

PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Examination : Semester 2
Date : February 23, 2008
Subject : 225-501 Systems Simulation

Academic Year : 2007
Time : 09:00-12:00
Room : R300

.....

ทุจริตในการสอบโทษขั้นต่ำ คือ ปรับตกในรายวิชาที่ทุจริต และพักการเรียน 1 ภาคการศึกษา

INSTRUCTIONS:

- 1. There are 6 questions in this examination paper. The marks allocated to individual questions are stated before each question.*
- 2. Answer all questions in the answer book(s) provided.*
- 3. Begin the answer to each question on a new page.*
- 4. Books, dictionaries and calculators are allowed.*

Asst. Prof. S. Taungbodhitham
Instructor



1. (5 Marks) Describe the circumstances under which simulation is the appropriate tool in operations research and systems analysis.
2. (5 Marks) Use the method suggested by Marsaglia and Bray to generate a sequence of six random normal numbers with four-digit decimal part using the following uniform random numbers:

.94 .73 .70 .82 .25 .35

3. (5 Marks) Time to failure for an automated production process have been found to be randomly distributed with a Weibull distribution with parameters $\alpha = 10$ and $\beta = 2$. Generate five values of time to failure from this distribution using the following uniform random numbers:

.17 .19 .07 .55 .22

4. (10 Marks) A simulation model of *PSU IE job shop* was developed to investigate the different scheduling rules. To validate the model, the current used scheduling rule was incorporated into the model and the resulting output compared to the observed system behavior. By searching the previous year's computerized records, it was estimated that the average number of jobs in the shop was 22.5 on a given day. Seven independent replications of the model were run, each of 30 days duration, with the following results for average number of jobs in the shop:

20.2 21.9 19.8 22.1 19.4 22.0 18.9

Conduct a statistical test to determine if model output is consistent with system behavior. Use a level of significance of $\alpha = 0.05$.

5. (15 Marks) Stock is examined at the end of each 5-day week and if it has declined to a level of six parts or less, an order is placed for ten units. Each order is delivered in accordance with the probability distribution shown in the table below (days till delivery are working days). When the simulation begins, it is the beginning of a week, there are 10 parts on hand and no orders are outstanding. Simulate 5 weeks of operation and estimate the mean units in ending inventory.

TURN OVER

<i>Daily Demand</i>	<i>Probability</i>	<i>Days till Delivery</i>	<i>Probability</i>
0	0.30	2	0.10
1	0.36	3	0.50
2	0.22	4	0.30
3	0.09	5	0.10
4	0.03		

6. (10 Marks) An experiment reported in *PSU Formula I*, in 2007, presented the vehicle-arrival data at *Hat Yai Square Bus Terminal*. The histogram of the data appeared to follow a Poisson distribution. The probability mass function for Poisson distribution was used to calculate the probabilities associated with various values of x , the number of arrivals in a 5-minute period. With this information, the following table is constructed.

<i>Arrivals per period</i> x	<i>Observed Frequency</i> O_i	<i>Expected Frequency</i> E_i
0	12	2.6
1	10	9.6
2	19	17.4
3	17	21.1
4	10	19.2
5	8	14.0
6	7	8.5
7	5	4.4
8	5	2.0
9	3	0.8
10	3	0.3
11	1	0.1

Use the chi-square test at $\alpha = 0.05$ to determine whether the distribution of the vehicle-arrival data is Poisson distribution.

END OF QUESTION
-GOOD LUCK-

