SASTRA
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School of Computing
Third CIA Examination – NOV 2023
Course Code: CSE211
Course Name: Formal Language and Automata Theory
Duration: 90 minutes Max Marks: 50

PART A **Answer all the questions** **10*2=20 marks**

1. State Myhili-Nerode theorem.
2. Find a regular expression for L = {w ∈ {0,1}* : 'w' has no pair of consecutive zeros}.
3. Define derivation tree.
4. Differentiate Chomsky and Greibach normal form.
5. Write the format of unrestricted grammar.
6. List out the observations on Turing's thesis.
7. Write context sensitive grammar for L = $\{a^n b^n c^n : n>0\}$.
8. What is a diagonalization language?
9. State Rice theorem.
10. Rewrite the Boolean expression in conjunctive normal form.
    $(x_1 \wedge x_2) \vee x_3$

PART B **Answer any 2 questions** **2*10=20 marks**

11. Draw the architecture and explain the working of multi-tape & multi-dimension turing machines.

12. Check whether the given grammar is ambiguous or not. If ambiguous, rewrite it and produce an unambiguous grammar.

E -> I / E + E / E * E / (E)

I -> a / b / c

13. Explain in detail about the closure properties of regular languages.

PART C **1*10=10 marks**

14. Explain in detail about Polynomial and Non-Polynomial Time Classes with suitable examples.

PART A

Answer all the Questions **10 x 2 = 20 Marks**

1. Explain cache memories.
2. What is the Grey code for the decimal numbers 65 and 96?
3. What is meant by Instruction register?
4. Define hazards in Pipelining
5. Solve the Boolean functions, using K –map F (x, y, z) = $\sum(0, 1, 4, 5)$
6. Write the functions of memory mapped I/O.
7. Define vector processing.
8. Write the basic computer instruction code format.
9. What is Arbitration?
10. Write the different types of instruction sets in IA-32 processor

PART B

Answer any two Questions **2 x 10 = 20 Marks**

11. Discuss in detail about memory reference instructions with flow chart. (10)
12. Design a combinational circuit with three inputs x, y, z and three outputs A, B, C. When the binary input is 0, 1, 2 , or 3, the binary output is one greater than the input. When the binary input is 4, 5, 6, or 7, the binary output is one less than the input. (10)
13. a) Justify the Operation of Superscalar processor. (5)
    b) Explain in detail about serial port and interface circuits. (5)

PART C

Answer the Question **1 x 10 = 10 Marks**

14. a) Design the accumulator logic with logic diagram. (5)
    b) Justify the use of DMA controllers in a computer system. (5)

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School of Computing
Third CIA Examination – Nov 2023
Course Code: CSE213
Course Name: Object Oriented Programming
Duration: 90 minutes Max Marks: 50

PART A (2x10=20)

Answer all the questions

1. Write the Trigraph equivalent for the following a) ??= b) ??/ c) ??' d) ??(
2. What is the difference between function overloading and template?
3. List the different modes in which file can be opened.
4. Is there any way to access class private members without its objects? Justify your answer.
5. Compute the output for the following code:

```
#include <iostream>
using namespace std;
class room {
   int width, length;
   void setvalue(int w, int h)
   {
      width = w;
      length = h;
      cout<<width<<length;
   }
};
int main() {
   room obj;
   obj.setvalue(12,24);
   return 0;
}
```

6. What is the purpose of UML?
7. Distinguish the aggregation and composition.

8. List the advantages of overloading.
9. Illustrate encapsulation.
10. Differentiate static and non-static data members.

PART B (3x10=30)

Answer Any Three Questions

11. Write a C++ program to read a file that contains integers. Read the integers and categorize them as even or odd. Store all even integers in a file called EVEN.TXT and all odd numbers in ODD.TXT.

12. Write a C++ program that has a class Train with data members as no_of_seats_Itier, no-of_seats_IItier, no-of_seats_IIItier and member function to set and display data. Derive a class Reservation that has data members seats_booked_Itier,seats_booked_IItier,seats_booked_IIItier and functions to book and cancel tickets and display the status.

13. Draw Class Diagram, Sequence Diagram and Activity Diagram for Online Railway ticket reservation system.

14. Explain the following with example i) Abstraction, ii) Inheritance, iii) Polymorpohism and iv) Encapsulation

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School of Computing

First CIA Exam –Nov 2023

Course Code: CSE214

Course Name: Computational Statistics

Duration: 90 minutes Max Marks: 50

Answer ANY TWO questions **PART A** **30 marks**

1. a) Consider the hypothetical distance between pairs of five objects as follows. Construct dendrogram using single linkage clustering.

$$D = \begin{bmatrix} 0 & & & & \\ 10 & 0 & & & \\ 4 & 8 & 0 & & \\ 7 & 6 & 10 & 0 & \\ 12 & 11 & 3 & 9 & 0 \end{bmatrix}$$

(10)

b) Assume X1 and X2 are two features with n1, n2 rows, discuss the spooled calculation. (5)

2.a) Amazon is planning for analyzing their sales data X and constructed factors. Calculate covariance. (10)

$$\text{Loadings} = \begin{bmatrix} 0.46 & 0.92 \\ 0.68 & -0.43 \\ 0.75 & 0.65 \\ 0.84 & -0.2 \\ 0.83 & -0.64 \end{bmatrix}$$

b) Interpret the following confusion matrix by calculating APER and accuracy percentage. (5)

Confusion matrix		Predicted	
Actual		No	Yes
	No	650	27
	Yes	76	534

3. a) Derive the covariance of regression coefficient of linear regression model. (10)

b) Discuss error calculation of MLR prediction with example. (5)

Answer the question **PART B** **20 marks**

4. Two dimensional data X=(3.2,2.5,4.3,3.8,5.1,4.8), Y=(1.5,4.4,6.5,3.9,7.2,6.4) are given. Apply kmeans clustering to divide the items into two groups. Discuss stopping criteria. Calculate Scatter coefficient. (20)

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School of Computing
Third CIA Examination – Nov 2023
Course Code: INT104
Course Name: DATABASE MANAGEMENT SYSTEMS
Duration: 90 minutes Max Marks: 50

PART A

Answer all the questions **5 * 2 =10 Marks**

1. **Differentiate relational vs OODB Model**
2. **Compare Serial Vs Non-serial Schedule**
3. **Differentiate deadlock vs starvation**
4. **Draw the wait-for graph with an example.**
5. **Write the rules for conflict serializable.**

PART B

Answer any three questions **3 * 10 =30 Marks**

6. **Discuss in detail the complex datatypes associated with object-oriented databases.**
7. **Discuss the following with examples**
   b. View serializable b. conflict serializable
8. **With a neat diagram explain the components of data warehouse.**
9. **With a neat diagram explain the transaction states and properties of transaction**
10. **Draw an ER diagram to discuss the scenario of ICC cricket world cup.**

PART C

Answer any one the questions **1 * 10 =10 Marks**

11. **Discuss any three functional dependencies with example.**
12. **Discuss the deadlock prevention techniques in transaction**