



- 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. Assume suitable data whenever necessary.
 9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Explain in detail various phases of Compiler. Also explain which phase is optional and why? 7

b) Explain Compiler writing tools. 6

OR

2. a) What is the difference between phase and pass of a compiler? 4

b) Explain the following compiler writing tools. 7

i) FLEX

ii) YACC

c) What is Cross Compiler? 2

3. a) Transform the following grammar so that it will be LL (1), without changing the language. Hence construct LL (1) parsing table for the modified grammar. 7

$S \rightarrow aAC \mid bB$

$A \rightarrow Abc \mid Abd \mid c$

$B \rightarrow f \mid g$

$C \rightarrow h \mid i$

b) Construct SLR (1) parsing table for the following grammar. 7

$E \rightarrow E + T \mid T$

$T \rightarrow T * F \mid F$

$F \rightarrow (E)$

$F \rightarrow id$

Show the moves made by Parser for input $id + id * id$.

OR

4. a) Explain the difference between LR (0), LR (1) and LALR in detail. 6
 b) Construct LALR parsing table for the following grammar. 8

$S \rightarrow L = R \mid R$

$L \rightarrow * R \mid \text{id}$

$R \rightarrow L$

5. a) Write SDTS and obtain three code for the following program fragment : 7
 while ($X < Y$ AND NOT ($Y > Z$)) do
 if ($X > 0$) then
 $X = X + 1$
 else
 $Y = Y - 2$
 b) What do you mean by semantic action for SDTS. Explain with suitable example write SDTS for Boolean expression. 6

OR

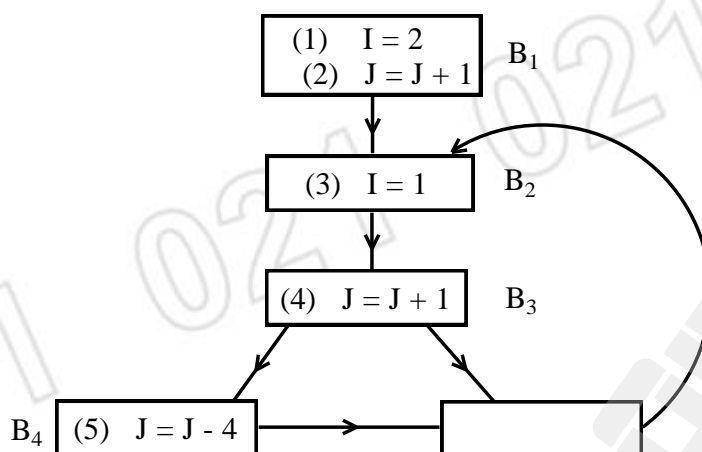
6. a) Write a short note on : 6
 i) Synthesized Attributes.
 ii) Inherited Attributes.
 b) For the given program fragment, obtain TAC and draw the control flow graph for the same. 7
 begin
 $\text{add} := 0$; $j := 1$;
 do
 begin
 $\text{add} := \text{add} + R[j] * T[j]$
 $j := j + 1$;
 end
 while ($j \leq 20$)
 end.

7. a) Discuss the different data structure use for symbol table representation in compiler. 7
 b) Explain with example error recovery in LR parsing. 7

OR

8. a) Discuss the various schemes for error recovery, that can be used to recover from syntactic phase errors. 7
 b) Explain heap - allocation storage strategy. 4
 c) Write a four properties for good error diagnosis. 3

9. Compute IN and OUT equations for the following graph and u-d chaining information for block B_3 . 13



OR

10. a) Write a short note on : 6
- Loop Unrolling
 - Loop Jamming
- b) Explain with suitable example loop invariant computation elimination from the code. Explain its importance in loop optimization. 7
11. a) Apply the Heuristic ordering Algorithm to detect optimal sequence and then generate optimal code for that sequence using two register R_0 and R_1 for the following code : 9
- $$T_1 = a + b$$
- $$T_2 = c + d$$
- $$T_3 = e - T_2$$
- $$T_4 = T_1 - T_2$$
- b) Explain different design issues for a good code generator. 4
12. a) Write a short note on peephole optimization. 7
- b) Give the labelling algorithm and determine number of register to evaluate following instruction set. 6
- $$T_1 = a + b$$
- $$T_2 = c + d$$
- $$T_3 = e + f$$
- $$T_4 = T_2 + T_3$$
- $$T_5 = T_4 + T_1$$
