Enrolment No. | | | | | | | |

S_4 (UCS04C02) CSE,IIIT

B. Tech. 4th Semester (CSE & IIIT) Mid Term Examination - 2023
Name of Subject: ENGINEERING MATHEMATICS - IV
Code No. UCS04B06/UCS04C02

Full Marks: 20 **Time: 1hour**

Symbols used here have their usual meanings

Group A

Answer all the following questions **Marks: 4**

1. Define slack variable.
2. What do you mean by basic feasible solution?
3. If $f(x) = \frac{1}{x^2}$ then find the divided differences $f(x_0, x_1), f(x_0, x_1, x_2)$.

[1 + 1 + 2]

Group B

Answer all the following questions **Marks: 8**

4. Use Stirling's formula to find the values of $f(3.8)$ from the following data:

x	1	2	3	4	5	6	7
$f(x)$	8.06	11.06	14.42	18.32	22.94	28.28	34.46

5. The following table gives the viscosity of an oil as a function of temperature. Use Lagranges formula to find the viscosity of oil at a temparatue of $140°C$.

Temp (in °C)	110	130	160	190
Viscosity	10.8	8.1	5.5	4.8

[4 + 4]

Group C

Answer all the following questions **Marks: 8**

6. Determine the optimal solution for the following transportation problem by using the VAM Method, where *Oi* and *Dj* represent i^{th} origin and j^{th} destination, respectively.

		Destination				
		D1	D2	D3	D4	*Supply*
Source	A	6	4	1	5	14
	B	8	9	2	7	16
	C	4	3	6	2	5
Demand		6	10	15	4	

7. Use appropriate method to solve the following LP problem:

Minimize $Z = x_1 + x_2$

subject to the constraints

$2x_1 + x_2 \geq 4;$

$x_1 + 7x_2 \geq 7;$

$x_1, x_2 \geq 0;$

[3 + 5]

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Enrolment No. | | | | | | 9 | 2 |

B.Tech 4th Semester Mid Term Examination, 2023

Name of Subject:Microprocessor & Microcontroller

Paper Code: UCS04B09(UG)/UCS04B03(IIITA)

Full Marks-20 **Time: 1:00 Hr**

The figures in the margin indicate full marks for the questions

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Answer all the questions

Group- A

1. (a) Define opcode and operand.
   (b) What is the address of TRAP?
   (c) List the operations performed by the ALU of 8085 microprocessor.
   (d) What do you mean by instruction cycle? (1X4=4)

Group- B

2. (a) What will be the contents of DE and HL register pairs respectively after the execution of the following instructions?

```
LXI H, 2500 H
LXI D, 0200 H
DAD D
XCHG
```

   (b)
```
MVI A, AA H
ORI FFH
RRC
RRC
CMC
INR A
```

   What are the contents of A register after executing the above set of instructions in sequence?

   (c) According to the word size, what are the types of instructions of 8085 microprocessor? Give examples for each of them.

   (d) What is PSW? Give the bit positions reserved for the flags. (2X4=8)

Group- C

3. (a) Draw the timing diagram of the instruction LHLD 4050H.

   (b) Design a memory system for 8085 such that it should contain 2KB of EPROM and 2 KB of RAM with starting addresses 0000H and 6000H respectively. (4X2=8)

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Enrolment No.

S_4 (UCS04B08)

B.Tech 4th Semester Mid-Term Examination, 2023

Department of Computer Science and Engineering

DESIGN AND ANALYSIS OF ALGORITHM

UCS04B08

Full Marks: 20 **Time: 1 hour**

Instructions:

1] All questions are compulsory.
2] Figures to the right indicate full marks.

PART -- A **(4 X 1 mark = 4 marks)**

1. Why always algorithms are mostly evaluated by Big-Oh (O)?
2. Arrange the following complexity of the algorithm in ascending order.

   $O(2^n)$, $O(n)$, $O(\log_2 n)$, $O(n\log_2 n)$, ~~$O(n!)$~~
3. What is Greedy method?
4. Calculate the time complexity for the given code

```
int i, j, k = 0;
for (i = n / 2; i <= n; i++) {
for (j = 2; j <= n; j = j * 2) {
k = k + n / 2;
} }
```

PART – B **(4 X 2 marks = 8 marks)**

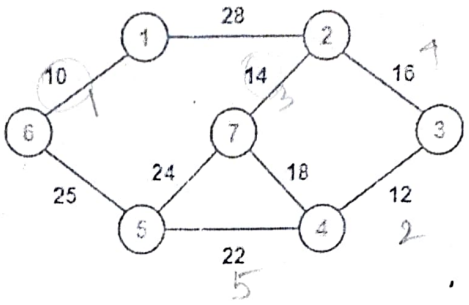
5. What are the advantages of Binary search over linear search? Give Example and time complexity.
6. Show that the following function is correct:

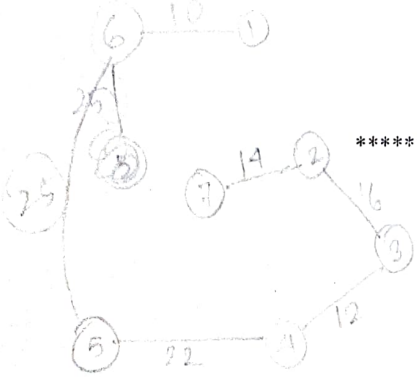
   $f(n)=10n^2+2n+2= O(n^2)$
7. Suppose it is known that the running time of one algorithm is O(nlogn) and that the running time of another algorithm is O(n^3). What does this say about the relative performance of algorithms?
8. Illustrate Omega and Theta asymptotic notations graphically and explain.

