



UNIVERSITY OF THE PUNJAB

M.Sc. I.T. (Second Year) Supply 2020 / Annual – 2021

Roll No.

Subject: Information Technology

Paper: VII (Operating Systems & Analysis of Algorithm)

Time: 2 Hrs. 30 Mins. Marks: 80

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Note: Attempt TWO Questions from each section. All Questions carry equal marks.

SECTION – 1 (OPERATING SYSTEMS)

Question#3

Differentiate between the following:

(4 each)

- Time sharing systems and Real Time Systems
- Process and Thread
- System call and Function call
- Zombie process and Orphan process
- Contiguous and non-contiguous memory allocation

Question#4

a) Consider the following set of processes:

(10)

Process	Arrival Time	Burst Time (ms)
P1	0	10
P2	1	8
P3	2	6
P4	3	7
P5	4	5

Draw the Gantt charts illustrating the execution of these processes using Round Robin scheduling (quantum=4) scheduling algorithms. Also compute Average Waiting Time (AWT) of the algorithms.

b) Consider the snapshot of a system. A = 10, B = 11, C = 12, D = 13

(2+8 marks)

Processes	MAX				Allocation			
	A	B	C	D	A	B	C	D
P0	6	7	9	1	1	2	2	1
P1	4	6	4	9	2	1	1	3
P2	5	4	6	4	2	2	3	2
P3	10	5	4	8	1	0	4	1
P4	8	4	7	3	1	2	2	3

Answer the following using Banker's Algorithm:

- What is the content of the matrix need?
- Is the system in a safe state? If yes, then what is the safe sequence? Show your work.

Question # 5

- a) What is a semaphore? Explain it using Wait and Signal operations. (4)
- b) Briefly explain bounded buffer problem. (4)
- c) Consider a system with 36-bit logical address that supports 4KB page size. Available RAM is 4 GB. Calculate the number of bits required for p, d and f. Also calculate page table size. (4)
- d) Calculate the number of page faults using optimal page replacement algorithm for the following reference string with four pages frame. (8)

1, 2, 3, 1, 4, 5, 2, 4, 6, 5, 7, 2, 1, 7, 6, 5, 4, 2, 4, 3

SECTION – 2 (ANALYSIS OF ALGORITHMS)

Question#6

- a) Find the time complexities of the following two code segments in terms of Big Oh notation. (6)

i.

```
for (int i = n/2; i < n; i++)  
{  
    for (int j = 1; j < n; j = j + n/2)  
    {  
        temp++;  
    }  
}
```

ii.

```
sum = 0;  
for(i=0; i<N; i++) {  
    if(i > j)  
        sum = sum + 1;  
    else {  
        for(k=0; k<N; k++)  
            sum = sum - 1;  
    }  
}
```

- b) Solve the following recurrence equation and find their complexities in terms of Big Oh. (6)

$$T(n) = 2T(n-1) + n$$

- c) Write an algorithm that will split a list into two sub-lists using `val` parameter, so that first sub-list will contain all the elements which are *less than or equal to val*, and the second sub-list will contain all the elements which are *greater than val*. (8)

Question#7

- a) Construct a binary search tree and Max Heap using the following set of elements: (8)

25, 12, 17, 35, 29, 32, 8, 10, 30, 6, 27

- b) Write an algorithm to delete the largest element of the binary search tree. (6)
- c) Write an algorithm to determine whether a given array of elements forms a Max heap or not. (6)

Question#8

Briefly answer the following questions:

(4 each)

- a) Explain divide and conquer strategy with the help of a suitable example.
- b) What is dynamic programming? Explain it using a suitable example.
- c) What is transpose of a directed graph and what are strongly connected components of a graph?
- d) What are the characteristics of greedy algorithms and what is optimal substructure property?
- e) Write a note on NP complete problems.



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Question 1.

