



# Indira Gandhi Delhi Technical University for Women

(Formerly Indira Gandhi Institute of Technology)

Kashmere Gate, Delhi-110006

## Probability and Statistics (BAS-108)

### TUTORIAL SHEET -1

#### UNIT- I

**Q.1** Define probability using its axioms. Provide the classical and statistical definitions of probability. If a student either passes or fails in a semester exam, which type of probability definition does this event follow?

**Q.2. (Tossing a six-sided die)** The number of spots turning up when a six-sided die is tossed is observed. Consider the following events:

A: The number observed is an even number.

B: The number observed is greater than 4.

C: The number observed is less than 4.

D: The number observed is 4.

Define a sample space for this random experiment, and assign probabilities to the outcomes.

(a) Find  $P(A)$ ,  $P(B)$ ,  $P(C)$  and  $P(D)$ .

(b) Find  $P(\bar{A})$

(c) Find  $P(A \cap B)$

**Q.3.** If  $P(A \cup B) = 5/6$ ,  $P(A \cap B) = 1/3$  and  $\overline{P(A)} = 1/2$ , find  $P(A)$  and  $P(B)$ .

Hence show that A and B are independent.

**Q.4** From a city population, the population of selecting (i) a male or a smoker is  $7/10$ , (ii) a male smoker is  $2/5$ , and (iii) a male, if a smoker is already selected is  $2/3$ . Find the probability of selecting. (a) a non-smoker, (b) a male, (c) a smoker, if a male is first selected

**Q.5.** An urn contains 4 tickets numbered 1,2,3,4 and another contains 6 tickets numbered 2,4,6,7,8,9. If one of the two urns is chosen at random and a ticket is drawn at random from the chosen urn, find the probabilities that the tickets drawn bears the number (i) 2 or 4, (ii) 3, (iii) 1 or 9.

**Q.6.** Write the statement of Baye's theorem in the contents of urns I, II, and III are as follows:

1 white, 2 black and 3 red balls

2 white, 1 black and 1 red ball and

4 white, 5 black and 3 red balls.

One urn is chosen at random and two balls drawn from it. They happen to be white and red. What is the probability that they come from second urns.

**Q.7.** The following table show data collected for the weekly food expenditure.

Expenditure on Food	No. of respondent
Less than 5 Euro	2
Less than 10 Euro	10
Less than 15 Euro	21

Less than 20 Euro	36
Less than 30 Euro	48
Less than 40 Euro	54
40 Euro or more	57

Obtain the Mean, Median, Mode and first quartile also interpret the results.

**Revise Q.8.** What are the characteristics of a good average? Define Arithmetic mean, Geometric Mean, Median and Mode, and give an two examples of real-life situation in which each of them can be the appropriate measure for the average.

**Q.9.** What are the characteristics for an ideal measure of Dispersion, define measure of dispersion with the standard deviation?

**Q.10.** An analysis of daily wages paid to the workers of two firms A and B belonging to the same industry gives the following results:

	<i>Firm A</i>	<i>Firm B</i>
<i>No. of workers</i>	<i>500</i>	<i>600</i>
<i>Average daily wages</i>	<i>Rs. 186</i>	<i>Rs. 175</i>
<i>Variance of distribution of wages</i>	<i>81</i>	<i>100</i>

(i.) Which firm, A or B, has a larger wage bill?

(ii.) In which firm, A or B, is there greater variability in individual wages?

(iii.) Calculate (a) the average daily wage, and (b) the variance of the distribution of wages, of all the workers in the firm A and B taken together.

**Answer Key:**

**Q.2.** (a)  $P(A) = 3/6$ ,  $P(B) = 2/6$ ,  $P(C) = 3/6$ ,  $P(D) = 1/6$

(b)  $P(\bar{A}) = 1/2$

(c)  $P(A \cap B) = 1/6$

**Q.3.**  $P(A) = 1/2$ ,  $P(B) = 2/3$ , A and B are independent.

**Q.4.** (a)  $P(\text{a non-smoker}) = 2/5$ ,

(b)  $P(\text{a male}) = 1/2$

(c)  $P(\text{a smoker is selected}) = 4/5$

**Q.5.** (i)  $5/12$  (ii)  $1/8$ , (iii)  $5/24$

**Q.6.**  $P(U_2/A) = \frac{1/9}{118/495} = \frac{55}{118}$

**Q.7. Mean is not possible for open ended dataset, Median=17.5,  $Q_1$ =11.93**

**Q.10** (i) Total wages paid to the workers by firm A = Rs. 93,000

Total wages paid to the workers by firm B = Rs. 1,05,000

(ii)  $CV(A) = 4.84$ ,  $CV(B) = 5.71$

(iii) (a) the average daily wage (combined mean) = Rs. 180

(b) the variance of the distribution of wages (combined variance) = Rs.121.36

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