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**2 MARKS QUESTIONS WITH ANSWERS**

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| **S.NO** | **QUESTIONS** | **CO** | **BL** |
|  | **Module-I** |  |  |
| 1. | Explain importance and limitations of Statics. | 1 | 1 |
|  | **Importance of Statistics**:   1. Data Interpretation and Decision Making 2. Scientific Research 3. Predictive Analysis 4. Quality Control 5. Risk Assessment and Management   **Limitations of Statistics**:  1.Misinterpretation of Data  2 . Dependence on Data Quality  3. Over-Simplification  4. Sampling Errors  5. Complexity of Advanced Techniques |  |  |
| 2. | Write merits and demerits of Arithmetic mean. | 1 | 1 |
|  | **Merits of Arithmetic Mean**:   1. **Simplicity and Easy to Understand** 2. Mathematically Well-Defined 3. Simple to Compute.   **Demerits of Arithmetic Mean**:   1. Sensitive to Extreme Values 2. Not Suitable for Skewed Distributions 3. Does Not Work Well with Categorical Data. |  |  |
| 3. | Find mean for the values 43,48,65,57,31,60,37,48,78,59,45 | 1 | 1 |
| Ans | Mean=  Mean= = 51.91 |  |  |
| 4. | Calculate the median for the values 27,31,19,35,23,16,40,46,17,37 | 1 | 1 |
| Ans | Arranged in ascending order:  16,17,19,23,27,31,35,37,40,46  here are 10 values in the dataset (an even number of values).  For an **even number of values**, the median is the average of the two middle values. In this case, the middle values are the 5th and 6th values.  Median= = 29 |  |  |
| 5. | Define range and mean deviation . | 1 | 1 |
| Ans | The **range** is a measure of the spread or dispersion of a set of data values. It is defined as the difference between the **maximum value** and the **minimum value** in the dataset. The range provides a simple way to understand how much the values in a dataset vary.  **Formula:**  Range=Maximum value−Minimum value ****Mean Deviation****: **Mean deviation** (also called the **average deviation**) is a measure of the average distance between each data point and the mean of the dataset. It shows how much the values deviate from the mean on average. The mean deviation is calculated by finding the absolute differences between each data point and the mean, and then averaging those differences. Formula: Mean Deviation = |  |  |
| 6. | Find the geometric mean of monthly income of 10 families of a particular place is given below  85,70,15,75,500,8,45,250,40,36 | 1 | 1 |
| Ans | The **geometric mean** is a type of mean that is used for datasets where the values are multiplied together, often used in cases involving growth rates or multiplicative processes. |  |  |
| 7. | Define Harmonic Mean. | 1 | 1 |
| Ans | The **harmonic mean** is a type of average that is typically used when dealing with rates or ratios, such as speed, efficiency, or other quantities where the data involves a reciprocal relationship. It is the reciprocal of the arithmetic mean of the reciprocals of the values in the dataset. Formula for Harmonic Mean: HM= |  |  |
| 8. | Explain Skewnwss. | 1 | 1 |
| Ans | **Skewness** is a statistical term that describes the asymmetry or lack of symmetry in the distribution of data. It indicates whether the data is skewed to the left or right, i.e., whether the data is concentrated more on one side of the mean. |  |  |
| 9. | Write properties of Correlation cofficient | 1 | 1 |
| Ans | The **correlation coefficient** (often denoted as rrr) measures the strength and direction of a linear relationship between two variables. It ranges from −1 to +1 and is commonly used in statistics to quantify how well two variables are related. |  |  |
| 10. | Write Spearmens Rank correlation Cofficient | 1 | 1 |
| Ans | Spearman's rank correlation coefficient (denoted as ρ\rhoρ or rsr\_srs​) is a non-parametric measure of the strength and direction of association between two ranked variables. It is used to assess how well the relationship between two variables can be described using a monotonic function (i.e., a relationship that is either always increasing or always decreasing). It is particularly useful when the data is ordinal or when the assumptions of Pearson's correlation (such as normality) are not met.  ρ=1 |  |  |
| **Module-II** | | | |
|  | State additive law of Probability. | 1 | 1 |
| **Ans.** | The **Additive Law of Probability** also known as the **Addition Rule** provides the probability of the union of two events. It is used to calculate the probability that at least one of two events occurs.  For two events A and B, the additive law of probability is stated as:  **P(A∪B)=P(A)+P(B)−P(A∩B)**  Where  P (A∪B) is the probability that event A or event B (or both) occur.  P (A) is the probability that event A occurs.  P (B) is the probability that event B occurs.  P (A∩B) is the probability that both events A and B occur. |  |  |
|  | State Multiplicative law of Probability. | 1 | 1 |
| **Ans** | The **Multiplicative Law of Probability** is used to find the probability that two or more events will occur simultaneously. It provides the probability of the intersection of two events.  For two events A and B, the multiplicative law of probability is stated as:  P(A∩B)=P(A)⋅P(B∣A)  Where:  P (A∩B) is the probability that both events A and B occur.  P (A) is the probability that event A occurs.  P (B∣A) is the conditional probability that event B occurs given that event A has already occurred. |  |  |
