

Register Number:

Date:

**ST. JOSEPH’S UNIVERSITY, BANGALORE - 27**

**M.Sc(COMPUTER SCIENCE) II SEMESTER**

**END SEMESTER EXAMINATION: APRIL 2024**

(Examination conducted in May/June 2024)

**CS 8421: PRINCIPLES OF COMPILER DESIGN**

**(For current batch students only)**

**Time: 2 Hrs. Max Marks - 50**

**This paper contains 3 printed pages and three parts.**

**PART A**

**Answer the following questions 5\*2=10 marks**

1. Find the number of tokens for the below code snippet

#include <stdio.h>

int main()

{

int num1, num2;

float avg;

printf("Enter first number: ");

scanf("%d",&num1);

printf("Enter second number: ");

scanf("%d",&num2);

avg= (float)(num1+num2)/2;

//%.2f is used for displaying output upto two decimal places

printf("Average of %d and %d is: %.2f",num1,num2,avg);

return 0;

}

1. Insert the following sequence of keys in the hash table **{9, 7, 11, 13, 12, 8}** Use linear probing technique for collision resolution, given the bucket size is 10.
2. Consider the following grammar and eliminate left recursion-
3. A → AAα / β
4. S → S0S1S / 01
5. For the given set of productions, Generate the semantic actions

S --> E

E --> E1 + T

E --> T

T --> T1 \* F

T --> F

F --> digit

**5.** Allocate the registers for the code t1 = a+b

c= d X t0

and write the same in assembly language.

**PART B**

**Answer any five of the following 4\*5 = 20 Marks**

**6**. Explain the phases of a compiler for the code term1=term2+term3\*term4X90.

**7.**Construct a binary search tree for the data 50, 70, 60, 20, 90, 10, 40, 100and find all the three types of traversals.

**8**.Consider the following grammar Parse the input string “int id , id ;” using a shift-reduce parser.

S → T L

T → int | float

L → L , id | id

**9**.Generate the parsing table using SLR(1) for the productions

E->T+E/T

T->i

**10.**Differentiate between static, stack and Heap allocations in Runtime environment

**11**.Find first() and follow() for

S->ACB/CbB/Ba

a->da/BC

b->g//€

C->h//€

**12**. Demonstrate peep hole optimization on the following code.

y = x + 5;

i = y;

z = i;

w = z \* 3;

**PART C**

**Answer any two of the following 10\* 2= 20 Marks**

**13.a**) What is a symbol table? What are the data structures used by symbol table to store the data . (5 marks)

**b)** Explain Direct acyclic graph with an example. (5 marks)

**14. a)** Construct parse tree for the input string w= (z(z,z)) using LL(1) top down parser.

(7 Marks)

S (L)/z

L SL’

L’ є /,SL’

**b)** Generate an operator precedence table for (3 Marks)

E->E+T/T

T->TxV/V

V->a/b/c/d

**15. a)** Write three address code for the following (4 Marks)

(a x b) + (c + d) – (a + b + c + d)

**b)** Write a note on a. Strength reduction b. constant folding c. combine operations in code optimization. (6 Marks)

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