CENTRAL UNIVERSITY OF HARYANA

Second Semester Term End Examinations August-September 2022

Programme: Master of Computer Application | **Session: 2021-22**
Semester: 2nd | **Max. Time: 3 Hours**
Course Title: Database Management System | **Max. Marks: 70**
Course Code: SBS CS 01 02 09 C 4004

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What is File System?

b) Write the Disadvantages of a DBMS.

c) Define "**Schema**".

d) What is Entity Set?

e) What are the basic operation of Relational Algebra?

f) Discuss DDL, DML, and DCL in SQL.

g) What is Unstructured Data? Explain with the help of example.

Q 2. (2X7=14)

a) What do you mean by DBMS architecture? Discuss with the help of suitable diagram.

b) What are various Characteristics of the Database Management System in detail.

c) Discuss the various types of Data Models.

Q3. (2X7=14)

a) Discuss the Entity-Relationship Model with help of suitable example.

b) Define Attributes; also discuss its types also with relevant examples.

c) Discuss following and their significance:

- Integrity constraints
- Referential and candidate keys

Q 4. (2X7=14)

a) What is normalization? Discuss first normal form to 3rd normal form with example.

b) What is Transaction? Also discuss the properties of transaction.

c) Why concurrency control techniques required? Discuss the various type of concurrency control techniques.

Q 5. (2X7=14)

a. Compare the Temporal database and Spatial databases with the help of suitable example.

b) Discuss Geographic information systems (GIS) in detail.

c) Writ the note on following :

- Mobile databases
- Multimedia Databases

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Second Semester Term End Examinations August- September 2022

Programme: MASTER OF COMPUTER APPLICATIONS **Session: 2021-22**

Semester: II **Max. Time: 3 Hours**

Course Title: Design & Analysis of Algorithms **Max. Marks: 70**

Course Code: SBS CS 01 02 13 C 4004

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What are the basic properties of algorithms?
b) Define space and time complexity.
c) How to evaluate efficiency of an algorithm?
d) Differentiate between knapsack and 0/1 knapsack problem.
e) How quick sort algorithm is better than the merge sort algorithm?
f) Explain the principle of optimality.
g) Describe the branch and bound method.

Q 2. (2X7=14)

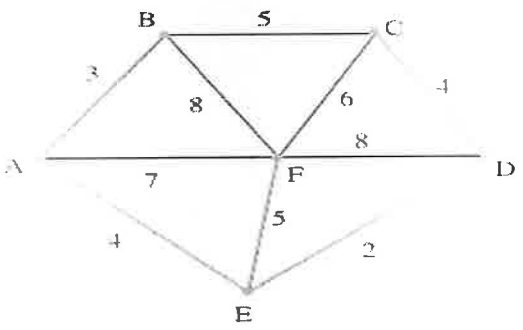
a) What are the various asymptotic notations used to analyze the algorithm? Explain in detail. What is the significance of these notations ?
b) Solve the given recurrence relations using the substitution method
$T(n)= 2T(n/2)+ n$
c) Write down various applications of STACK and QUEUE in detail.

Q3. (2X7=14)

a) What is the divide and conquer technique? Write an algorithm for sorting elements in an efficient way using this technique with complexity.

b) Solve the following Knapsack problem-
Input: 3 objects, C = 50 w= {15, 18, 25} p= {30, 40, 16}

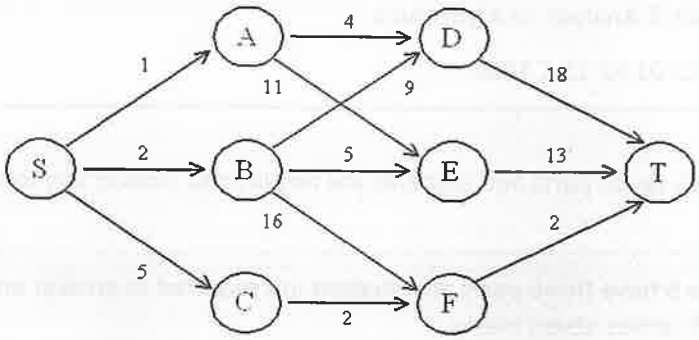
c) What is the difference between Prims algorithm and Kruskals algorithm for finding the minimum spanning tree of a graph? Execute both Prim's and Kruskal's algorithms on the given graph.



Q 4. (2X7=14)

a) Explain the backtracking method to solve the 4 queen's problem using suitable examples.

b) What is a multistage graph problem? Discuss its solution based on a dynamic programming approach. Find a minimum cost path from 'S' to 't' in the multistage graph using dynamic programming.



c) Solve the following Knapsack problem using dynamic programming-

Input: 3 objects, C = 6 w= {2, 3, 4} p= {1,2,5}

Q 5. (2X7=14)

a) Explain NP-completeness in detail with suitable examples.

b) Explain the difference between the P and NP class of problem.

c) What is SAT problem? Explain CNF-SAT, and 3-SAT problem with suitable examples.