Select the most appropriate option from the following: (10x1=10)

1. Which one of the following is an entry points to the OS Kernel's code?
A. Interrupt B. Trap C. Signal D. All of the given
2. Which of the following is not a state of a process?
A. Running B. Spinning C. Suspended D. Blocked
3. Which of the following scheduler is invoked on an I/O interrupt?
A. Long term scheduler C. Medium term scheduler
B. Short term scheduler D. None of the above
4. Which one of the following is not an inter-process communication tool?
A. FIFO B. Pipe C. Semaphore D. Socket
5. The interval from the time of submission of a process to the time of allocation of CPU is termed as _____ time.
A. response B. waiting C. turnaround D. allocation
6. Which one of the following is a process synchronization tool?
A. Thread C. Semaphore
B. Pipe D. Socket
7. The circular wait condition of deadlock can be prevented by
A. using thread C. using semaphore
B. using pipes D. defining a linear ordering of resource types
8. The bounded buffer problem is also known as _____.
A. Readers – Writers problem C. Dining – Philosophers problem
B. Producer – Consumer problem D. None of these
9. In paged memory system, if the page size is increased, then the internal fragmentation generally:
A. Becomes more C. remains constant
B. Becomes less D. none of the above
10. A computer system has 36-bit logical address with a page size of 4KB. The maximum number of pages a process can have is _____.
A. 2^{12} C. 2^{24}
B. 2^{16} D. 2^{36}

Question#2

Select the most appropriate option from the following: (10X1=10)

1. The time factor when determining the efficiency of algorithm is measured by _____.
A. Counting microseconds C. Counting the number of statements
B. Counting the number of key operations D. Counting the number of if statements

2. What does it mean when we say that an algorithm X is asymptotically more efficient than Y?
- X will be a better choice for all inputs except possibly small inputs
 - X will be a better choice for all inputs except possibly large inputs
 - X will be a better choice for all inputs
 - Y will be a better choice for small inputs
3. The algorithm that does not require extra memory for carrying out the sorting procedure is called:
- in-place
 - stable
 - unstable
 - in-partition
4. Which of the following sorting procedure is the slowest?
- Heap Sort
 - Merge Sort
 - Bubble Sort
 - Counting Sort
5. What is recurrence for worst case of Quick Sort?
- $T(n) = T(n-2) + O(n)$
 - $T(n) = T(n-1) + O(n)$
 - $T(n) = 2T(n/2) + O(n)$
 - $T(n) = T(n/10) + O(n)$
6. A sorting technique is called stable if:
- It takes $O(n \log n)$ time
 - It uses divide and conquer paradigm
 - It takes $O(n)$ space
 - It maintains the relative order of occurrence of non-distinct elements
7. In a max-heap, element with the greatest
- Leaf
 - Root
 - First node of left-sub tree
 - First node of right-sub tree
8. The maximum number of nodes in a binary tree of height h is:
- 2^{h-1}
 - 2^h
 - 2^{h+1}
 - $2^{h+1}-1$
9. Which of the following statements is true?
- Every AVL tree is also a valid Max Heap
 - Every Max Heap is also a valid Binary Search Tree
 - Every AVL tree is also a Complete Binary Tree
 - Every Min Heap is also a Complete Binary Tree
10. Which of the following algorithm design technique is used in finding minimum weight spanning tree?
- Dynamic programming
 - Backtracking
 - Greedy
 - Divide and conquer



ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Note: Attempt TWO Questions from each section. All Questions carry equal marks.

SECTION 1 : Database Systems

Q3) Define Transaction and also discuss properties of transaction. (Marks:20)

Q4) Define the following with example: (Marks: 5*4=20)

Update anomaly, Entity integrity rule, Functional Dependency, Weak entity, Multivalued attribute.

Q5) Identify entities, attributes and relationship and also draw an Entity Relationship Diagram (ERD) for the following case study. (Marks:20)

A manufacturing company produces products. The following product information is stored: product name, product ID and quantity on hand. These products are made up of many components. Each component can be supplied by one or more suppliers. The following component information is kept: component ID, name, description, suppliers who supply them, and products in which they are used.

Base your design on the following Assumptions:

- A supplier can exist without providing components.
- A component does not have to be associated with a supplier.
- A component does not have to be associated with a product. Not all components are used in products.
- A product cannot exist without components.

SECTION 2 : Object Oriented Analysis and Design

Q.6. (Marks 20)

List down stages of Software Development Life Cycle (SDLC)? Also write a brief explanation on SDLC stages

1.) ANALYSIS

2.) DESIGN ?

Support your answer with example?

Q.7. (Marks 20)

Carefully consider the following table of Domain Model Entities and draw a Domain Model Diagram based on them. Also apply relationships and cardinality in the diagram?

SR#	Entity Name	Entity Description
1	Order	Contains items of Order Items
2	Item	Single instance of Products in Order
3	Item-Store	Store holds multiple items in Stock
4	User	User creates and adds/ removes items from Order
5	Store Manager	Check availability of Item in Store

Q.8. (Marks 20)

Write a brief note on USE CASE Diagram? What are different USE CASE RELATIONSHIPS? Give suitable examples to support your answer?



