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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2020/2021 ACADEMIC YEAR ONE**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF PURE AND APPLIED SCIENCES**

**FOR THE DEGREE OF BACHELOR OF INFORMATION SCIENCE**

**COURSE CODE: STA 121**

**COURSE TITLE: PROBABILITY AND STATISTICS II**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 19/08/2021 TIME: 09.00-11.00 AM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of FOUR (4) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

**+**ete random variable, is given by for Given that is a constant, find the value of and hence find the pdf of the random variable (5 marks)

1. The discrete random variable , has the probability distribution as shown below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | -3 | -2 | -1 | 0 | 1 |
|  | 0.1 | 0.25 | 0.3 | 0.15 |  |

1. Find the value of (2 marks)
2. Find (1 mark)
3. Find (1 mark)
4. A discrete random variable has the following probability distribution function

|  |  |  |  |
| --- | --- | --- | --- |
|  | -1 | 0 | 1 |
|  |  |  |  |

If determine (3 marks)

1. Let be a continuous random variable with pdf

Find the value of and hence compute (5 marks)

1. A random variable can assume only odd integer values between 0 and 12. It is distributed in such a way that

1. Find the probability distribution of (2 marks)
2. Find the and the (5 marks)
3. The number of calls per 10 minutes received at safaricom switchboard follows a Poisson distribution with mean 0.6. Find the probability that
4. No calls will be received in the first 10 minutes (2 marks)
5. More than 2 calls will be received in a period of 40 minutes (4 marks)

**QUESTION TWO (20 MARKS)**

1. A random variable has the following probability distribution function

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|  | 0 |  |  |  |  |  |  |  |

1. Find and complete the table (6 marks)
2. Determine the cumulative distribution function of (2 marks)
3. A continuous random variable has probability density function given by . Determine
4. The value of (2 marks)
5. (4 marks)
6. The assembly time for a racing toy car manufactured by CMC follows a normal distribution with a mean of 55 minutes and a standard deviation of 4 minutes. The company closes at 5pm daily. If one worker starts assembling a racing car at 4 pm, what is the probability that he will finish the job before the company closes for the day? (6 marks)

**QUESTION THREE (20 MARKS)**

1. A random variable takes the values 1,2,3,4,5,6,7 which are mutually exclusive and mutually likely. Obtain the upper bound of

What is the exact probability? (11 marks)

1. If is the number scored in a throw of a fair die, show that the Chebychev’s inequality gives

(9 marks)

**QUESTION FOUR (20 MARKS)**

1. A continuous random variable has the probability distribution function given by . Find the moment generating function of and use it to find and (8 marks)
2. An airline knows that overall, 15% of the passengers do not turn up for flight. The airline decides to adopt a policy of selling more tickets than there are seats on a flight. For an aircraft with 11

seats, the airline sold 15 tickets for a particular flight. Obtain a suitable model for the for the number of passengers who do not turn up for the flight after buying a ticket

Find the probability that

1. More than 12 passengers turn up for this flight
2. Exactly 2 passengers miss seats on this flight
3. There are two empty seats on this flight. (12 marks)

**QUESTION FIVE 20**

1. A random variable, has *pdf,* given as find the *pdf* of (5 marks)
2. Suppose that has a distribution given by

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|  |  |  |  |  |  |  |  |

Find the distribution of a random variable (5 marks)

1. Let be independent random variables each having probability function . Define and

Find the joint *pdf* of using the transformation technique (10 marks)