



- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Due credit will be given to neatness and adequate dimensions.
  9. Assume suitable data whenever necessary.
  10. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Define compiler. Explain different phases of compiler with suitable diagram & show output generated by every phase of compiler for following statement  
 $A = B + C * 20.$  9
- b) What are different compiler construction tools? 4

**OR**

2. a) Write a Lex program to identify keyword, constant, identifier & operators. 6
- b) Explain the significance of FIRST & FOLLOW with suitable example. 7
3. a) Is given grammar is LR(0) or not 8  
 $S \rightarrow cA | ccB$   
 $A \rightarrow cA | a$   
 $B \rightarrow ccB | b$
- b) Compare LR(0), LR(1) & LALR Parser. 5

**OR**

4. a) Construct LR(1) parsing table for below grammar 8  
 $S \rightarrow wAz | xBz | wBy | xAy$   
 $A \rightarrow r$   
 $B \rightarrow r$
- b) Explain Bottom up parsing techniques. 5

5. a) Consider the SDTS

- $E \rightarrow E - E$  {printf "-" 3,
- $E \rightarrow E + E$  {printf "+" 3,
- $E \rightarrow E * E$  {printf "\*" 3,
- $E \rightarrow E / E$  {printf "/" 3,
- $E \rightarrow id$  {printid.name}
- $E \rightarrow (E)$

Convert the following infix expression into postfix expression.

- a)  $id1 - id2 / id3$
- b)  $(id1 - id2) * (id3 / id4)$
- c)  $((id1 + id2) * Id3)$

b) Translate the expression

$-(a+b)*(c+d)-(a+b+c)$

into a) Quadruple b) Triple c) Indirect triple representation.

OR

6. Generate TAC using SDTS for the following statement

$A[I, J, K] = B[I, J] + C[I + J + K]$

where

A is 3D array of size  $10 \times 10 \times 10$

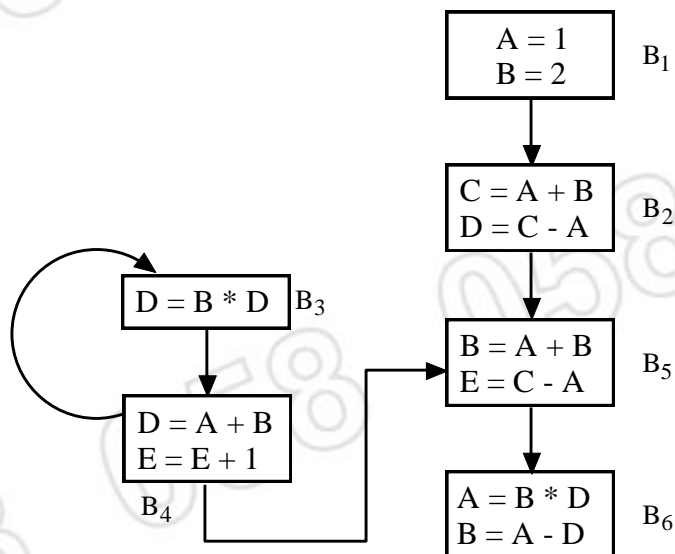
B is 2D array of size  $10 \times 10$

C is 1D array of size 30

BPW = 2

Also generate annotated parse tree for the same.

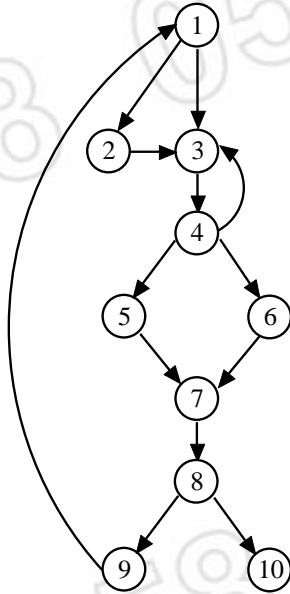
7. Compute IN & OUT for following graph.



Also Compute  $\mu d$  chain for Block  $B_3$  &  $B_5$

OR

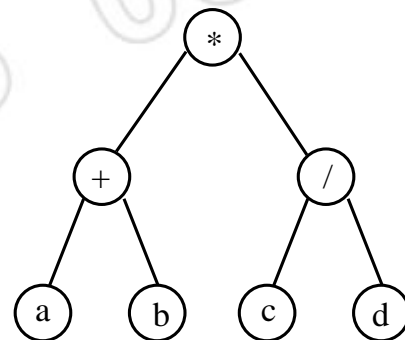
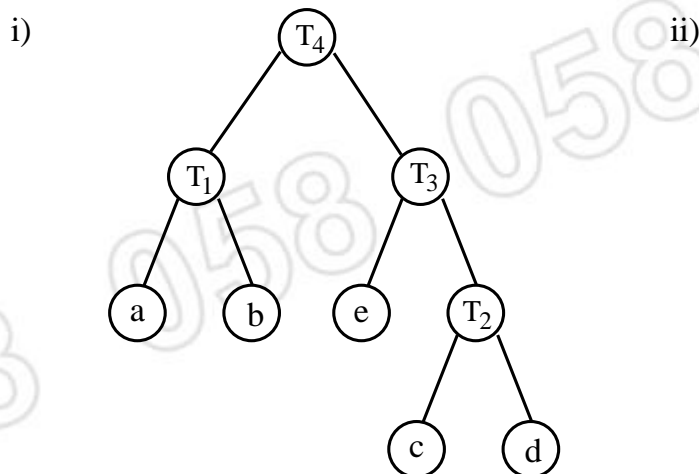
8. a) Write a note on
- Loop unrolling.
  - Loop Jamming.
  - Loop invariant computation.
- b) What is dominator? Construct dominator tree for following graph. 8



9. a) Explain what are different issues in code generator. 5
- b) Generate code for following expression using code generation algorithm  
 $X = (a+b) - ((C+d) - e)$  8

OR

10. a) Explain first part of labelling algorithm & determine number of Register required to evaluate following tree. 8



- b) Explain peephole optimization in detail. 5

11. a) What are different storage allocation strategies? Explain. 6

b) Explain error Recovery in LR parsing. 7

**OR**

12. a) Define symbol table. Explain data structure use for Representation of symbol table. 7

b) What are different error Recovery strategies? Explain. 6

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