Islamic University of Science and Technology
Department of Computer Science and Technology

Course Code : **CSE351C** | Course Title : **Formal Languages and Automata Theory**
Semester: 6th | Examination: **End Term. Spring 2023**
Max Marks : **50** | Duration : **2 Hour 30 Minutes**

Note:
Q.1. Attempt all questions.
Q.2. Assumptions made if any, should be stated clearly at the beginning of your answer.

UNIT I

Q.1 Obtain **DFA** for the following:

i) L = {w | w ∈ {a, b} with even number of a's and b's}.

ii) The set of all strings beginning with a 1 that when interpreted as a binary integer is a multiple of 3.

iii) The set of all strings ending in 011 over alphabet set {0, 1}.

OR **[3+4+3]**

i) Convert the following **NFA to DFA:**

State	Input a	Input b
→ Q_0	Q_1, Q_4	--
Q_1	--	Q_2
Q_2	--	Q_3
*Q_3	Q_3	Q_2
Q_4	Q_5	--
Q_5	Q_6	--
* Q_6	Q_6	Q_6

ii) Explain following terms with suitable examples:
a) Star closure b) Strings c) Language d) Empty Language **[6+4]**

UNIT II

Q2. i) Obtain regular expression for the following:
a) $\{ a^{2n} b^{2m+1} | n >= 0, m >= 0 \}$. **b)** All strings not ending with 001

ii) Minimize the DFA represented by the following transition table:

State	Input a	Input b
→ Q_0	Q_1	Q_5
Q_1	Q_6	Q_2
Q_2	Q_0	Q_2
Q_3	Q_2	Q_6
Q_4	Q_7	Q_5
Q_5	Q_2	Q_6
Q_6	Q_6	Q_4
* Q_7	Q_6	Q_2

[4+6] **OR** **K.T.O**

OR

i) For the given Epsilon NFA:
a) Compute the ε- closure of each state.
b) Convert the automation to a DFA.

State	Input ε	Input a	Input b	Input c
→ p	{q,r}	{p,q}	{ r}	--
q	{r}	--	{q,r}	--
*r	--	--	--	{r}

[3+7]

UNIT III

Q.3.i) Obtain a CFG to generate a language of all non-palindromes over {a,b}. Put the grammar in **Greibach's Normal Form.**

[3+7]

OR

i) Begin with the grammar:

S → aA | a | B| C
A → aB | ε
B → aA
C → cCD
D → abd

a) Eliminate ε productions.
b) Eliminate any **unit productions** in the resulting grammar.
c) Eliminate any **useless symbols** in the resulting grammar.
d) Put the resulting grammar into **Greibach's Normal Form.** [2+2+3+3]

UNIT IV

Q.4. i) Design PDA for the following you may accept either by final state or by empty stack:

a) L = {w | w ε (0,1)* , the number of 0's is less than twice the number of 1's}.
b) L = {wCw^R| w ε(a+b)*} where w^R is reverse of w.

[5+5]

OR

i) Is the PDA to accept the language L = {ww^R| w ε (a+b)*} where w^R is reverse of w, deterministic? Why or Why not? What are two conditions that differentiate DPDA from NPDA? [10]

UNIT V

Q.5.i) Design Turing machine that accepts the language consisting of all odd length palindromes over a and b. Show Instantaneous description for "abbabba".

