# Department of Computer Science and Engineering

Jashore University of Science and Technology

Semester Final Examination-2021

**4th Year 1st Semester, Session: 2016-17**

Course Code: CSE 4101 Time: 3.00 hours

Course Title: Artificial Intelligence Marks: 72

**[N.B. Answer any 06 sets questions from following 08 sets questions.**
**The figures in the right margin indicate full marks.]**

1. a) What is the difference between uninformed and informed search? Describe Breadth-first Search and Greedy Best-first Search. 06
   b) Describe two different blind search approaches. Which one is better in which aspect? 06

2. a) Describe Association Rules Learning. 04
   b) Describe Classification. 04
   c) Describe Clustering. 04

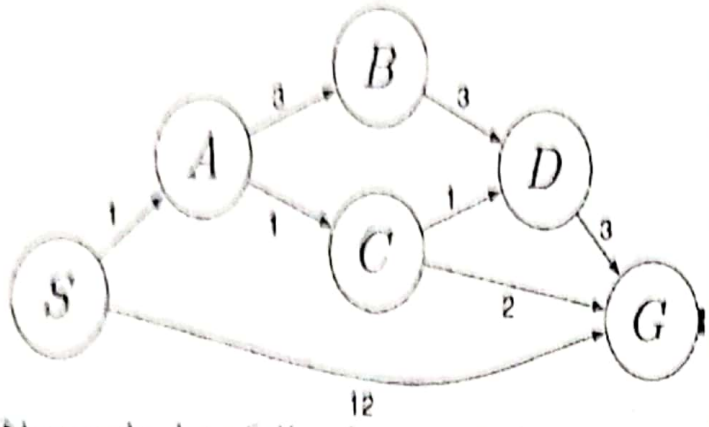
3. a) Describe k-means Clustering algorithm. Describe some of the Distance Measures. 06
   b) What is the main problem of k-means clustering? Find alternatives of the k-means clustering algorithm 03
   c) Write short notes on agglomerative clustering. 03

4. a) How can a problem be formally defined? Describe in brief. 03
   b) What is an agent? Describe different types of agents. 06
   c) Explain Local Beam Search. 03

5. a) Explain Support Vector Machine with example. 03
   b) Explain Decision Tree with example. 03
   c) Consider the following set of statement: 06
   (i) Whoever can read is literate
   (ii) Dolphins are not literate
   (iii) Some Dolphins are intelligent
   (iv) Some who are intelligent cannot read
   (v) Everyone who is not intelligent is liked by no one
   From the above statements, conclude that "Some who are intelligent cannot read" using Resolution.

6. a) What are the properties of a Hill-climbing algorithm? Explain. Write the algorithm. 04
   b) What is the problem of a Hill-climbing algorithm? Discuss some of its variants 04
   c) Explain Simulated Annealing with algorithm. 04

7. a) Write down the differences between informed search and heuristic search. What can be a good heuristic to solve n queen problem? 03
   b) "Iterative Deepening A* performs a series of depth-first searches and keeps track of the cost function" – Explain. How IDA* differs from A* search? 05
   c) Consider the following graph, and the heuristics are shown in the table below: 04




| State | $h_1$ | $h_2$ |
|---|---|---|
| $S$ | 5 | 4 |
| $A$ | 3 | 2 |
| $B$ | 6 | 6 |
| $C$ | 2 | 1 |
| $D$ | 3 | 3 |
| $G$ | 0 | 0 |

Now calculate following heuristics (use optimality rules of A*):
(i) Is h1 consistent?, (ii) Is h2 admissible?

8. a) Which properties should a good knowledge representation system should possess? Describe some knowledge representation techniques. 03
   b) How representing simple facts in Logic can help reason new facts? Explain. 03
   c) What is the problem of Simple Relational Knowledge? Explain with example. 03
   d) What is Isa Relationship? How can it improve reasoning facts in Logic? 03

# Department of Computer Science and Engineering

Jashore University of Science and Technology

Semester Final Examination-2021

**4th Year 1st Semester, Session: 2016-17**

Course Code: CSE 4103 Time: 3.00 hours

Course Title: Compiler Design Marks: 72

**[N.B. Answer any 06 sets questions from following 08 sets questions. The figures in the right margin indicate full marks.]**

