



## UNIVERSITY EXAMINATIONS

### EXAMINATION FOR SEPTEMBER –DECEMBER 2019/2020 FOR BACHELOR OF SCIENCE IN COMPUTER SCIENCE

COURSE CODE RCS 302: COURSE UNIT COMPILER CONSTRUCTION

DATE \_\_\_\_\_

TIME: 2 HOURS

#### GENERAL INSTRUCTIONS:

Students are NOT permitted to write on the examination paper during examination time.

This is a closed book examination. Text book/Reference books/notes are not permitted.

#### SPECIAL INSTRUCTIONS:

This examination paper consists Questions in Section A followed by section B.

Answer **Question 1 and any Other Two** questions.

QUESTIONS in ALL Sections should be answered in answer booklet(s).

1. **PLEASE** start the answer to EACH question on a NEW PAGE.
2. **Keep your phone(s) switched off at the front of the examination room.**
3. **Keep ALL bags and caps at the front of the examination room and DO NOT refer to ANY unauthorized material before or during the course of the examination.**
4. **ALWAYS** show your working.
5. **Marks indicated in parenthesis i.e. ( ) will be awarded for clear and logical answers.**
6. **Write your REGISTRATION No. clearly on the answer booklet(s).**
7. **For the Questions, write the number of the question on the answer booklet(s) in the order you answered them.**
8. **DO NOT** use your **PHONE** as a **CALCULATOR**.
9. **YOU** are **ONLY ALLOWED** to leave the exam room **30minutes** to the end of the **Exam**.
10. **DO NOT** write on the **QUESTION PAPER**. Use the back of your **BOOKLET** for any calculations or rough work.

## **SECTION A (Compulsory)**

### **Question #1 [30 Marks]**

- a) Describe any three types of codes compilers may generate **(6 marks)**
- b) Compiler construction is a microcosm of computer science, discuss the statement **(6 marks)**
- c) Explain any three Memory Management Strategies for a program compilation process **(3 marks)**
- d) Using a suitable diagram draw the design of a Compiler **(5 marks)**
- e) State any three general types of parsing methods in syntax analysis **(3 marks)**
- f) The regular expression language is a powerful pattern-matching tool and is integral to many programming languages. State and explain any two regular expression operations **(4 marks)**
- g) Describe any three factors influencing code optimization in a program compilation **(3 marks)**

## **SECTION B (Answer any two options)**

### **Question #2 [20 Marks]**

- a) State any five qualities of a good compiler **(5 marks)**
- b) The design of an Abstract Syntax Tree is often closely linked with the design of a compiler and its expected features. List any five core requirements in the design of Abstract Syntax Trees **(5 marks)**
- c) The symbol table is used to store essential information about every symbol contained within the program, discuss the importance of the symbol table in programming and compilation progress **(5 marks)**
- d) List any five actors to consider in a code generator in the compiler design **(5 marks)**

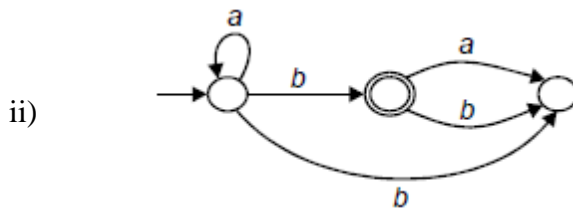
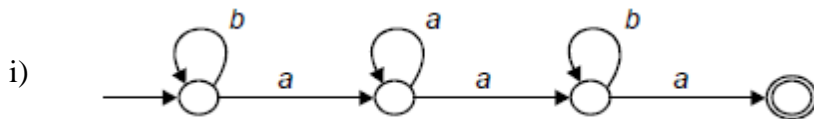
### **Question #3 [20 Marks]**

- a) State and explain the most common features in most programming languages **(5 marks)**

- b) Discuss why the semantic analysis is performed in a compiler? **(5 marks)**
- c) Describe the various compiler design considerations **(6 marks)**
- d) Differentiate between Concrete Syntax and Abstract Syntax **(4 marks)**

**Question #4 [20 Marks]**

- a) Discuss any three problems encountered in modern computing platforms due computer Architecture and Compiler Design **(6 marks)**
- b) Discuss the importance of Lexical Analysis as a Separate Phase in compilation process **(6 marks)**
- c) State and explain any two types of semantic analysis that can be run in the compilation **(4 marks)**
- d) Determine the regular expression for the languages accepted by the following automata **(4 marks)**



**Question #5 [20 Marks]**

- a) Explain any five sources of errors in the compilation process **(5 marks)**
- b) Describe any four basic types of phrases as used in context free grammars **(4 marks)**
- c) State any five common punctuation errors in syntax analysis during the program compilation process **(5 marks)**
- d) Discuss any three memory segments allocated by most operating systems when a program is started **(6marks)**