **B** = 3i + j – 2k then evaluate (**A** + **B**) ∘ (**A** - **B**).

(2) Find the angle between the vectors 3i – 2j + k and 2i + 3j.

(c) Attempt any **ONE** questions. **[3]**

(1) Show that the point (2, –2), (8, 4), (5, 7) and (–1, 1) are the vertices of rectangle.

(2) Define Divergence and Curl.

(d) Attempt any **ONE** questions. **[5]**

(1) Find the equation of the straight line parallel to y = x + 1 and passing through the point (4, 3).

(2) Find the equation of a straight line passing through the point of intersection of the lines 3x + 2y = 4 and x + y = 3 and parallel to the line joining the points (1, 1) and (2, 4).

4. (a) Attempt all the questions. **[4]**

(1) If $n = 10$, $\sum_{i=1}^{10} D^2 = 280$, then find the rank correlation coefficient.

(2) What is the range of coefficient of correlation?

(3) When r is zero, then two regression lines are parallel or perpendicular?

(4) Define the meaning of Regression.

(b) Attempt any **ONE** questions. **[2]**

(1) Suppose it is calculated that a is 4 and b is 2 for a particular estimating line with one independent variable. If the independent variable has a value of 2, what value should be expected for the dependent variable?

(2) Define correlation analysis.

(c) Attempt any **ONE** questions. **[3]**

(1) Explain the properties of correlation coefficient.

(2) Find spearman's rank correlation for the following data.

Fertilizers used :	15	18	20	24	30	35	40	50
Productivity :	85	93	95	105	120	130	150	160

(d) Attempt any **ONE** questions. **[5]**

(1) Calculate Karl Pearson's coefficient of correlation.

x	1	2	3	4	5	6	7	8	9	10
y	15	9	7	5	12	13	20	25	23	22

(2) From the following data find out the probable yield when rainfall is 40 cms. using regression equation.

	Rainfall (in cms.)	Production (in tons)
Mean	35	50
S.D.	5	8

Coefficient of correlation = 0.8

5. (a) Attempt all the questions. **[4]**

(1) If P(A) = 2/3, P(B) = 3/4, P(A/B) = 2/3, then find P(B/A).

(2) What is the probability that a leap year selected at random would contain 53 Saturdays?

(3) If P(A) = 0.67 , P(B) = 0.85 , P(A or B) = 0.98 , then find P(A and B).

(4) If an unbiased coin is tossed 3 times, then what is the probability that 2 head fall upward?

(b) Attempt any **ONE** questions. **[2]**

(1) Define mutually exclusive event.

(2) Define Poisson Probability Distribution function.

(c) Attempt any **ONE** questions. **[3]**

(1) Write probability density function of Normal Distribution.

(2) Calculate the expected value of x from the following probability distribution.

x	:	0	1	2
P(x)	:	0.3	0.4	0.3

(d) Attempt any **ONE** questions. **[5]**

(1) A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is 1/7 and that of wife's selection is 1/5. What is probability that only one of them will be selected ?

(2) Of a large group of men, 5% are less than 60 inches in height and 40% are between 60 and 65 inches. Assuming a normal distribution, find the mean height and standard deviation.

[Given, $P(0 < z < 0.13) = 0.05$, $P(0 < z < 0.26) = 0.10$, $P(0 < z < 1.645) = 0.45$, $P(0 < z < 1.28) = 0.40$]