

Total No. of Questions : 7]

PA-3399

SEAT No. :

[Total No. of Pages : 3

[5919]-11

M.Sc. (Computer Science)

CSUT - 111 : PARADIGM OF PROGRAMMING LANGUAGE

(2019 Pattern) (Semester - I)

[Max. Marks : 70

Time : 3 Hours]

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any Five questions from 2 to 7.
- 3) Questions 2 to 7 carry equal marks.

Q1) Solve any 5 of the following:

[5×2=10]

- a) Write a difference between call by value and call by reference.
- b) What is formal parameter? Give example.
- c) What is dynamic memory allocation?
- d) Which function is used to join two strings. Give Syntax.
- e) Give difference between structure & union.
- f) Explain malloc() and calloc() functions with example.

Q2) Attempt the following:

- a) i) Explain Iteration and recursion with example. [5]
- ii) Define union and free union. [2]
- b) Briefly explain functional programming with example. [5]

P.T.O.

Q3) Attempt the following:

- a) i) Explain different types of operators available in C. [5]
- ii) Define Semaphore. [2]
- b) Give Syntax and use of following functions: [5]
- i) getchar()
- ii) putchar()
- iii) puts()
- iv) printf()
- v) scanf()

Q4) Attempt the following:

- a) i) Briefly explain data encapsulation and data abstraction. With example. [5]
- ii) Define polymorphism with example. [2]
- b) What is output of following code? Justify. [5]

```
int main()  
{  
    int a = 5, b = 10, c = 7;  
    predict (a, &b, c);  
    print f("%d - %d - %d", a, b, c);  
}  
Void predict (int p, int *q, int r)  
{  
    p = 50;  
    *q = *q * 10;  
    r = 77;  
}
```

Q5) Attempt the following:

- a) i) What is dangling pointer. Explain with example. [5]
- ii) Explain two solutions to dangling pointers. [2]
- b) Explain following functions with example: [5]
- i) fclose()
- ii) fopen()
- iii) fgets()
- iv) fputs()
- v) fclose all()

Q6) Attempt the following:

- a) i) Find out the output of following code. Justify. [5]

```
main()
{
    int a = 10, b = 20;
    {int c = 30;
    printf ("%d %d %d", a, b, c);
    }
    printf ("%d %d %d", a, b, c);
}
```

- ii) Give difference between Enum and Union. [2]

- b) What will be output of following code. Justify. [5]

```
main()
{
    auto int i = 10;
    {
        auto int i = 20;
        printf ("%d \n", i);
    }
    printf ("%d \n", i);
}
```

Q7) Attempt the following (Any Two):

- a) What is enumeration type? Give design issues for enumeration type. [6]
b) Briefly explain declarative paradigm and imperative paradigm. State difference between both. [6]
c) What is Semaphore? Explain briefly with example. [6]



Total No. of Questions : 7]

PA-3401

SEAT No. :

[Total No. of Pages : 2

[5919]-13

M.Sc. (Computer Science)
CSUT-113 : DATABASE TECHNOLOGIES
(2019 Pattern) (Semester-I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any five questions from Q.2 to Q.7.
- 3) Questions Q.2 to Q.7 carry equal marks.

Q1) Solve any five of the following: [10]

- a) What is Sharding?
- b) Impedance mismatch is a disadvantage of NoSQL databases. (State True/False - comment).
- c) What is standard column family in column-family stores?
- d) List some of the popular Graph databases.
- e) State the significance of eventual consistency in NoSQL databases.
- f) Define the document database.

Q2) Attempt all: [12]

- a) i) What is an aggregate? [2]
- ii) Describe aggregate data model with example. [5]
- b) Polyglot persistence refers to the usage of different databases in different circumstances in a single applications:- Comment. [5]

Q3) Attempt all: [12]

- a) i) Event sourcing is an approach to the persistence. (Justify) [2]
- ii) Explain the concept of Brewer's theorem. [5]
- b) Consider an "Employee" database of a company, with three collections (entities) :- Employee, Address, Designation. [5]
 - i) Employee will have a unique employee ID, first name and last name.
 - ii) Address will contain city, state, and country.
 - iii) Designation specifies the name of post on which employee is recruited.

Create a document data model for the given use case.

P.T.O.

