

Total No. of Questions : 7]

SEAT No. :

PA-3399

[Total No. of Pages : 3

[5919]-11

M.Sc. (Computer Science)

CSUT - 111 : PARADIGM OF PROGRAMMING LANGUAGE

(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 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]

SEAT No. :

PA-3400

[Total No. of Pages : 4

[5919]-12

M.Sc.

COMPUTER SCIENCE

CSUT-112 : Design and Analysis of Algorithms
(2019 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.

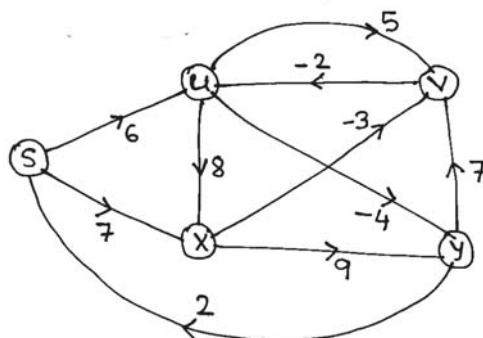
Q1) Solve any five of the following.

[5×2=10]

- a) Define θ notation and show that $5n^2+3n$ is $\theta(n^2)$.
- b) List any four algorithms that use divide and conquer strategy.
- c) Define minimum spanning tree.
- d) What do you mean by longest common subsequence problem?
- e) Define :-
 - i) Tree edge
 - ii) Back edge
- f) Give implicit and explicit constraints of 8 Queen's problem.
- g) Write two bounding function associated with every node in LCBB.

Q2) Solve the following.

- a) Rank the following functions in their increasing order of growth rate. [7]
 $e^n, n^n, n!, \log_e(n^n), n^2$
- b) Find out the shortest paths from source 's' to all other vertices. [5]



P.T.O.

Q3) Solve the following.

- a) Explain quick sort algorithm. Sort the following numbers using quick sort. [7]

26, 5, 37, 1, 61, 11, 59, 15, 48, 19.

- b) Find an optimal solution to the knapsack instance [5]

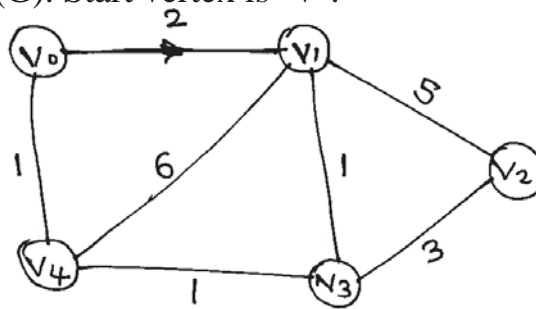
$n = 3$ $m = 20$ $(p_1, p_2, p_3) = (25, 24, 15)$

$(w_1, w_2, w_3) = (18, 15, 10)$

Using function method, from dynamic programming.

Q4) Solve the following.

- a) Using prim's algorithm find the minimum spanning tree of the following graph (G). Start vertex is 'V'. [7]



- b) Find longest common sub - sequence of X and Y. Where [5]

$X = \langle A, B, C, B, D, A, B \rangle$

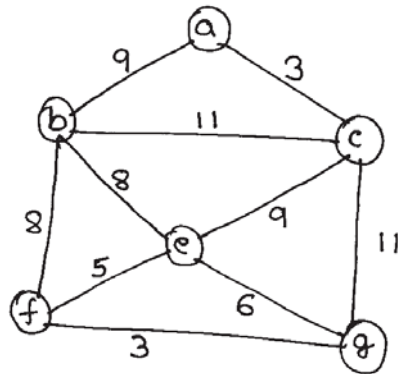
$Y = \langle B, D, C, A, B, A \rangle$

Q5) Solve the following.