|  | A box containing 10 balls , find the number of ways in which 3  balls can be drawn at Random. | 1 | 1 |
| Ans | Given n=10 , r = 3  There for No. of ways =  =120 |  |  |
|  | Define Sample Space with suitable example. |  |  |
| Ans | **Sample Space** denoted as S is the set of all possible outcomes of an  experiment or random trial. It represents every possible result that can  occur in the experiment.  **Example 1: Tossing a Coin**  When you toss a coin, there are two possible outcomes: heads (H) or  tails (T).  Therefore, the sample space for this experiment is:  S={H,T} |  |  |
|  | Define: (i) Mutually Exclusive Events (ii) Mutually Exhaustive Events | 1 | 1 |
| Ans | **Mutually Exclusive Events** are two or more events that cannot occur at the same time. In other words, the occurrence of one event excludes the occurrence of the other event.  If events A and B are mutually exclusive, the probability that both A and B occur together is zero.  This can be mathematically expressed as:  P(A∩B) = |  |  |
|  | Define Conditional Probability. |  |  |
| Ans | **Conditional Probability** is the probability of an event occurring given that another event has already occurred. The conditional probability of event A occurring given that event B has already occurred is denoted by P(A∣B)  This is read as "the probability of A given B. It is calculated using the formula:  P(A∣B) =  Where:  P (A∣B)) is the probability of event A occurring given that event B has occurred.  P (A∩B) is the probability that both events A and B occur.  P (B) is the probability that event B occurs. |  |  |
|  | If P(A)= , P(B)=  and P(AB)= find P(). | 1 | 1 |
| Ans | P(A∣B) =  P(A∣B) =  P(A∣B) = |  |  |
|  | The chances of three students A, B and C solving a problem given in  Mathematics Olympiad are , and  respectively. What is the  Probability of the problem being solved? | 1 | 1 |
| Ans | Given P(A) = 1/2 , P(B) = 1/3 ,P(C) = 1/4  P() = 1-1/2 = 1/2  P() = 1-1/3= 2/3  P() = 1-1/4 = 3/4  Probability that problem can be solved = 1- (P () P () P())  = 1-(1/2)(2/3)(3/4)  = 23/24 |  |  |
|  | If P(A)=, P(B)= and P(AB)= find P(). | 1 | 1 |
| Ans | P() =  P(A∣B) =  P(A∣B) = |  |  |
|  | Find the probability for the event when a non-defective bolt will be  found if out of 600 bolts already examined 12 were defective. | 1 | 1 |
| Ans | Number of non-defective bolts=600−12=588  Probability of non defective bolts=  P(non-defective) =  =    = |  |  |
|  | **Module-III** |  |  |
|  | In a binomial distribution consisting of 5 independent trails, Probabilities of 1 and 2 successes are 0.4096 and 0.2048 respectively. Find the parameter ‘p’ of the distribution? | 1 | 1 |
| Ans | By definition of Binomial distribution  P(X=r) =  Given that P(X=1)=0.4096  we can write:  5p(1−p)4=0.4096 ……………………..(1)  Given that P(X=2)=0.2048  we can write:  10p2(1−p)3=0.2048 …………………….(2)  Solving equation 1 and 2 we get  P= 0.00128 |  |  |
|  | Let X denote the number of heads in a single toss of 4 fair coins. Determine P(X<2) | 1 | 5 |
| Ans | For a single toss of 4 fair coins, the total number of possible outcomes is = 24 = 16  The probability of getting 0 heads (all tails) in a toss of 4 coins is  P(X=0) = 1/16  The probability of getting exactly 1 head is P(x=1) = 4/16  P(X<2) = P(X=0) + P(X=1) = 1/16+4/16 = 5/16 |  |  |
|  | Wite any two properties of normal distribution. | 1 | 5 |
| Ans | 1. The normal distribution is symmetric about its mean. 2. The normal distribution has a characteristic "bell-shaped" curve. |  |  |
|  | Illustrate any two examples of Binomial distribution. | 1 | 2 |
| Ans | 1.We can find the probability of getting a head or tail by tossing a coin.  2. .We can find the probability of getting a defective bulbs in Quality Control in a Factory. |  |  |
|  | For a normally distributed variate with mean 1 and standard deviation 3, find the probability that 3.43 | 1 | 1 |
| Ans | We know that  Z=  For X=3.43 = z1= 0.81  For X=6.19 = z2 = 1.73  P(Z≤0.81)≈0.7910  P(Z≤1.73)≈0.9582 |  |  |
|  | The mean and varience of a binomial distribution is 4 and 4/3 respectively. Find P(X) | 1 | 6 |
| Ans | Given Mean μ= np = 4 = p=4/n  Varience σ2= np(1−p) = 4/3​.  Solving above two equations we get n=6,p=2/3,  P(X=0)= 1/729  P(X≥1)=1−P(X=0) = 728/729 |  |  |
|  | Write any two conditions of Possion distribution. | 1 | 5 |
| Ans | 1.The variable is a discrete variable.  2.The number is trials is large. |  |  |
|  | The mean of a binomial distribution is 18 and the variance is 6, then  find the number of trials conducted? | 1 | 1 |
| Ans | Mean: μ= np = 18  Variance: σ2=np (1−p)=6  Solving both equations we get n= 27 |  |  |
|  | Illustrate any two examples of Poisson distribution. | 1 | 2 |
| Ans | 1.Number of Customer Arrivals at a Bank  2.Number of telephone calls per minute at a switch board. |  |  |
|  | At a checkout counter customers arrive at average of 1.5 per minute. Find the probabilities that in any given minute of time (i) At most 4 will arrive. | 1 | 1 |
| Ans | P(X=x) =  Here λ=1.5  to find P(X≤4),X=0,1,2,3,4.  P(X≤4)=P(X=0)+P(X=1)+P(X=2)+P(X=3)+P(X=4)  P(X≤4)= 1.1072. |  |  |

**Course co-coordinator HOD**