

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSc
BRANCH: MATH

SEMESTER : IX
SESSION : MO 2024

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.
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- Q.1(a) Define Kolmogorov complexity of a sequence and use this concept to examine the randomness of the sequence aabbaabbaabb....(to be repeated 1000 times). [5] CO=1 BL=2
Mod=1
- Q.1(b) What is the main difference between the terms “random” and “deterministic”? [5] CO=1 BL=1
Distinguish clearly between ontic and epistemic randomness with examples. Mod=1
- Q.2(a) Test whether the following sample can be regarded as random using run test for randomness (take the level of significance as 5%): [5] CO=2 BL=3
Mod=2
- | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| 31 | 20 | 35 | 46 | 78 | 5 | 26 | 39 | 42 | 18 |
| 30 | 53 | 47 | 76 | 22 | 23 | 54 | 30 | 27 | 17 |
| 56 | 61 | 15 | 97 | 6 | 0 | 35 | 49 | 9 | 4 |
- Q.2(b) Explain the working of Tausworthe’s feedback shift register method for pseudorandom number generation. [5] CO=2 BL=2
Mod=2
- Q.3(a) Using four independent $U(0,1)$ variate values as 0.3176, 0.6413, 0.9345 and 0.5283, simulate a Chi-Square variate with 4 degrees of freedom. All symbols have usual meanings. [5] CO=3 BL=3
Mod=3
- Q.3(b) A random variable X has the following probability distribution:- [5] CO=3 BL=3
Mod=3
- | | | | | | |
|-----------|------|------|-------|------|------|
| X: | 0 | 1 | 2 | 3 | 4 |
| P(X = x): | 6/31 | 5/31 | 10/31 | 2/31 | 8/31 |
- Write an algorithm to simulate X.
- Q.4(a) The following data provide the height (H) in cm and weight (W) in Kg of 5 persons: [5] CO=4 BL=3
Mod=4
- | | | | | | |
|----|-----|-----|-----|-----|-----|
| H: | 167 | 152 | 165 | 171 | 148 |
| W: | 72 | 58 | 60 | 75 | 55 |
- Find the expected weight of a person whose height is 160 cm and the expected height of a person whose weight is 65 Kg.
- Q.4(b) Explain Single Exponential Smoothing. What are the underlying assumptions for this model to be useful? [5] CO=4 BL=2
Mod=4
- Q.5(a) Distinguish between Markov Chain Monte Carlo and ordinary Monte Carlo methods with illustrating examples. [5] CO=5 B= 3
Mod=5
- Q.5(b) Write a short note on outliers pointing out their applications in business and industries. [5] CO=5 BL=2
Mod=5

:26/11/2024:E