



# UNIVERSITY OF THE PUNJAB

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

Paper: I-NI / I-NII (Discrete Mathematics + Logic Design & Computer Organization)

Roll No. ....

Time: 3 Hrs. Marks: 100

## USE SEPARATE ANSWER SHEET FOR EACH PART

NOTE: Question No. 1 is Compulsory. Attempt any TWO questions from remaining Questions.

### PART – I (DISCRETE MATHEMATICS)

Question # 1: Select the right answer cutting and overwriting is not allowed. (2x5=10)

- What is the cardinality of the set of odd positive integers less than 10?
  - 10
  - 5
  - 3
  - 20
- The converse of conditional statement  $p \rightarrow q$  is \_\_\_\_\_?
  - $q \rightarrow p$
  - $\neg q \rightarrow \neg p$
  - $\neg p \rightarrow \neg q$
  - None of these
- What is the Cartesian product of  $A = \{1, 2\}$  and  $B = \{a, b\}$ ?
  - $\{(1, a), (1, b), (2, a), (2, b)\}$
  - $\{(1, 1), (2, 2), (a, a), (b, b)\}$
  - $\{(1, a), (2, a), (1, b), (2, b)\}$
  - $\{(1, 1), (a, a), (2, a), (1, b)\}$
- Big-O estimate of function  $f(n)=16n^3+3n^2$  is:
  - $O(n^2)$
  - $O(3n^2)$
  - $O(n^3)$
  - $O(19n^5)$
- A complete graph (undirected) with 4 vertices has \_\_\_\_\_ edges?
  - 4
  - 5
  - 6
  - 7

Question # 2

[10 + 10]

- Give a big-O estimate for  $f(n) = (n^2 + 4n \log n)^*(n + 1)$
- Prove by mathematical induction that  $4^n - 1$  is divisible by 3, for integers  $n \geq 1$ .

Question # 3

[10+10]

- Prove by truth tables that  $\neg(A \leftrightarrow B) \Leftrightarrow (\neg A \vee \neg B) \wedge (A \vee B)$
- Given the adjacency matrix:

$$A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

Draw its corresponding graph.

Question # 4

[10 + 10]

- Draw  $W_6, C_6, K_6$ .
- Give a proof by contradiction that if  $x$  is a rational number and  $y$  an irrational number, then  $x+y$  is irrational.

## PART – II (LOGIC DESIGN & COMPUTER ORGANIZATION)

**NOTE: Question No. 5 is Compulsory. Attempt any TWO questions from remaining Questions.**

**Question # 5:** Fill in the blanks with appropriate answer. (5x2=10)

1. Decoder is a \_\_\_\_\_ circuit.
2. ~~The simplified expression of half adder carry is \_\_\_\_\_.~~
3. ~~Table that lists inputs for required change of states is called \_\_\_\_\_.~~
4. DR register is named as \_\_\_\_\_.
5. To implement 4-bit counter using D flip flop \_\_\_\_\_ numbers of flip flop required.

**Question # 6:** (10+10)

- a) Design code converter circuit that accepts input as Excess-3 code and generates output in 7421 Code.
- b) Simplify the function in SOP using Boolean Algebra.  
 $F(A,B,C) = A'B'C + A'BC + A'BC' + ABC$

**Question # 7:** (10+10)

- a) Design a 3-bit majority circuit.
- b) Design Full Adder Circuit using Half Adder and some extra gates.

**Question # 8:** (10+10)

- a) The content of PC in the basic Computer is ABC. The content of Memory at address ABC is 2DEF. ~~The content of memory at address DEF is 0EFC. The content of memory at address ECA is ABCD.~~  
Write down the name of the instruction that will be executed next? Give the contents of registers PC, IR, DR, AC at the end of the execution of this instruction.
- b) Design 8 X 3 Encoder Circuit.



# UNIVERSITY OF THE PUNJAB

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

Paper: II (Object Oriented Programming + Data Structure & Algorithms)

Roll No. ....

Time: 3 Hrs. Marks: 100

## USE SEPARATE ANSWER SHEET FOR EACH PART

### PART – I

#### (OBJECT ORIENTED PROGRAMMING)

**NOTE:** Attempt any THREE out of FOUR questions while Question No.1 is Compulsory.

**Question # 1:** Give precise and short answers of following with examples: (5x4=20)

- 1) How encapsulation is achieved in java language?
- 2) What is difference between late binding and early binding?
- 3) Write keywords used for exception handing in java.
- 4) What is difference between package and library?
- 5) What is multithreading? How it is achieved in java language?

**Question # 2:** (16)

Define a class employee having data members as emp\_code, dept\_code, age, basic, DA, HRA and three member functions as getdata(), putdata(), calculatesalary() to get, display all the values of data members and calculate the total salary by adding basic, Daily Allowance (DA), House Rent Allowance (HRA). Write this program for 10(ten) employees using an array of objects.

**Question # 3:** (16)

```
class X
{
    void x1();
    public: void x2();
    protected: void x3();
};
class Y: public X
{
    void y1();
    public: void y2();
    protected: void y3();
};
class Z: public Y
{
    void z1();
    public: void z2();
};
void main()
{
    X temp1;
    Y temp2;
    Z temp3;
}
```

- a) Name ALL member functions of all classes that are visible through “temp1”, “temp2” and “temp 3” in the main function.
- b) What changes need to do for apply function overriding?
- c) Write a virtual function void show() in class X and override this function in class Y and class Z.
- d) Write code for calling function void show() of class Y.