- a) Solve traveling sales person problem (TSP) using dynamic programming method for the graph G given by adjacency matrix. [7]

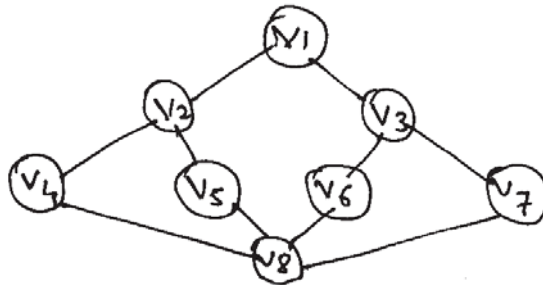
$$A = \begin{bmatrix} 0 & 15 & 9 & 5 \\ 19 & 0 & 7 & 10 \\ \infty & 10 & 0 & 10 \\ 6 & \infty & 6 & 0 \end{bmatrix}$$

- b) Find the minimum spanning tree for the following graph using Kruskal's algorithm. [5]



Q6) Solve the following.

- a) Draw BFS and DFS for following graph. [7]



- b) Sort the following numbers with counting sort algorithm. [5]

5, 3, 1, 2, 1, 4, 1, 3, 2, 5.

Q7) Write a short note on any two of the following. [2×6=12]

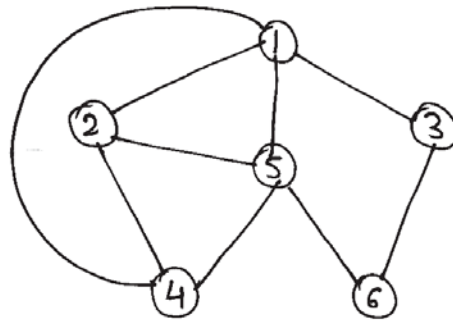
- a) Define the term with example.
- i) Optimization problem
 - ii) NP Hard
 - iii) Matrix chain multiplication

b) Draw the portion of state space tree generated by LCBB for the following instance $n = 5$ $m = 12$.

$$w = (4, 6, 3, 4, 2)$$

$$p = (10, 15, 6, 8, 4)$$

c) What is Hamiltonian cycle? Find out all possible Hamiltonian cycle for the following graph.



Total No. of Questions : 7]

SEAT No. :

PA-3401

[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 (entitier) :- 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 Vivo, 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]

SEAT No. :

PA-3402

[Total No. of Pages : 6

[5919]-14

M.Sc. (Computer Science)

CSDT - 114 (A) : CLOUD COMPUTING

(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) List the benefits of cloud computing.
- b) Define Hypervisor.
- c) What is grid computing?
- d) List the kind of risks associated with cloud computing.
- e) Which type of cloud service is provided by Amazon EC2?
- f) What is data center?

Q2) Attempt the following:

[10]

- a)
 - i) Give the disadvantages of cloud computing. **[2]**
 - ii) Write a short note on virtualization. **[4]**
- b) Describe the Amazon cloud services in detail. **[4]**

P.T.O.

Q3) Attempt the following: [10]

- a) i) Give the importance of cloud security. [2]
- ii) Write a note on cloud development models. [4]
- b) Explain programming environment of Google App Engine. [4]

Q4) Attempt the following: [10]

- a) i) What do you mean by load balancing? [2]
- ii) Elaborate data security & application security. [4]
- b) Write a note on Infrastructure-as-a Service. [4]

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

- a) Explain virtual machine provisioning and manageability. [5]
- b) Why security processes are important in Security Architecture Design?[5]
- c) Discuss about emerging cloud software environments in detail. [5]



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) Is the python strings are 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 3 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-3403

[Total No. of Pages : 3

[5919]-21

M.Sc. (Computer Science)

CSUT 121 : ADVANCED OPERATING SYSTEM

(2019 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Attempt any FIVE of the following :

[5 × 2 = 10]

- a) What is the difference between zombie and orphan process?
- b) List any four features of Linux OS.
- c) What is hard link?
- d) Justify : In linux the files are usually accessed via file names.
- e) Write any four memory allocation mechanisms supported by linux.
- f) How linux uses opportunistic allocation?

Q2) Attempt the following :

- a) i) Explain structure of a buffer header. Also explain how kernel maintains the buffer cache. **[4]**
- ii) What is data segment? How to manage it? **[3]**
- b) Explain the following system calls : **[5]**
 - i) `vfork()`
 - ii) `execl()`
 - iii) `exit()`
 - iv) `wait()`
 - v) `waitpid()`

P.T.O.

