Roll Number: _____

Thapar Institute of Engineering and Technology, Patiala

Department of Computer Science and Engineering

END SEMESTER EXAMINATION

B. E. (COE) 7th Sem	Course Code: **UCS802**
Semester-I (2020/21)	Course Name: **Compiler Construction**
December 10, 2020	Thursday, 03.00 – 5.00 PM
Time: 2 Hours, M. Marks: 50	Name of Faculty: SHB and RKT

NOTE: ATTEMPT ANY 5 QUESTIONS OUT OF 7 QUESTIONS IT IS COMPULSORY TO MENTION, ON THE TOP OF FIRST SHEET, THE QUESTION NUMBERS YOU ARE ATTEMPTING. ONLY FIRST 5 ANSWERS WILL BE EVALUATED.

Q1. Consider the following regular expression

$$a(a|b)(a|b)^*b$$

a) Derive annotated syntax tree for the regular expression. (3)

b) Compute firstpos, lastpos and followpos and draw the corresponding DFA. (3+4)

Q2. Consider the following grammar:

S → BC | b
B → bB | a
C → cC | ε

a) Generate the Set of Items for the above grammar. (5)

b) Draw the LR(1) Table from the derived set of items. (5)

Q3.a) Given a syntax directed definition below with the synthesized attribute ***val,*** draw the annotated parse tree for the expression $(3 + 4) * (5 + 6)$ (4)

$L \longrightarrow E$, $L.val = E.val$
$E \longrightarrow T$, $E.val = T.val$
$E \longrightarrow E_1 + T$, $E.val \longrightarrow E_1.val + T.val$
$T \longrightarrow F$, $T.val = F.val$
$T \longrightarrow T_1 * F$, $T.val \longrightarrow T_1.val * F.val$
$F \longrightarrow (E)$, $F.val = E.val$
$F \longrightarrow digit$, $F.val = digit.lexval$

b) Compare and contrast: (6)

i) SDT and SDD.

ii) Inherited and synthesized attributes.

Q4. a) Consider the following expression (5)

sum = sum + ((i and j) or (a and b) and (a or b))

Represent it using Quadruple and triples.

b) Discuss various error recovery strategies in parsing. (5)

Q5. Consider the following grammar:

$S \rightarrow 1AB \mid \in$

$A \rightarrow 1AC \mid 0C$

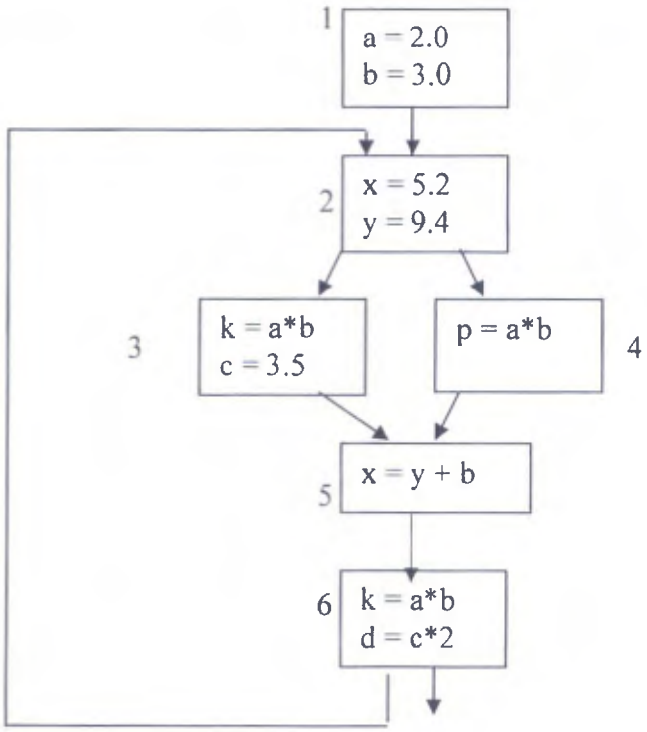
$B \rightarrow 0S$

$C \rightarrow 1$

a) Construct the Predictive parsing table for the above grammar. (8)

b) Is this grammar LL(1), If yes, How? If no Why? (2)

Q6.



Explain the following optimization transformations and after studying the program flow given above indicate whether any of the following optimization transformations can be applied to it or not.

i. Common Subexpression Elimination ii. Dead code elimination

iii. Constant Propagation iv. Frequency reduction

(2.5*4 = 10)

Q7. Consider the following statement (10)

$x = y + z * 3$

Explain each phase and show all phases **pictorially** which a compiler will follow in compiling the above statement.