Course Code : CST 402 / CST 412　　　　　　　　**EVFU/MW – 18 / 6104**

Seventh Semester B. E. (Computer Science and Engineering) Examination

LANGUAGE PROCESSORS

Time : 3 Hours]　　　　　　　　　　　　　　　　　　　　[Max. Marks : 60

Instructions to Candidates :—
    (1)   Each Question carry marks as indicated.
    (2)   Due credit will be given to neatness.
    (3)   Assume suitable data wherever necessary.
    (4)   Illustrate your answers wherever necessary with the help of neat sketches.

1.   (a)   Discuss the advantages of breaking up the compiler functionality into front end and back end stages.　　　　　　　　　　2 (CO 1)

        (b)   Explain the process of implementing a new language using bootstrapping and cross compiler. (give representation in Tombstone diagram)　　　4 (CO 1)

        (c)   Construct the DFA by syntax tree construction method for the regular expression $a* b* (a | b) *$. Optimize the resultant DFA.　　　　　　4 (CO 1)

2.   (a)   Construct LL (1) parsing table for the grammar
           E –> RS
           S –> + E | ε
           R –> (E) | int A
           A –> * R | ε

           Also show the string validation process for the input string $w = (int) + int$.
                                            6 (CO 2)

<div align="center">OR</div>

        (b)   Construct CLR parsing table for the given grammar and show if the given grammar is LALR.
           S –> aAd | bBd | aBe | bAe
           A –> c
            B –> c　　　　　　　　　　　　　　　　　　　　6(CO2)

(c)   Discuss the following with example :—

(i)   Handle

(ii)   Left Factoring

(iii)   Conflicts in LR parsing

(iv)   Parser Generator.   4 (CO 2)

3.   (a)   Generate the 3 address code using Syntax Directed Translation Scheme
If (L < = R and C < D) then

   i = 1

   Do

        A [I] [J] = B [L + R] [A [L] [R]]

        i + +

   while (i <= 10 or i < C)

Assume the size of array A is 10×20 and B is 10×20, Also w = 2.
                                                           6 (CO 3)

(b)   Design a SDT scheme for a new language as follows : basic types allowed
are int and char, # denotes addition, $ denotes multiplication operation.
Perform type checking for operands in syntax directed scheme. If both the
operands are int the result is int. If one operand is int and another operand
is char, then error must be reported.   4 (CO 3)

4.   (a)   Consider the grammar given below and write the error routines to perform
phrase level error recovery in LR parsing.

S –> A x B | Bc

A –> yA | z

B –> xB | ε   7 (CO 1,2)

(b)   What is an activation record ? Explain how they are used to access local
and global variable.   3 (CO 1)

5. (a) Use appropriate technique of code optimization to optimize the following code

A = 1 ; B = 2 ; C = 0 ;
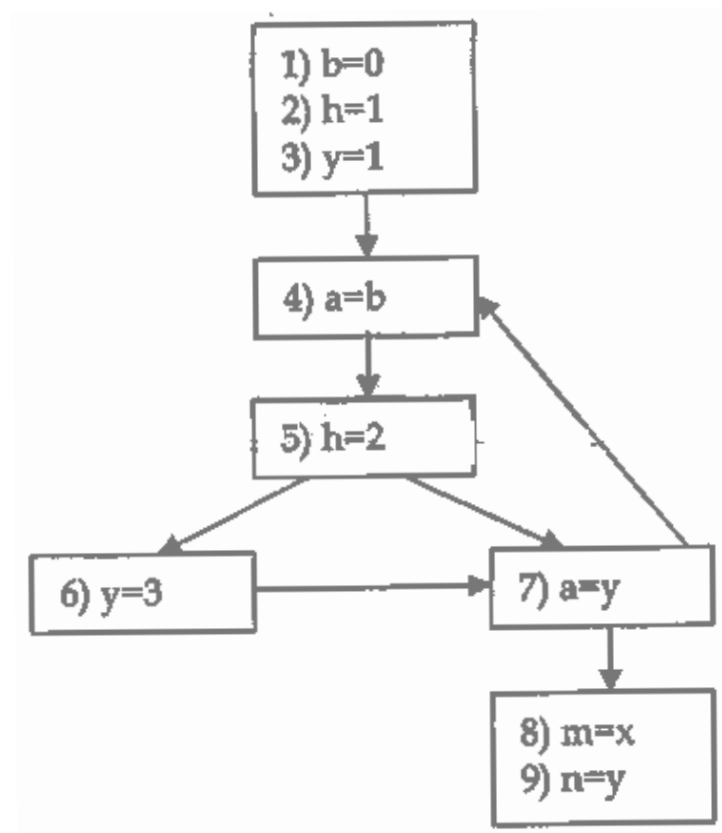While (A < 10)
{
  Avg = C / 1 ;
  D = C * 2 ;
  Temp = D + A / 3 ;
  A = A + 5 ;
}   4 (CO 4)

(b) Determine the loop invariant computation and move it to the pre header, outside the loop in the given control flow graph.
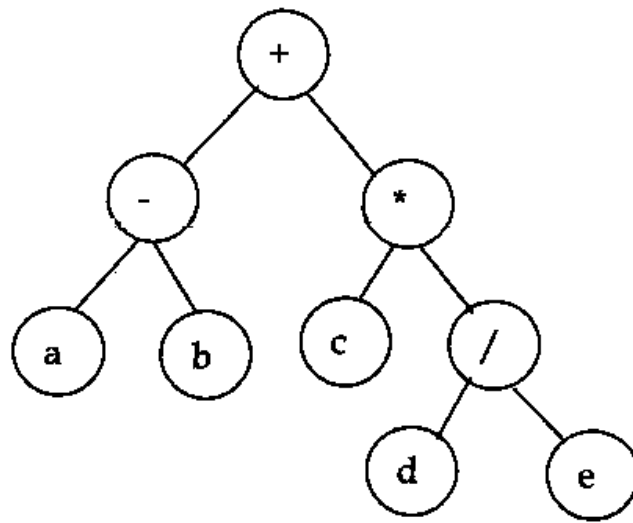

6 (CO 4)

6. (a) Apply the labeling algorithm to the three address code by constructing DAG and then generate code using gencode algorithm for the arithmetic expression
$a = b - (c * d) + e / (f + g)$.   5 (CO 4)

(b) Apply dynamic programming code generation algorithm to the DAG given below.

5 (CO 4)