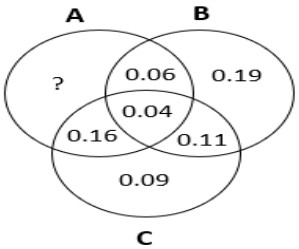
BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
WORK INTEGRATED LEARNING PROGRAMMES

M .Tech (DSE) & M Tech(AIML)

Introduction to Statistical Methods

Webinar 1: Date: 06.11.2022 / 08.11.2022

Topic: Measures of Central Tendency, Measures of Variability, Basic Probability concepts, Conditional Probability and Bayes Theorem

1	A psychologist wrote a computer program to simulate the way a person responds to a standard IQ test. To test the program, he gave the computer 15 different forms of a popular IQ test and computed its IQ from each form IQ Values: 134 136 137 138 138 143 144 144 145 146 146 146 147 148 153 Find the following Statistical measures: i. Mean, median, and mode ii. Rang, Variance and standard deviation iii. Obtain and interpret the quartiles. iv. Determine and interpret the interquartile range. v. Identify potential outliers, if any.
2	For two observations ‘a’ and ‘b’, show that standard deviation is half of the distance between them.
3	If $P(A) = 1/2$, $P(B) = 1/3$ and $P(A \cap B) = 1/5$ then find a). $P(A \cup B)$ b). $P(A^c \cap B)$ c). $P(A \cap B^c)$ d). $P(A^c \cap B^c)$ e). $P(A^c \cup B^c)$ f). $P((A \cup B)^c)$
4	There are three events A, B and C. The probability of occurrence of at least one of them is 0.23. Using the probabilities given in the following Venn diagram, find the probability of the event A. 
5	A political leader has submitted his nomination to compete in two different electoral constituencies namely A1 and A2. The probability of wining in constituency A1 and A2 is 0.80 and 0.65 respectively. The probability of losing at least one of the constituencies is 0.35. What will be the probability that he will win in one of the constituencies?
6	Are every mutually exclusive independent events?

7	Let A and B be the two possible outcomes of an experiment and suppose P(A) = 0.4, P(B) = p and P(AUB) = 0.7 (i) For what choice of 'p' are A and B mutually exclusive? (ii) For what choice of 'p' are A and B independent?
8	In an online shopping survey, 30% of persons made shopping in Flipkart, 45% of persons made shopping in Amazon and 5% made purchases in both. If a person is selected at random, find i) the probability that he makes shopping in at least one of two companies ii).the probability that he makes shopping in Amazon given that he already made shopping in Flipkart. iii).the probability that the person will not make shopping in Flipkart given that he already made purchase in Amazon.
9	Of 1000 car parts produced, it is known that 350 are produced in one plant, 450 parts in a second plant, and 200 parts in a third plant. Also, it is known that the probabilities are 0.18, 0.21, and 0.11 that the parts will be defective if they are produced in the first, second and third plants respectively. (a) What is the probability that a randomly picked part from this batch is defective? (b) If given that it is defective part what is the probability it is produced from second plant?
10	A manufacturing company produces certain types of output by 4 machines i.e A, B, C and D. Machine A produces 15%, Machine B produces 30 % and Machine C produces 30% of daily production. Based on experience it is observed that 1% of the output by Machine A is defective. Similarly, the defectives by other machines are 2% ,3% and 4% respectively. An item is drawn at random and found to be defective. Is it possible to find the defective item is produced bv which Machine? If so, find it
11	An insurance company insured 1,000 taxi drivers, 2,000 car drivers and 3,000 truck drivers. The probability of their accident is 0.05, 0.15 and 0.1 respectively. One of the insured persons meets with an accident. What is the probability that he is a truck driver?
12	A manufacturer has three machine operators A, B and C. The first operator A produce 1% defective items, whereas the other two operators B and C produce 5% and 7% defective items respectively. A is on the job for 50% of the time, B is on the job for 30% of the time. A defective item is produced, what is the probability that it was produced by A, B, C? Based on this write your observations.