

**PROGRAMME:** B.Sc.  
**COURSE TITLE:** Principles of Compilers and Construction  
**COURSE CODE:** CIT316  
**CREDIT UNIT:** 3  
**DURATION:** 2½ HRS

**Instructions: Answer Question ONE (1) and any other three questions**

- 1(a) Outline the four basic types of grammars. *(4 marks)*  
(b) Consider the concatenation of two set of strings, 'bab' and 'aba'. What will be the resulting string? *(1 mark)*  
(c) With examples, define a lexeme? *(4 marks)*  
(d) What are the roles of the parser? *(6 marks)*  
(e) Given the expression:

$$X = (a + (b*c))/(a-(b*c))$$

Generate the corresponding parse tree. *(10 marks)*

- 2(a) What are the specific areas that causes problems during measurement on the performance of actual complier? *(5 marks)*  
(b) With diagrammatic representation, give a description of the directed acyclic graph. *(8 marks)*  
(c) How is directed acyclic graph different from the parse tree *(2 marks)*
- 3(a) What is the output from an intermediate phase of a compiler? *(4 marks)*  
(b) Given the following source code statement:  
 $c = a + b * 5;$   
show the phases of compilation process and their results from initial phase up to the intermediate code level. *(10 marks)*  
(c) What is the intermediate code called *(1 mark)*
- 4(a) Given the expression:

$$d := (a-b) + (a-c) + (a-c)$$

Write the three address code. *(4 marks)*

- d) Generate the corresponding target machine code for the expression in 4(a). **(5 marks)**
- (c) Complete the table by writing out the corresponding semantic rules for each of the production rule.

$$E \rightarrow E + T$$

$$E \rightarrow T$$

$$T \rightarrow T * F$$

$$T \rightarrow F$$

$$F \rightarrow (F)$$

$$F \rightarrow \text{num} \quad \text{(6 marks)}$$

- 5(a) What are the drawbacks of syntax analyzers that makes the semantic analysis phase very important? **(3 marks)**
- (b) Differentiate between the Deterministic and Non-deterministic Finite automata **(8 marks)**
- (c) How is a Finite automaton different from the Transition tree **(4 marks)**
- 6(a) Write down what is involved when considering code generation task. **(3 marks)**
- (b) Differentiate between the Kleene star and Kleene plus closure **(4 marks)**
- (c) Define Dead Code Elimination and give example with explanation **(8 marks)**