Q4) Attempt all: [12]

- a) i) Define replication factor. [2]
- ii) Master slave distribution allows replicating the data across multiple nodes. Comment. [5]
- b) Discuss the concept of incremental Migration. [5]

Q5) Attempt all: [12]

- a) i) The Cassandra cluster scales horizontally.(State True/False) Justify.[2]
- ii) Explain how NoSQL databases are useful to store different formats of data. [5]
- b) Model the following case study as a graph database. [5]

Mr.Goyal purchased a Mobile phone online from Flipkart shopping site at the cost of 10,000/-. This mobile was also recommended by Mr. Kohli on 10 January 2022. Flipkart also sells other branded mobile phones of different companies such as Viyo, Oppo, Redmi.

The mobile purchased by Mr. Kohli is Vivo V11 with a warranty of 1 year.

- i) Identify different nodes, labels, relationships and respective properties.
- ii) Draw a graph model using the same.

Q6) Attempt all: [12]

- a) i) NoSQL databases are schemaless :- Comment. [2]
- ii) Describe the properties of NoSQL databases. [5]
- b) How consistency is applied in column - family databases? [5]

Q7) Attempt any two: [12]

- a) Write a note on version stamps in NoSQL databases. [6]
- b) Explain replication set of MongoDB with diagram. [6]
- c) Describe the concept of map - reduce structure with a two - stage map-reduce example. [6]



Total No. of Questions : 5]

PA-3402

[5919]-14

M.Sc. (Computer Science)
CSDT - 114 (B) : ARTIFICIAL INTELLIGENCE
(2019 Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Questions from 2 to 5 carry equal marks.

Q1) Solve any five of the following. [5]

- a) Explain any two fields of AI.
- b) Define Search Strategy.
- c) State the types of supervised learning.
- d) Are python strings immutable?
- e) State any two approaches for knowledge representation.
- f) What is heuristic function?

Q2) Attempt the following: [10]

- a) i) State any two AI techniques. [2]
- ii) Explain generate and test algorithm. [4]
- b) Compare propositional logic and predicate logic. [4]

Q3) Attempt the following: [10]

- a) i) What is a dictionary in python? [2]
- ii) Explain the different types of machine learning. [4]
- b) Translate following English statement in FOPL. [4]
 - i) Some girls play chess.
 - ii) Not all students like both Computer and Marathi.
 - iii) All Parrots fly.
 - iv) Every student respects his Teacher.

Q4) Attempt the following: [10]

- a) i) Write disadvantages of Breadth First Search. [2]
ii) Give the state space representation of "water jug problem", where there are 2 jugs of 4L and 3L respectively. We want 2L water in 4L jug. [4]
- b) Consider the following FOPL statements. Using resolution prove FIDO WILL DIE. [4]
- i) $\forall x: \text{dog}(x) \rightarrow \text{animal}(x)$
ii) $\text{dog}(\text{FIDO})$
iii) $\forall y: \text{animal}(y) \rightarrow \text{die}(y)$

Q5) Attempt any 2 of the following: [10]

- a) What is hill climbing? Write algorithm for it. [5]
b) Write a python program to check the given number is palindrome or not. [5]
c) Given an initial state of a 8-puzzle problem and final state to be reached: [5]

| | | |
|---|---|---|
| 2 | 8 | 3 |
| 1 | 6 | 4 |
| 7 | | 5 |

Initial State

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 8 | | 4 |
| 7 | 6 | 5 |

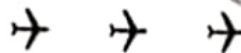
Final State

Find the most cost-effective path to reach the final state from initial state using A* algorithm.

Consider,

$g(n)$ = Depth of node

$h(n)$ = Number of misplaced tiles



Total No. of Questions : 5]

PA-3402

[5919]-14

M.Sc. (Computer Science)
CSDT - 114 (C) : WEB SERVICES
(2019 Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Questions 2 to 5 carry equal marks.

Q1) Solve any five of the following. .

[5]

- a) What do you mean by wire protocol?
- b) Give the use of SOAP actor attribute.
- c) Define UDDI.
- d) What is Web Service?
- e) Define stub.
- f) How does solicit-response operation differs from Request-response operation?

