TECHNICAL UNIVERSITY OF MOMBASA

INSTITUTE OF COMPUTING AND INFORMATICS

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

UNIVERSITY EXAMINATION FOR:

BSC. MATHS AND COMPUTER SCIENCE AND BSC STATISTICS AND

COMPUTER SCIENCE

EIT4317: SIMULATION AND MODELLING

END OF SEMESTER EXAMINATION

SERIES: APRIL 2016

TIME: 2 HOURS

DATE: Pick Date Apr 2016

Question ONE

a) Computer implementation of simulation is costly due to some reasons. State three reasons that accounts for this cost [3 marks]

b) Describe any five desirable features of a simulation software [5 marks]

c) What is significance of randomness in simulation experiments [2 marks]

d) Explain three circumstances under which simulation experiments would be preferred over experimentation [3 marks].

e) Briefly elucidate the steps in a simulation study [8 marks]

f) Let $a=7^5=16807$ m=2,147,483,647 (a prime number) and c=0. These choices satisfy the conditions that ensure a period P=m-1. Further specified a seed X0=123,457. Generate the first three random numbers [4 marks].

g) Define the following terms as used in simulation and modeling
   a. Simulation [1 mark]
   b. Measures of performance [1 mark]
   c. System [1 mark]
   d. System environment [1 mark]

e. Model [1 mark]

Question TWO

a) explain factors that need to be considered when selecting a simulation software [6 Marks]
b) explain the various simulation languages   [6 marks]

c) In appraising a £ 300,000 investment project, a firm uses a discount rate of 5%. The equipment will produce a cash inflow (net of operating costs) of £ 75,000 per year, over a five year period. At the end of the five years, the firm expects to sell the equipment for £ 10,000.
calculates s the Net Present Value of the project?
[8 marks]

Question THREE

a) Write a program called Grade Needed that takes 3 numbers; your current course grade (call it CurrentGrade), the percent weight of your final exam in your total grade (call it ExamWeight) and your desired course grade (call it DesiredGrade). Have it return one number: ExamGrade, the score you need to make on the final exam to achieve this grade. The equation is:

$$ExamGrade = \frac{DesiredGrade - CurrentGrade(1-ExamWeight)}{ExamWeight}$$

[4 marks]

b) Briefly explain how files are created and accessed in matlab?[4 marks]
c) Write a Matlab function program that calculates the sum of the squares of the first n integers.
[6 marks]
d) The sales of Jensen Foods, a small grocery chain, since 2001 are

Year	Sales
2001	7
2002	10
2003	9
2004	11
2005	13

Required:
Forecast sales for 2006 using Linear trend Trend Analysis

[6 marks]

Question FOUR

a) The demand rate for a particular item is 12000 units/year. The ordering cost is Rs. 100 per order and the holding cost is Rs. 0.80 per item per month. If no shortages are   allowed and the replacement is instantaneous, determine:
Required:-
Calculate:-
      I.   The economic order quantity.
     II.   The time between orders.
    III.   The number of orders per year.

IV. The optimum annual cost if the cost of item is Rs. 2 per item.
[10 marks]

a) Differentiate between stochastic model and deterministic models [6 marks]
b) Name four real world problems in business where simulation is applied and their solution methods[4 marks]

Question FIVE

a) Differentiate between :
   i. Physical and mathematical models
   ii. Static and dynamic models
   iii. Deterministic and stochastic models   [6 marks]
b) A wholesaler stocks an item for which demand is uncertain. He wishes to assess two re-ordering policies i.e. order 10 units at a reorder level of 10, or order 15 units at a reorder level of 15units , to see which is most economical over a 10 day period.

The following information is available:

Demand per day (units)   probability

Demand per day (units)	probability
4	0.10
5	0.15
6	0.25
7	0.30
8	0.20

Carrying costs at ksh 15 per unit per day.
Ordering costs ksh 50 per order.
Loss of good- will for
- Each Unit out of stock ksh 30.
- Lead time 3 days.
- Opening stock 17 units.
- The probability distribution is to be based on the following random numbers
    41 92 05 44 66 07 00 00 14 62
    20 07 95 05 79 95 64 26 06 48
  Note: the reorder level is physical stock plus any replenishment orders outstanding.

REQUIRED:

To simulate the behavior of two ordering policies-order 15 at reorder level of 15 and order 10 at
Reorder level of 10- to establish the cheaper policy.[14 Marks]