CLASS: IMSc   SEMESTER : IX
BRANCH: Math   SESSION : MO 2023

SUBJECT: MA503 STATISTICAL COMPUTING

TIME: 03 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)	Define a random experiment. Why is it called random?	[2]	CO=1Mod=1	BL=1
Q.1(b)	Using the concept of Kolmogorov complexity, explain why the sequence ABCABCABC……(to be repeated 500 times) cannot be called random.	[3]	CO=1Mod=1	BL=2
Q.1(c)	Distinguish clearly between genuine and false randomness with examples.	[5]	CO=1Mod=1	BL=2
Q.2(a)	What are pseudorandom numbers? Why are they useful?	[2]	CO=2Mod=2	BL=1
Q.2(b)	Test whether the following sample can be regarded as random using run test for randomness (take the level of significance as 5%):	[3]	CO=2Mod=2	BL=4

51	12	25	36	81	1	21	19	12	8	28
30	53	42	17	2	3	14	38	22	11	42
25	67	52	90	0	6	31	47	98	64	23

Q.2(c)	Explain the working of any one pseudorandom number generator which you have studied.	[5]	CO=2Mod=2	BL=2
Q.3(a)	Write an algorithm to simulate a geometric variate with p = 1/3	[2]	CO=3Mod=3	BL=3
Q.3(b)	Using two independent U(0,1) variate values as 0.6291 and 0.3517, simulate a standard Cauchy variate. All symbols have usual meanings.	[3]	CO=3Mod=3	BL=4
Q.3(c)	Write an algorithm to simulate the random variable Y whose distribution is given below:-	[5]	CO=3Mod=3	BL=4

Y: -2   -1   0   1   2
P(Y = y): 4/25   4/25   13/25   2/25   2/25

Q.4(a)	Why should there be two lines of regression?	[2]	CO=4Mod=4	BL=1
Q.4(b)	Define a time series. Why is time series analysis important?	[3]	CO=4Mod=4	BL=2
Q.4(c)	Distinguish between Single and Double Exponential Smoothing models pointing out the situations in which they are useful.	[5]	CO=4Mod=4	BL=2
Q.5(a)	What is an outlier? Explain briefly why outlier analysis is useful.	[2]	CO=5Mod=5	B= 1
Q.5(b)	Explain Markov Chain Monte Carlo method with an example.	[3]	CO=5Mod=5	B= 2
Q.5(c)	Write an algorithm for simple random sampling without replacement.	[5]	CO=5Mod=5	BL=3

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