01. a) Construct a Abstract Syntax Tree from the following Parse Tree. Show each steps and mention the rules corresponding to the steps. 06

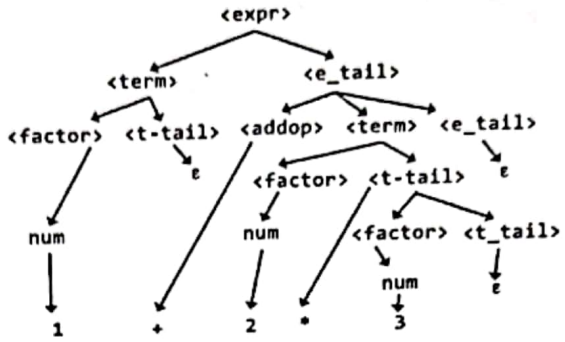



Figure 1: Parse Tree

b) Briefly describe each parts of Front End Analysis and Back End Analysis of a Compiler with a simple scenario. 06

02. a) What is the basic difference among Expression, Term and Factor? 04

b) Diferentiate between Syntax and Semantics with example. 04

c) Consider a Grammar: **S → 0 | 1 | S+S | S*S** and a String **0*1+1**. Is the Grammar ambiguous? When a grammar is called ambiguous? How to resolve ambiguity of a Grammar? 04

03. a) *Define Parse Tree and Abstract Syntax Tree.* 04

b) *Consider a Parser* **LR(k)**. What this **k** refers to? Briefly describe the significance of *this* **k**? 04

c) *Why we are interested to Deterministic Parser instead of Non-Deterministic Parser?* 04

04. a) If a grammar is left recursive, we must rewrite it to make it right recursive. Why? 04

b) Consider the following grammar: **exp → exp+term | exp-term | term** 04
Is there any left recursion? If so, convert it into right recursion.

c) What is left factoring? What is the difficulty with the grammar **A → uv | uw** ? How to resolve it? 04

05. a) Given the following grammar, determine the first sets. 06

**E → T X**
**X → + E**
**X → ε**
**T → int Y**
**T → ( E )**
**Y → * T**
**Y → ε**

b) Given the following grammar, determine the follow sets. 06

**S → ABCD**
**A → a/ε**
**B → b/ε**

$C \rightarrow c$
$D \rightarrow d/\varepsilon$
$E \rightarrow e/\varepsilon$

06. Construct a Parse Table for the following **Grammar, G**. Don't forget to show the Expanded Grammar and First and Follow sets. 12

```
exp → term exp'
exp' → addop term exp' | ε
addop → + | -
term → factor term'
term' → mulop factor term' | ε
mulop → *
factor → ( exp ) | number
```

**Figure 2: Grammar G**

07. a) Determine FIRST and FOLLOW sets from the following grammar. 04

$E \rightarrow E+T$
$E \rightarrow T$
$T \rightarrow T*F$
$T \rightarrow F$
$F \rightarrow (E)$
$F \rightarrow a$

b) Construct CLR parse table for the following grammar. 05

$S \rightarrow CC$
$C \rightarrow cC$
$C \rightarrow d$

c) *Differentiate between one-pass and multi-pass compiler.* 03

08. a) What kind of patterns can be found from the following regular expressions? *06*
*[Don't forget about the precedence of the operators]*
$a|b^*, (a|b)^*, (a|c)^*b(a|c)^*$

b) Convert the following NFA to DFA *06*

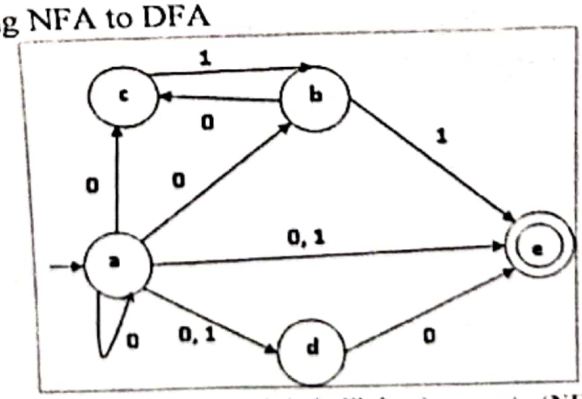



**Figure 3: Non Deterministic Finite Automata (NFA)**

***The End***

# Department of Computer Science and Engineering

Jashore University of Science and Technology

Semester Final Examination-2021

**4th Year 1st Semester, Session: 2016-17**

Course Code: CSE 4107 Time: 3.00 hours

Course Title: Parallel and Distributed Processing Marks: 72

**[N.B. Answer any 06 sets questions from following 08 sets questions. The figures in the right margin indicate full marks.]**

