DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER VI [IT]
SUBJECT: (IT608) LANGAUGE TRANSLATOR

Examination	**:Third Sessional**	**Seat No.**	**: ________________**
Date	**: 07/04/2016**	**Day**	**: Thursday**
Time	**: 12.30 to 1.45**	**Max. Marks**	**: 36**

INSTRUCTIONS:

1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed.

(a) In ______type of Intermediate code representation, common sub expression is been shown only once in a tree, while in _______type of Intermediate code representation, explicit names are given to each computation result. **[1]**

[syntax tree/ DAG/ 3- address code/postfix form]

(b) From following what are the properties of optimizing compilers? **[1]**

1) Transformation must preserve the meaning of programs.
2) Transformation must, on the average, speed up the programs by a measurable amount
3) A Transformation must be worth the effort.

i)only 2 and 3 ii) only 2 and 3 iii) only 1 and 3 iv) all of above

(c) What are popular names for following optimization techniques :- **[2]**

1) Replaces an expensive operation by a cheaper one.
2) Modification that decreases the amount of code in a loop.
3) Deducing at compile time that the value of an expression is a constant and using the constant instead .
4) If an expression occurs several times, compute it once and reuse the results.

Possible techniques are :- i) Reduction in strength ii) code motion iii) constant folding iv) Dead code elimination v) loop invariant code motion vi) copy propagation vii) constant propagation . viii) Common sub expression elimination

(d) Explain at least 2 different crucial issues affecting code generation. **[2]**

(e) Translators which generate machine code directly are better than those which generate intermediate code. State T/F with justification. **[2]**

(f) With reference to runtime environment, identify from following which statements are “not” correct and which are correct. *Rewrite equivalent* ***correct*** *version of the statement, if it is wrong.* **[4]**

1) Two approaches to implement dynamic scope are a) Deep access b) Shallow access
2) Three storage allocation strategies are a) Static allocation b) Stack allocation c) queue allocation
3) The term “state” refers to a function that maps a name to a storage location, whereas the term “environment” refers to a function that maps a storage location to the value held there.
4) In static allocation the position of an activation record in memory is not fixed at run time.

Q.2 Attempt ***Any Two*** from the following questions. **[12]**

(a) For the following statement do as directed.

x = (-b + sqrt(b^2 - 4*a*c)) / (a*c)

(i)Show the DAG representation of the given expression. [2]
(ii)Give 3 address code (3AC) representation for DAG created in (i). [2]
(iii)Use indirect triple structure, storage organization technique to store 3AC. [2]

(b) Give assembly code generated by a **simple code generator** for following statement **[6]**

z = ((a-b) + (a+b) - (a*b)). State how many registers are used, also list the issues in the design of code generator.

(c) Give 3-Address IC for following pseudo code. **[6]**

```
i = 0;
while ( i < 20 )
{
        i++;
        if ( i == 10)
        break;
}
for(a=i; a<20; a=a+1)
{
        a++;
}
```

And also state at least two advantages of intermediate code.

Q.3 (a) Consider the program given below, in a block-structured pseudo-language with lexical scoping and nesting of procedures permitted. **[5+3]**

Program main

```
{
  Var ...
    Procedure A1 {
                 Var ...
                  Call A2;
                } //End A1

  Procedure A2 {
         Var ...
         Procedure A21 {
                        Var ...
                         Call A1;
                       }// End A21

                  Call A21;
                  }//End A2;
          Call A1;
}//End main.
```

Consider the calling chain: main → A1 → A2 → A21 → A1.

i) For the given sequence of activations.,give the snapshot of memory layout showing clearly -

a) control links and b) access links .

Also explain the reasoning used to setup the links.

ii) Also show if the "display" method was to be used, how the display array would look.

(b) Using example , explain following machine dependent / machine independent code optimization techniques- 1) peephole optimization 2) copy propagation **[4]**

OR

Q.3 (a) Consider following program written in dynamic scoped , non nested language. **[8]**

What is the output under

a) pass (call) by value
b) pass (call) by reference
c) copy-restore
d) macro(call by name)

```
int a[10];  int i;
main( ) { i=1; a[1]=10, a[2]=20 ;     p(a[i]);     print (a[1],a[2]); }
p(int x){ i=i+1 ;     x=x+2 ;  }
```

(b) Using example , explain following machine dependent / machine independent code optimization techniques- **[4]**

1) Dead code elimination 2) pipelining