**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2016/2017**

**THIRD YEAR SECOND SEMESTER UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY**

**STA 2200 PROBABILITY AND STATISTICS II**

**DATE: NOVEMBER, 2016 TIME: 2 HOURS**

**INSTRUCTIONS:**

**QUESTION ONE: 30 MARKS**

a. Explain the following terms as used in statistics:-

i. Random variable.

ii. Discrete random variable

iii. Continuous variable [6 marks]

b. A class of children is each asked to draw a line that they think is 10cm long without using a ruler. The teacher models how many centimeters each child’s line is longer than 10cm by the random variable x and believes that x has the following probability density function:-

f (x) = 1/8x, -4 < x < 4

o, otherwise

i. Profit that ……………………..

ii. Define fully the cumulative distribution function f(x) for x

iii. Calculate the proportion of children making an error of less than 15% according to this model

iv. Give two reasons why this may not be a very suitable model.

[10 marks]

c. The discrete random variable x has the following probability distribution:-

x 0 1 2 3 4

p(x=x) 0.2 0.3 0.2 0.1 0.02

i. Write down the name of this distribution x

ii. Find p( 0 < x < 2 )

iii. Find E (x) [6 marks]

d. A discrete random variable following a passion distribution with mean 6.

Find:

i. P(x=v)

ii. P(x>2)

iii. The mean of a distribution is 40 and standard deviation 6.

Calculate n, p and q. [4 marks]

**QUESTION TWO: 20 MARKS**

a. A game is played as follows. Thro a fair four sided due to score eight times the number that faces down unless it is a four. If it is a four, you are given a second chance is which you score only four times the number that faces down. Let x be a random variable denoting the score for each player:

Represent the information in:-

i. A tree diagram showing the value of x and the corresponding probability.

ii. Make a probability distribution table.

iii. Use the table to find the mean of the scores. [15 marks]

b. Payback is a popular investment criterion in practice. Discuss its advantages and disadvantages. [10 marks]

**QUESTION THREE: 20 MARKS**

a. A factory produces blades in packets of 10. The probability of a blade to be detective is 0.2%. Find the number of packets having two detective blades in a consignment of 10,000 packets. [5 marks]

b. What probability model is appropriate to describe a situation where 100 misprints are distributed randomly throughout 100 pages of a book? For this model, what is the probability that a page observed at random will obtain at let three PRIATS? [10 marks]

c. A discrete random variable x follows poison law. Find

p(x>2) and p(x is at must 2), if it is given that (x)=2.5 and -2.5 =0.0821

[5 marks]

**QUESTION FOUR:20 MARKS**

a. What are moments? [1 marks]

b. Name the first four moments. [4 marks]

c. From the following data of the wages of 50 workers of a factory compute the first four moments about mean and also B1 B2.

|  |  |
| --- | --- |
| 100-120  120-140  140-160  160-180  180-200  200-220  220-240 | 1  3  7  20  12  4  3 |

**QUESTION FIVE: 20 MARKS**

From post records, a manufacturer of twine knows that faults occur in the twine at a rate of 1.5 per 25 m.

a. Find the probability that a randomly chosen 25m length of twine there will be exactly 4 faults. [2 marks]

The twine is usually sold in balls of length 100m. A customer buys there balls of twine.

b. Find the probability that only one of them will have fewer than 6 faults.

[4 marks]

As a special order a ball of twine containing 500m is produced.

c. Using a suitable approximation, find the probability that it will contain between 23 and 33 faults inclusive. [4 marks]

The continuous random variable x has probability density function

F(y) **= kx(5-x), v< x < 4**

O otherwise, where k is a content

d. Show that k=3/56 [2 marks]

e. Find expressions for distribution, F(x) [4 marks]

f. E(x)

g. Verify that the median value of x lies between 2.5 and 5.5 [2 marks]