

Name :  
Reg No :

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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**07 THRISSUR CLUSTER**

**SECOND SEMESTER M.TECH. DEGREE EXAMINATION APRIL 2018**

**Computer Science and Engineering**

**Computer Science and Engineering**

**07CS6102**

**ADVANCED COMPILER DESIGN**

**Time : 3 hours**

**Max. Marks: 60**

Answer all six questions. Part 'a' of each question is compulsory.

Answer either part 'b' or part 'c' of each question

<b>Q.no.</b>	<b>Module 1</b>	<b>Marks</b>
<b>1a</b>	Explain the differences between inherited and synthesized attributes.	<b>4</b>
	<b>Answer b or c</b>	
<b>b</b>	Construct a Syntax-Directed Translation scheme that translates arithmetic expressions from infix to postfix notation. Solution should include the context-free grammar, the semantic attributes for each of the grammar symbols, and semantic rules. Show the application of the scheme to the input " <b>3*4+5*2</b> ".	<b>5</b>
<b>c</b>	Construct a SDD for simple type expression, give annotated parse trees for the following expressions i) <b>int a,b,c</b> ii) <b>float w,x,y,z</b>	<b>5</b>
<b>Q.no.</b>	<b>Module 2</b>	<b>Marks</b>
<b>2a</b>	Write in detail about translation of switch statement.	<b>4</b>
	<b>Answer b or c</b>	
<b>b</b>	Write the semantic rules for the generation of three address statements for Boolean expression and flow of control statements. Show the three address statements for The following statement  if( <b>a&gt;b    a&gt;c &amp;&amp; a !=d</b> )  <b>a=a+1;</b>	<b>5</b>
<b>c</b>	Write the three address code for the assignment <b>a= b*-c+b*-c</b> and implement using triples, quadruples and indirect triples.	<b>5</b>

Q.no.	Module 3	Marks
3a	Explain concept of nonlocal data access on stack.	4
<b>Answer b or c</b>		
b	Outline the heap management process. How allocation and deallocation of space within the heap can be managed?	5
c	What is an Activation tree? Discuss the significance of activation tree and activation records in Compiler.	5

Q.no.	Module 4	Marks
4a	Discuss different methods used in peephole optimization	4
<b>Answer b or c</b>		
b	Describe code generation algorithm for translating intermediate code to target code.	5
c	Explain algorithm for partitioning Three-address Instructions into Basic Blocks. Draw the flow graph representation for the given intermediate code.	5

```

1. i = 1
2. j = 1
3. t1 = 10 * i
4. t2 = t1 + j
5. j = j + 1
6. if j <= 10 goto (3)
7. i = i + 1
8. if i <= 10 goto (2)
9. i = 1
10. t3 = i - 1
11. if i <= 10 goto (10)

```

Q.no.	Module 5	Marks
5a	Explain about some semantic preserving transformations.	5
<b>Answer b or c</b>		
b	For the program below:	7
	1. Determine the corresponding control flow graph.	
	2. Determine the dominators of each node in the CFG	
	3. Show the immediate dominator tree	
	4. Identify the set of nodes in each natural loop. Are the loops nested? Why?	

```

i = 0;
while (i < N) do
  for(i=0; j < i; j++)
    if(a[i] < a[j]) then
      tmp = a[j];
      a[j] = a[i]
      a[i] = tmp;
    else
      if(a[i] == a[j]) then
        continue;
      else
        break;
      end for
    i = i + 1;
  end while

```

**c** Discuss about data flow analysis in detail. **7**

<b>Q.no.</b>	<b>Module 6</b>	<b>Marks</b>
<b>6a</b>	Discuss about instruction level parallelism using the concept of pipelining.	<b>5</b>
<b>Answer b or c</b>		
<b>b</b>	What are different code scheduling constraints? Explain in detail.	<b>7</b>
<b>c</b>	What is meant by basic block scheduling? Write an algorithm for list scheduling.	<b>7</b>