Q3) Attempt the following :

a) i) Discuss the architecture of Unix. [4]

ii) Explain the behavior of following C program. [3]

```
main()
{
int fd1, fd2;

char buf1 [512], buf2 [1024];

fd1 = fopen ("etc/passwd", O-RDONLY);
fd2 = fopen ("etc/passwd", O-RDONLY);

read (fd1, buf1, sizeof (buf1));
read (fd2, buf2, sizeof (buf2));

}
```

b) What is the use of atexit() function? Write a C program to demonstrate the use of atexit() system call. [5]

Q4) Attempt the following :

a) i) Discuss the concept of signal set. [4]

ii) Write a short note on dup() & dup2() system call. [3]

b) Explain calloc() and write a C program to demonstrate the use of calloc(), free() system calls. [5]

Q5) Attempt the following :

a) i) Explain nice(), getpriority() and setpriority() system calls. [4]

ii) Explain rmdir() and mkdir() functions. [3]

b) Write a C program to demonstrate race condition in catching signals. [5]

Q6) Attempt the following :

- a) i) What is meant by process? Elaborate the various process states with the help of diagram. [4]
- ii) What is signal? Explain various methods of handling signals. [3]
- b) Write a C program to handle the two-way communication between the parent & child using pipe. [5]

Q7) Write short notes on any two of the following :

- a) Setting user ID and setting group ID. [6]
- b) Process creation and process termination. [6]
- c) Blocking the signal and retrieving pending signals. [6]



Total No. of Questions : 7]

SEAT No. :

PA-3404

[Total No. of Pages : 2

[5919]-22

M.Sc. (Computer Science)

CSUT-122 : Mobile Technologies

(2019 Pattern) (CBCS) (Semester - II) (Credit 4)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Question 1 is compulsory.*
- 2) *Solve any five of 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) State any four application of mobile computing.
- b) What are components inside android SDK?
- c) Write a short note on R. Java.
- d) What are the platforms that phonegap supports?
- e) What is X code?
- f) List the data types in android SQLite.

Q2) Attempt All :

a) Explain following layouts :

[7]

- i) Linear Layout.
- ii) Table Layout.

b) What is android OS? Explain its architecture in detail.

[5]

Q3) Attempt All :

a) What is intent? Explain in detail.

[7]

b) State diff. between JVM vs DVM.

[5]

P.T.O.

Q4) Attempt All :

- a) What is parsing? Explain XML parsing with example. [7]
- b) Explain state of android fragments. [5]

Q5) Attempt All :

- a) Explain Android Activity Life Cycle with example. [7]
- b) What is phoneGap? Write a 'Hello World' program using phoneGap. [5]

Q6) Attempt All :

- a) Create android application to do multiply of two numerical digit (xml and java class). [7]
- b) Write a program swift to print the following out put : Hello world!. [5]

Q7) Write short notes on any two of the following : [12]

- a) Write short note on "Android Manifest".
- b) Explain IOS architecture in detail.
- c) What is Android Runtime? Explain Android virtual Device?



Total No. of Questions : 7]

SEAT No. :

PA-3405

[Total No. of Pages : 2

[5919]-23
M.Sc.
COMPUTER SCIENCE
CSUT - 123 : Software Project Management
(2019 Pattern) (Semester - II)

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) *Q.2 to Q.7 carry equal marks.*

Q1) Solve any five of the following. **[10]**

- a) List any four qualities required for project manager?
- b) What do you mean by Project Plan?
- c) Define ROI and NPV.
- d) Define cost estimates and explain its types.
- e) List the outputs of performance reporting process in communication management.
- f) State the purpose of statement of work (SOW).

