NBG-003-006202 Seat No. _____

B. Sc. (Bioinformatics) (Sem. II) (CBCS) Examination

April / May - 2017

BI - 202 : Mathematics & Statistics - II

(Old Course)

Faculty Code : 003

Subject Code : 006202

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

1 Answer the following in short : **20**

(1) $f(x)=x^2-2x+5$ is decreasing for $x<$ _____

(2) The mean value for the function $f(x)=x^2-2x+3$ in (0,2) using Rolle's Theorem is _____

(3) For $f=x^2y^3+x^3y^2$, $\frac{\partial^2 f}{\partial x \partial y}=$ _____

(4) The slope of the line $2x+3y=6$ is _____

(5) The distance between the points $(-2,4)$ and $(-2,-1)$ is _____

(6) The mean value for the function x^3+x in (1,2) using Lagrange's theorem is _____

(7) If $\overline{a}\cdot\overline{b}=0$ then the angle between the vectors $\overline{a}$ and $\overline{b}$ is _____

(8) Area of the triangle formed by (4,1), (5,1) and the origin is _____

(9) The value of y-intercept of the line passes through the origin is _____

(10) $\int x^2+2^x\,dx=$ _____ $+c$

(11) $\int \frac{x}{a}+\frac{a}{x}dx=$ _____ $+c$

(12) $\int 3x^4-\frac{2}{x^2}dx=$ _____ $+c$

(13) $\int \frac{1}{5x+2}dx=$ _____ $+c$

(14) The range of Co-efficient of correlation is _____

(15) There is _____ correlation between rainfall and level of ground water.

(16) Co-efficient of correlation is _____ mean for Regression coefficients.

(17) In usual notations $P(A-B)=$_____

(18) If A' and B' are independent events then $P(A' \cap B')=$_____

(19) For a probability distribution $\sum P(x_i)=$_____

(20) If for a binomial distribution mean = 8 and Variance = 4 then the value of p = _____

2 (A) Answer any **three** : **2×3=6**

(1) Find $\int 5x^2+\frac{3}{x}+2^x\,dx$

(2) Find $\int_2^3 x^3+3x-1\,dx$

(3) For $\bar{x}=(2,3,0), \bar{y}=(1,1,1) \& \bar{z}=(2,1,2)$ *find* $[\bar{x}\ \bar{y}\ \bar{z}]$

(4) Verify whether the points (1,3), (1,4), (1,–3) are collinear or not

(5) For $f(x,y)=2x^2y+xy^2+3xy$ find $f_x, f_y \& f_{yx}$

(6) Find the interval/s where the function $f(x)=x^3-3x^2-45x$ is decreasing.

(B) Answer any **three** : **3×3=9**

(1) Find $\int \frac{2x+5}{\sqrt{x^2+5x+2}}\,dx$

(2) Find $\int_1^2 \frac{x+5}{x+4}\,dx$

(3) Verify Lagrange's Mean Value Theorem for $f(x)=(x-1)(x-2)(x-3)$ where $x \in [0,4]$

(4) If $\bar{x}=(2,1,3), \bar{y}=(1,2,4) \& \bar{z}=(1,8,2)$ Prove : $\bar{x}\cdot(\bar{y}+\bar{z})=\bar{x}\cdot\bar{y}+\bar{x}\cdot\bar{z}$

(5) Find the area of triangle having vertices (1,4), (2,3) and (3,0)

(6) Find the coordinates of the point which divides the join of the points $A(1,-2) \& B(4,7)$ externally in the ratio 2 : 3

(C) Answer any **two** : **2×5=10**

(1) Find $\int_2^3 \frac{2x+5}{x^2+5x}\,dx$

(2) Show that the line joining A (2,1) and B (3,4) is perpendicular to the line joining C(7,5) and D(4,6)

(3) For $f(x,y)=3x^2+4xy+3y^2$ prove that $x\frac{\partial f}{\partial x}+y\frac{\partial f}{\partial y}=2f(x,y)$

(4) Prove that the points A (2,2), B(2,4), C(4,4) and D(4,2) are vertices of a square

(5) Find maximum and minimum values for the function $f(x)=4x^3+19x^2-14x+3$

3 (A) Answer any **three** : **2×3=6**

(1) For a bivariate sample $r=0.8$ and $P.E.=0.08$ then find n

(2) Explain types of correlation

(3) If $E(x)=3$ then find the value of $E(4x-5)$

(4) If $r=0.9, S_y=9, S_x=4.5$ then find the values of b_{yx} and b_{xy}

(5) If $\bar{a}=4\hat{i}+6\hat{j}$ and $\bar{b}=3\hat{i}+4\hat{j}$ then find $(3\bar{a}-5\bar{b})\cdot(2\bar{a}+7\bar{b})$

(6) If $P(A_1)=0.4, P(A_2)=0.2$ & $P(A_1/A_2)=0.4$ then find the probability that only A_2 happens.

(B) Answer any **three** : **3×3=9**

(1) There are two defective pencils in a pack of dozen pencils, If three pencils are taken at Random, find the probabilities that (1) At the most one pencil is defective (2) Two Pencils are defective.

(2) If A, B and C are mutually exclusive and exhaustive events and if $3P(A)=2P(B)=6P(C)$ Then find $P(A\cup B)$.

(3) The probability distribution of demand of a commodity is given below :

Demand(x)	5	6	7	8	9	10
Prob.P(x)	0.05	0.1	0.3	0.4	0.1	0.05

Find the expected demand and its variance.

(4) If $\bar{a} = 4\hat{i} + 2\hat{j} - \hat{k}$ and $\bar{a} = 5\hat{i} + 2\hat{j} - 3\hat{k}$ then find the angle between the vectors $\bar{a} + \bar{b}$ and $\bar{a} - \bar{b}$

(5) The sum of the squares of rank differences of two variables x and y is 126 and the Correlation coefficient is –0.5. Find the number of pairs.

(6) The regression equations of two variables are $5y = 9x - 22$ *and* $20x = 9y + 350$ then find means of x and y and also find the value of r.

(C) Answer any **two** : **2×5=10**

(1) Find the regression coefficients from the following data :

x	21	22	23	24	25	26	27	28	29	30
y	17	19	19	20	23	24	27	26	28	27

(2) Find the coefficient of rank correlation

x	28	27	26	35	39	42	39	37	32	22
y	40	42	38	49	40	50	38	44	45	36

(3) If $\bar{a} = 2\hat{i} + 5\hat{j} - 7\hat{k}, \bar{b} = -3\hat{i} + 4\hat{j} + \hat{k}$ and $\bar{c} = \hat{i} - 2\hat{j} - 3\hat{k}$ then show that $(\bar{a} \times \bar{b}) \times \bar{c}$ and $\bar{a} \times (\bar{b} \times \bar{c})$ are not the same.

(4) The probability distribution of a random variable x is as follows :

x	0	1	2	3	4	5	6	7
$P(x)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2 + k$

(1) Find the value of k

(2) Obtain the probability distribution of x.

(5) There are 6 red and 3 black balls in one bag; 5 red and 6 black balls in another bag. A bag is selected at random and two balls are drawn from it. Find the probability that one is red ball and one is black ball.
