

**Question Bank For IA 2 , Sem 3, EM-III , 2023-24**

**Q1 .** For the following data

X	44	49	52	52	47	76	65	60	63	58
Y	48	58	45	60	43	80	58	50	77	46

- Calculate correlation coefficient
- Calculate regression lines y on x and x on y.
- Estimate the value x when y= 70 , also estimate y when x=55

**Q2 .** Calculate the Rank Correlation Coefficient for the following data

Student no	1	2	3	4	5	6	7	8
Marks in Economics	52	63	45	36	72	65	45	25
Marks in Marketing	62	53	51	25	79	43	60	33

**Q3** If the regression lines are  $10x + 3y - 62 = 0$  and  $6x + 5y - 50 = 0$ . Find  $(\bar{x}, \bar{y})$ , correlation coefficient. Also find  $\sigma_x$  if  $\sigma_y = 2$ .

**Q4.** Show that the give function is harmonic and find its harmonic conjugate

- $u(x, y) = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$
- $v(x, y) = \log(x^2 + y^2) + x - 2y$

**Q5** If  $f(z) = u + iv$  is analytic and  $u + v = e^x(\cos y + \sin y) + \frac{x-y}{x^2+y^2}$ . Find  $f(z)$

**Q6.** Find values of constants a,b,c,d,e if

$f(z) = (ax^4 + bx^2y^2 + cy^4 + dx^2 - 2y^2) + i(4x^3y - exy^3 + 4xy)$  is analytic

**Q7.** Find the orthogonal trajectory of the family of curves given by

$$e^{-x} \cos y + xy = \alpha$$

**Q8** Suppose that a r.v. X has the following pdf  $f(x) = \begin{cases} c(1 - x^2) & , -1 \leq x \leq 1 \\ 0 & , otherwise \end{cases}$

- Find value of c.
- Find the mean  $E(X)$  , variance  $V(X)$ ,  $E(3X + 4)$ , and  $V(2X + 5)$

**Q9.** For the following function find the value of k such that it is a probability mass function  
a)

$X = x$	-2	-1	0	1	2
$P(X = x)$	$\frac{k}{20}$	$\frac{2}{5k}$	$\frac{k}{5}$	$\frac{k}{10}$	$\frac{k-1}{5k}$

Also find  $E(X)$  and  $V(X)$  and Find  $P(-1 \leq X \leq 1)$

b)

$X = x$	0	10	15
$P(X = x)$	$\frac{k-6}{5}$	$\frac{2}{k}$	$\frac{14}{5k}$

Also find (i) CDF of X, (ii)  $F(15)$ , (iii)  $E(X)$  and  $V(X)$ ,

**Q10.** Find the MGF of the following pmf and also find the first four raw moments and central moments.

$X = x$	-2	1	3
$P(X = x)$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{2}$

**NOTE: Values may be changed in the question paper. Questions could be modified.**