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B.E. (Computer Science & Engineering) Seventh Semester (C.B.S.)

Language Processor

P. Pages : 3 **NIR/KW/18/3572**

Time : Three Hours * 1 8 8 3 * 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. 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) Explain various phases of compiler in brief. For the given expression, **8**

$a = b * c + d / e$

b) What is Cross Compiler? Explain bootstrapping. **5**

OR

2. a) What are compiler writing tools. **6**

b) Construct minimized DFA for the regular expression $a^*(aa + bb)^* b$. **7**

3. a) Design LL (1) Parser for the given grammar. **8**

$S \rightarrow UVW$

$V \rightarrow aV / \in$

$U \rightarrow (S) / aSb / d$

$W \rightarrow cW / \in$

Also, given Parsing Actions for the input string "(dc) ac".

b) What is an ambiguous and unambiguous grammar. **3**

c) Compare SLR, CLR and LALR Parser. **3**

OR

4. a) State whether grammar is CLR, LALR or not **10**

$B \rightarrow bDAe$

$D \rightarrow Dd; / E$

$A \rightarrow A; E / E$

$E \rightarrow B / a$

b) What is the significance of FIRST and FOLLOW in top down Parsers. **4**

5. a) What are different types of intermediate codes? Comment following statement into all intermediate code. **4**

$$a = SQRT(b * b - 4 * a * c) / 2 * a$$

b) Translate following statement into intermediate code using SDTS : **9**

```
Switch (x + y)
{
    Case 2 : a = a + 1; break;
    Case 3 : a = b – 1; break;
    Case 4 : switch (y)
             {
                 Case 0 : c = 0; break;
                 Case 1 : c = 1; break;
             }
    Case 5 : a = c – 1; break;
    Default : a = 0;
}
```

OR

6. Translate the following assignment statement of intermediate code using array reference. **13**

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

Where A, B, C, D are array of 2X3, 4X5, 6 and 7 respectively. Assume bpw = 4.
Also draw Annotated Parse tree for the same.

7. a) How different attributes of identifiers is stored in block structured language. **7**

b) Give run time storage management for call and return statement. **6**

OR

8. a) Explain Phrase level error recovery in LR Parsing. **7**

b) When error is detected in top – down Parser? How LL (1) Parser recovers from error. **6**

9. Write short note on : **14**

i) Common sub expression elimination.

ii) Loop Jamming

iii) Loop Unrolling

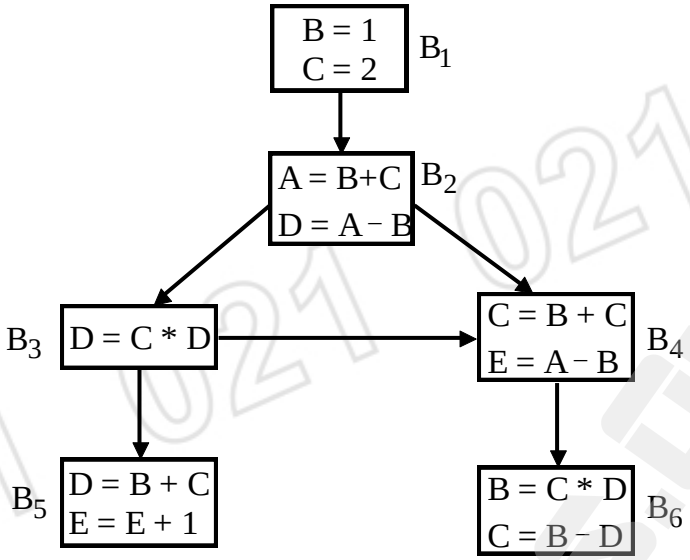
iv) Reducible Flow Graph

v) DAG

vi) Dead Code Elimination.

OR

10. Compute IN and OUT for following Flow Graph. **14**



11. a) Explain peephole optimization techniques in details. **7**

b) What are the issues in the design of code generator. **6**

OR

12. a) Generate code for the following expression using labelling algorithm. **8**

$$X = (a + b) - (e - (c + d))$$

b) Explain the need of Heuristic code generation algorithm and also perform the same on constructor DAG. **5**

$$X = (a + b) - (e - (c * d))$$

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The secret of getting ahead is getting started.

~ Mark Twain