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Object Oriented Analysis and Design)

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Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x1=10)

i) Database constraints can be create?

- A) At the same time as the table is created
- B) At the same time as the database is created
- C) After the table has been created
- D) At the time of table creation and also after the table creation

ii) In relational database, which key can't be creating more than one for each table?

- A) Primary
 - B) Foreign
 - C) Unique
 - D) Secondary
- iii) Which command is used to remove a table from the database in SQL?
- A) DELETE TABLE
 - B) DROP TABLE
 - C) ERASE TABLE
 - D) UNATTACH TABLE

iv) When mapping a supertype/subtype relationship which of the following is true?

- A) The supertype primary key is assigned to each subtype.
- B) The subtype primary key is assigned to each supertype.
- C) There is no link between the supertype/subtype entities.
- D) There is no primary key/foreign key relationship between a supertype/subtype.

v) Which of the following is illegal?

- A) Select sysdate - sysdate from dual
- B) Select sysdate - (sysdate - 2) from dual
- C) Select sysdate - (sysdate + 2) from dual
- D) Select sysdate + sysdate where dual

vi) If a query involves NOT, AND, OR with no parenthesis

- A) AND will be evaluated first; OR will be evaluated second; NOT will be evaluated last.
- B) NOT will be evaluated first; OR will be evaluated second; AND will be evaluated last.
- C) NOT will be evaluated first; AND will be evaluated second; OR will be evaluated last.
- D) The order of occurrence determines the order of evaluation.

vii) If each employee can have more than one skill, then skill attribute belongs to which type of attribute?

- A) Multivalued attribute.
- B) Nonexclusive attribute.
- C) Repeating attribute.
- D) Data replica attribute.

viii) A student can take not more than 5 subjects in a semester. The number of students allowed in a subject in a semester is not more than 40. What is the student – subject relationship cardinality?

- A) 5:40
- B) 40:5
- C) N:5
- D) 40:M

ix) In database we use which type of database object to restrict database access, make complex queries easy and present different view of same data items?

- A) Table
- B) Report
- C) Views
- D) Wizard

x) The HAVING clause does which of the following?

- A) Acts EXACTLY like a WHERE clause.
- B) Acts like a WHERE clause but is used for groups rather than rows
- C) Acts like a WHERE clause but is used for rows rather than columns
- D) Acts like a WHERE clause but is used for columns rather than groups

Q.2. Precisely explain the following concepts:

(5 x 2 = 10)

i. Domain Model Elements Definition and Symbols

ii. GRASP Pattern – Names and Definitions

iii. UML Diagrams – Any file names and use.

iv. Write a note on MVC (Model View Controller Architecture)

v. Quality Assurance



UNIVERSITY OF THE PUNJAB

M.Sc. I.T. (Second Year) Supply 2020 / Annual – 2021

Roll No.

Subject: Information Technology
Paper: IX [9-COMP] (Enterprise Application Development &
Artificial Intelligence)

Time: 2 Hrs. 30 Mins. Marks: 80

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Note: Attempt TWO Questions from each section. All Questions carry equal marks.

PART – I : (ENTERPRISE APPLICATION DEVELOPMENT)

Question 3.

(4*5=20)

- Write down some of the disadvantages of cookies?
- Explain the life cycle of JSP.
- What is the use of AJAX?
- Explain the web architecture.

Question 4.

(5+15=20)

- Differentiate state management between sessions and cookies.
- Write a JSP page, which will dynamically create a table with Laptop information stored in the database. Table contains two columns (one is Laptop Company Name and other one is Laptop Model).

DB Name: Database

Table name: Laptop(name(varChar(50)), model(varChar(50)))

Question 5.

(10+10)

- Suppose you have an HTML form containing two fields and a button as shown in the figure below. In Field1, there are two numbers with space separated. Write code in HTML/Javascript that will multiple the two numbers and write the result in Field2 by pressing upon the button as shown in the figure below.

Field1:

12 4

Multiple Button

Field2:

3

- Write a JavaScript function Prime (no), if no. is prime display "Prime Number" as alert otherwise display "It is not a Prime Number" as alert.

PART – II : (ARTIFICIAL INTELLIGENCE)

Question 6.

(4x5=20)

Write a short note on following terms. Discuss definitions, examples and applications.

- Artificial Intelligence.
- Knowledge base and Knowledge Based Agent
- Rational agent
- Natural language processing

Question 7.