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Second Semester Term End Examinations August- September 2022

Programme: MASTER OF COMPUTER APPLICATIONS **Session: 2021-22**

Semester: II **Max. Time: 3 Hours**

Course Title: Theory of Computation **Max. Marks: 70**

Course Code: SBS CS 01 02 08 E 3003

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) Define DFA and NDFA with suitable examples.

b) Construct a finite automation that will accept those strings of a binary number that are divisible by three?

c) Draw a Mealy machine for the following language, output string is identical to the input string on the even position.

d) Construct a finite automata equivalent to R.E.-

$(a^* + b)^* (a + b)$

e) Eliminate all null production from the grammar:

$S \rightarrow ABAB$

$A \rightarrow a\,A \mid \varepsilon$

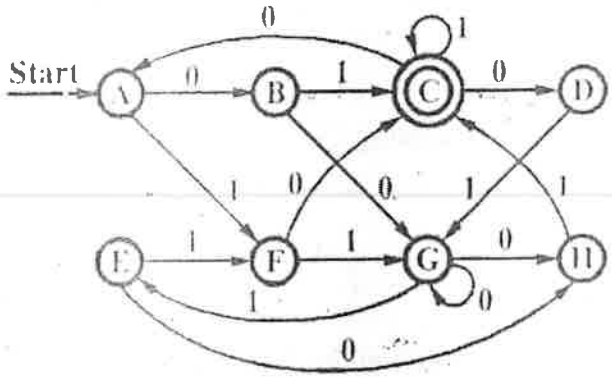
$B \rightarrow b\,B \mid \varepsilon$

f) Describe Turing Machine with the help of suitable diagram & parameters.

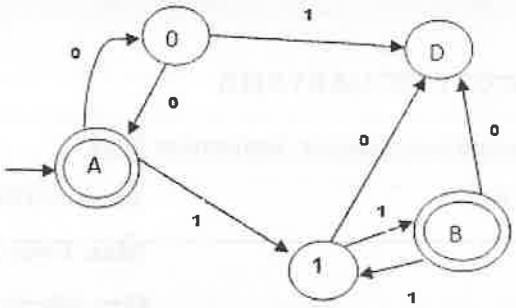
g) State and prove Arden's Theorem.

Q 2. (2X7=14)

a) What is Minimization? Minimize the given Finite automation.



b) Find a regular expression corresponding to finite automata.



c) Show that if r1 and r2 are regular expressions, then:

(i) L (r1r2) = L (r1) L (r2)

(ii) L (r1*) = (L (r1))*

Q3. (2X7=14)

a) Use pumping Lemma to prove that the following sets are not regular:

(i) $L = \{ a^n b^{2n} \mid n>=0\}$

(ii) $L = \{ a^n \mid n$ is prime number$\}$

b) Consider CFG with production

$S \rightarrow aS \mid aSbS \mid \varepsilon$

This grammar is ambiguous. Show in particular that the string "aab" has two derivation trees

(i) LMD

(ii) RMD

c) Convert the following grammar to CNF -

$S \rightarrow @ S \ / [S \ \% S] / p / q$

Q 4. (2X7=14)

a) Construct a PDA accepting $\{ wcw^R \mid w \varepsilon \{a,b\}^* \}$ by empty stack.

b) Obtain CFG for the PDA given as below:

$M = (\{p , q\} , \{0,1\} , \{x, Z_0 \} , \delta , q , Z_0)$ where δ is given by –

$\delta(q , 1 , x) = (q, x x)$

$\delta(q , 0 , x) = (p, x)$

$\delta(p , 1 , x) = (q, \Lambda)$

c) Construct a PDA equivalent to the following CFG:

$S \rightarrow 0S1 / \varepsilon$

Q 5. (2X7=14)

a) Design a Turing Machine to recognize the given languages-

$L= \{ 1^n 2^n 3^n | n>=1\}$

b) Write note on (any One):

(i) Recursive & Recursively numerable languages

(ii) Multi tape TM

c) Describe NP completeness. Explain P and NP class problem using suitable examples.

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Second Semester Term End Examinations August- September 2022

Programme: MCA **Session: 2021-22**

Semester: 2nd Semester **Max. Time: 3 Hours**

Course Title: Computer Graphics **Max. Marks: 70**

Course Code: SBS CS 01 02 10 C 4004

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) Explain the scan line method for visible surface detection.

b) What are the display files? Explain with examples. How are Polygons and characters represented in display file?

c) Differentiate between Random and Raster Scan displays.

d) Discuss the various geometrical transformations with suitable examples

e) Why LCD is termed as Flat Panel Display? Explain its working principle.

f) Enumerate the difference between pointing devices and positioning devices.

g) A polygon A (2,5), B(6,9), and C(10,2) scale 2 unit in X direction and 3 unit in Y direction. Find the new co-ordinates.

Q 2. (2X7=14)

a) What do you mean by colour model? also discuss the various colour models used in graphics system.

b) Explain the basic architecture of Cathode Ray Tube? Discuss in detail the raster and random scan displays.

c) Write short note on following:

- VGA and SVGA resolutions.
- Plasma panel and LED.

Q3. (2X7=14)

a) Discuss DDA algorithm for line drawing with an example.

b) Write the Bresenham's circle drawing algorithm with suitable example.

c) Explain the difference between symmetrical DDA and simple DDA.