Q2) a) What is Project Management? Explain project integration management. **[7]**

b) Write short note on GQM. **[5]**

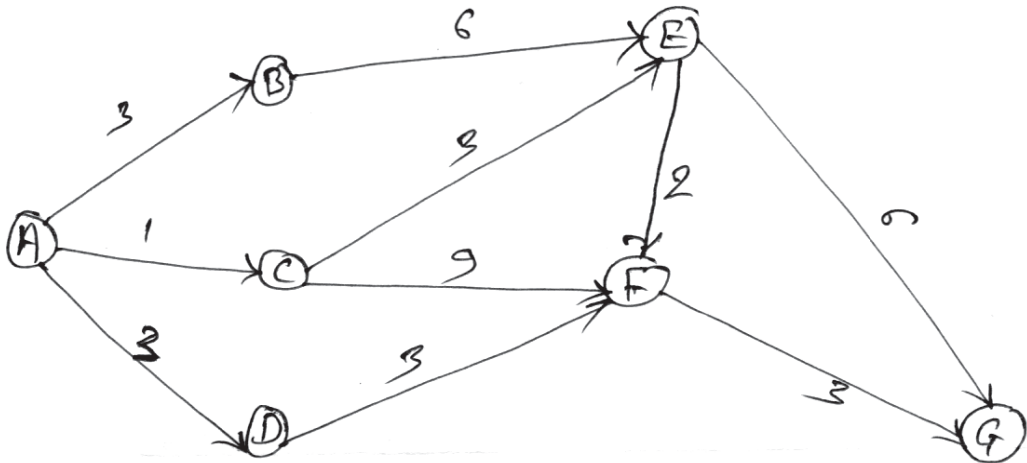
Q3) a) Explain the Bohem's software quality model. **[7]**

b) Write the categories of Risk and explain the Risk management process in details. **[5]**

Q4) a) Explain common elements of a project plan and also describe the overview of the project. **[7]**

P.T.O.

- b) Define CPM. Find critical path for the following Network diagram. [5]



- Q5) a) Explain EVA? Given the following information for a project, answer the following question BCWS = 25,000Rs, BCWP = 15,000Rs, ACWP = 32,000Rs. Find CPI and SPI. [7]

- b) Explain project staff acquisition in detail. [5]

- Q6) a) Explain COCOMO model with example. [7]

- b) Define project charter. Design project charter for college management system. [5]

- Q7) Write short note on any two of the following. [12]

- Metrics Plan
- Resource management
- Project integration management.



Total No. of Questions : 5]

SEAT No. :

PA-3406

[Total No. of Pages : 5

[5919] - 24

M.Sc. (Computer Science)

CSDT124B : HUMAN COMPUTER INTERACTION

(2019 Pattern) (Semester - II)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates :

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

Q1) Solve Any 5 of the following :

[5]

- a) What is meant by Drag & Drop Action?
- b) What is meant by List Inlay?
- c) What is Ergonomics?
- d) What are the input and output channels?
- e) What are the structures of design?
- f) What are the categories of mobile platforms?

Q2) Attempt the following :

[10]

- a)
 - i) What is execution and evaluation loop? **[2]**
 - ii) Who are stockholders? What roles do they play? **[4]**
- b) List the parts of human eye. **[4]**

P.T.O.

Q3) Attempt the following : [10]

- a) i) Who are Actors in drag & drop? [2]
- ii) Differentiate Artificial Visual Construct & Natural Visual Construct. [4]
- b) Write a note on WIMP interface. List it's elements. [4]

Q4) Attempt the following : [10]

- a) i) List pros & cons of SMS. [2]
- ii) List out types of design rules. [4]
- b) What are three main approaches to prototyping? [4]

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

- a) Explain in detail about evaluation techniques. [5]
- b) Explain GOMS with example. [5]
- c) Write a note on World Wide Web. [5]



Total No. of Questions : 5]

PA-3406

[5919] - 24

M.Sc. (Computer Science)

CSDT124C : SOFT COMPUTING

(2019 Pattern) (Semester - II)

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) *Question Q.2 to Q.5 carry equal marks.*

Q1) Solve **Any five** of the following :

[5]

- a) What is fuzzy logic?
- b) Define artificial neural network and what are the components of neural network?
- c) What are the application of soft computing?
- d) Where is genetic algorithm used?
- e) What is meant by fuzzification?
- f) Why is activation function used?