(20)

Rules:

- | | |
|--------|-------------------------------------|
| Rule 1 | $A \wedge B \rightarrow C$ |
| Rule 2 | $A \rightarrow D$ |
| Rule 3 | $C \wedge D \rightarrow E$ |
| Rule 4 | $B \wedge E \wedge F \rightarrow G$ |
| Rule 5 | $A \wedge E \rightarrow H$ |
| Rule 6 | $D \wedge E \wedge H \rightarrow I$ |

Facts:

- Fact 1. A
Fact 2. B
Fact 3. F

Goal:

Our goal is to prove H.

By using the above rules, facts deduce the result using forward chaining.

Question 8.

(10+10)

- Convert the following expression to CNF and to DNF:
 $A \vee (B \wedge C) \vee (D \wedge E \wedge \neg(A \vee B))$
- Provide definition of Heuristic. In what ways can heuristics be useful in search? Name three ways you use heuristics in your everyday life.



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Question 1.

Select the most appropriate option from the following:

(5x2=10)

1. For evaluating the expression and places it into the output, _____ JSP element is used.
 - a. JSP Scriptlet
 - b. JSP Expression
 - c. Both a & b
 - d. None of above
2. Super keyword can be used for calling _____.
 - a. multiple constructors
 - b. constructor of parent class
 - c. function of child classes
 - d. All of above
3. In CSS which type of styles has highest priority?
 - a. Internal Style Sheets
 - b. Inline Styles
 - c. External Style Sheets
 - d. All has same priority
4. There is no difference between the life cycles of JSP and Java Servlets.
 - a. True
 - b. False
5. Which one is pure java JDBC implementation?
 - a) JDBC-ODBC Bridge
 - b) Native Protocol
 - c) Middleware
 - d) Native API

Question 2.

Select the most appropriate option from the following:

(5x2=10)

1. Which algorithm will work backward from the goal to solve a problem?
 - a) Forward chaining
 - b) Backward chaining
 - c) Hill-climb algorithm
 - d) None of these
2. uniform-cost search expands the node n with the _____.
 - a) Lowest path cost
 - b) Heuristic cost
 - c) Highest path cost
 - d) Average path cost
3. Who is considered as father of Artificial Intelligence?
 - a) Howard Aiken
 - b) Alan Turing
 - c) John McCarthy
 - d) None of these
4. The network inspired by neurons in brain in Artificial Intelligence
 - a) Local Area Network 2
 - b) Neural Network
 - c) Both a and b
 - d) None of these
5. Which search method takes less memory
 - a) DFS
 - b) BFS
 - c) Linear Search
 - d) Both a and b



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M.Sc. I.T. (Second Year) Supply 2020 / Annual – 2021

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Subject: Information Technology

Paper: X [10-COMP]

(Theory of Automata & Compiler Construction)

Time: 2 Hrs. 30 Mins. Marks: 80

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PART-I (THEORY OF AUTOMATA)

Question 3.

(12+8=20)

- a. Construct a DFA for the following language and character set is $\Sigma = \{a, b\}$
 $L_0 = \{w \mid w \text{ contains at least 2 a's and at most 3 b's}\}.$
- b. What is meant by Minimization of a DFA?

Question 4.

(12+8=20)

- a. Construct a DPDA for the following language and character set is $\Sigma = \{a, b\}$
 $L_1 = \{a^n b^m, \text{ where } n = m / 2 \text{ and } n, m \geq 1\}.$
For example, aabb, aaabb, etc. are not valid but aabbbb etc. is valid string.
- b. Write down the context free grammar for the language L_1 , defined in part a.

Question 5.

(12+8=20)

- a. Construct a Turing Machine for the following language and character set is $\Sigma = \{a, b\}$
 $L_1 = \{a^n b^m, \text{ where } n = m / 2 \text{ and } n, m \geq 1\}.$
For example, aabb, aaabb, etc. are not valid but aabbbb etc. is valid string.
- b. Differentiate the Non – Deterministic criteria of FA and PDA.

PART-II (COMPILER CONSTRUCTION)

Question 6.

(5+3+12=20)

A language has a description as given below:

- Identifiers: Any sort of words which consists of at least one alphabet (A-Z and a-z) and starts with underscore ().
- Numeric/Constants: Any decimal number i.e. number having a point in it and there must be a number (either 0 or any other number) before and after point.

