THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE

HIGHER DIPLOMA IN COMPUTER STUDIES PART I

SEMESTER II EXAMINATIONS

APRIL/MAY 2010 SERIES

QUANTITATIVE TECHNIQUE

TIME: 2 HOURS

Instructions to Candidates

Question **ONE** is **Compulsory**.
Answer any other **TWO** Questions.
SMP Tables and Calculators can be used.

Question ONE

(a). Explain the following elements of a queuing model.

(i). Arrival rate
(ii). Queue discipline
(iii). Service process
(iv). Departure
(v). Traffic intensity **(10 Marks)**

(b). State and explain any **THREE** components of the total stock holding cost. **(6 Marks)**

(c). Distinguish between the following terms as used in inventory control.

(i). Economic Order Quantity. (EOQ)
(ii). Economic Batch Quantity. **(4 Marks)**

(d). Describe the following types of simulation.

(i). Continuous
(ii). Discrete
(iii). Analogue **(6 Marks)**

(e). State any **FOUR** stages involved in building a simulation run. **(4 Marks)**

Question TWO

(a). Outline the steps of Monte Carlo method. **(5 Marks)**

(b). The schedule of vehicles arriving at a big garage per day for service was recorded as follows:

Number of Vehicles	0-6	7-9	10-16	17-19	20-26	27-29	30-36
Number of Days	9	14	17	22	10	5	3

(i). Using the following random numbers;

9359, 9582, 9900, 1007, 4849, 9522, 6639, 3732,
Simulate the number of vehicles arriving at the garage. **(10 Marks)**

(ii). Calculate the expected number of vehicles arriving per day.

Give the answer to the nearest whole number. **(5 Marks)**

Question THREE

For one of the chemical produced by a company, the fixed weekly cost is £9,000 and the variable cost per ton is £30. Each ton produced is sold at a price of £60.

(a). Express total cost, total revenue and total profit in terms of the number of tons produced and sold per week.
(b). Plot the total cost and total revenue functions in the same graph given $(0 \leq \times \leq 700)$ tons. Determine the level of output at which break-even occurs.
(c). Calculate the break-even output level algebraically.
(d). From the graph in (b) above find the output level which will yield a profit of £6,000 per week. **(20 Marks)**

Question FOUR

(a). Define the following terms as used in inventory control system.
(i). Order cost
(ii). Carrying cost
(iii). Zero load time **(6 Marks)**

(b). The yearly requirement of a manufacturer is 1,000 units of a part that is used at a uniform rate throughout the year. The machine set-up cost per lot is Ksh.30,640 while production cost is Ksh.3,900 per unit. Interest, insurance and taxes are estimated at 12% on average inventory. The cost of storing the parts is estimated at Ksh.612 per unit per year.

(i). Calculate the economic batch quantity.
(ii). Calculate the total stock holding cost. **(14 Marks)**

Question FIVE

(a). State any **THREE** queuing situation. **(3 Marks)**

(b). Customers arrival at a post office serving counter was found to be at an interval of 4 minutes. The person serving at the counter was serving a customer at a rate of 2 minutes. Evaluate the following:-

(i). The utilization factor. **(2 Marks)**

(ii). What is the probability of a customer arriving and finding at most three customers at the counter. **(6 Marks)**

(iii). What is the probability of a customer arriving and receive service immediately. **(3 Marks)**

(iv). What is the average of customers at the counter who are not being served. **(4 Marks)**

(v). What is average time spent by a customer for the whole duration. **(2 Marks)**