Q2) Attempt the following :

[10]

- a) i) What is Cartesian product? Consider the two sets A and B given as, $A = \{0, 1\}$. $B = \{a, b, c\}$ find the Cartesian product of A and B.
[2]

- ii) Consider following fuzzy set, [4]

$$R = \left\{ \frac{1.0}{0} + \frac{0.5}{1} + \frac{0.7}{2} + \frac{0.4}{3} + \frac{0.5}{4} \right\}$$

$$S = \left\{ \frac{0.6}{0} + \frac{0.7}{1} + \frac{0.2}{2} + \frac{0.9}{3} + \frac{0.2}{4} \right\}$$

Find the following,

- 1) $R \cup S$.
 - 2) $R \cap S$.
 - 3) \bar{R} .
 - 4) $\bar{R} \cup S$.
- b) What are the classification of Activation Function? [4]

Q3) Attempt the following : [10]

- a) i) What are Genetic algorithm? Write down any two disadvantages of genetic algorithm. [2]
- ii) Explain lambda-cut for a fuzzy relation. Consider relation

$$R, \begin{bmatrix} 0.9 & 0.0 & 0.2 \\ 1.0 & 0.5 & 0.3 \\ 0.3 & 1.0 & 0.7 \end{bmatrix}$$

Determine the λ -cut relations for the following λ values on R. [4]

- 1) $\lambda_{0.6}$.
 - 2) $\lambda_{0.4}$.
 - 3) $\lambda_{0.8}$.
 - 4) $\lambda_{0.9}$.
- b) What is Hebbian learning rule formula? Explain hebb learning rule with suitable example. [4]

Q4) Attempt the following : **[10]**

- a) i) Difference between artificial neural network and biological network. **[2]**
 ii) Explain crossover operator with suitable examples. **[4]**

b) Consider fuzzy sets, **[4]**

$$P = \left\{ \frac{0.1}{C_1} + \frac{0.5}{C_2} + \frac{1.0}{C_3} \right\} \quad S = \left\{ \frac{0.3}{S_1} + \frac{0.8}{S_2} \right\} \quad Q = \left\{ \frac{0.4}{Z_1} + \frac{0.7}{Z_2} + \frac{1.0}{Z_3} \right\}$$

Find the following,

- i) $R = P \times S$.
 ii) $T = Q \circ R$ using max-product composition.

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

- a) Explain the following terminologies of genetic algorithm. **[5]**
 i) Population.
 ii) Chromosomes.
 iii) Genes.
 iv) Alleles.
 v) Fitness Function.

b) Define “Back Propagation”. What are the advantages and disadvantages of Back propagation algorithms. **[5]**

c) What is fuzzy implication? Let $X = \{1, 2, 3, 4, 5, 6\}$ be the universe of discourse, consider the following three fuzzy set defined on the above universe. **[5]**

$$A = \left\{ \frac{0.6}{2} + \frac{1.0}{3} + \frac{0.2}{4} \right\} \quad B = \left\{ \frac{0.4}{2} + \frac{1.0}{3} + \frac{0.8}{4} + \frac{0.3}{5} \right\}$$

$$C = \left\{ \frac{0.3}{1} + \frac{0.5}{2} + \frac{0.6}{3} + \frac{0.6}{4} + \frac{0.5}{5} + \frac{0.3}{6} \right\}$$

Determine the implication relations.

If X is in A Then Y is in B.



Total No. of Questions : 7]

SEAT No. :

PA-3407

[Total No. of Pages : 2

[5919]-31

M.Sc. (Computer Science)

**CSUT - 231 : SOFTWARE ARCHITECTURE AND
DESIGN PATTERN**

(2019 Pattern) (Semester - III) (CBCS)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any five questions from Q2 to Q7.*
- 3) *Q2 to Q7 carry equal marks.*

Q1) Solve any five of the following :

[10]

- a) What are design patterns and why are they useful?
- b) Explain unified modeling language.
- c) What is Gang of Fouz (GOF)?
- d) Define :
 - i) High coupling
 - ii) Low coupling
- e) What is the purpose of swimlanes in activity diagram?
- f) Can we create a clone of a singleton object?

Q2) Attempt the following :

- a) What is abstract factory? Explain it's consequences in details. **[7]**
- b) How pattern interact in selected framework? **[5]**

Q3) Attempt the following :

- a) Explain different types of behavioral pattern. **[7]**
- b) Differentiate in between service oriented architecture (SOA) and microservices architecture. **[5]**

P.T.O.

