M.Sc. CSc. 538-2077 ✡

Tribhuvan University

**Institute of Science and Technology**

2077

✡

Master Level / I Year/ Ist Semester/ Science — Full Marks: 45

**Computer Science and Information Technology (CSc. 538)** — Pass Marks: 22.5

(Advanced Operating System) — Time: 2 hours.

*Candidates are required to give their answers in their own words as for as practicable.*

The figures in the margin indicate full marks.

## Group A

**Long answer questions:**

**Attempt any two questions.** **(2x10=20)**

1. Define distributed system. Explain reasons for distributed system. Discuss the types of distributed OS. (10)

2. Define tracks, cylinder and transfer rate. Calculate total head movement with disk queue requests for I/O to blocks of cylinders 98, 183, 37, 122, 14, 124, 65, 67, if head starts at 53 and a total of 200 cylinders from 0 to 199 using SCAN and C-SCAN scheduling methods. (10)

3. Explain CPU scheduling algorithm optimization criteria. Find wait time, TAT, average wait time and average TAT from the given information using preemptive priority based algorithm: (10)

| Process | Arrival Time (ms) | Brust Time (ms) | Priority Level |
|---|---|---|---|
| P1 | 0 | 10 | 1 |
| P2 | 0 | 5 | 3 (Lowest) |
| P3 | 0 | 7 | 2 |
| P4 | 5 | 6 | 0 (Highest) |

## Group B

**Short answer questions:**

**Attempt all questions.** **(5x5=25)**

4. Discuss about port scanning and DOS (Denial of Servive) threats. (5)

5. Explain authentication algorithm using symmetric key distribution. (5)

6. Explain recovery from deadlock using process termination. (5)

7. Explain the steps used in basic page replacement. (5)

8. Compare MPEG1, MPEG2 and MPEG4. (5)

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**Computer Science and Information Technology (CSc. 539)** — Pass Marks: 22.5

(Object Orientation Software Engineering) — Time: 2 hours.

*Candidates are required to give their answers in their own words as for as practicable.*
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## Group A

**Long answer questions:**

**Attempt any two questions.** **(2x10=20)**

1. List several software process models. Explain how both waterfall model and prototyping model can be accommodated in the spiral process model.

2. Discuss the differences between black box and white box testing models. Discuss how these testing models may be used together to test a program schedule in object oriented testing process.

3. Differentiate between object modeling techniques with responsibility driven design with advantages and disadvantages.

## Group B

**Short answer questions:**

**Attempt all questions.** **(5x5=25)**

4. Differentiate between object-oriented programming with structure-oriented programming.

5. Explain the component management with practical example.

6. Explain in brief about project scheduling and tracking.

7. Discuss about object oriented testing strategies with example.

8. Write note on hierarchical object-oriented design.

Bishnu Bhattarai

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Master Level / I Year/ Ist Semester/ Science — Full Marks: 45

**Computer Science and Information Technology (CSc. 540)** — Pass Marks: 22.5

(Algorithms and Complexity) — Time: 2 hours.

*Candidates are required to give their answers in their own words as for as practicable.*

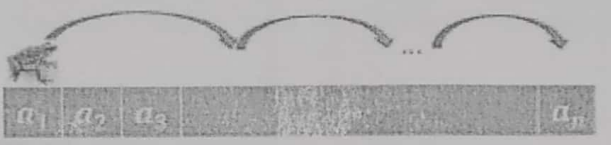
The figures in the margin indicate full marks.

## Group A

**Long answer questions:**

**Attempt any two questions.** **(2x10=20)**

1. You are given an array of n positive integers ($A = [a_1, a_2, \ldots, a_n]$) which is indexed from 1 to n. A small frog sits on the first entry of the array. The frog aims to reach the last entry of the array by one or several jumps, and it has to jump according to the following rule: when the frog is on the ith entry of the array, it can only jump to the j th entry if $0 < j - i \leq a_i$



Using dynamic programming, design an algorithm to calculate the minimum number of jumps with which the frog can reach the last entry of the array from the first entry. What is the worst case time complexity of your algorithm? (8+2)

2. Explain Mesh algorithm for maximum selection with $n^2$ processor. Will it work optimal? When will it be the optimal? (10)

