

(6 pages)

OCTOBER 2012 P/ID 17456/RCF/PCAB

Time : Three hours

Maximum : 75 marks

PART A — (5 × 5 = 25 marks)

Answer ALL questions.

1. (a) A problem in statistics is given to the three students A , B and C whose chances of solving it are $1/2$, $3/4$ and $1/4$ respectively. What is the probability that the problem will be solved if all of them try independently?

Or

- (b) A random variable x has the following probability distribution :

Value of X, x :	0	1	2	3	4	5	6	7
$P(x)$:	0	a	$2a$	$2a$	$3a$	a^2	$2a^2$	$7a^2 + a$

- (i) Determine the value of a .
- (ii) Find $P(x < 6)$, $P(X \geq 6)$ and $P(0 < X < 5)$.

2. (a) The probability of a man hitting a target is $\frac{1}{3}$. How many times must be fired so that the probability of his hitting the target at least once is more than 90%.

Or

- (b) X is a normal variate with mean 0 and standard deviation 5. Find the probability that
- (i) $26 \leq X \leq 40$ and
- (ii) $|X - 30| > 5$.

3. (a) Calculate the correlation coefficient for the following data ;

X : 65 66 67 67 68 69 70 72
 Y : 67 68 65 68 72 72 69 71

Or

- (b) Fit the straight line to the following data :

X : 1 2 3 4 6 8
 Y : 2.4 3 3.6 4 5 6

4. (a) Discuss on the method of sampling.

Or

- (b) The following table gives the number of aircraft accidents that occurs during the various days of the week. Find whether the accidents are uniformly distributed over the week.

Days :	Sun	Mon	Tues	Wed	Thus	Fri	Sat
No. of accidents :	14	16	8	12	11	9	14

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5. (a) Discuss on the basic principles of experimental design.

Or

- (b) Explain the component of time series.

PART B — (5 × 10 = 50 marks)

Answer any FIVE questions.

6. Given $P(A) = 0.30$, $P(B) = 0.78$ and $P(A \cap B) = 0.16$. Find
- (a) $P(A \cup B)$.
 - (b) $P(A \cup B)$.
 - (c) $P(A \cap B)$.
 - (d) $P(A/B)$.
 - (e) $P(A \cap B)$ and
 - (f) $P(B/A)$.

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7. For geometric distribution $P(x) = 2^{-x}$;
 $x = 1, 2, 3, \dots$ Prove that Chebyshev's inequality
gives $P\{|X - 2| \leq 2\} > 1/2$.

8. If X and Y are two random variables having joint
density function

$$f(x, y) = 1/8(6 - x - y); \quad 0 \leq x \leq 2, \quad 2 \leq y \leq 4$$
$$= 0; \quad \text{otherwise.}$$

Find :

(a) $P(X < 1 \cap Y < 3)$.

(b) $P(X + Y < 3)$ and

(c) $P(X < 1/Y < 3)$.

9. The mean yield for one acre plot is 662 kg with a
standard deviation 32 kg. Assuming normal
distribution, how many one acre plots in a batch of
1,000 plots would you expect to have yield.

(a) over 700 kgs

(b) below 650 kgs and

(c) what is the lowest yield of the best 100 plots?

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[P.T.O.]

10. In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible.

Variance of $X = 9$ Regression equations :
 $8X - 10Y + 66 = 0$, $40X - 18Y = 214$. What were

- (a) the mean values of X and Y ?
 - (b) the correlation coefficient between X and Y , and
 - (c) the standard deviation of Y .
11. Two independent samples of sizes 8 and 7 contained the following values :
- Sample I: 19 17 15 21 16 18 16 14
- Sample II: 15 14 15 19 15 18 16

Is the difference between the sample means significant?

12. In order to determine whether there is significant difference in the durability of 3 makes of computers, samples of size 5 are selected from each make and frequency of repairing during the first year of purchase is observed. The results are as follows :

A :	5	6	8	9	7
B :	8	10	11	12	4
C :	7	3	5	4	1

In view of the data observed, what conclusion can you draw?

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13. Calculate the seasonal indices from the following data using the average method.

Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
1974	72	68	80	70
1975	76	70	82	74
1976	74	66	84	80
1977	76	74	84	78
1978	78	74	86	82

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