Q4) Attempt the following :

- a) Write a short note on blackboard model. [7]
- b) Explain factory and decorator with suitable examples. [5]

Q5) Attempt the following :

- a) i) Assume a factory that manufactures teacups. There are about four types of teacups. They differ only by shape and colour. the ingredients and quality are the same. The factory manufactures around 1000 items in one batch for one type of teacup. In this case, creating 4000 teacups from the scratch is an inefficient task. Draw the UML diagram considering appropriate design pattern. [5]
- ii) What is layered system in software architecture. [2]
- b) What is facade? Explain the difference between facade pattern and normal pattern. [5]

Q6) Attempt the following :

- a) What is unified process? Explain the phase of unified process. [7]
- b) What are abstract classes and concrete classes. Explain with examples. [5]

Q7) Write a short notes on any two of the following : [12]

- a) Proxy pattern.
- b) Singleton pattern.
- c) Builder pattern.



Total No. of Questions : 7]

SEAT No. :

PA-3408

[Total No. of Pages : 2

[5919]-32

M.Sc. (Computer Science)

CSUT - 232 : MACHINE LEARNING

(2019 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

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

Q1) Solve any Five of the following :

[10]

- a) Define Entropy.
- b) Define information Gain.
- c) List out the libraries of python which support ML?
- d) List out the steps of data preprocessing in Machine Learning?
- e) What is feature scaling?
- f) What is Under fitting?

Q2) Solve the following :

[12]

- a) Describe Classification in brief? [7]
- b) How is KNN different from k-means clustering? [5]

Q3) Solve the following :

[12]

- a) Define and explain precision and recall. [7]
- b) Find the Probability of Fruit with Yellow color, Sweet Taste and Long in Size. (Naïve Bay's Theorem). [5]

Fruit	Yellow	Sweet	Long	Total
Orange	350	450	0	650
Banana	400	300	350	400
Others	50	100	50	150
Total	800	850	400	1200

P.T.O.

Q4) Solve the following : [12]

- a) What is Bayes' Theorem? Discuss how it is useful in a machine learning context. [7]
- b) Perform KNN algorithm & predict the type of a fruit or food type to which tomato (Sweet = 6, crunch = 4) belongs. [5]

Ingredient	Sweet	Crunch	Food Type
Grape	8	5	Fruit
Green Bean	3	7	Vegetable
Nuts	3	6	Protein
Orange	7	3	Fruit

Q5) Attempt the following : [12]

- a) Write an algorithm of an agglomerative clustering and Perform Agglomerative algorithm on the following data and plot a dendrogram using **complete linkage** approach. [7]

Item	P1	P2	P3	P4	P5
P1	0				
P2	9	0			
P3	3	7	0		
P4	6	5	9	0	
P5	11	10	2	8	0

- b) How do you handle missing or corrupted data in a dataset? [5]

Q6) Solve the following : [12]

- a) Explain Association Rules in ML? [7]
- b) Consider following Data Points, Using Linear SVM plot the graph. (Select 3 Support Vectors).
Positively Labeled Data = {(3, 1), (3, -1), (6, 1), (6, -1)}
Negatively Labeled Data = {(1, 0), (0, 1), (0, -1), (-1, 0)} [5]

Q7) Write short notes on any Two of following. [12]

- a) Q learning.
- b) PCA (Principle Component Analysis).
- c) Cross-Validation.



Total No. of Questions : 7]

SEAT No. :

PA-3409

[Total No. of Pages : 2

[5919]-33

M.Sc. (Computer Science)

CSUT 233 : WEB FRAMEWORKS

(2019 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any five questions from Q.2 to Q.7 of the following.*
- 3) *Q.2 to Q.7 carry equal marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Figures to the right side indicates full marks.*

Q1) Solve any Five of the following : **[10]**

- a) State any two advantages of Node js.
- b) What are streams in Node js? State different types of streams?
- c) What are promises in Node js?
- d) What are Django URLs?
- e) Is JavaScript LOOSELY/WEAKLY typed language? Justify.
- f) What is buffer in Node.js?

