



# The Co-operative University of Kenya

**END OF SEMESTER EXAMINATION DECEMBER-2019**

**EXAMINATION FOR THE DEGREE OF MASTER OF CO-OPERATIVE  
MANAGEMENT (YR I SEM II)**

**UNIT CODE: COMC 4109**

**UNIT TITLE: BUSINESS STATISTICS**

**DATE: 20<sup>TH</sup> DECEMBER, 2019**

**TIME: 9:00 AM – 12:00 PM**

---

## **INSTRUCTIONS:**

- Answer question **ONE (compulsory)** and any other **THREE** questions

## **QUESTION ONE**

- a) The probability that a particular injection will have reaction to an individual is 0.002. Find the probability that out of 1000 individuals
- i) No individuals will have reaction from the injection. (2 marks)
  - ii) 1 individuals will have reaction from the injection. (2 marks)
  - iii) At least 1 individuals will have reaction from the injection. (2 marks)
  - iv) Almost 2 individuals will have reaction from the injection. (2 marks)
- b) In a razor blades manufacturing factory, there is small chance of 1/500 for any blade to be defective. The blades are supplied in packets of 10. Find the approximate number of packets containing
- i) No defective blades in a consignment of 10,000 packets. (2 marks)
  - ii) 2 defective blades in a consignment of 10,000 packets. (2 marks)
- c) Assuming the probability of male birth as  $\frac{1}{2}$
- i) Find the probability distribution of number of boys out of 7 births. (2 marks)
  - ii) Find the probability that a family of 7 children have at least one boy (2 marks)
  - iii) Find the probability that a family of 7 children have at least five boys (2 marks)
  - iv) Out of 600 families with 7 children each find the expected number of families with (ii) and (iii) above (2 marks)
- d) The weekly wage of 4,000 workmen is normally distribution with mean wage of Ksh.250 and wage standard deviation of Ksh.105. Estimate the number of workers whose weekly wages are
- i) between Ksh.200 and Ksh.280 (2 marks)
  - ii) between Ksh.169 and Ksh.273 (2 marks)
  - iii) more than Ksh.272 (3 marks)
  - iv) less than Ksh.265 (3 marks)

## **QUESTION TWO**

- a) Monthly sale of beer at a bar is believed to be approximately normally distributed with mean 2450 units and standard 400 units. To determine the level of orders and stock, the management wants to find two values symmetrically on either side of mean, such that the

probability that sales of beer during the month will be between the two values is (a) 0.95  
 (b) 0.99. Find the required values. (10 marks)

b) The distribution of typing mistakes committed by a typist is given below:

Number of mistakes ( $X$ ) :	0	1	2	3	4	5
Number of pages( $f$ ) :	142	156	69	27	5	1

Fit a Poisson distribution and find the expected frequencies. (10 marks)

### QUESTION THREE

- a) An economist wishes to estimate the average family income in a certain population. The population standard deviation is known to be Rs 4,000, and the economist uses a random sample of size  $n = 225$ . What is the probability that the sample mean will fall within Rs 750 of the population mean? (10 marks)
- b) In recent years, convertible sport coupes have become very popular in Japan. Toyota is currently shipping Celicas to Los Angeles, where a customizer does a roof lift and ships them back to Japan. Suppose that 25% of all Japanese in a given income and lifestyle category are interested in buying Celica convertibles. A random sample of 100 Japanese consumers in the category of interest is to be selected. What is the probability that at least 20% of those in the sample will express an interest in a Celica convertible? (10 marks)

### QUESTION FOUR

- a) Obtain the equations of the lines of regression of  $Y$  on  $X$  from the following data.  
 $X$  : 12 18 24 30 36 42 48  
 $Y$  : 5.27 5.68 6.25 7.21 8.02 8.71 8.42  
 Find the most probable value of  $Y$ , when  $X = 40$ . (10 marks)
- b) The following table gives the ages and blood pressure of 9 women.  
 $Age(X)$ : 56 42 36 47 49 42 60 72 63  
 $Blood\ Pressure(Y)$  147 125 118 128 145 140 155 160 149
- i) Find the correlation coefficient between  $X$  and  $Y$ . (3 marks)  
 ii) Determine the least square regression equation of  $Y$  on  $X$ . (3 marks)  
 iii) Estimate the blood pressure of a woman whose age is 45 years. (4 marks)

### QUESTION FIVE

- a) A manufacturer of screws has noticed that on an average 0.02 proportion of screws produced are defective. A random sample of 400 screws is examined for the proportion of defective screws. Find the probability that the proportion of the defective screws ( $p$ ) in the sample is between 0.01 and 0.03? (10 marks)
- b) The makers of Duracell batteries claims that the size AA battery lasts on an average of 45 minutes longer than Duracell's main competitor, the Energizer. Two independent random samples of 100 batteries of each kind are selected. Assuming  $\sigma_1 = 84$  minutes and  $\sigma_2 = 67$  minutes, find the probability that the difference in the average lives of Duracell and Energizer batteries based on samples does not exceed 54 minutes. (10 marks)