The character set $\Sigma = \{A, B \dots Z, a, b \dots z, 1, 2 \dots 9\}$

- Design an FA for the above given language.
- Write the regular expression for the same language.
- Now, execute the lexical analyzer for string "a12 d 4.0" and identify all lexemes along with their tokens.

Question 7.

(10+10=20)

$A \rightarrow BX$
 $B \rightarrow bB \mid \epsilon$
 $X \rightarrow xXy \mid \epsilon$

- Construct the LL parse table for the above given grammar.
- Tell the validity of string "b x y \$" by tracing it through LL parser / predictive parser.

Question 8.

(20)

- What is meant by ambiguity? How can we remove it from a grammar? Explain it by using an example.
- Explain in-order traversal of a tree.



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Paper: X [10-COMP]

(Theory of Automata & Compiler Construction)

Time: 30 Min. Marks: 20

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Question 1.

Select the most appropriate option from the following:

(5x2=10)

1. Push – Down Automata can design all regular languages as well as context free languages.
 - a. True
 - b. False
2. In Regular Expressions, which operator has lowest priority?
 - a. Dot (.)
 - b. Union (+)
 - c. Closure (*)
 - d. All have same priority.
3. _____ tells the current state / scenario of a machine at a particular time unit.
 - a. Final State
 - b. Transition Function
 - c. Configuration
 - d. None of above
4. PDA has _____ types.
 - a. 1
 - b. 2
 - c. It has no further type
 - d. None of above
5. Output of a Finite Automata may
 - a. Accept / Reject
 - b. Loop
 - c. Accept / Reject / Loop
 - d. None

Question 2.

Select the most appropriate option from the following:

(5x2=10)

1. Order of the phases for C/C++ program execution is _____.
 - a. Preprocessor > Linker > Assembler > Compiler > Loader
 - b. Preprocessor > Assembler > Compiler > Linker > Loader
 - c. Preprocessor > Compiler > Assembler > Linker > Loader
 - d. None of above
2. Lexical Analyzer is also known as _____.
 - a. Scanner
 - b. Parser
 - c. Type checker
 - d. All of above
3. Syntax analyzer is also known as _____.
 - a. Scanner
 - b. Parser
 - c. Type checker
 - d. All of above
4. Target Code generator phase depends upon the _____ language.
 - a. Source
 - b. Target
 - c. Both of above
 - d. None of above
5. _____ Parser is the least powerful parser of _____.
 - a. LR (0), Top Down Parser
 - b. LR(1), Top Down Parser
 - c. LR (0), Bottom Up Parser
 - d. LR(1), Bottom UP Parser



UNIVERSITY OF THE PUNJAB

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Paper: IX [9-NET] (Network Design and Management +
Wireless and Mobile Communication)

Time: 30 Min. Marks: 20

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Question 1.

Select the most appropriate option from the following:

(5x2=10)

1. What is the maximum number of IP Addresses that can be assigned to hosts on a local subnet that uses 255.255.255.254 subnet mask?
a) 14
b) 15
c) 16
d) None of the above
2. Internet is used globally now a days:
a) True
b) False
3. A _____ is the physical path over which a message travels.
a) Path
b) Medium
c) Protocol
d) Route
4. Which of this is not a network edge device?
a) PC
b) Smartphones
c) Servers
d) Switch
5. A _____ set of rules that governs data communication.
a) Protocols
b) Standards
c) RFCs
d) Servers

Question 2.

Select the most appropriate option from the following:

(5x2=10)

1. Three or more devices share a link in _____ connection.
a) Unipoint
b) Multipoint
c) Point to point
d) Simplex
2. Packet switching is type of transmission
a) True
b) False
3. The physical layer is concerned with _____
a) bit-by-bit delivery
b) process to process delivery
c) application to application delivery
d) port to port delivery
4. Bits can be sent over guided and unguided media as analog signal by _____
a) digital modulation
b) amplitude modulation
c) frequency modulation
d) phase modulation
5. Which of the following is false with respect to TCP?
a) Connection-oriented
b) Process-to-process
c) Transport layer protocol
d) Unreliable



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Paper: IX [9-NET] (Network Design and Management +
Wireless and Mobile Communication)

Time: 2 Hrs. 30 Mins. Marks: 80

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PART – I : (NETWORK DESIGN AND MANAGEMENT)

Q.3. (20)

Define Topology. Explain different topologies in detail.

Q.4. (20)

Which layer is responsible for creating, managing and terminating sessions between applications?
Explain in detail.

