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**KIIT Deemed to be University**

**Online Mid Semester Examination(Autumn Semester-2020)**

**Subject Name & Code:** Probability and Statistics & MA-2011

**Applicable to Courses: B. Tech, 3rd Semester (CSE, IT and CSCE branch)**

**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** |
| **Q.No:1(a)** |  | If A and B are two mutually exclusive and exhaustive events, then   1. ) 2. ) 3. ) 4. and   **Ans: d** | CO-1 |
|  |  | A single card is drawn at random from an ordinary deck of cards. Find the probability that it is either a 9 or a diamond.   1. 0.500 2. 0.308 3. 0.318 4. 0.414   **Ans: b** | CO-1 |
|  |  | If the events A and B are independent, then   1. and are independent 2. and are independent 3. and are independent 4. All the above   **Ans: d** | CO-1 |
|  |  | In the system, functioning of each component is independent. The probability that each component works is 0.85. What is the probability that the system works ?  **C:\Users\nEW u\Desktop\Capture 1.JPG**   1. 0.9933 2. 0.9953 3. 0.9833 4. 0.9853   **Ans: a** | CO-1 |
| **Q.No:1(b)** |  | Let *A*, *B* and *C* be three events with probabilities , , , , and . What is the value of ?   1. 0.3 2. 0.4 3. 0.5 4. 0.2   **Ans: a** | CO-2 |
|  |  | Let be three mutually exclusive and exhaustive events and be an arbitrary event. Given that , , and , then is   1. 0.355 2. 0.405 3. 0.455 4. 0.5   **Ans: c** | CO-2 |
|  |  | Consider a tetrahedral die and roll it twice. What is the probability that the number on the first roll is strictly higher than the number on the second roll ?   1. 1/2 2. 3/8 3. 5/16 4. None of the above   **Ans: b** | CO-2 |
|  |  | If A and B are two independent events with then is   1. 0.82 2. 0.88 3. 0.11 4. 0.13   **Ans: a** | CO-2 |
| **Q.No:1(c)** |  | Let be the random variable with image having pmf . What is the value of *P* ?   1. 124/511 2. 120/511 3. 120/204 4. 124/204   **Ans: b** | CO-3 |
|  |  | Two dice are thrown simultaneously which give the sample space }. What is the probability mass function of the random variable  ?   1. if ; if and otherwise 2. if 2≤z≤7; if and otherwise 3. if ; if and otherwise 4. if ; if and otherwise   **Ans: b** | CO-3 |
|  |  | The cdf of the rv X is as follows:  Then is   1. 0.81 2. 0.76 3. 0.73 4. 0.56   **Ans: d** | CO-3 |
|  |  | Suppose that the pmf of *X* is as given in the accompanying table.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |   What is the value of ?   1. 0.55 2. 0.45 3. 0.2 4. 0.5   **Ans: a** | CO-3 |
| **Q.No:1(d)** |  | If probability mass function of the random variable *X* is  , then find to the value of k and .   1. and 2. and 3. and 4. and   **Ans: b** | CO-4 |
|  |  | For any real , the random variable *X* is defined for and otherwise. The random variable *Y* is defined by for and for . Expectation of the r.v. is   1. None of the above   **Ans: a** | CO-4 |
|  |  | If the rv *X*~Bin(20,0.35), then what is value of ?   1. 0.7735 2. 0.8479 3. 0.8818 4. 0.7955   **Ans: c** | CO-4 |
|  |  | If the random variable *X* has a geometric distribution process with probability of getting the success is *p*=0.37, then what is the value of ?   1. 0.1477 2. 0.0894 3. 0.1378 4. 0.1275   **Ans: a** | CO-4 |
| **Q.No:1(e)** |  | The probability that an individual is left-handed is 0.16. In a class of 10 students, what is the mean and standard deviation of the number of left-handed students?   1. ; 2. ; 3. ; 4. ;   **Ans: d** | CO-5 |
|  |  | Three fair dice are rolled once. What is the mean and variance of the random variable *X* that counts number of sixes given with probabilities , , , ?   1. ; 2. ; 3. ; 4. ;   **Ans: a** | CO-5 |
|  |  | If the rv X~Bin(25,0.25), then what are mean and variance of the rv ?   1. ; 2. ; 3. ; 4. ;   **Ans: d** | CO-5 |
|  |  | Find the probability if the probability values are , , and where μ is mean of *X* and σ is standard deviation of *X*.   1. 0.25 2. 0.75 3. 0.35 4. 0.85   **Ans: b** | CO-5 |