Q2) Attempt the following:

[10]

- a) i) Explain in short Apache Axis environment. [2]
- ii) Explain publishing API of UDDI. [4]
- b) Explain different ways to secure a RESTFUL API in Java. [4]

Q3) Attempt the following: [10]

- a) i) Give the difference between JSON and XML. [2]
- ii) What are the characteristics of Web Services. [4]
- b) What is SOAP? Give the structure of SOAP message and explain it. [4]

Q4) Attempt the following: [10]

- a) i) List the Header Child Element Attributes. [2]
- ii) Explain the steps in DCOM Communication. [4]
- b) Explain Limitations of UDDI. [4]

Q5) Attempt any two of the following: [10]

- a) Explain Web Service architecture. [5]
- b) Explain design guidelines for building RESTFUL Web Service. [5]
- c) Describe UDDI data structure and their relationships with figure. [5]



Total No. of Questions : 7]

SEAT No. :

PA-3432

[Total No. of Pages : 2

[5921] 11

**M.Sc. (Computer Application)
CA-CCTP-1 WEB TECHNOLOGY
(2019 Pattern) (Semester-I)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Q.1 is compulsory.
- 2) Attempt/solve any Five questions from Q.2 to Q.7.
- 3) Q.2 to Q.7 carry equal marks.
- 4) Figures to the right indicates full marks.

Q1) Solve any five of the following:

[10]

- a) List any two client side and server side scripting languages.
- b) What is type juggling in php?
- c) Define Dom.
- d) List the methods of passing parameters to a function in Php.
- e) What is a Framework?
- f) Name any two events associated with mouse in Javascript.

Q2) Attempt the following.

- a) What is Multidimensional Array in Php? Illustrate how to create multidimensional array for (Name,mobile no, email id) of 3 students. [7]
- b) Why to use php-framework? Discuss two examples of framework. [5]

Q3) Attempt the following.

- a) Define list in HTML. Explain different types of list along with different attributes. [7]
- b) Discuss <div> and tag in detail with example. [5]

P.T.O.

Q4) Attempt the following.

- a) Explain any five operators supported by Javascript. also explain operator Associativity [7]
- b) Compare the variable function and Anonymous function in php. [5]

Q5) Attempt the following.

- a) What is the syntax of sort(), rsort(), ksort() and asort(). Explain in detail how these functions are used to sort on array. [7]
- b) Define CSS. Explain the use of external css with example. [5]

Q6) Attempt the following.

- a) Explain different features of XML with different areas of application. [7]
- b) Differentiate between HTTP and FTP [5]

Q7) write any two of the following: [12]

- a) Explain in detail various data types supported by php. [6]
- b) Write a javascript for concatenating two strings. [6]
- c) Which are the attributes of <form> tag. Explain various elements of the form tag. [6]



Total No. of Questions : 7]

SEAT No. :

PA-3434

[Total No. of Pages : 3

[5921]-13

M.Sc. (Computer Application)

CA-CCTP-3 : DESIGN AND ANALYSIS OF ALGORITHM

(2019 Pattern) (Semester-I)

Time : 3 Hours]

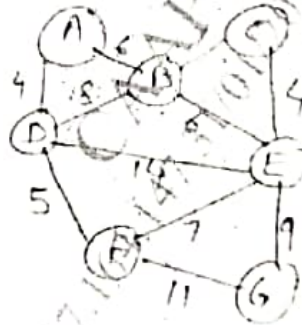
[Max. Marks : 70

Instructions to the candidates:

- 1) Question-1 is compulsory.
- 2) Solve any five questions from Q2 to Q7.
- 3) Questions 2 to 7 carry equal marks.

Q1) Solve any five of following. [10]

- a) Write difference between linear equations and linear inequalities.
- b) Rank following functions in increasing order of growth rates. n^2 , n^4+2n , n^2-18n , n^3
- c) Find minimum cost spanning tree for graph using kruskal's algorithm.



- d) Apply binary merge pattern on 5, 12, 28, 32, 84, 53
- e) Explain problem of Job sequencing.
- f) Write non-deterministic algorithm for max-clique problem.

Q2) Attempt following. [12]

- a) Write algorithm for binary search and also apply it on 3, 5, 6, 8, 11, 12, 13, 15, 20, 23, 24, 26, 29 to search 16. [7]
- b) Apply counting sort on 1, 10, 2, 3, 4, 10, 5, 4, 9, 10. [5]

P.T.O.