[10]

OR

i) Obtain a Turing Machine to multiply two unary numbers separated by the delimiter 1. [10]

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Department of Computer Science and Engineering
Islamic University of Science and Technology

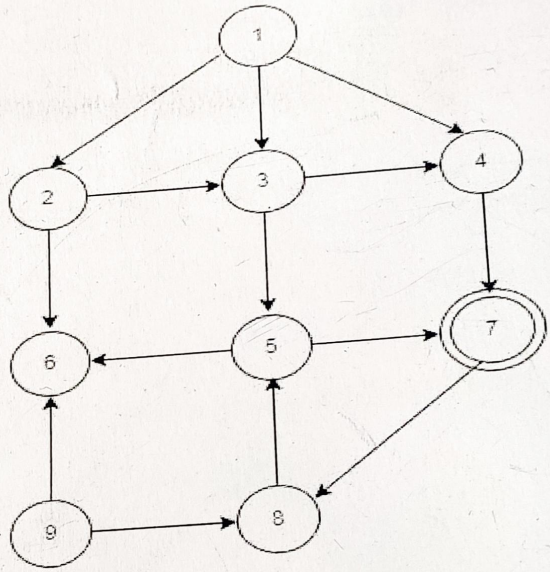
Roll No: _____
Subject: Artificial Intelligence
Examination: End-Term
Time: $2\frac{1}{2}$ hours

Semester: 6th
Course Code: CSE-352C/CSE-603T
Session: Spring 2023
Max. Marks: 50

Note: Attempt one question from each unit.

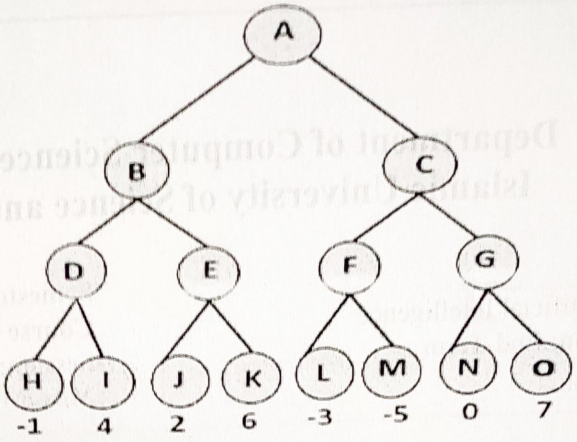
UNIT I

1. What is an Agent? Explain Simple Reflex and Model Based agent with the help of diagram?
2. Differentiate between Blind Search and Informed Search also, Apply Breadth First Search to the given graph with **1 as start state** and **7 as goal state**. Describe the step-by-step process and the data structures involved



UNIT II

3. What is a heuristic function, and how is it used in A*? Explain A* Algorithm with an example?
4. What is Mini-Max Algorithm? Explain step by step process of Mini-Max algorithm on the given game tree. [Hint: You can either start with Maximizer or Minimizer].



UNIT III

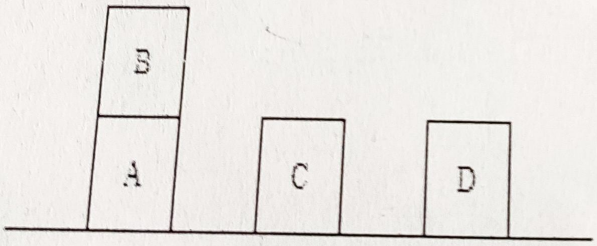
5. What is Knowledge representation? What are different types of Knowledge? Mention various issues in Knowledge representation?
6. What is Resolution? Use resolution to prove **"was Marcus loyal to Caesar"** for the given statements.
   (a) Marcus was a man. (b) Marcus was a Pompeian.
   (c) All Pompeians were Romans. (d) Caesar was a ruler.
   (e) All Pompeians were either loyal to Caesar or hated him.
   (f) Every one is loyal to someone.
   (g) People only try to assassinate rulers they are not loyal to.
   (h) Marcus tried to assassinate Caesar (i) All men are people