**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** | **CO**  **Mapping** |
| **Group-1** | | |
| **Q.No:2** | The population of a particular country consists **of** three ethnic groups. Each individual belongs to one of the four major blood groups. The accompanying joint probability table gives the proportion of individuals in the various ethnic group-blood group combinations.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | | Blood Group | | | | | Ethnic Group |  | *0* | *A* | *B* | *AB* | | 1 | 0.082 | 0.106 | 0.008 | 0.004 | | 2 | 0.135 | 0.141 | 0.018 | *k* | | 3 | 0.215 | 0.200 | 0.065 | 0.020 |   Suppose that an individual is randomly selected from the population and events are defined as  *A* = {type *A* selected}, *B* = {type *B* selected}, and *C* = {ethnic group 2 selected}   1. Find the value of *k* if the ethnic group-blood group combinations values given in the accompanying table are probability values. 2. Calculate both 3. Calculate both 4. If the selected individuals do not have type *AB* blood, what is the probability that he or she is from the ethnic group 1? 5. If the selected individuals do not have type *B* blood, what is the probability that he or she is from the ethnic group 2? | CO-1 |
| **Q.No:3** | A consumer organization that evaluates new automobile customarily reports the number of major defects in each car examined. Let *X* denote the number of major defects in a randomly selected car of a certain type. The cdf of *X* is as follows:   1. Calculate the pmf of *X*. 2. Calculate the probabilities directly from cdf   i. ii. .   1. Calculate the expectation of *X.* 2. Calculate the variance of *X.* 3. Determine the probability that *X* is more than 2 standard deviation of its mean value. | CO-2 |
| **Q.No:4** | Airlines sometimes overbook flights. Suppose that for a plane with 50 seats, 55 passengers have tickets. Define the random variable *Y* as the number of ticketed passengers who actually shows up for the flight. The probability mass function of *Y* appears in the accompanying table.   |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  1. Find cdf of *Y.* 2. Calculate *P*{*Y* is within 47 and 50, inclusive}. 3. If you are the second person on the standby list, what is the probability that you will be able to take the flight ? 4. Calculate *E*(*Y*) and *V*(*Y*). 5. Determine the probability that *Y* is within 1 standard deviation of its mean value. | CO-3 |
| **Group-2** | |  |
| **Q.No:5** | 1. What is binomial distribution with the random variable and define the binomial pmf of *X* where *n=*number of trials and *p*=probability of getting success. 2. Define cdf of binomial distribution function of *X* 3. Sketch the graph of for and . 4. Find mean of the rv . 5. Find variance of the rv . | CO-4 |
| **Q.No:6** | The pmf of uniform distribution with random variable is   1. Find the cdf of uniform distribution . 2. Sketch the graph of for 3. Calculate for . 4. Find mean of the rv . 5. Find variance of the rv . | CO-5 |
| **Q.No:7** | In any Bernoulli trial, the outcomes of the trial are success(*S*) and failure(*F*) given with their probabilities and respectively. The random variable has the geometric distribution that counts the position of getting the first success in the trial. The pmf of *X* is   1. Find the cdf of geometric distribution . 2. Sketch the graph of for and 3. Calculate with . 4. Find mean of with arbitrary value of *p*. 5. Find variance of with arbitrary value of *p*. | CO-5 |

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