Q3) Attempt following. [12]

a) What is stable sorting in merge sort? Apply merge sort on list 85, 24, 63, 45, 17, 31, 96, 50, 40. Also give its recurrence relation. [7]

b) Find optimal storage of elements for 3 tapes. [5]

$$n = 13, \quad li = (11, 4, 7, 31, 6, 4, 17, 25, 3, 2, 10, 9, 5)$$

$$fi = (6, 10, 5, 21, 4, 50, 24, 8, 9, 2, 3, 10, 2)$$

Q4) Attempt following. [12]

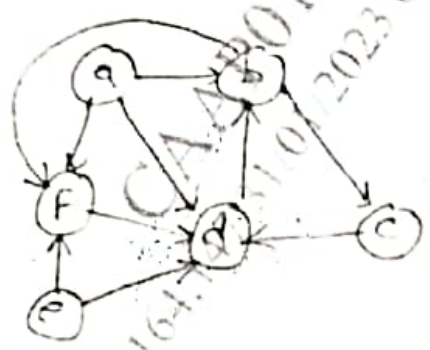
a) Explain matrix chain multiplication problem and using it multiply matrices in chain $10 \times 5, 5 \times 10, 10 \times 20, 20 \times 5$ to find minimum cost. [7]

b) Find knapsack instance using LCBB FTS where, $n = 4, m = 15, p = \{10, 10, 12, 18\}, w = \{2, 4, 6, 9\}$. [5]

Q5) Attempt following. [12]

a) Write algorithm for insertion sort. Apply it on 5, 25, 9, 13, 4, 81, 2. [7]

b) Draw DFS spanning tree for graph with dfn numbering. Also explain different types of edges in short. [5]



Q6) a) Solve following [12]

i) Explain Queen's problem. [2]

ii) Draw Dynamic state space tree for sum of subset problem. $w = (12, 15, 18, 5, 20), m = 50$. [5]

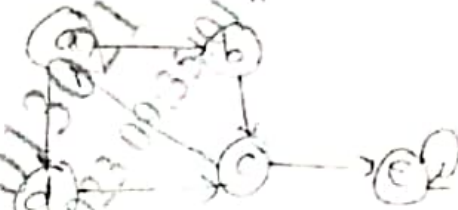
b) Multiply 2 matrices using strassen's matrix multiplication. [5]

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 2 \end{bmatrix}, \quad B = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

Q7) Attempt any two of following.

[12]

- a) Write short note on strongly connected components & find strongly connected components & cross edges for graph.



- b) Solve maximum profit earned for 0/1 knapsack using Dynamic programming (function & merge & purge both)

$$p = (1, 2, 5), w = (2, 3, 4), m = 6.$$

- c) Obtain reduced cost matrix for TSP using LCBB

$$\begin{bmatrix} \infty & 12 & 10 & 11 \\ 11 & \infty & 9 & 8 \\ 2 & 5 & \infty & 6 \\ 10 & 12 & 3 & \infty \end{bmatrix}$$

Total No. of Questions : 5]

SEAT No. :

PA-3435

[Total No. of Pages : 7

[5921]-14

M.Sc. (Computer Application)

CA-CBOTP-1A : OBJECT ORIENTED PROGRAMMING WITH C++
(2019 Pattern) (Semester - I)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:-

- 1) Question 1 is compulsory.
- 2) Solve any three questions from Q.2 to Q.5.
- 3) Questions 2 to 5 carry equal marks.

Q1) Solve any five of the following :

[5]

- a) A C++ program must have a main function. Justify True or False.
- b) What is a constructor?
- c) State any two types of Inheritance in C++.
- d) Write the syntax of Pure virtual Function.
- e) Which class can be used for both read/write C++ file I/o operations?
- f) What is the use of throw statement in exception handling?

Q2) Attempt the following :

[10]

- a) i) What is a friend class? Give its syntax. [2]
- ii) What is the use of following four manipulator functions endl, setw, set fill and set precision. [4]

R.T.O.

- b) What is inheritance? What ambiguity can arise in the following program.
How to solve it? [4]

```
include <iostream.h>
using namespace std;
Class A
{
    Public :
    int a ;
};
Class B
{
    Public ;
    int a ;
};
Class C : public A, Public B
{
    Public ;
    int b ;
};
Void main ( )
{
    C obj ;
    obj.a = 10 ;
    obj.b = 20 ;
}
```

Q3) Attempt the following : [10]

- a) i) What is a parameterised constructor? [2]
ii) Explain the use of ifstream and ofstream classes in C++ and write a file handling program using ofstream class object to write the content in the file. [4]
- b) Give the general format of a class and state the significance of private, public and protected access specifiers [4]