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**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**SCHOOL OF EDUCATION**

**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION ARTS WITH IT**

**1ST YEAR 2ND SEMESTER 2015/2016 ACADEMIC YEAR**

**KISII CAMPUS REGULAR**

**COURSE CODE: SMA 105**

**COURSE TITLE: INTRODUCTION TO PROBABILITY THEORY**

**EXAM VENUE: -- STREAM: (BED ARTS)**

**DATE:21/12/16 EXAM SESSION: 9.00 – 11.00 AM**

**TIME: 2 HOURS**

**Instructions:**

1. **Answer Question ONE (COMPULSORY) and ANY other 2 questions**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**QUESTION ONE**

1. Differentiate between:

i)Trial and Event (2mks)

ii) Exhaustive event and mutually exclusive events (2mks)

1. A die is thrown up and observations made. Let P be the event of getting and even number; Q event of getting an odd number and R event of getting a prime number.

Find

1. P intersect Q (2mks)
2. P union Q (3mks)
3. P union R (3mks)
4. Pintersect R (3mks)
5. The complement of R (3mks)
6. Let P be areal-valued function defined on $Σ$, P is called a probability function and P(A) is the probability of the event A. Based on this, state the four axioms of probability (4mks)
7. i)Show that the impossible event $ϕ$ has a probability of zero (4mks)

ii) show that for any event K, we have P(KC) = 1-P(K) (4mks)

**QUESTION TWO**

1. Three fair coins are tossed. Find the probability that they are all heads if
2. The first coin is head(4mks)
3. One of the coins is head (4mks)
4. A lot contains 12 items of which 4 are defective.Three items are drawn from the lot one at a time without replacement.By multiplication theorem, find the probability that all three are non- defective (5mks)
5. State and prove the Bayes theorem (8mks)

**QUESTION THREE**

1. A pair of dice is thrown.Let X assign to each point (a,b) the maximum of its number i.e

X(a,b)=Max(a,b).

1. Compute the probability distribution f of X(6mks)
2. Put the information in (i) above inform of a table of X and f(x)(2mks)
3. Acoin which is weighted so that P(H) = $\frac{2}{3}$ and P(T)=$\frac{1}{3}$ is tossed 3 times.Let x be a random variable which assigns to each point in S the larges number of successive heads which occur. Find the
4. Probability distribution in form of a table (8mks)
5. Find the expectation of x ,E(x) (4mks)

**QUESTION FOUR**

1. In a given experiment, the following probability distribution table was obtained.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | 0 | 1 | 2 | 3 |
| F(x) | $$\frac{1}{27}$$ | $$\frac{6}{27}$$ | $$\frac{12}{27}$$ | $$\frac{8}{27}$$ |

1. Find the mean of f(x)=x2 (3mks)
2. Find the variance of x (5mks)
3. Find the standard deviation of x (1mk)
4. A continuous random variable x has the probability density function given as

$$f\left(x\right)=\left\{\begin{array}{c}\frac{1}{2}x, 0\leq x\leq 2\\0, elsewhere\end{array}\right.$$

1. Find P(1$\leq x\leq 1.5$) (2mks)
2. The mean of x (2mks)
3. The moment generating function of x (7mks)

**QUESTION FIVE**

1. A university in England claims that only 50% of all KSCE students are capable of doing university work will join their university. Assuming that it’s claim is true, find the probability that among 18 students capable of doing university work,
2. Exactly 10 will qualify to their university (3mks)
3. Atleast 10 will qualify to their university (4mks)
4. Atmost 10 will qualify to their university (4mks)
5. i)As part of air pollution survery,an inspector decided to examine the exhausts of six of a company’s twenty four tracks.If four of the company’s tracks emit excessive amount of pollutants, what is the probability that none of them would be included in the inspector’s sample (3mks)

ii)The mean height of 5 male students at JOOUST kisii is 1.51m and the standard deviation is 1.5m.Assuming that the heights are normally distributed, find how many male students are between 1.2m and 1.55m high (6mks)