Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India
(Autonomous College Affiliated to University of Mumbai)

End Semester Examination
MAY/JUNE 2018

Max. Marks: 100	Duration: 3 Hours
Class: TE	Semester: VI
Course Code: CPC601	Branch:COMPS

Name of the Course: System Programming and Compiler Construction

Instruction:

(1) All questions are compulsary
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Q No.		Max. Marks	CO

P.T.O.

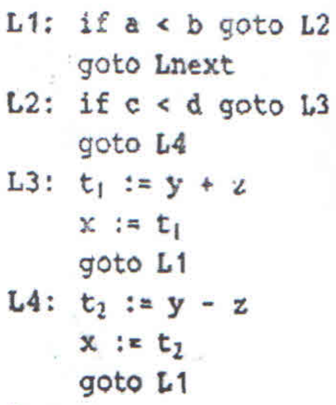
Q.1 (a)	Consider the following grammar S → A A → Bb / Cd B →aB / ε C → cC / ε A. Construct LL(1) parsing table. B. State with reason that the above grammar is LL(1) or not. C. Parse the given input string by using LL(1) parser : cccd 1 mark for finding the occurrence of left recursion and left factoring and eliminating it correctly, otherwise 0 marks 4 marks for correct parsing table, One mistake in parsing table is tolerable but if it exceeds more than 1 then 0.5 marks will be deducted for each incorrect entry. 1 mark to state the reason for the grammar to be LL(1) or not, otherwise 0 marks correct parsing method along with the table of Stack, Input buffer and actions shown at each step - 4 marks **OR** Consider the following grammar:- S → aSbS S → a A. Construct the SLR(1) parsing table B. State with reason that the above grammar is SLR(1) grammar or not. augmenting grammar- 1 mark correct canonical collection of LR(0) items that includes proper arrows shown, state numbers mentioned properly, labelling to the transitions– 4 marks 1 incorrect state or transition is tolerable, if exceeded 0.5 marks will be deducted for each incorrect state. but if the same state is responsible for checking whether the grammar is SLR(1) or not, then 0 marks will be given. correct parsing table- 4 marks 1 incorrect entry in parsing table is tolerable, if exceeded 0.5 marks will be deducted for each incorrect entry. correct reason for stating whether the grammar is SLR(1) grammar or not - 1 mark	10	CO3

Q.1 (b).	A. What are the types of conflicts in LR parsing? Explain them with respect to LR(0) parser with examples. stating shift reduce and reduce reduce conflicts- 1 mark shift reduce conflict and reduce reduce explanation with respect to LR(0) parser - 1 mark each that implies 2 marks shift reduce conflict and reduce reduce examples of LR(0) parser states- 1 mark each that implies 2 marks	5	CO3
	B. Write a lex program to print number of words, digits, and lines written in a file. 1 mark for writing correct declaration sectior with no syntax errors 2 marks for writing rules section with correct logic and no syntax error 2 marks for writing the subroutine section along with main function with no syntax error main function should include the statements of open an input file in read mode and calling yylex function. 1 syntax error is tolerable, if exceeded 0.5 marks will be deducted for each syntax error. if incorrect logic then no marks will be awarded.	5	
Q. 2(a)	With reference to Run time environment explain Static and Heap allocation strategies in detail 05 Marks: Static allocation 05 Marks: Heap allocation	10	CO5
Q. 2(b)	Write short notes on: A.Recognition of keywords and identifiers in lexical analysis using transition diagram. 2 mark for the diagram of both- keywords and identifiers 3 marks for the description of both. B.Error recovery strategies in syntax analysis. 1 mark for listing all correct strategies of error recovery in syntax analysis. 1 mark for explanation of each of the strategies that implies 4 marks.	10	CO3
Q.3 (a)	Draw and explain the different instruction formats supported by IBM 360/370 Machine. RR , RX , SI , SS , RS for each format 2 Marks	10	CO1