Q.5. (20)

Explain the difference between TCP/IP Model and DoD Model in detail

PART – II : (WIRELESS AND MOBILE COMMUNICATION)

Q 6: Decompose the signal $(1 + 0.1 \cos 5t)\cos 100t$ into a linear combination of sinusoidal function, and find the amplitude, frequency, and phase of each component (20)

Q 7: Consider a simple telephone network consisting of two end offices and one intermediate switch with a 1-MHz full-duplex trunk between each end office and the intermediate switch. The average telephone is used to make four calls per 8-hour workday, with a mean call duration of six minutes. Ten percent of the calls are long distance. What is the maximum number of telephones an end office can support?

(20)

Q 8: Explain Pulse Code Modulation (PCM) and Delta Modulation (DM) in detail. (20)



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Subject: Information Technology

Paper: X [10-NET] (Network Security & Netcentric Computing)

Time: 2 Hrs. 30 Mins. Marks: 80

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PART – I : (NETWORK SECURITY)

Q 3. Encrypt the following text by using Caesar Cipher. (20)

“The learning process continues until the day you die.”

Q 4. Explain the following terms with examples: (20)

- User Authentication
- Password Authentication
- Digital signature
- Biometric authentication

Q 5. Explain about transport layer, functionality, protocols and devices. (20)

PART – II : (NETCENTRIC COMPUTING)

Q 6. Explain the types of Wireless Technology. (20)

Q 7. Difference between GSM and AMPS (20)

Q 8. Explain Clock synchronization. (20)



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Paper: X [10-NET] (Network Security & Netcentric Computing) Time: 30 Min. Marks: 20

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Q 1. Select the most appropriate option from the following:

(5x2=10)

1. Modification of data after unauthorized access is a type of _____ attack?
 - A. Passive Attack
 - B. Unintentional Attack
 - C. Active Attack
 - D. All mention above.
2. Vigenère Cipher is a _____?
 - A. Transposition
 - B. Substitutions
 - C. Product
 - D. None of above
3. Which one is Security Service?
 - A. RFC.2828
 - B. X.800
 - C. Both a& b.
 - D. None of above.
4. A digital signature is a mathematical technique which validates?
 - A. Authenticity
 - B. Non repudiation
 - C. Integrity
 - D. All of above
5. A firewall is installed at the point where the secure internal network and untrusted external network meet which is also known as _____?
 - A. Meeting point
 - B. Check Point
 - C. Secure point
 - D. Firewall point

Q 2. Select the most appropriate option from the following:

(5x2=10)

1. Which of the following is the world's first cellular system to specify digital modulation and network level architecture?
 - A. AMPS
 - B. CDMA
 - C. GSM
 - D. IS-54
2. Which of the NetWare protocol works on layer 3 network layer?
 - A. IPX
 - B. NCP
 - C. SPX
 - D. XMPT
3. Cristian's Algorithm is _____
 - A. Active Time Server Algorithm
 - B. Passive Time Algorithm
 - C. Logical algorithm
 - D. All of above
4. The functionality of medium access control is _____?
 - A. Reliable data delivery
 - B. Fairly control access
 - C. Protection of data
 - D. All mention above
5. What is the objective of the knapsack problem?
 - A. To get maximum total value in the knapsack
 - B. To get minimum total value in the knapsack
 - C. To get maximum weight in the knapsack
 - D. To get minimum weight in the knapsack



UNIVERSITY OF THE PUNJAB

M.Sc. I.T. (Second Year) Supply 2020 / Annual – 2021

Paper: 10-IS (Information Management Systems & Information System Security)

Subject: Information Technology

Time: 30 Mins. Marks: 20

Roll No. in Fig.

Roll No. in Words.

Signature of Supdt.:

Attempt this Paper on this Question Sheet only.

Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Question 1.