Q 4. (2X7=14)

a) Difference between translation and rotation. A rectangle A(2,2), B(5,2), C(5,3) and D(2,3) is rotated by 90^0 about origin in anticlockwise direction. Find the new co-ordinates.

b) What are windowing and clipping? Explain midpoint sub- division algorithm.

c) Explain the Cohen Sutherland line clipping algorithm with the help of an example.

Q 5. (2X7=14)

a) Explain 3-dimensional Translation, Rotation and Scaling transformations.

b) What is the difference between geometric and coordinate transformations? Discuss the various 3-D geometric transformations.

c) What are the projections? How are they useful? Explain different types of projections.

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Second Semester Term End Examinations August-September 2022

Programme: Master of Computer Application(MCA) **Session: 2021-2022**
Semester: 2nd Semester **Max. Time:** 3 Hrs
Course Title: Object Oriented Programming **Max. Marks: 70**
Course Code: SBS CS 01 02 11 C 4004

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What is virtual base class ?

b) Explain any two forms of inheritance. Give an example of each.

c) Write a C++ program to swap two numbers using pointer

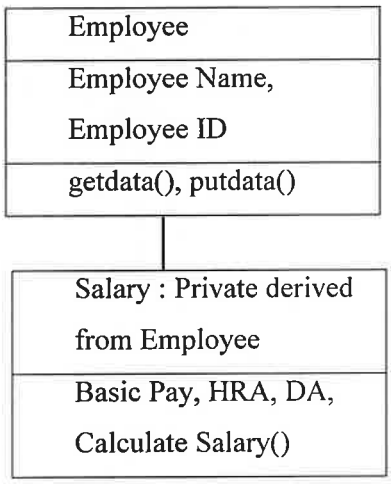
d) List and explain use of any four file mode parameters.

e) Explain the use of friend function by writing a C++ program.

f) State the use of scope resolution operator and its use in C++.

g) Differentiate between compile time and run time polymorphism.

Q 2. (2X7=14)



a) Define classes to appropriately represent class hierarchy as shown in above figure. Use constructors for both classes and display Salary for a particular employee.

Define a class named 'Train' representing following members:

Data members :- Train Number, Train Name, Source, Destination, Journey Date, Capacity

Member functions: Initialise Members, Input Train Data, Display Data

Write a C++ program to test the train class.

b) What is data hiding? What are the different mechanisms for protecting data from external users of a class objects?

c) What do you mean by allocation of memory ? compare static and dynamic allocation techniques ? also describe various function for dynamic allocation.

Q3. (2X7=14)

a) Demonstrate hybrid inheritance with the help of suitable example.

b) How base class pointers are casted into derived class pointers? Explain with the help of an example.

c) Explain destructors with its syntax. Also write a program to trace the flow of execution of destructor in a class.

Q 4. (2X7=14)

a) What is operator overloading? List the operators that cannot be overloaded and justify why they cannot be overloaded.

b) Write a C++ program to overload binary operators.

c) Define virtual function with the help of an example. Differentiate between virtual function and pure virtual function.

Q 5. (2X7=14)

a) Discuss function template. How function template can be overloaded?

b) What is exception handling? How exceptions are rethrown in C++, explain it with an example.

c) Give syntax of and explain various functions related to ifstream and ofstream classes: seekg(), tellg(),read(),write()

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Second Semester Term End Examinations August- September 2022

Programme: Master of Computer Application (MCA) | **Session: 2021-22**

Semester: Second | **Max. Time: 3 Hours**

Course Title: Software Engineering | **Max. Marks: 70**

Course Code: SBS CS 01 02 12 C 4004

Instructions:

1. Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and students are required to answer any two parts of each question. Each part carries seven marks.

Q 1. (4X3.5=14)

a) What are the rules for Human Computer Interface design? Explain in brief.

b) Discuss the need of Software Requirement Specifications (SRS).

c) What do you mean by Software Engineering? Discuss evolution of Software engineering.

d) What is a Risk? Briefly discuss about the Risk Management.

e) Explain the agile process for software development.

f) What is software crisis? What are the causes and how software engineering deals with it?

g) What do you mean by problem analysis and requirements specification.

Q 2. (2X7=14)

a) What are process models? Why are the important? Explain SPIRAL model with a proper diagram.

b) Explain the Software characteristics in detail.

c) Write the short note on cost estimation models

Q3. (2X7=14)

a) What do you understand by Quality Assurance? Explain levels of quality assurance.

b) Enlist and explain steps required to perform cost estimation using COCOMO model.

c) Discuss the steps of Software Requirement Analysis in detail.

Q 4. (2X7=14)

a) What is software design? What is its need? How design of software related to evaluation of software? Categorize software design.

b) Explain the concept of measurement and metrics in software engineering. What are different types of process metrics?

c) Compare various design methodologies used in object-oriented design.

Q 5. (2X7=14)

a) What is the significance and goals of software testing? Explain various testing strategies.

b) What are the different techniques in white-box testing?

d) Define debugging. Write the general characteristics of bugs and discuss the life cycle of debugging task mentoring various steps involved.