ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION **SUMMER SEMESTER, 2021-2022**

DURATION: 1 HOUR 30 MINUTES **FULL MARKS: 75**

CSE 4801: Compiler Design

Programmable calculators are not allowed. Do not write anything on the question paper.

Answer **all 3 (three)** questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

---

1. a) A computer program is a set of instructions understandable by human beings. Discuss the steps to convert a computer program into computer understandable format in brief. 5 (CO1) (PO1)

   b) The process of constructing a compiler can be modularized to improve efficiency. Draw a block diagram showing various construction phases and modules of a compiler and discuss in brief. 10 (CO1) (PO1)

   c) Discuss the strategies to recover from lexical errors. 10 (CO1) (PO1)

2. a) Consider the following grammar: 5 (CO2) (PO2)

   $A \rightarrow aB \mid b$
   $B \rightarrow cC \mid d$
   $C \rightarrow a \mid c$

   What type of phrase-structure grammar can accurately describe the grammar? Justify your answer.

   b) You need to construct a predictive parser for the following grammar: 10 (CO2) (PO2)

   $A \rightarrow AB \mid AC \mid b$
   $B \rightarrow Bd \mid e \mid d$
   $C \rightarrow a \mid d$

   Preprocess the grammar to make it ready to work with predictive parser.

   c) Show the steps to prove that the string *baedd* is a valid sentence for the grammar given in Question 2.b) using recursive descent parsing method. 10 (CO2) (PO2)

3. a) A grammar is given below:

   $E \rightarrow E + T \mid T$
   $T \rightarrow T * F \mid F$
   $F \rightarrow (E) \mid \mathbf{id}$

   i. Find the set of FIRST(X) and FOLLOW(X) for each non terminal X. 5 (CO2) (PO2)

   ii. Generate set of states, i.e., LR(0) items for the grammar to construct SLR parser. 10 (CO2) (PO2)

   b) Explain how the set of FIRST(X) and FOLLOW(X) helps to take decisions during SLR parsing. 10 (CO2) (PO1)