

4 – Marks

- (1) If 'A', 'B' and 'C' are any three events associated with any random experiment, then prove that, $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$.
- (2) Out of **100** students, two sections of **40** and **60** are formed. If you and your friend are among 100 students, What is the probability that, (i) you both enter the same section ?
(ii) you both enter the different section ?
- (3) Find the probability that when a hand of **7** cards is drawn from a well shuffled deck of **52** cards it contains (i) all kings (ii) exactly **3** kings.
- (4) A fair coin is tossed **4** times a person win **Rs1**, for each head and lose **Rs1.50** for each tail that turns up. From the sample space & calculate how many different amount of money the person can have after **4** tosses also calculate the probability of having each of these amount.
- (5) On her vacations Veena visits four cities (A, B, C and D) in a random order. What is the probability that she visits (i) A before B ? (ii) A just before B ?
- (6) Let A and B be sets. If $A \cap X = B \cap X = \phi$ and $A \cup X = B \cup X$ for some set X, show that $A = B$.
- (7) For any sets A and B, show that $P(A \cap B) = P(A) \cap P(B)$.
- (8) A college awarded **38** medals in football, **15** in basketball and **20** in cricket. If these medals went to a total of **58** men and only three men got medals in all the three sports, how many received medals in exactly two of the three sports ?
- (9) A survey shows that **63%** of Indians like coffee, whereas **76%** likes tea. If x % of Indians like both coffee and tea, find the range of possible values of x .
- (10) Using properties of sets, show that, (i) $A \cap (A \cup B) = A$ (ii) $A \cup (A \cap B) = A$.
- (11) $A = \{1, 2, 3, 5\}$ and $B = \{4, 6, 9\}$. Let a relation $R : A \rightarrow B$, as $\{(x, y) : |x - y| \text{ is odd ; } x \in A, y \in B\}$.
(i) Write R in roster form. (ii) Find the domain of R (iii) Find the range of R.
- (12) Let R be a relation from N to N defined by $R = \{(a, b) : a, b \in N \text{ and } a = b^2\}$. Are the following true?
(i) $(a, a) \in R$, for all $a \in N$ (ii) $(a, b) \in R, \Rightarrow (b, a) \in R$ (iii) $(a, b) \in R, (b, c) \in R \Rightarrow (a, c) \in R$.
- (13) Let R be a relation on Z defined by $R = \{(x, y) : |x - y| \text{ is divisible by } n ; x, y, n \in Z\}$.
Are the following true?
(i) $(x, x) \in R$, for all $x \in N$ (ii) $(x, y) \in R, \Rightarrow (y, x) \in R$ (iii) $(x, y) \in R, (y, z) \in R \Rightarrow (x, z) \in R$.
- (14) Find the domain and range of the function $f(x) = \sqrt{9 - x^2}$
- (15) Find the domain and range of the function $f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x + 12}$
- (16) The Cartesian product $A \times A$ has **9** elements among which are found **(-1, 0)** and **(0, 1)**. Find the set A and the remaining elements of $A \times A$.

6 – Marks

(17) Calculate the mean deviation about median age for the age distribution of **100** persons given below:

Age	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41 – 45	46 – 50	51 – 55
Number	5	6	12	14	26	12	16	9

(18) Calculate mean, Variance and Standard Deviation for the following distribution.

Classes	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 – 100
Frequency	3	7	12	15	8	3	2

(19) The mean and standard deviation of a group of **100** observations were found to be **20** and **3**, respectively. Later on it was found that three observations were incorrect, which were recorded as **21, 21** and **18**. Find the mean and standard deviation if the incorrect observations are omitted.

(20) The mean and variance of eight observations are **9** and **9.25**, respectively. If six of the observations are **6, 7, 10, 12, 12** and **13**, find the remaining two observations.

(21) If **4**-digit numbers greater than or equals to **5,000** are randomly formed from the digits **0, 1, 3, 5, and 7**, what is the probability of forming a number divisible by **5** when,
(i) The digits are repeated ? (ii) the repetition of digits is not allowed ?

(22) In a survey it was found that **21** people liked product **A**, **26** liked product **B** and **29** liked product **C**. If **14** people liked products **A** and **B**, **12** people liked products **C** and **A**, **14** people liked products **B** and **C** and **8** liked all the three products. Find how many liked (i) exactly one product.
(ii) exactly two product.