3. Demonstrate odd-even merge sort in Butterfly network. Calculate its time complexity. (7+3)

## Group B

**Short answer questions:**

**Attempt all questions.** **(5X5=25)**

4. Explain the randomized algorithm with reference to primality testing problem. (5)
5. Explain how dynamic programing approach can be used to solve optimal BST. (5)
6. How can you compute rank in a linear array? Explain. (5)
7. Explain work done and its efficiency with a suitable example of your own for PRAM. When do you confirm that the algorithm is optimal? (5)
8. How can you decide which algorithm design technique is suitable for given problem? Answer with reference to Tree vertex splitting, String editing, and Sum of subsets problems. (5)

Bishnu Bhattarai

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Master Level / I Year/ Ist Semester/ Science

**Computer Science and Information Technology (CSc. 543)**

(Neural Networks)

Full Marks: 45

Pass Marks: 22.5

Time: 2 hours.

*Candidates are required to give their answers in their own words as for as practicable.*

The figures in the margin indicate full marks.

**Group A**

**Long answer questions:**

**Attempt any two questions.** **(2x10=20)**

1. What do you mean by back propagation? Write down its algorithm and explain it. How can you solve EX-OR gate problem using back propagation? Explain with suitable numerical example.
2. Differentiate between supervised and unsupervised learning. In what case we have to use semi-supervised learning. Draw the block diagram of learning framework. Explain each block with practical examples.
3. Differentiate between classical machine learning algorithm and deep learning. What do yo mean by long short term memory (LSTM). Draw its block diagram and explain it.

**Group B**

**Short answer questions:**

**Attempt all questions.** **(5X5=25)**

4. What is a heteroassociative architecture? How can you generate weighted matrix? Explain with suitable example.
5. What is the McCulloch/Pitts Neuron? Explain it with algorithm. Why you can't apply it for the solution of EX-OR gate? Justify.
6. Explain the importance of journal papers for master's student. Explain in detail about any one paper you have studied during your course work. Explain the importance of conclusion and recommendation in the paper.
7. What do mean by fuzzy logic? Explain the importance of membership function. How can you make fuzzy system? Explain it with suitable example.
8. Explain the components of Genetic Algorithm along with its algorithm. What are the applications of Genetic Algorithm?

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Master Level / I Year/ Ist Semester/ Science

**Computer Science and Information Technology (CSc. 544)**

(Parallel and Distributed Computing)

Full Marks: 45

Pass Marks: 22.5

Time: 2 hours.

*Candidates are required to give their answers in their own words as for as practicable.*

The figures in the margin indicate full marks.

## Group A

**Long answer questions:**

**Attempt any two questions.** **(2x10=20)**

1. Why do we need parallel computing? What might be the reasons behind choosing the RAM machine for modeling and characterizing parallel algorithm? Describe the models of concurrent programming. (2 + 2 + 6)

2. State the formal definition of Generalized BSR model? List the types too. Simulate the one criterion BSR algorithm to sort the array {2,4,2,3}. {2 + 2 + 6}

3. Explain the significances of check pointing in parallel and distributed computing. Describe how check pointing with simple rollback ensure consistent check pointing. (5 + 5)

## Group B

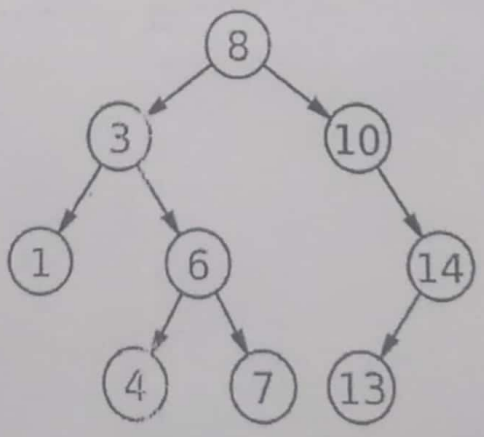
**Short answer questions:**

**Attempt all questions** **(5 × 5 = 25)**

4. Define petri net. What are the purposes of colored petri net? (3 + 2)

5. How logical clock can be used to order the events using Logical Clock in distributed computing? Explain. (5)

6. Compute the post order numbering of the following tree. (5)



7. How do you schedule interval ordered task without communication? Illustrate with an example. (5)

**(2x2.5=5)**

8. Write short notes on (Any two )

   a. Open Distributed System

   b. Parallel Reduction Operation

   c. PRAM Model