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Thapar Institute of Engineering and Technology, Patiala
Department of Computer Science and Engineering

B E- COE, CSE (VII Semester) EST	Course Code: UCS802
	Course Name: Compiler Construction
December 13, 2022 16:30	
Time: 3 Hours, M. Marks: 40	Name Of Faculty: Karun Verma, Sunita Garhwal, Avadh Kishor, Rupali Bhardwaj, Rohit Ahuja

Note: *Attempt all questions with proper justification. Assume missing data, if any, suitably.*

Q1. (a) Consider the following code: (2*3+2)

```
fact(x)
{
  int f=1;
  for (i=2;i<=x; i++)
    f=f*i;
  return f;
}
```

    I.   Convert the given code into three address code.
    II.   Design basic blocks for the obtained three address code.
    III. Draw the flow graph using leader and basic blocks.

Q1. (b) Explain code movement and dead code elimination with the help of a suitable example.

Q2. (a) Consider the following CFG with semantic rules   (3+5)

$decl \rightarrow type\ var - list$	$var - list.dtype = type.dtype$
$type \rightarrow int$	$type.dtype = integer$
$type \rightarrow float$	$type.dtype = real$
$var - list_1 \rightarrow id, var - list_2$	$id.dtype = var - list_1.dtype$
	$var - list_2.dtype = var - list_1.dtype$
$var - list \rightarrow id$	$id.dtype = var - list.dtype$

Draw the parse tree for the string "**float x , y**" showing the dtype attribute as specified by the attribute grammar.

Q2. (b) Convert the regular expression $r = \left(01(0 + 1)\right)^*$ into NFA using Thompson's construction and convert the obtained into DFA using subset construction method.

[P.T.O.]

Q3. (a)   Write the Quadruples, Triples, and Indirect triples for the expression given below: (4+4)
              a+b*c-d/(b*c).

Q3. (b)   Construct Syntax tree and Directed acyclic graph (DAG) for a+b*c-d/(b*c).

Q4   Consider the given grammar   (2+4+2)
                                $S \rightarrow aSb | \epsilon$
          a) Construct LR(1) items for the given grammar.
          b) Construct the action and goto tables for LR(1) and LALR(1).
          c) Show the error detection for the string " **aab**" using LR(1) and LALR(1) tables.

Q5. (a)   Draw possible organization (in stack form) for the run time environment of the   (4+4)
          following code:
          int Fat (int n)
          {   int x;
              if (n>1)
                 x= n*Fat(n-1);
              else
                 x=1;
              return x ;
          }
           void main ( ){
             Fat(4); }

Q5.(b)   Differentiate between Pass by value-result and Pass by name with suitable
          example.

***********End of Paper**************