PART – C **(2 X 4 marks = 8 marks)**

9. Find the optimal solution for the Fractional Knapsack problem given as: I= {I_1, I_2, I_3, I_4, I_5}, w={5,10,20,30,40}, v={30,20,100,90,160}. The Knapsack capacity, W=60.

10. Find the time complexity of Kruskal's Algorithm and find the Minimum Spanning tree with following example.





********** Best Wishes**********

Enrolment No. 21UCS182

S4(UCS04B10)CSE

BTech 4th Semester Mid Term Examination- 2023
Name of Subject: Object Oriented Programming
Paper Code:UCS04B10

Full Marks: 20 Time: 1 Hour

The figures in the margin indicate full marks for the questions

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Attempt all the questions

(2 x 5)= 10

1. a) What is object-oriented programming (OOP)? How is it different from procedure-oriented programming?
   b) How OOP supports data encapsulation and abstraction.
   c) What is the application of the scope of resolution operator in C++?
   d) Define friend functions with its importance in C++?
   e) Find the output of the following code

```
#include<iostream>
#include<cstring>
using namespace std:

int main()
{
        char *s = "GOODLUCK";
        for (int i = strlen(s)-1; i >=0; i--)
        {
                for (int j = 0; j<=i; j++)
                cout << s[j];
                cout << endl;
        }
        return 0;
}
```

GOODL

(5+5)=10

2. a) What is a Constructor? Summarize the types of constructors supported by C++ with examples.

   b) Write a C++ program to enter your enrollment no., name, no. of subjects you have passed in the 3rd semester accordingly enter subjects name and corresponding credit points & obtained grades, SGPA and display all the entered information using arrays of objects concept.

   (Use your First Name for **Class name** and Last name as **Object name**)

Enrollment No: 21UCS122

S4 (UCS04C17): CSE

B.Tech 4th Semester Mid Term Examination- 2023

Formal Language & Automata Theory

UCS04C17

Full Marks: **20**

Time: **1 hour**

[The figure in the margin indicate full marks for the question]

Answer questions part-wise. Do not mix answer of a part with another part

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All Questions are Compulsory.

PART – A (4 X 1 = 4)

1. What is Deterministic Finite Automata? Enumerate the difference between DFA and NFA.

2. What is Regular Expression? Write the applications of Regular Expression.

3. Construct a regular expression for the set of all binary strings where in the fifth last symbol is 0.

4. The string 0100 belong to the set represented by:

   i) 110*(0+1) ii) 1(0+1)*101 iii) (10)*(01)*(00+11)* iv) (00+(11)*0)*

PART – B (4 X 2 = 8)

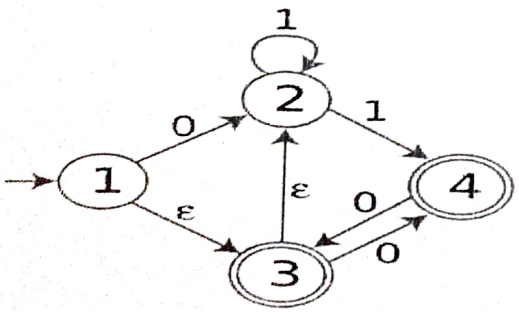
5. Prove that the class of regular sets is closed under complementation.

6. Construct deterministic finite automata for the binary strings with an even number of 0's and an odd number of 1's.

7. Find out Finite automata for the following regular expressions

   a. 01 + 11 + 0(1+01)*
   b. 01 + (00+11)* 011

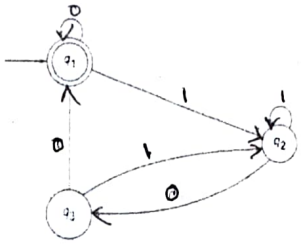
8. Find the finite automata after removing the λ transitions from the given finite automata M.



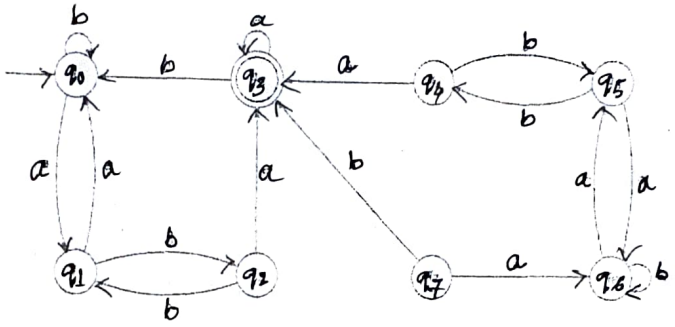
PART – C

(2 X 4 = 8)

9. Construct Regular Expression from the following Finite Automata.



10. Construct the minimum state automaton equivalent to the following transition graph.



********** Best Wishes******