**KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY**

**DEEMED TO BE UNIVERSITY, BHUBANESWAR – 24**

**(Decld. U/S 3 of UGC Act, 1956)**

**Probability and Statistics**

**KIIT Deemed to be University**

**Online Mid Semester Examination(Autumn Semester-2021)**

**Subject Name & Code:** MA-2011 **Applicable to Courses: B.Tech**

**Full Marks=20** **Time:1 Hour**

**SECTION-A(Answer All Questions. All questions carry 2 Marks)**

**Time:20 Minutes (5×2=10 Marks)**

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| **Question No** | **Question Type(MCQ/SAT)** | **Question** | **CO Mapping** | **Answer Key**  **(For MCQ Questions only)** |
| **Q.No:1(a)** | **SAT** | The probability of solving a specific problem by two students A and B are and , respectively. If both of them try to solve the problem independently, then find the probability that  (i) the problem is solved.  (ii) exactly one of them solved the problem | CO2 |  |
|  | **SAT** | Consider the type of clothes dryer (gas or electric) purchased by each of five different customers at a certain store.  (i) If the probability that at most one of these purchases an electric dryer is 0.428, what is the probability that at least two purchase an electric dryer?  (ii)If P(all five purchase gas) =0 .116 and P(all five purchaseelectric) = .005, what is the probability that at least one  of each type is purchased? | CO2 |  |
|  | **MCQ** | Let A and B be two independent events such that and .  Then the value of  and are  (a)0.5 and 0.2  (b) 0.3 and 0.146  (c ) 0.3 and 0.149  (d) 0.3 and 0.141 | CO2 | (b) |
|  | **MCQ** | Let A and B be two events such that ,and  Then the value of and  are  (a)0.236 and 0.8525  (b) 0.0236 and 0.8525  (c ) 0.2343 and 0.8535  (d) 0.239 and 0.8545 | CO2 | (a) |
| **Q.No:1(b)** | **SAT** | Box A contains 7 red and 5 green balls. Box B contains 8red and 6 green balls. One box is selected and a ball is drawn. Then  (i) what is the probability that a red ball is drawn?  (ii)If the ball drawn is a red ball, what is the probability that it was drawn from box A? | CO6 |  |
|  | **MCQ** | Consider the following probabilities  . Then,  and are  a) 0.455 and 0.738  (b) 0.457 and 0.738  (c) 0.457 and 0.736  (d) 0.455 and 0.736 | CO6 | (d)  Correction- To find  May be given  Grace mark |
|  | **MCQ** | Consider the following probabilities  .  Then,  and are  a) 0.057 and 0.409  (b) 0.067 and 0.509  (c) 0.067 and 0.609  (d) 0.087 and 0.709 | CO6 | (b) |
|  | **MCQ** | A boiler has five identical relief valves. The probability that any particular valve will open on demand is 0.95. Assuming  independent operation of the valves,  then P(at least one valve opens) and  P(at least one valve fails to open) are  (a) 0.96 and 0.2262  (b) 0.97 and 0.2362  (c ) 0.98 and 0.2362  (d)0.99 and 0.2262 | CO6 | (d) |
| **Q.No:1(c)** | **MCQ** | Let be the Bernoulli random variable. Let considers the value with probability and  .  Then the values of and are  (a)and  (b)and  (c)and  (d)and | CO3 | (b) |
|  | **MCQ** | Let be the discrete random variable with probability mass function where is a constant. Then the value of and are  (a) 1/14 and 2.571  (b) 1/12 and 2.6  (c) 1/14 and 3.571  (d) 1/12 and 2.571  respectively | CO3 | (a) |
|  | **MCQ** | Let is a discrete random variable with  Probability mass function  . Then the values of and are  (a)4.5 and 2.966  (b) 2.5 and 2.766  (c)13.5 and 1  (d)4.5 and 2.966 | CO3 | (c) |
|  | **MCQ** | Let is a discrete random variable with Then the value of and are  (i)31.5 and 12.5  (ii)22.5 and 8.5  (iii)32.5 and 7.5  (iv)22.5 and 6.5 | CO3 | (c) |
| **Q.No:1(d)** | **MCQ** | Let be the discrete random variable with above cdf. Then the values of  and are  (a) 0.1 and 0.683  (b) 0.4 and 0.583  (c) 0.4 and 0.683  (d) 0.4 and 0.75 | CO2 | (b) |
|  | **MCQ** | Let be the discrete random variable with above cdf. Then the values of  and are  (a) 0.1 and 0.683  (b) 0.4 and 0.8  (c) 0.4 and 0.75  (d) 0.583 and 0.8 | CO2 | (d) |
|  | **MCQ** | Let be the discrete random variable with above cdf. Then the values of  and are  (a) 0.1 and 0.683  (b) 0.4 and 0.8  (c) 0.416 and 0.8  (d) 0.583 and 0.75 | CO2 | (c) |
|  | **MCQ** | Let be the discrete random variable with above cdf. Then the values of  and are  (a) 0.1 and 0.683  (b) 0.4 and 0.8  (c) 0.416 and 0.8  (d) 0.583 and 0.75 | CO2 | Given solution (b)  Correct solution - (c) |
| **Q.No:1(e)** | **MCQ** | Let a box contains 4 red balls and 6 black balls. 3 balls are drawn at random without replacement. Let be the random variable denotes the number of red ball drawn. Then the probability of and are  (a) 0.416 and 0.8  (b) 0.33 and 0.8  (c) 0.416 and 0.96  (d) **0.33** and 0.96 | CO2 | (d)  Correct-  **0.033**and 0.96  May be givenGrace Mark |
|  | **MCQ** | Four fair coins are tossed once. Let be the random variable denotes the number of heads. Then the probability of and are  (a) 0.6875 and 0.6875  (b) 0.6975 and 0.6475  (c) 0.7075 and 0.6675  (d) 0.6875 and 0.6475 | CO2 | (a) |
|  | **MCQ** | A fair coin is tossed till 2 head appears. Let be the random variable denotes the number of toss. Then and are  (a) 0.6875 and 0.875  (b) 0.6975 and 0.475  (c) 0.0781 and 0.375  (d) 0.6875 and 0.375 | CO2 | (c) |
|  | **MCQ** | Let the probability of a defective screw is . A packet contains 1000 screws. Then the expected number of defective screws and the standard deviation of the screws that are defective are respectively  (a) 10 and 4.162  (b) 9 and 3.162  (c) 9 and 4.262  (d) 10 and 3.162 | CO2 | (d) |