1. a) Explain computer architecture based on Von Neumann model. 04
   b) Define Parallel computing. Explain the reasons for parallel computing? 04
   c) Define Cloud Computing and explain with examples. 04

2. a) What do you understand by scalability of a parallel system? 03
   b) Write down the differences between multiprocessor and multicomputer. 03
   c) What is a Single-point-of-failure and how can distribution help here? 03
   d) What do you mean by location transparency and time-stamping? 03

3. a) Distinguish between Parallel and distributed computing. 03
   b) Describe Parallel Programs design with examples. 05
   c) Distinguish between UMA and NUMA Shared memory architectures? 04

4. a) Sketch the shared cache, Bus based shared memory, Dancehall and Distributed memory SMP hardware organizations. 04
   b) Define Cache coherence problem. Explain Bus Snoopy Cache Coherence protocols. 04
   c) Explain MSI protocol state machine for Bus requests with proper examples. 04

5. a) Define message passing. Explain Directory based cache coherence protocols with examples. 04
   b) Explain the task of following Directory protocol messages: 04
      *i) ReadMiss(P,A):*
      *ii) WriteMiss(P,A):*
      *iii) Invalidate(P,A):*
      iv) *Fetch(P,A):*
   c) Explain how we develop parallelism in uniprocessor system? 02
   d) Mention pitfalls in distributed processing. 02

6. a) Define Message passing. Distinguish between Synchronous Vs. Asynchronous message passing techniques. 04
   b) Describe the features of MPI and mention which features are NOT part of MPI and explain why do we use MPI? 04
   c) Describe the deadlocks in blocking operations in MPI with proper examples. 04

7. a) Give a simple performance model of a generic parallel operation performed on n elements. Explain what the parameters represent. 04
   b) Describe a simple scheme in which there are as many lightweight processes as there are runnable threads. 04
   c) What is Hadoop? What is the use of this technology? 04

8. a) Describe the memory hierarchy with proper diagram and examples. 03
   b) Describe the advantages, disadvantages and applications of Vector Processors. 03
   c) What is the difference between a parallel processor and a co-processor? 03
   d) Explain how we develop parallelism in uniprocessor system? 03

**Department of Computer Science and Engineering**

Jashore University of Science and Technology

Semester Final Examination-2021

**4th Year 1st Semester, Session: 2016-17**

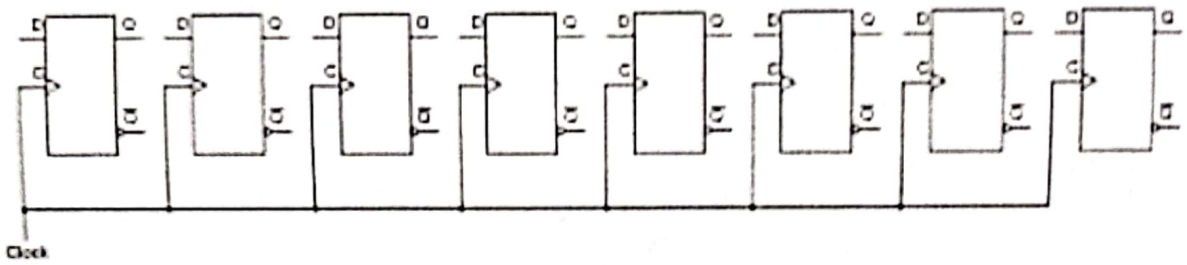
Course Code: CSE 4109 Time: 3.00 hours

Course Title: Digital System Design Marks: 72

**[N.B. Answer any 06 sets questions from following 08 sets questions.**
**The figures in the right margin indicate full marks.]**

