22492

22223

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) State any two advantages of network models.

b) Two fair dice one rolled. Determine the probability of getting

i) Two six

ii) One six

c) A fair coin is tossed five times, find probability of obtaining

i) Two heads

ii) At most two heads

d) Find the line of regression of X and Y for the following data n = 8

$\sum(x_i - \bar{x})^2 = 36$, $\sum(y_i - \bar{y})^2 = 44$

$\sum(x_i - \bar{x})\ (y_i - \bar{y}) = 24$

Marks

e) Verify whether the following function can be regarded as the p.m.f. for the given value of X.

$$P(X = x) = \begin{cases} \frac{x^2}{5} & x = 0,\ 1,\ 2 \\ 0 & \text{Otherwise} \end{cases}$$

f) If $X \sim N(4, 25)$ then find $P(x \leq 4)$.

g) If $\sum d^2 = 66$ and $n = 10$ then find the rank correlation coefficient.

2. Attempt any <u>FOUR</u> of the following: **12**

a) Two digits numbers are to be made using the digit 3, 5, 6 and 8 without repetition of digits. Find the probability of the following events.

i) The number is odd

ii) The number is divisible by 9.

b) If A and B are two event such that P(A) = ¼, P(B) = ½ and $P(A \cap B) = \frac{1}{8}$ then $P(A' \cap B')$

c) An urn contains 4 red and 7 blue balls, two balls are drawn at random with replacement. Find the probability of getting

i) 2 red balls

ii) 2 blue balls

iii) 1 red and 1 blue ball

d) The equations of two regression lines are $10x - 4y = 80$ and $10y - 9x = 40$, find

i) $\bar{x}$ and $\bar{y}$

ii) bxy and byx

e) For bivariate data $\bar{x} = 53$, $\bar{y} = 28$, $byx = -1.2$, $bxy = -0.3$

i) Find correlation coefficient between x and y.

ii) Estimate y when $x = 50$

Marks

3. Attempt any FOUR of the following: **12**

a) The probability distribution of discrete r.v. of X is as follows:

X = x	1	2	3	4	5	6
P[X = x]	K	2K	3K	4K	5K	6K

i) Determine the value of K

ii) Find P(x $\leq$ 4), P(2 < x < 4), P(x $\geq$ 3)

b) A boy tossed a fair coin 3 times. If he gets Rs. 2X for X heads. Find his expected gain.

c) Obtain expected value of variance of X for the probability distribution.

X	1	2	3	4	5
P(X = x)	0.2	0.4	0.1	0.1	0.2

i) Find E(X)

ii) Find $E(X)^2$

iii) Find var(X)

d) A fair coin is tossed 12 times. Find the probability of getting

i) Exactly seven heads

ii) At least two heads

iii) At most three heads

e) If X has follows Poisson distribution with parameter m = 5, Find

i) P(x = 3)

ii) P($x \leq 1$)

($\therefore$ e^{-5} = 0.0671)

Marks

4. Attempt any THREE of the following: **12**

a) State any two similarities and differences of CPM and PERT.

b) Draw the AON diagram for the following data.

Activity	Immediate predecessor	Duration (week)
A	–	5
B	A	4
C	A	7
D	B	6
W	B, C	6
F	C	5
G	D, E, F	7

c) Define Float. Explain its different types and their importance.

d) Draw the network for the project whose activities with their relationship are given below. Activities A, D, E can start simultaneously B, C > A ; G, F > D, C ; H > E, F.

e) Draw the arrow diagram as well as the AON diagram.

Activity	Immediate predecessor
A	–
B	–
C	–
D	A, B
E	B
F	B, C

Marks

5. Attempt any TWO of the following: **12**

a) If the correlation coefficient between x and y is 0.6, covariance is 27 and variance of y is 25. Find the variance of x.

b) Calculate the coefficient of correlation between x and y series from the following data n = 15, x = 25, y = 18, $6x$ = 3.01, $6y$ = 3.03

$\sum(x_i - \bar{x})\ (y_i - \bar{y}) = 24$

c) Calculate the correlation coefficient is 0.6 and the sum of squares of difference is 66. Then find the number pairs of observation.

d) Find the rank correlation coefficient between x and y variables.

x	10	20	35	14	18	21	16
y	13	25	18	19	20	26	27

e) If the following data one of the value of y is missing. Arithmetic means of 6 and 8 series respectively.

(x)	6	2	10	4	8
(y)	9	11	2	8	7

Estimate missing observation.

6. Attempt any TWO of the following: **12**

a) From the data 7 pairs of observation on X and Y following results are obtained.

$\sum(x_i - 70) = -38,\ \sum(y_i - 60) = -5$

$\sum(x_i - 70)^2 = 2990,\ \sum(y_i - 60)^2 = 275$

$\sum(x_i - 70) - (y_i - 60) = 1063$

i) Obtain the line of regression of Y on X.

ii) Obtain the line of regression of X on Y.

iii) Obtain the correlation coefficient between X and Y.

Marks

b) The following tables gives the aptitude tests scores and productivity indices of 10 workers selected at random.

i) Obtain the two regression equation and estimate

ii) Obtain the line of regression to predict Y for X = 50

Aptitude score (X)	60	62	65	70	72	48	53	73	65	82
Productivity index (X)	68	60	62	80	85	40	52	62	60	81

c) In partially destroyed laboratory record of an analysis of correlation of data only the following results are legible variance of X = 9 Regression equations are

i) $8x - 10y + 66 = 0$

ii) $40x - 18y - 214 = 0$

Find out the following missing results

1) The means of X and Y

2) The coefficient of correlation between X and Y

3) The standard deviation of Y