UNIT IV

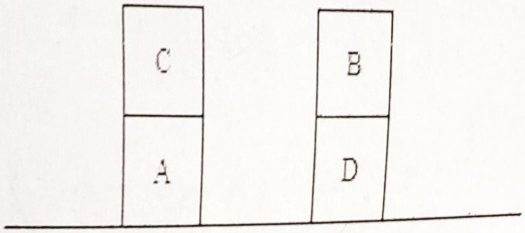
7. What is Expert System? Explain the Architecture of Expert System ?
8. What is Membership Function in Fuzzy Logic? Find AUB , A∩B , A-B and B-A for the following Fuzzy Sets A= {(1,1), (2,1), (3,0.9) ,(4,0.6), (5,0.4), (6,0.3), (7,0.2)} and B={(1,0.3), (2,0.3),(3,0), (4,1), (5,0.6), (6,0.9), (7,0.3), (8,1)}

UNIT V

9. What is Sussman Anomaly? Solve the given block world problem with Goal Stack Planning.



Initial State



Goal State

10. What is planning in AI? List the components of Planning and explain what Planning is needed for Vacuum Cleaner Agent?

Islamic University of Science and Technology

Department of Computer Science and Engineering

Programme: B.Tech. (CSE)	**Session:** Spring-2023, **Semester:** 6th
Course Title: Microprocessors, Peripherals and Interfacing	**Course code:** CSE-350C
Examination: Regular/Repeat/Backlog End Term	**Max Marks:** 50
Time: $2\frac{1}{2}$ hours	**Roll No.** 18

Answer one question from each unit.

Q. No.	Question	Marks
1	With the help of a functional pin diagram, classify the various categories of microprocessor-8085 signals. Discuss the functionalities of *Control Signals*.	10
	OR	
2	With the help of a diagram, discuss the internal architecture of 8085 and mention its various functional blocks.	
3	a. Draw and discuss the *Opcode Fetch* machine cycle of 8085 microprocessor. b. With the help of an example, discuss data transfer (copy) group, arithmetic group, logical group, branch group, stack, I/O and machine control group categories of instructions in 8085.	2 x 5
	OR	
4	Draw and discuss the timing diagram of: a. I/O *Read* machine cycle. b. I/O *Write* machine cycle.	
5	How 8085 microprocessor implements the concept of a sub-program? With the help of an example in each case, illustrate the sequence of program counter values and execution flow in two sample programs of choice, where `sample program 1` consists of a sub-program and `sample program 2` does not contain any sub-program. In `sample program 1`, you should mention the address to be stored on the stack while a MPU is executing it.	10
	OR	
6	Discuss the 8-step interrupt process in 8085-microprocessor. In each step discuss the instructions (if any) used to carry out the operation of the particular step.	
7	With the help of a proper circuit diagram explain the interfacing 8085-microprocessor using the decoder logic with: a. Input devices b. Output devices	2 x 5
	OR	
8	Discuss IO structure of a typical microprocessor. Discuss and compare: a. Memory-mapping of an I/O device b. IO-mapping of an I/O device	
9	Discuss the pipelined-architecture of Intel 8086 microprocessor. The diagram should clearly differentiate between the Bus Interface Unit (BIU), and Execution Unit (EU) of the architecture.	10
	OR	
10	List the advanced features of: • Intel-8088, • Intel-80186, • Intel- 80286, • Intel-80386, and • Intel-80486	

----------All the Best----------

Islamic University of Science and Technology, Kashmir.

B.Tech. CSE 6th Semester

End-Term Examination

Computer Graphics (CSE-350E)

*Duration: **2.5** Hours*

*Max Marks: **50***

*Note: Attempt **any one** question from each unit. All questions carry **10 marks**.*

Unit 1

Q1(a). Differentiate between beam-penetration and shadow mask methods. **(6)**

Q1(b). How is an image formed on the CRT screen? **(4)**

Q2(a). Differentiate Raster Scan and Random Scan system referring to the efficiency of each. **(5)**

Q2(b). What is persistence, resolution, horizontal retrace and aspect ratio? If an image has height of 10 inches and aspect ratio of 2.5, what is its width? **(5)**

Unit 2

Q3(a). Illustrate DDA line drawing algorithm for the line with end points (2, -2) and (5, 8). **(5)**