1. a) Draw and describe 4-bit shift right register. 04
   b) What is the definition of a register in the context of digital circuitry? Also, define and compare/contrast what a shift register. 03
   c) Explain SAP-1 computer control word for SUB operations. 05

2. a) Draw the necessary connecting wires between flip-flops so that serial data is shifted from right to left instead of left to right as you may be accustomed to seeing in a shift register schematic: 04




   Be sure to also note where data enters this shift register, and where data exits.
   b) In 8080/8085 manual says, it needs 13 T-states to fetch and execute the *LDA instruction.* *06*
   If the system clock has a frequency of 2.5MHz, how long is an *instruction cycle?*
   c) Differentiate between microinstructions and macroinstructions. 02

3. a) Simplify the following Boolean functions by using K-map. 06
   **i) F (m, n, o, p) =Σ (0, 2, 3, 12, 13, 14, 15)**
   **ii) F (A, B, C, D) = A'B'C'+ B'CD' + A'BCD' + AB'C'**
   b) Design a Full Adder. 06

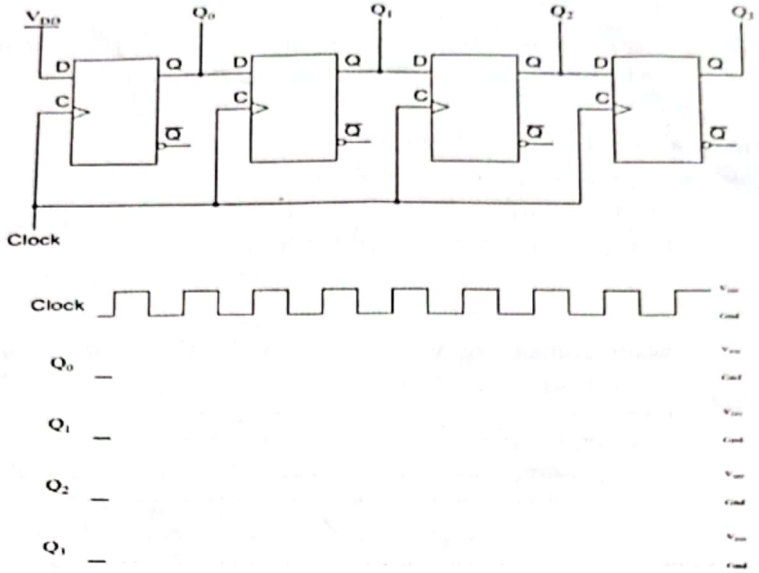
4. a) A sequential circuit with two D Flip-Flops, A and B; two inputs, x and y; and one output, z, is specified by the following next-state and output equations: 06

$$A(t+1) = x'y + xA$$
$$B(t+1) = x'B + xA$$
$$z = B$$

   Draw the logic diagram of the circuit.
   b) Write the steps to perform the micro-operation $R1 \leftarrow R2 + R3$ in a data path 03
   c) If the register A holds binary value 11011001. Determine the value of register B and the logic micro-operation to be performed in order to change the value of A to: 03
   (i) 01101101

P.T.O

5. a) Complete the timing diagram for this circuit, assuming all Q outputs begin in the low state: 05




b) Explain the difference between serial digital data and parallel digital data 03

c) Design a digital circuit that performs the four logic operations of exclusive OR, exclusive NOR, NOR and NAND. Use two selection variables. Show the logic diagram of one typical stage. 04

6. a) How can you implement a binary adder and subtractor? Describe with necessary diagram. 05

b) Draw an ASM chart for counting the number of 1s in a register. 03

c) Perform the arithmetic operations (+42)+(-13) and (-42)-(-13) in binary using (i) sign-1's complement (ii)sign 2's complement. 04

