JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- APRIL-2023

COURSE CODE(CREDITS): 18B11CI413 (03) MAX. MARKS: 25

COURSE NAME: Modeling and Simulation Techniques

COURSE INSTRUCTORS: MAX. TIME: 1 Hour 30 Minutes

Dr. Sunil Datt Sharma & Dr. Nafis U Khan

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. Generate the random numbers for the following parameters using multiplicative linear congruential method and compare the periods of these numbers: **[CO-4, Marks: 06]**

(i) $a = 11, m = 16,\ x_0 = 7$
(ii) $a = 7, m = 16,\ x_0 = 7$

Q2. A random number $R_i = \{0.63, 0.83, 0.98, 0.33, 0.78\}$ has been generated using LCM/LCG method. Use the Kolmorgorov-Smirnov to test that R_i is uniformly distributed or not. (Critical value is 0.565 at 5% level of significance, and degree of freedom 5). **[CO-4, Marks: 05]**

Q3. The number of yiest cells counted in a haemocytometer is compared to the theoretical distribution is given below. Does the experimental result support the theoretical distribution?

No. of Yeast cells in the square	Obseved Frequency (Oi)	Expected Frequency (Ei)
0	103	106
1	143	141
2	98	93
3	42	41
4	8	14
5	6	5

(Critical value is 11.1 at 5% level of significance, and degree of freedom 5)

[CO-4 & CO-2 Marks: 05]

Q4. (a) Write the characteristics of good random generator and how these can be achieved?
(b) Differentiate between chi-square test and kolmorgorav-smirnov test.

[CO-4, Marks: 04]

Q5. The number of customers arriving at shopping mall in 2 hour duration between 10 a.m. and 12 noon was monitored for five working days over a 20 week period. The following table shows the resulting data:

Arrival per period	0	1	2	3	4	5	6	7	8	9
Frequency	12	10	19	17	10	8	7	5	5	3

Determine: (a) Histogram of the data (b) Sample mean (c) Sample variance (d) Sample standard deviation **[CO-4 & CO-2 Marks: 05]**