Paper Code: MTME-101	**Roll No.**									

M.Tech.
FIRST SEMESTER EXAMINATION, 2016-17
SIMULATION, MODLLEING AND ANALYSIS

[Time: 3 Hours] [Max. Marks: 70]

Note: Attempt ***any five*** questions. Marks are indicated against each question. Assume any missing data suitably.

1. Answer the following:-

(a) What is simulation? Discuss its advantages and disadvantages. **[06]**

(b) Discuss the hit and miss method of system simulation with respect to calculate the value of π. Prepare a ten iteration simulation table using the method and calculate the value of π. **[08]**

2. Answer the following:-

(a) With a neat flow chart explain the various stages of an industrial simulation process. **[06]**

(b) A cake shop keeps a record of the sales of a particular variety of cake (in dozens) for the past 100 days as shown in table. It intends to develop a new variety of cake and expects the sales of the new variety of cake to follow the sales trend of earlier cake variety. Develop a simulation model for 15 days to identify the optimal stocking policy. **[08]**

Demand (in dozens)	11	12	13	14	15	16	17	18	Total
Number of days	2	5	8	25	31	19	6	4	100

3. Answer the following: - **[7x2=14]**

(a) Explain the development of inverse transform technique for exponential distribution. Write its algorithm and develop 10 random exponential variates. Take λ as 1/5 and the seed random number as 0.1306.

(b) Discuss the acceptance rejection technique algorithmof generating random variates for a uniform distribution system. Solve the following function to generate 5 random variates.

$$f(x) = \begin{cases} 2x+3, 0 \le x \le 1 \\ 0, otherwise \end{cases}$$

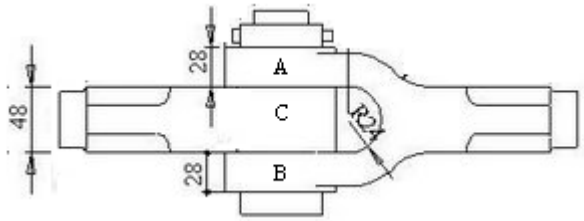
4. Answer the following: - **[7x2=14]**

(a) Why the computer generated random numbers are called pseudo random numbers? Use a seed random number of 1357 to develop ten random numbers of the series using mid square method. Also comment on any anomaly in the series.

(b) Discuss linear congruential method of random number generation technique with a suitable example. What are its major limitations?

.

5. For the given knuckle joint the dimensions of A, B and C are critical for the assembly. The assembly will fail if $A+B+C>104$ mm which is the gap between bottom and top caps. Prepare a simulation table and determine the probability of dis-assembly is ten iterations. **[14]**



Tolerances and random numbers for A, B and C are given in the following tables.

Part	Dimensions (mm)
A	28±0.02
B	28±0.02
C	48±0.05

Random number for A, B & C

A	90	8	73	59	6	79	14	12	50	46
B	52	22	70	97	77	25	19	26	27	59
C	15	74	43	73	44	59	41	61	72	40

6. A stockiest of a certain industrial product finds the probability distributions of demand and the lead time as shown in the respective tables.
Probability distribution of demand:

Demand (units)	40	50	60	70	80	90	100	110	120
Probability	0.08	0.14	0.15	0.20	0.14	0.12	0.08	0.06	0.03

Probability distribution of lead time:

Lead time (Days)	2	3	4	5
Probability	0.20	0.25	0.35	0.20

The ordering cost is Rs. 100/- per order, the inventory carrying cost is Rs. 5/- per unit per day and the unit shortage cost is Rs 20/- per unit per day. The total cost of inventory comprises of ordering cost, inventory holding cost and shortage cost. The reordering policy is that order for a quantity of 500 units is placed when inventory goes below 300 units and the new units reflect in the inventory stock at the end of lead time.Calculate the average inventory holding cost after ten simulations. The start inventory is 500 units.
Take random numbers for demand as 85, 39, 03, 91, 11, 70, 99, 98, 06, 21 and the random numbers for lead time are 56, 90, 99, 48. **[14]**

7. A machining enterprise has two machines, A and B, which are used to process different parts. The completion time of these parts on both the machine is dynamic and is subject to variation. A summary of processing time from the pat records for both machines is as given:

Process time (Minutes)	5	6	7	8	9	10
Machine A	0.10	0.15	0.25	0.30	0.15	0.05
Machine B	0.20	0.35	0.15	0.15	0.10	0.05

Prepare a simulation table for 15 simulations and calculate the average product completion time. The random numbers for machine A and machine B are as under: **[14]**

A	24	92	79	39	78	33	91	27	46	30	27	92	88	63	22
B	29	92	59	81	33	05	58	84	13	85	87	53	95	75	33