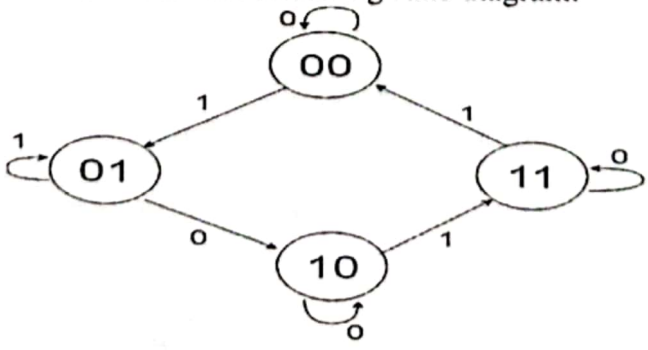
7. a) Draw and explain SAP-1 computer block diagram. 06

b) What is micro-operation? Describe the basic micro-operation with example. 03

c) Differentiate between machine cycle and instruction cycle. 03

8. a) Design a combinational circuit using a ROM. The circuit accepts a 3-bit number and generates an output binary number equal to the square of the input number. 06

b) Design a sequential circuit for the following state diagram: 06



**Course Title: Compiler Design Laboratory Course Code: CSE 4104**

**Full Marks 25: Time 40 mint**

1. What is Compiler? Mention the back end phases of a compiler. 2
2. Define a Context Free Grammar. 2
3. What is a regular expression? State the rules, which define regular expression? 3
4. Eliminate the left recursion for the following grammar 3
   E-->E+T/T
   T-->T*F/F
   F-->(E)/id
5. Describe operator precedence with example 3
6. What are the problems with top down parsing? 1
7. Representing the syntax by a grammar is advantageous. What is the cause? 1
   (A) It is concise
   (B) It is accurate
   (C) Automation becomes easy
   (D) All of the above
8. What is the necessity of Intermediate code generation phase of compilation? Also show the types of intermediate code generator. 3
9. How to find out the first and follow. Show the algorithm 3
10. What is the action of parsing the source program into proper syntactic classes? 1
    (A) Syntax analysis
    (B) Lexical analysis
    (C) Interpretation analysis
    (D) General syntax analysis
11. _____ is a process of finding a parse tree for a string of tokens. 1
    (A) Analyzing
    (B) Recognizing
    (C) Parsing
    (D) Tokenizing
13. Which programming languages are classified as low level languages? 1
    (A) BASIC, COBOL, FORTRAN
    (B) Assembly languages
    (C) Knowledge based Systems
    (D) Prolog 2, Expert Systems
12. For what purpose type checking is used?
13. The output of lexical analyzer is 1
    (A) Strings of characters
    (B) A set of tokens
    (C) Syntax tree
    (D) A set of regular expressions

**Department of Computer Science and Engineering**

Jashore University of Science and Technology

Semester Final Examination-2021

**4th Year 1st Semester, Session: 2016-17**

Course Code: CSE 4105 Time: 3.00 hours

Course Title: Information Security and Control Marks: 72

**[N.B. Answer any 06 sets questions from following 08 sets questions. The figures in the right margin indicate full marks.]**

1. a) What is Information System? Write the characteristics of information. Why we need security of information? 07
   b) Write the various layers of security of a successful organization and briefly describe why we need this layers of security. 05

2. a) Establish a security system development life cycle and write the working summary of their phases. 06
   b) Information security; is it an Art or a Science? Give your answer with example. 04
   c) Why acts of human error or failure? 02

3. a) Briefly describe the attack replication vectors. 06
   b) What are the goals of Cryptanalysis? Give your answer and why? 06

4. a) Consider a scheme involving the replacement of alphabet as follows: 02
   Original : A B C …….. X Y Z
   Changed to: Z Y X …….. C B A.
   If Alice sends a message HSLDNVGSVNLMVB, what should Bob infer from this?
   b) The following shows a plaintext and its corresponding Cipher text. Give your answer how is it possible. 05
   Plaintext: HELLO
   Cipher text: ABNZF
   c) "Digital signatures have assumed great significance in the modern world of Web commerce"- Do you agree/disagree with this statement? Explain why? Also mention the working procedure of Digital signatures? 05

5. a) What is fault tolerance terminology and why need this terminology? 05
   b) How we fixing faults? 04
   c) If buffer overflows then what happened? Give answer with proper example. 03

6. a) How Viruses work? 02
   b) Write the Characteristics of "Virus". 03
   c) How we prevent "Virus Infection"? 04
   d) How brain Virus spreads? 03

7. a) Why we install additional security controls in operating system? 04
   b) How can we test the system security? 04
   c) What is file system? How does the file system handle security? 04

8. a) How does the file system ensure data integrity? 06
   b) What do ethical hackers do? 03
   c) Briefly describe the administering security policy. 03