Select the most appropriate option from the following:

(10x1=10)

1. Which one is the organizations Back Bone?
a. Capital b. Employee c. Management d. Information
2. Information management system that monitors the elementary activities and transactions of the organizations are ...
a. Management level system b. Operational level system c. Knowledge level system
3. In an information system which one is not a technology driver for an information system?
a. Knowledge asset management b. Networks and the Internet
c. Object technologies d. Enterprise applications
4. WEP stands for what?
a. Wired equivalency protocol b. Wired equivalent privacy
c. Wireless encryption protocol d. None of Above
5. From the options below, which of them is not a threat to information security?
a. Disaster b. Eavesdropping c. Information leakage d. Unchanged default password
6. What product can be considered to be part of the threat containment architecture?
a. MARS b. Catalyst switch c. ASA firewall d. Cisco Security Agent (CSA)
7. Which one of the following is not a component of a good security policy?
a. Governing policy b. User policies c. Technical policies d. User training
8. Network layer firewall works as a
a. frame filter b. packet filter c. both (a) and (b) d. none of the mentioned
9. WPA2 is used for security in
a. Ethernet b. Bluetooth c. Wi-Fi d. none of the mentioned
10. Hardware firewalls usually are located inside the network security perimeter as the last line of defense?
a. True b. False

Question#2

(10X1=10)

Select the most appropriate option from the following:

1. In a general sense, security is defined as a state of freedom from danger or risk?
a. True b. False
2. Network layer firewall works as a
a. Frame filter b. Packet filter c. Both (a) and (b) d. None of the mentioned
3. Which is not a goal of an information security policy?
a. Identify the critical information assets. b. Identify how the assets must be secured.
c. Identify the storage to the data.
4. The term "exploit" means to take advantage of vulnerability?
a. True b. False
5. In _____ resources are allocated on demand.
a. Packet switching b. Circuit switching c. Line switching d. Frequency switching
6. _____ is the practice and precautions taken to protect valuable information from unauthorized access, recording, disclosure or destruction.
a. Network Security b. Database Security c. Information Security d. Physical Security
7. A virtual private network establishes a virtual Internet network that consists of you, your customers, and suppliers?
a. True b. False
8. Software keyloggers are programs that silently capture all keystrokes, including passwords and sensitive information.
a. True b. False
9. Common network device vulnerabilities include weak passwords, default accounts, and privilege escalation?
a. True b. False
10. Secure shell (SSH) network protocol is used for
a. Secure data communication b. Remote command-line login
c. Remote command execution d) All of the mentioned True



UNIVERSITY OF THE PUNJAB

M.Sc. I.T. (Second Year) Supply 2020 / Annual – 2021

Roll No.

Subject: Information Technology

Paper: 10-IS (Information Management Systems & Information System Security) Time: 2 Hrs. 30 Mins. Marks: 80

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Note: Attempt TWO Questions from each section. All Questions carry equal marks.

SECTION – 1 (INFORMATION MANAGEMENT SYSTEMS)

Question # 3

(10X2=20)

- a) Briefly explain intrusion detection system (IDS) and intrusion protection system (IPS)?
- b) Define Denial-of-Service Attacks and its Types?
 - a. Denial of Access to Information
 - b. Denial of Access to Applications
 - c. Denial of Access to Systems
 - d. Denial of Access to Communications
 - e. How Denial-of-Service Attacks Are Accomplished

Question # 4

(10+10=20)

- a) Explain the Network Management and its type?
 - a. Network Management Protocols (SNMP, CIMP, WMP)
 - b. Network Management System / SLA
 - c. Network Management Products
- b) Infrastructures & Protocols
 - a. Application Protocols (HTTP, HTML, CSS, SMTP, FTP, etc.)
 - b. System Services (Web Server, Directory Services, Printing Services, etc.)

Question # 5

(10X2=20)

- a) Define the Access Control Systems and its types?
 - a. Physical Access Control
 - b. Access Cards
 - c. Electronic Surveillance
 - d. Biometrics
 - e. Event Monitoring
- b) What are common network design factors and also explain role of DNS in WAN communication and its types?

SECTION – 2 (INFORMATION SYSTEM SECURITY)

Question # 6

(10X2=20)

- a) Explain the IP addresses, its classes, and difference b/w private and public addresses?
- b) What is role of security policy and how can implement it for secure networking?

Question # 7

(10X2=20)

- a) How we can secure our network, explain parameters to secure it?
- b) Define Access Attacks?
 - a. Snooping
 - b. Eavesdropping
 - c. Interception
 - d. How Access Attacks Are Accomplished

Question # 8

(10X2=20)

- a) Explain routing protocols and its characteristics?
- b) Explain the access control list (ACL) to safe the communication?



UNIVERSITY OF THE PUNJAB

M.Sc. I.T. (Second Year) Supply 2020 / Annual – 2021

Paper: 9-IS (Data Warehousing and Data Mining & Artificial Intelligence)
Subject: Information Technology

Time: 30 Mins. Marks: 20

Roll No. in Fig.

Roll No. in Words.

