Tribhuvan University

Institute of Science and Technology

2081

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Bachelor Level / First Year/ Second Semester/ Science

Computer Science and Information Technology (CSC160)

(Discrete Structure)

(OLD COURSE)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Section A

Long answer questions.

Attempt any TWO questions. **(2×10=20)**

1. Define discrete probability. Solve the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2}$ with initial conditions $a_0 = 1$ and $a_1 = 4$. [2 + 8]
2. What is simple graph? How do you find forward and backward augmented path to calculate maximal flow? Explain with your own example. [2 + 8]
3. Define geometric and arithmetic progression. Prove that $1 + 3 + 5 + \ldots + (2k - 1) = k^2$ using mathematical induction. [3 + 7]

Section B

Short answer questions.

Attempt any EIGHT questions. **(8×5=40)**

4. Define function and describe its types. [5]
5. What is primality test? Find all additive inverse pairs in Z_{10}. [1 + 4]
6. Discuss about Universal and Existential quantifier with examples. [5]
7. State pigeon hole principle. Expand $(a + b)^3$ using Binomial expansion. [2 + 3]
8. Define tree, spanning tree and minimum spanning tree with examples. [5]
9. Solve the following congruence using Chinese Remainder Theorem. [5]
   $x \equiv 5$ MOD 7
   $x \equiv 2$ MOD 5
10. How do you represent set? Explain. [5]
11. Using direct proof, show that the square of odd is odd. [5]
12. Describe relation and its properties. [5]