Q2) Attempt all of the following: **[12]**

- a) What is Express.js? Write a program to create a simple Web Server using node js. **[7]**
- b) What are the modules in Node.js? Explain different modules used in Node. js? **[5]**

P.T.O.

Q3) Attempt all of the following: [12]

- a) What are event emitters? Explain its methods. [7]
- b) Write a program to get and display a file information in Node js. [5]

Q4) Attempt all of the following: [12]

- a) Create a node.js file that select all records from the "customers" table, and display the result object on console. [7]
- b) What is Django? Explain Django architecture with neat diagram. [5]

Q5) Attempt all of the following: [12]

- a) Explain the file structure of a typical Django project and steps to create a Django project. [7]
- b) What is a Web Server? Explain web application architecture. [5]

Q6) Attempt all of the following: [12]

- a) Write as program to create Django app in which after running the server, "**Hello! am learning Django**" should be displayed on the browser. [7]
- b) Explain Django generic views with example? [5]

Q7) Write short notes on any Two of the following: [12]

- a) Callback and promises.
- b) Node package manager.
- c) Mongoose Scheme Types.



Total No. of Questions : 5]

SEAT No. :

PA-3410

[Total No. of Pages : 2

[5919]-34

S.Y. M.Sc. (Computer Science)
CSDT - 234A : BIG DATA ANALYTICS
(2019 Pattern) (Semester - III)

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) *Question 2 to 5 carry equal marks.*

Q1) Attempt any Five of the following : **[5]**

- a) Define Bigdata.
- b) What is sharding?
- c) Enlist various data integration patterns.
- d) What is Hive?
- e) What is IMDG?
- f) Define data munging.

Q2) Attempt the following : **[10]**

- a) i) Explain big data analytics. **[2]**
ii) Explain 3V's of Bigdata. **[4]**
- b) Explain Hadoop framework in detail. **[4]**

Q3) Attempt the following : **[10]**

- a) i) While using main memory, which weak points overcome by IMDG architecture? **[2]**
ii) Explain types of replication strategies. **[4]**
- b) Explain various features of HDFS. **[4]**

P.T.O.

- Q4)** Attempt the following : **[10]**
- a) i) Enlist the stages of SEMMA methodology. **[2]**
 - ii) What are the benefits of Hadoop. **[4]**
 - b) Explain how to extract value from Bigdata. **[4]**
- Q5)** Attempt any two of the following : **[10]**
- a) Explain Map Reduce pattern with suitable example. **[5]**
 - b) Explain about components of YARN architecture. **[5]**
 - c) Explain CRISP methodology. **[5]**



Total No. of Questions : 5]

SEAT No. :

PA-3411

[Total No. of Pages : 2

[5919]-35

M.Sc. (Computer Science)

CSDT - 234 B : WEB ANALYTICS

(2019 Pattern) (Semester - III)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) *Q.1 is compulsory.*
- 2) *Solve any three questions from Q2 to Q5.*
- 3) *Q2 to Q5 carry equal marks.*

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

- a) List the types of web analytics.
- b) Enlist the different types of dashboard.
- c) What is website traffic analysis?
- d) List the types of report generated by Google analytics.
- e) Give the two benefits of surveys.
- f) What is acquisition analysis?

Q2) Attempt the following : [10]

- a) i) What is Funnels? State the types of funnel. [2]
- ii) Write the note on Heuristic Evaluation. [4]
- b) Explain web analytics process in detail with suitable diagram. [4]

Q3) Attempt the following : [10]

- a) i) What is site visit? State the stages for conduction of successful site visit. [2]
- ii) Write a note on website survey. [4]
- b) Write a note on different emerging analytics. [4]

P.T.O.

Q4) Attempt the following : [10]

- a) i) Mention the different levels through which Google Analytics aggregates the data. [2]
- ii) What is Text Analysis? Explain it's techniques in short. [4]
- b) Write a note on - [4]
 - i) Toolbar Data
 - ii) Panel Data

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

- a) What is Google Analytics? Explain in short the different reports generated by it. [5]
- b) What is metric? Explain any five web metrics. [5]
- c) Write a note on different competitive intelligence data sources. [5]