Signature of Supdt.:

Attempt this Paper on this Question Sheet only.

Division of marks is given in front of each question.

This Paper will be collected back after expiry of time limit mentioned above.

Question 1.

(5x2=10)

Select the most appropriate option from the following:

- Which is used to improve the performance of heuristic search?
 - Quality of nodes
 - Quality of heuristic fun
 - Simple form of nodes
 - None of the above
- Hill-Climbing algorithm terminates when,
 - Stopping criterion met
 - Global Min/Max is achieved
 - No neighbour has higher value
 - Local Min/Max is achieved
- Hill climbing sometimes called _____ because it grabs a good neighbour state without thinking ahead about where to go next.
 - Needy local search
 - Heuristic local search
 - Greedy local search
 - Optimal local search
- Which are needed to compute the logical inference algorithm?
 - Logical equivalence
 - Validity
 - Satisfiability
 - All of the mentioned
- Which form is called as conjunction of disjunction of literals?
 - Conjunctive normal form
 - Disjunctive normal form
 - Normal form
 - All of the mentioned

Question#2

(5X2=10)

Select the most appropriate option from the following:

- _____ is not a data mining functionality?
 - Clustering and Analysis
 - Selection and interpretation
 - Classification and regression
 - Characterization and Discrimination
- _____ normalization is not very well efficient in handling the outliers Min max
 - Min max
 - Z Score
 - Decimal Scaling
 - None of the above
- Which of the following is not a kind of data warehouse application?
 - Information processing
 - Analytical processing
 - Data mining
 - Transaction processing
- Data warehouse contains _____ data that is seldom found in the operational environment
 - informational
 - normalized
 - denormalized
 - summary
- The process of viewing the cross-tab (Single dimensional) with a fixed value of one attribute is _
 - informational
 - normalized
 - denormalized
 - summary



Subject: Information Technology

Paper: 9-IS (Data Warehousing and Data Mining & Artificial Intelligence) Time: 2 Hrs. 30 Mins. Marks: 80

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Note: Attempt TWO Questions from each section. All Questions carry equal marks.

SECTION – 1 (DATA WAREHOUSING & DATA MINING)

Question 3. Define and explain difference between E-R Modeling and Dimensional Modeling. (20)

Question 4. Learn a decision tree using the ID3 (based on Information gain) algorithm and draw the tree. Predict the class of the Instance {A, B, B} (20)

Rec. #	F1	F2	F3	Class
1	A	A	A	+
2	A	A	B	+
3	A	B	A	+
4	B	A	B	-
5	B	B	A	-
6	B	B	B	-

Question 5. Write note on two of the followings (10+10)

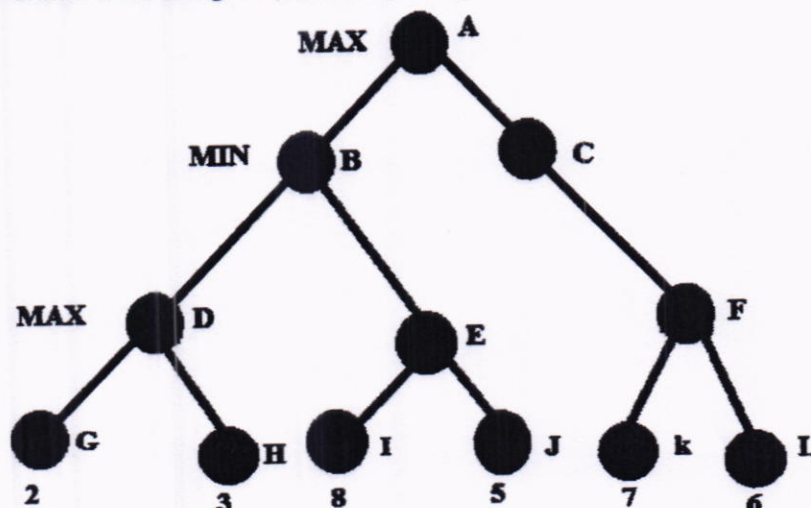
- Data Mining applications
- OLTP
- OLAP Models

SECTION – 2 (ARTIFICIAL INTELLIGENCE)

Question 6. Discuss why you think the problem of machines “learning” is so difficult. (20)

Question 7. Solve following questions using the following game tree (10+10)

- Perform minimax.
- Perform a left-to-right alpha-beta pruning.



Question 8. Write note on two of the followings (10+10)

- Expert System
- Backpropagation Learning
- Classification vs Clustering