

314316

12526

3 Hours / 70 Marks

Seat No.

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- 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) Let $S = \{b, d, f, h, a, c, e, g\}$, $A = \{b, d, f, h\}$ and $B = \{a, d, e, h\}$. List the elements of the following events.

i) $(A \cup B)'$

ii) $A' \cap B'$

b) Verify whether the following functions can be regarded as p.m.f. for the given values of X.

$$P(x) = \begin{cases} \frac{x-1}{3} & , \quad x = 1, 2, 3 \\ 0 & , \quad \text{otherwise} \end{cases}$$

c) State any two common errors in Networking.

P.T.O.

d) for bivariate data.

$\bar{x} = 53$, $\bar{y} = 28$, $b_{yx} = -1.2$, $b_{xy} = -0.3$, Find estimate of Y for X = 50.

e) Draw Scatter diagram and identify the type of correlation for the following data.

Capital (₹ in crore)	2	3	4	5	6	8	9
Profit (₹ in lakh)	6	5	7	7	8	12	11

f) In the following data, one of the value of Y is missing. Arithmetic means of X and Y series are 6 and 8 respectively.

(X)	6	2	10	4	8
(y)	9	11	?	8	7

Estimate missing observation.

g) From the given following data, obtain the linear regression estimates of X for Y = 10, $\bar{X} = 7.6$, $\bar{Y} = 14.8$, $\sigma_x = 3.6$, $\sigma_y = 25$ and $\gamma = 0.8$.

2. Attempt any **THREE** of the following :

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- a) A box contains 75 tickets numbered 1 to 75. A ticket is drawn at random from the box. What is the probability that, number on ticket is divisible by 3 and 5.
- b) For two events A and B of a sample space S, if $P(A \cup B) = \frac{5}{6}$, $P(A \cap B) = \frac{1}{3}$ and $P(B') = \frac{1}{3}$ then find P(A).
- c) A random variable X has the following probability distribution.

X	0	1	2	3	4
P(X = x)	k	2k	4k	2k	k

Find -

- i) Value of k.
- ii) $P(X \geq 2)$, $P(X \leq 1)$.
- d) Define Float. Explain its different types and their importance.

3. Attempt any THREE of the following :

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- a) An urn contains 4 red and 7 blue balls. Two balls are drawn at random with replacement find the probability of getting :
- 2 red balls
 - 2 blue balls
 - One red and one blue ball.
- b) Obtain the expected value and variance of X for the following probability distribution.

$X = x$	-2	-1	0	1	2
$P(X = x)$	0.2	0.3	0.1	0.15	0.25

- c) Discuss any two similarities and differences of CPM and PERT.
- d) For a bivariate data of $\bar{X} = 53$, $\bar{Y} = 28$, $b_{yx} = -1.5$ and $b_{xy} = -0.2$.

Find –

- Correlation coefficient between X and Y.
- Estimate Y when $X = 50$.

4. Attempt any THREE of the following :

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- a) Calculate the Spearman's rank correlation coefficient for the following data and interpret the result :

x	35	54	80	95	73	73	35	91	83	81
y	40	60	75	90	70	75	38	95	75	70

- b) A fair coin is tossed 3 times. A person receives Rs. X^2 . If he gets X number of heads in all. Find his expected gain.
- c) State Fulkerson's Rule for numbering of events in a Network Diagram.
- d) If the rank correlation coefficient is 0.5 and $\sum di^2 = 42$. Assuming that no ranks are repeated. Find the number of pairs of observations.
- e) The coefficient of correlation between two variable x and y is 0.48. The covariance is 36 and the variance of x is 16. Find the standard deviation of y .

P.T.O.

5. Attempt any TWO of the following :

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- a) If X has poisson distribution with variance 2, Find :
- $P(X = 4)$
 - $P(X \leq 4)$
 - Mean of X (Use $e^{-2} = 0.1353$)
- b) For the following project -
- Draw Network Diagram.
 - Find Critical Path and Project completion time.
 - Identify Critical Activities.

Activity	A	B	C	D	E	F	G	H
Preceding Activity	-	A	A	B	C	D	D,E	F,G
Duration (in Days)	6	5	2	4	2	1	5	3

- c) From the data of 15 pairs of observations on X and Y. Following results are obtained.

$$\bar{x} = 25, \bar{y} = 18, \Sigma(x_i - \bar{x})^2 = 136$$

$$\Sigma (y_i - \bar{y})^2 = 148, \Sigma(x_i - \bar{x})(y_i - \bar{y}) = 122$$

Find :

- The line of regression of Y on X.
- The line of regression of X on Y.

6. Attempt any TWO of the following :

- a) The equations of two regression lines are :
 $10x - 4y = 80$ and $10y - 9x = -40$ Find :
 i) \bar{x} and \bar{y}
 ii) b_{yx} and b_{xy}
 iii) If $\text{Var}(Y) = 36$ obtain $\text{Var}(X)$
 iv) Υ
- b) From the following data :

Price (Rs.)	10	12	13	12	16	15
Amount Demand	40	38	43	45	37	43

- i) Estimate the likely demand when the price is Rs. 20.
 ii) Estimate the likely price when the demand is 39.25.
- c) A sample of five items is taken from the production of a firm. Length and weight of the five times are given below.

Length (cm)	3	4	6	7	10
Weight (gm)	9	11	14	15	16

Calculate Karl Pearson's Co-efficient of correlation between length and weight.
