



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

FIRST SEMESTER EXAMINATION FOR DIPLOMA IN BUILDING AND CONSTRUCTION

BCE BD 200: STATISTICS

Date: 2/8/2016

Time: 8:30 – 10:30 AM

INSTRUCTIONS:

Answer Question one and any other two questions

SECTION A: (COMPULSORY)

QUESTION ONE [30MKS]

- a) Differentiate between the following terms
- i) Discrete and continuous random variables (2 marks)
 - ii) Inferential and descriptive statistics (2 marks)
 - iii) Type I and Type II errors (2 marks)
- b) The following table of lead concentration in the blood of a group of people. Calculate the mean and standard deviation. (6 marks)

Sample	1	2	3	4	5	6	7	8	9	10
Resistance (ohms)	119	120	120	121	122	119	119	122	123	123

- c) The number of messages sent per hour over a computer network has the following distribution

no. of messages	10	11	12	13	14	15
P(x)	0.08	0.15	0.30	0.020	0.2	0.07

Calculate the mean and standard deviation (8 marks)

- d) The probability that a randomly selected college student is a senior is 0.01. The joint probability that the student is a computer science major and senior is 0.03. find the conditional probability that the student is a computer science major given that he/she is a senior. (2 marks)
- e) Suppose the reaction time of teenage drivers are normally distributed with $\mu=0.535$ and $\sigma=0.115$
- What is the probability that a teenage driver chosen at random will have a reaction time of less than 0.655. (3 marks)
 - Find the probability that a teenage driver will have a reaction time of 0.45 to 0.65 (4 marks)
 - Find the probability that a teenage driver chooses at random will have a reaction time greater than 0.85. (3 marks)

SECTION B

QUESTION TWO [20MKS]

- a) If the probability that a factory produces defective bolts is 0.01. Determine the probability that out of 2000 bolts
- Exactly 3 will be defective (4 marks)
 - More than 3 will be defective (6 marks)
- b) State three measures of central tendency. (3 marks)
- c) The probability of a husband living for over 75 years is 0.5 and the probability of a wife living for over 75 years is 0.4. What is the probability that both lives for over 75 years (2 marks)
- d) The following is a grouped set of data for visits made to the doctor by a sample of children

Visit to doctor	0	1	2	3	4	5	6	7
No. of children	2	8	27	45	38	15	4	1

Calculate the standard deviation (5 marks)

QUESTION THREE [20MKS]

- a) The probability of a student passing a CAT is $\frac{2}{3}$. If the student passes the cat, the probability of getting an A is $\frac{3}{4}$. If he fails the CAT the probability of getting an A is $\frac{1}{5}$. Using a tree diagram, calculate the probability that;
- He fails and gets an A (4 marks)
 - The student gets an A (2 marks)
- b) A survey shows that 56% of baby boomers have car loans and are making payments on these loans. Assume that this result holds true for the current population of all baby boomers. Let X denotes the no. of random sample of 3 baby boomers who are making payments on their car loans. Write the population distribution of X and draw a bar graph for this probability distribution. (6 marks)

- c) A statistician for the department of water in Machakos town monitored the safety of water. The set standard for the safety of water is 70 bacteria per cubic centimeter of water. The average value larger than 70 is felt to be unsafe (dangerous). The following observations were obtained when the experiment was conducted
69,74,76,70,72,73,71,68,73
Test the hypothesis at 5% level of significance and draw conclusions. (5 marks)
- d) State three axioms of probability (3 marks)

QUESTION FOUR [20MKS]

- a) The hardness of 143 samples of steel in Amara Steel Company is measured and grouped into bands as shown below.

Hardness	89-91	91-93	93-95	95-97	97-99	99-101
Frequency	17.5	21.5	32	38	17	17

- (i) Calculate the mean hardness (5 marks)
- (ii) Calculate the standard deviation of the hardness. (5 marks)
- b) List Four conditions of Binomial experiment (4 marks)
- c) Suppose the mean salaries for professors in US are believed to be \$61,650. A sample of 36 full Professors revealed a \$ 69,800. Assuming standard deviation is \$5,000, can it be concluded that the average salary has been increased using 0.05 level of significance? (6 marks)

QUESTION FIVE [20MKS]

- a) Given the following the data below

Mass(Kg)	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44
No. of fish	6	20	12	10	5	6	2	1

- Calculate the median and semi interquartile range (8 marks)
- b) The number of vehicles owned by a family are as follows

No. of vehicles	0	1	2	3	4
Frequency	30	470	850	490	160

- Write down the probability distribution of x hence calculate the mean and variance (8 marks)
- c) If 20% possess the sickle trait out of population of 5 year old school children, what is the standard error of the proportion of sickle cell patients in repeated sample of 150 from this population of school children of 95% confidence interval. (4 marks)