O/C

Roll Number:_____

Thapar University, Patiala

Department of Computer Science and Engineering

END SEMESTER EXAMINATION

M.C.A- (Final Year)	Course Code: PCA511
5 Semester	Course Name: Compiler Construction
December 13, 2019	Monday, 14.00 – 17.00 Hrs
Time: 3 Hours, M. Marks: 100	Name of Faculty: Sanjeev Rao

Note: ***Attempt all questions***
Assume missing data, if any, suitably

Q.1 a) Consider the following grammar and eliminate left recursion- (15)

$$S \rightarrow (L) / a$$
$$L \rightarrow L, S / S$$

a) Remove Left recursion, if any.
b) Calculate First and Follow.
c) Construct LL (1) parsing table and check whether it is LL (1).

Q.1 b) Discuss various issues faced in efficient code generation? (5)

Q.2 a) Consider the following Context-Free Grammar along with Semantic actions

Production	Semantic Rule
$L \rightarrow E\ n$	$L.val=E.val$
$E \rightarrow E_1 + T$	$E.val = E_1.val+T.val$
$E \rightarrow T$	$E.val = T.val$
$T \rightarrow T_1 * F$	$T.val= T_1.val \times F.val$
$T \rightarrow F$	$T.val=F.val$
$F \rightarrow (E)$	$F.val=E.val$
$F \rightarrow Digit$	$F.val=digit.lexval$

(i) Construct and evaluate the annotated parse tree for expression **(4+3)*(6+5)n** (6)

(ii) Differentiate between S-Attributed Grammar and L-Attributed Grammar (4)

Q.2 b) Differentiate between following using suitable example: (10)

(i) Bootstrapping and Cross Compiler

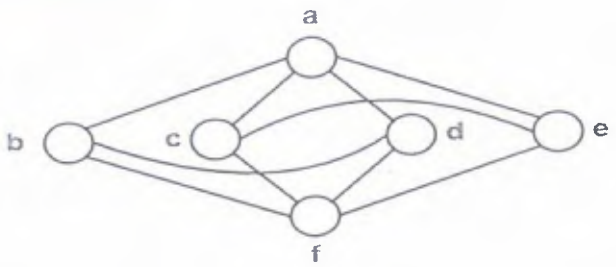
(ii) Local Optimization and Global Optimization

Q.3 (a) Consider the following expression : (15)

$$((x+y)-((x+y) * (x-y))) + ((x+y) * (x-y))$$

(i) Write three address code
(ii) Represent three address code in quadruple, triples and indirect triples.
(iii) Construct the DAG for basic block

Q.3 b) Consider the following graph : (5)



(i) Solve the above graph using Graph Coloring algorithm
(ii) Find the chromatic number for the above graph.

Q.4 a) Explain the various types of errors encountered during the process of program translation and execution? Discuss various types of Error Recovery strategies adopted at various phases of compiler design. (10)

Q4 b) Illustrate all phases of compiler by mentioning their need and scope in compiler design? (10)

Q.5 a) Consider the following source code and Compute basic block and draw its flow graph: (10)

```
begin
        prod :=0;
        i:=1;
        do begin
        prod :=prod+ a[i] * b[i];
        i :=i+1;
        end
        while i <= 20
end
```

Q.5 b) What is Activation Record? Explain the structure and purpose of each field in Activation Record with a suitable example? (10)

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Note: Evaluated Answer-sheets will be shown on 16-Dec-2019 (Monday) at L410-PG Activity Space -II (New Building) from 11:00 AM to 01:00 PM.