Q.3 (b)	Draw and explain flowchart of pass 1 of two pass assembler ? Explain the structure of databases used with example. Flowchart and explanation 6 Marks Databases structures : 4 marks OR For the following program show the entries in symbol table , base table and generate machine code JOHN START 0 USING * , 15 L 1 , FIVE A 1 , FOUR ST 1 , TEMP FOUR DC F'4' FIVE DC F'5' TEMP DS 1F END Symbol table: 4 Marks Base table : 2 Marks Machine code : 4 Marks	10	CO2
Q.4 (a)	With reference to IBM 360/370 draw and explain flowchart of pass 1 of direct Linking Loader? specify the databases used by it. Flowchart and explaination : 6 Marks databases used : 4 Marks OR For following program show the contents of ESD , TXT , RLD and END Card. JOHN START ENTRY RESULT EXTERN SUM BALR 12 , 0 USING * , 12 ST 14 , SAVE L 1 , POINTER L 15 , ASUM BALR 14 , 15 ST 1 , RESULT L 14 , SAVE BR 14 TABLE DC F'1,7,9,10,3' POINTER DC A(TABLE) RESULT DS F SAVE DS F ASUM DC A(SUM) END ESD - 3 Marks TXT - 4 Marks RLD - 3 Marks	10	C01

Q.4 (b)	Draw and Explain flowchart of pass2 of macroprocessor. Flowchart : 6 Marks Explanation : 4 Marks	10	CO2

Q.5 (a)	What do you mean by three address code.
	Generate three address code for given expression
	while (a < b) do
	if (c < d) then
	x_c= y + z
	else
	x = y + z
		10	CO4



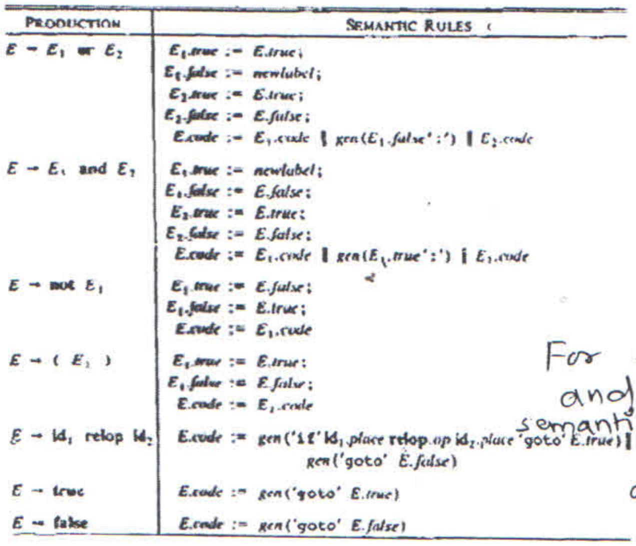
```
L1: if a < b goto L2
    goto Lnext
L2: if c < d goto L3
    goto L4
L3: t1 := y + z
    x := t1
    goto L1
L4: t2 := y - z
    x := t2
    goto L1
Lnext:
```

Generating three address code of while stmt 07 marks

Three address code meaning : 3 Marks

OR

Write a syntax directed definition that generates three address code for Booleans.



PRODUCTION	SEMANTIC RULES
$E \to E_1$ or E_2	E_1.true := E.true; E_1.false := newlabel; E_2.true := E.true; E_2.false := E.false; E.code := E_1.code ‖ gen(E_1.false':') ‖ E_2.code
$E \to E_1$ and E_2	E_1.true := newlabel; E_1.false := E.false; E_2.true := E.true; E_2.false := E.false; E.code := E_1.code ‖ gen(E_1.true':') ‖ E_2.code
$E \to$ not E_1	E_1.true := E.false; E_1.false := E.true; E.code := E_1.code
$E \to (E_1)$	E_1.true := E.true; E_1.false := E.false; E.code := E_1.code

$E \to$ id$_1$ relop id$_2$	E.code := gen('if' id$_1$.place relop.op id$_2$.place 'goto' E.true) ‖
	gen('goto' E.false)

$E \to$ true	E.code := gen('goto' E.true)
$E \to$ false	E.code := gen('goto' E.false)

For each production rule and semantic action : 2 Marks at least write 5 Production rules and corresponding semantic rule

Q.5 (b)	Explain with example code generation from DAG ? Comment on optimality ordering with reference to it. code generation from DAG : 6 Marks optimality ordering : 4 Marks	10	CO3