**SECTION-B(Answer Any One Question. Each Question carries 10 Marks)**

**Time: 30 Minutes** **(1×10=10 Marks)**

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| **Question No.**  **(Question Bank)** | **Question** | **CO Mapping** |
| **Question No:2** | 1. Define variable in the sense of descriptive statistics with example. 2. Write a brief note on types of data in the sense of variable. 3. Define stem-and-leaf display with example. | CO1 |
| **Question No:3** | A box contains 50 balls, 20 of them are red balls. 25 balls are drawn at random with replacement. Let be the discrete random variable denotes the no of red balls drawn. Then determine  (i) the probability mass function of X.  (ii) the expected no of red balls drawn  (iii) the probability of drawing at most 3 red balls.  iv)the upper bound for .  (v) the upper bound for the probability that lies at least 2 standard deviations from its mean. | CO2 |
| **Question No:4** | A box contains 1000 apples. Suppose that of apples are defective. Let be the random variable denotes the number of defective apples, then find the following.  (i) What is the probability of getting defective apples, i.e.,  (ii) What is the probability of getting more than 3 defective apples?  (iii) What is the expected number of defective apples? Determine the standard deviation for the defective apples.  (iv) Determine the upper bound for .  (v) Find the upper bound for the probability that lies at least 3 standard deviations from its mean. | CO1 |
| **Question No:5** | You are tossing a fair coin till you get 5 heads. Let be the random variable denotes the number of toss. Then determine the following.  (i) What is the probability that on the toss you will get exactly 5 heads, i.e.,  (ii)What is the probability that on the 11th toss you will get 5 heads?  (iii) Determine the expected number of tosses to get 5 heads also determine the standard deviation for the toss to get 5 heads.  (iv) Determine the upper bound for .  (v) Find the upper bound for the probability that lies at least 2standard deviations from its mean. | CO2 |
| **Question No:6** | 1. Explain negative binomial distribution with an example 2. Prove that hypergeometric pmf approaches tobinomial pmf . 3. Find mean and variance of Poisson distribution. | CO3 |