NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2002

SUBJECT: SIMULATION AND MODELLING
CODE: SCS2103

INSTRUCTION TO CANDIDATES

1.   Answer any four questions from Section A and the One quest in Section B.
2.   Paper contains Seven questions.

Time: 3 hours

SECTION A
QUESTION ONE

a)   Define the term simulation.   [3]

b)   For what purposes can Simulation be used for?   [7]

c)   Outline the advantages and disadvantages of Simulation.   [10]

QUESTION TWO

With the aid of a flow chart, outline the steps followed in the Simulation process.
[20]

QUESTION THREE

Inter-arrival times as well as the service time at a single-chair unisex barbershop distributed. The values of the λ and μ are 2 per hour and 3 per hour respectively. The time between arrivals averages ½ hour, and 3 per hour respectively. That is the time between arrivals averages ½ hour, exponentially distributed, and the service time averages 20 minutes also exponentially distributed.

a)   Compute the service utilization and the probabilities for zero, one, two, three, four or more customers.   [11]

b)   Calculate the probability that the barber is busy.   [3]

c)	The time-average number of customers in the system.	[3]
d)	The average time the customer spends in the queue.	[3]

QUESTION FOUR

a)   What are the properties of Random numbers? [4]

b)   Define pseudo-random numbers. [3]

c)   State the properties of a good random generator. [4]

d)   Use the linear congruential method to generate a sequence of random
numbers with $X_0 - 27$ $a = 17$ $c = 43$ and $m = 100$ [9]

QUESTION FIVE

a)   State the algorithm that can be used to perform Kolmogorov Smirnov test.

b)   Based on the algorithm above (5a), test the five numbers:

0,44,   0,81   0,16   0,05   0,93 with $x = 0,05$

QUESTION SIX

Use the Chi Test with $x = 0,05$ to test whether the data shown below are
uniformly distributed. Your test should use n = 10 intervals of equal length,
namely [0, 0.1],   [0.1, 0.02] ---

0.34	0.18	0.25	0.89	0.87	0.44	0.12	0.46	0.67	0.21
0.83	0.90	0.79	0.64	0.70	0.81	0.94	0.22	0.74	0.74
0.96	0.76	0.77	0.67	0.50	0.41	0.52	0.99	0.02	0.73
0.47	0.99	0.17	0.82	0.56	0.05	0.45	0.78	0.05	0.31
0.99	0.30	0.23	0.19	0.82	0.93	0.65	0.39	0.42	0.37
0.99	0.71	0.99	0.46	0.05	0.66	0.10	0.18	0.49	0.42
0.32	0.17	0.54	0.01	0.81	0.28	0.69	0.75	0.49	0.34
0.72	0.51	0.56	0.97	0.30	0.94	0.96	0.73	0.05	0.58
0.06	0.43	0.84	0.24	0.40	0.64	0.40	0.79	0.62	0.19
	0.39	0.97	0.88	0.64	0.47	0.60	0.29	0.78	0.11
	0.26								

QUESTION SEVEN

Write brief notes on the following forecasting methods:

a)   Least Square regression.   [5]

b)   Simple moving average.   [5]

c)   Exponential Smothering.   .   [5]

d)   Forescating through simulation.   [5]

END OF QUESTION PAPER

GOOD LUCK!