Indian Institute of Information Technology Ranchi

Department of Computer Science & Engineering

B. Tech End Semester Examination – Spring Semester 2022-23

Semester: 4th Sem. **Course Instructor: Dr. Nidhi Kushwaha**

Course Code: CS-2002 **Course Name: Compiler Design**

QUESTION PAPER

Duration: 3 hrs. **Max Marks: 100**

Roll No. 2021UG107

Instructions:
(1). Number in [ ] indicates marks.
(2). Any missing data can be assumed suitably.
(3). Symbols have their usual meaning.

Section A: Attempt any three questions.

1 **(a)** What is shift-reduce parsing? Create LR(0) parsing table for the following grammar **(10)**
S->TL;
T->int|float
L->L,id |id
to process the string **"int id, id;"**

(b) What do you mean by handle and viable prefixes in bottom-up-parser? Show them for the following the string **"abbcde"** under the grammar given below: **(10)**
S->aABe
A->Abc|b
B->d

2 **(a)** Define grammar and Chomsky hierarchy. Give the type of grammar if it has production rules given by **(10)**
S → a |aAS
A → SS |SbA |ba
Also discuss formal languages and their list of operations.

(b) What are the issues of code generation phase? Explain its activation and scope. **(10)**

3 **(a)** Construct a NFA for accepting all possible strings of zeros and ones that do not contain 101 as a substring. **(8)**

(b) Define a symbol table. Give three techniques for creating it? **(8)**

(c) Differentiate between LR(0) and SLR(1) parsers. Which one is more powerful parser and why? **(4)**

4 **(a)** What do you mean by SDT & SDD? Describe a SDT for translation of Boolean expression: **(10)**

E -> E1 relop E2

(b) Give a short note on the cross-compiler. **(10)**

Section B: Attempt any two questions.

5 **(a)** What do you mean by left recursion and left factoring in grammar? Eliminate them from the following grammar **(10)**

$E \rightarrow E+T \mid E-T \mid T$

$T \rightarrow a \mid b \mid (E)$

(b) State rules for computing the FIRST() and FOLLOW() functions. Find them for the following grammar **(10)**

S -> ACB | CbB | Ba

A -> da | BC

B->g | λ

C -> h | λ

6 **(a)** What is operator precedence grammar? Check whether the following grammars are operator precedence grammar or not? **(10)**

i) E->AB
A-a
B->b

ii) E->EOE
E-id
O->+|*|/

iii) E->E+E | E*E | E/E |id

(b) What do you mean by lexical, syntactic, semantic and logical errors and their recovery strategies? **(10)**

7 **(a)** Discuss the procedure for common sub-expression detection and elimination. Use this procedure for optimizing of the following code: **(10)**

t1= b+ c

t2= d*e

t3= b+c

t4= t2*t3

t5= t4 *f

x = t1-t5

(b) What are three address codes? How they are represented by quadruples, triples and indirect triples. Show them for the assignment statement a=b*-c+b*-c **(10)**

Good Luck