

(6 pages)

MAY 2016

P/ID 17508/PCASH

Time : Three hours

Maximum : 100 marks

PART A — (6 × 5 = 30 marks)

Answer any SIX questions.

1. For any two events A and B show the following :
 - (a) $P(\bar{A} \cap B) = P(B) - P(A \cap B)$
 - (b) $P(A \cap \bar{B}) = P(A) - P(A \cap B)$
2. If A , B and C are mutually independent events then show that $A \cup B$ and C are also independent.
3. A and B play a game in which their chances of winning are in the ratio 3:2. Find A 's chance of winning atleast three games out of five games played.
4. Six coins are tossed 6,400 times using the Poisson distribution, find the approximate probability of getting six heads r times.

5. Calculate the correlation co-efficient for the following heights (in inches) of fathers (X) and their sons (Y) :

X: 65 66 67 67 68 69 70 72

Y: 67 68 65 68 72 72 69 71

6. Explain about errors in sampling.
7. The mean weekly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful?
8. Using three year moving averages determine the trend and short-term fluctuation.

Year : 1983 1984 1985 1986 1987

Production : 21 22 23 25 24

Year : 1988 1989 1990 1991 1992

Production : 22 25 26 27 26

PART B — (7 × 10 = 70 marks)

Answer any SEVEN questions.

9. A letter is known to have come either from TATA NAGAR or from CALCUTTA. On the envelope just two consecutive letters TA are visible. What is the probability that the letter came from CALCUTTA?
10. If you wish to estimate the proportion of Engineers and Scientists who have studied Probability theory and you wish your estimate to be correct within 2% with Probability 0.95 or more, how large a sample would you take
- (a) if you have no idea what the true proportion is,
- (b) if you are confident that the true proportion is less than 0.2?
11. Let X and Y have bivariate normal distribution with parameters :
- $$\mu_x = 5, \mu_y = 10, \sigma_x^2 = 1, \sigma_y^2 = 25, \text{Corr}(x, y) = \rho$$
- (a) if $\rho > 0$, find ρ when
- $$P(4 < y < 16 | x = 5) = 0.954$$
- (b) If $\rho = 0$, find $P(X + Y) \leq 16$.

12. Fit a Poisson distribution to the following data :

Number of mistakes

per page : 0 1 2 3 4 Total

Number of pages : 109 65 22 3 1 200

13. Obtain the rank correlation co-efficient for the following data :

X: 68 64 75 50 64 80 75 40 55 64

Y: 62 58 68 45 81 60 68 48 50 70

14. For 10 randomly selected observations, the following data were recorded :

Observation No. : 1 2 3 4 5 6 7 8 9 10

Overtime Hrs (X) : 1 1 2 2 3 3 4 5 6 7

Additional units (Y) : 2 7 7 10 8 12 10 14 11 14

Determine the co-efficients of regression and regression equation using the non-linear form :

$$y = a + b_1X + b_2X^2 .$$

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[P.T.O.]

15. The following figures show the distribution of digits in numbers chosen at random from a telephone directory :

Digits :	0	1	2	3	4	5
Frequency :	1026	1107	997	966	1075	933
Digits :	6	7	8	9	Total	
Frequency :	1107	972	964	853	10,000	

16. The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64, 66 inches. Is it reasonable to believe that the average height is greater than 64 inches? Test at 5% significance level assuming that for 9 degrees of freedom $P(t > 1.83) = 0.05$.
17. Describe the solving procedure of one-way classification problems.
18. The following table gives the yield on 15 sample plots under three varieties of seed :

A	B	C
20	18	25
21	20	28

A	B	C
23	17	22
16	15	28
20	25	32

Find out the average yields of land under different varieties of seed and show the significance differences.
