

Elective - I : Compiler Design

P. Pages : 2

Time : Three Hours

**NRJ/KW/17/4643**

Max. Marks : 80

- 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) Draw and explain the structure of realistic compiler. 6

b) What are the different phases of compiler. 7

OR

2. a) List the different types of compiler. And explain the compiler writing tool LEX or FLEX. 6

b) Explain the concept of cross compiler and bootstrapping. 7

3. a) Check whether the given grammar is LL(1) or not and construct a predictive parsing table or LL(1) parsing table : 7

$$S \rightarrow Qt Qu | a$$

$$Q \rightarrow \epsilon | b | R$$

$$R \rightarrow \epsilon | f$$

b) Construct LALR parsing table for the grammar given below : 7

$$S \rightarrow BB$$

$$B \rightarrow aB | d$$
OR

4. a) Compare the LALR and SLR parsing techniques. 4

b) Find the FIRST and FOLLOW set for the given grammar, 10

$$G = \{ S \rightarrow PQP$$

$$P \rightarrow aP | \epsilon$$

$$Q \rightarrow bQ | \epsilon$$

$$\}$$

And construct the parsing table for SLR (1) and test whether the grammar is SLR (1) or not.

5. a) Write the 3 types of representation used by intermediate - code generation phase by compiler. Explain any two of them. 7

b) What do you mean by TAC? Represent the following expression into quadruples, triples and indirect triples. 7

$$-(a+b)+d+(d*(a+b))+(Ca-b)*r).$$
OR

6. a) Write the SDTS for the given expression $A < B$ or $D < Q$ and $X < Z$ & generate TAC & parse tree. 7

b) For the statement given below, write the TAC and SDTS : 7

$$A[k, p] = B[k, p + q] + D[A[k, p], q] * F[k, p]$$

Given the dimension of 2 D arrays A, B, D and F are 30 x 30. Assume bpw is 4.

7. a) List and explain the different storage allocation strategies. 6

b) What is the need of symbol table? Explain the data structure for symbol table management. 7

OR

8. a) Explain the error recovery in LL Parsons. 6

b) Explain the following errors with suitable example : 7

i) lexical errors

ii) syntactic errors

iii) semantic errors

9. a) Write a note on : 6

i) Code motion

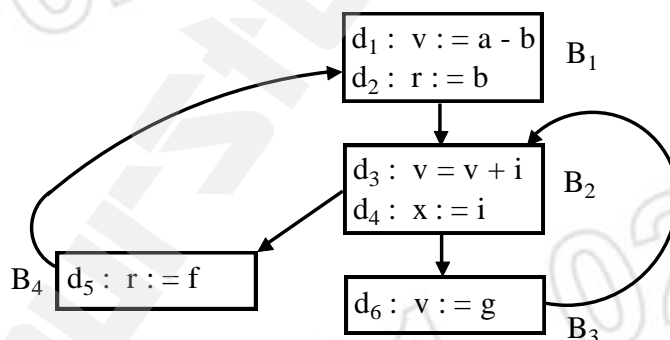
ii) Reduction in strength

b) What are the sources of optimization? Explain the importance of code optimization by taking suitable examples. 7

OR

10. a) Explain loop unrolling and loop jamming with suitable example. 5

b) Consider the given flow graph and compute GEN, KILL, IN and OUT sets and write U-d chaining information : 8



11. a) Write the difficulties or three issues related in the design of code generation phase of compiler. 6

b) Explain the register allocation and find the number of registers required to evaluate the expression given below : 7

$$E := -(x + y) + r + (r + (x + y)) + (x - y) * q$$

OR

12. a) Write the steps used by the labelling algorithm. Show the implementation using code $t_1 = a + b$; $t_2 = c + d$; $t_3 = e - t_2$; $t_4 = t_1 - t_3$. 6

b) Explain the peephole optimization in detail. 7