Q3(b). Explain in detail the Mid-Point Circle drawing algorithm with reference to the 8-way circle symmetry. **(5)**

Q4(a). Using Bresenham's line drawing algorithm, draw line between (-2, 1) and (8, 6). **(5)**

Q4(b). Explain Boundary Filling Algorithm in detail with the help of an example. **(5)**

Unit 3

Q5(a). Briefly explain various transformations done in 2D. **(4)**

Q5(b). Clip the following line segment against window whose lower left most corner is (0, 0) and top right corner is (8, 4): **(6)**

i. A(3,1) and B(9,3) ii. C(-3,-2) and D(5,3).

Q6. Write the composite transformation matrix for: **(10)**

i. General piot point rotations. ii. General fixed point scaling.

iii. Two successive rotations. iv. Two successive translations. v. Two successive scaling.

Unit 4

Q7(a). What is projection? Explain different types of projection. (4)

Q7(b). Differentiate between Scan-line and Z-buffer algorithms. (3)

Q8(a). Explain in detail the Painter's algorithm with a proper example. (5)

Q8(b). Differentiate between the orthographic and oblique projections. (5)

Unit 5

Q9 (a). Explain in detail any 2 of the following shading techniques: (10)

(i) Gouraud shading
(ii) Phong shading
(iii) Flat shading

Q10. Write short notes on the following methods: (10)

(i) Constraints (ii) Grids (iii) Gravity fields (iv) Rubber band (v) Dragging

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Programme: B.Tech. (CSE)	**Session:** Spring-2023
Subject: Java Programming	**Course code:** CSE353C / CSE_605T
Examination: End-Term	**Semester:** 6th
Time: $2\frac{1}{2}$ hours	**Max Marks:** 50

Note: Attempt all questions. **Roll No.:**

Q. No.	Question	Marks
1	**a)** What is dynamic method dispatch? Illustrate with the help of program. **b)** Illustrate the significance of using final keyword with variables, method, and class, with the help of documented program. **OR** **a)** What is Type casting? Discuss its types. Illustrate with the help of programs. **b)** Write a program in java that contains a method which accepts an object of another class as argument. Using that class object, the method should display value of variable in the calling class.	10
2	Differentiate between Throw and Throws. Illustrate the significance of using finally block with the help of program. **OR** Write a program that can perform file operations-Create, Write, Read and Delete. Also, the program should be capable enough to handle at the exceptions.	10
3	What a program and a html file for creating an Applet by implementing Runnable that is capable of displaying "**Welcome to IUST**" in a circular fashion (marque) in a banner. **OR** Write an application in java using java foundation class which will include a textbox, a menu, Submenus and a button contains image as label. On pressing a keyboard key, the textbox should display " **I know Key handling**". Also display the following table in the application.	10
4	What is the significance of Serialization? Illustrate serialization and Deserialization with the help of documented programs. **OR** What do you mean by runnable in java. Illustrate with the help of examples 4 types of constructors of Thread class.	10

EID	Name	Location
23	Kumar	Delhi
25	Tarun	Mumbai
43	Rakesh	Jammu

Islamic University of Science and Technology

Department of Computer Science and Engineering

Programme: B.Tech. (CSE)	**Session:** Spring-2023
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Time: $2\frac{1}{2}$ hours	**Max Marks:** 50

5	Write a set of programs that are capable of supporting remote method invocation with a common interface Consumer donating function declaration as getCName(),getCID, getCLocation(). Clearly mention client and server-side programs. Also, list the steps to execute the whole system. **OR** Write a program in java that can perform the following operations through java application A. Create the following table in database.	10

ProductID	Name	Price
793	Pen	70
512	Pencil	15
847	Eraser	20
329	Ruler	25

B. Calculate average price of the product.
C. Print all the details of the products whose price is greater than 18.
D. Handle all the errors in the program.

----------All the Best----------