**Question # 4:** (16)

Write a C++ program to create three string objects with values: KING, USMAN, SHEIKH. Now, concatenate them into one string object as “KING SHIEKH USMAN” using:

- a) Append function
- b) + operator
- c) Call + operator in main function for above mentioned example
- d) Write syntax for overloading uniry+ operator.

**PART – II**  
**(DATA STRUCTURE AND ALGORITHM)**

*NOTE: Attempt any THREE out of FOUR questions.*

Question # 5: (16)

Write a program that implementation of the single linked list with two pointer head and current. Add following member functions in this class

a) Add function that adds the elements in the link list, the element should be add at the end of link list:     **void add(int x)**

b) Write **Reverse ()** function that uses a stack object to print the elements of linklist in reverse order.

Note: Assume the implementation of stack class with member function: **push(x)**, **pop()**, **top()**, **isEmpty()** and **isFull()**:

Question # 6: (16)

Convert the following infix expression to prefix and postfix notation. Show the process by writing all the steps using stack.

Infix expression:  $((A / (B + C)) * (E - A) * C)$

Question # 7: (16)

Write the Pseudocode/ C++ code to build a Max Heap and apply the algorithm on the given array. Show the status of the array by drawing the heap after each iteration or recursive call.

Index	A[1]	A[2]	A[3]	A[4]	A[5]	A[6]	A[7]	A[8]	A[9]	A[10]	A[11]
<b>Original Array</b>	65	31	32	26	21	19	68	13	24	15	14

Question # 8: (16)

Sort the following array using insertion sort. Show the process by writing all the steps as follows:

Index	A[0]	A[1]	A[2]	A[3]	A[4]	A[5]	A[6]
<b>Original Array</b>	20	35	40	100	3	10	15
<b>Step 1</b>							

Also write Pseudocode of **INSERTION-SORT(A)**



# UNIVERSITY OF THE PUNJAB

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

Paper: III (Writing Workshop +  
Business and Technical Communication)

Time: 30 Min. 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.**

**Q.1.**

Supply the correct form of the verbs given in parenthesis in the following sentences. (5x1=5)

- i. Margaret has not \_\_\_\_\_ to work yesterday. She wasn't feeling well. (go)
- ii. Look! That man over there is \_\_\_\_\_ the same sweater as you. (wear)
- iii. Your son is much taller than when I last \_\_\_\_\_ him. (see)
- iv. I still don't know what to do. I did not \_\_\_\_\_ yet. (deciding)
- v. I wonder why Jim is \_\_\_\_\_ so nice to me today. (be)

**Q.2. Answer the following questions.**

**(5+5+5)**

i. What is meant by Paralinguistic / language?

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ii. Describe different kinds of informative speaking.

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iii. Define Proxemics.

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# UNIVERSITY OF THE PUNJAB

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

Paper: IV (Introduction to Information Technology +  
Advanced Computer Programming)

Time: 30 Min. 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.

**Q.1. Select the Correct option against each of the following. (5x2=10)**

1. Semiconductor memory device in which stored data will remain permanently stored as long as power is supplied is
  - A. dynamic memory device
  - B. storage device
  - C. flash device
  - D. static memory device
2. Computer word size is a multiple of
  - A. 16 bits
  - B. 4 bits
  - C. 1024 bits
  - D. 10 bits
3. In computer terminology, OCR stands for
  - A. Optical Character Reader
  - B. Optical Card Reader
  - C. Office Cash Receiver
  - D. Online Computer Retrieval
4. Type of computer memory in which access time is not constant but varies depending on address location is known as
  - A. RAM
  - B. RWM
  - C. ROM
  - D. SAM
5. Device that takes data from user and convert it into form that can be easily understandable by computer is
  - A. storage device
  - B. output device
  - C. input device
  - D. pointing device

**Q.2. Select the correct option against each of the following.**

**(5x2=10)**

1. The major language of World Wide Web is
  - (A) HTML
  - (B) PHP
  - (C) ASP.NET
  - (D) Java
2. HTML is an abbreviation for?
  - (A) HiTech Meaningful Language
  - (B) HyperText Meaningful Language
  - (C) HiTech Markup Language
  - (D) HyperText Markup Language
3. \_\_\_\_\_ is a device from where the information is sent.
  - (A) Transmitter
  - (B) Spreadsheet
  - (C) Simulation
  - (D) Modulation
4. \_\_\_\_\_ is a mathematical model of a real system in the form of a computer program.
  - (A) Transmitter
  - (B) Spreadsheet
  - (C) Simulation
  - (D) Modulation
5. LAN is an abbreviation for?
  - (A) Large Access Network
  - (B) Local Access Network
  - (C) Large Area Network
  - (D) Local Area Network





# UNIVERSITY OF THE PUNJAB

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

Paper: IV (Introduction to Info. Tech. +  
Advanced Computer Programming)

Roll No. ....  
Time: 2 Hrs. 30 Min. Marks: 80

**ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED**

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

## PART 1: Introduction to Information Technology

- Q.3. (20)
- a. Describe any 5 elements/tags from HTML. [5 x 2 = 10]
  - b. Write down the advantages of JavaScript Language. [10]

- Q.4. (20)
- Describe the following terms:
- a. Central Processing Unit
  - ~~b. Input and Output Storage~~
  - c. Microsoft Office
  - d. Artificial Intelligence

- Q.5. (20)
- Write an algorithm and flow chart that ask user for a discrete number n, if the number is positive then print its table up to multiple of 10 from 0, otherwise ask for input again until you get the required input or 0.

## PART 2: Advance Computer Programming

- Q.6. (20)
- Write a program which asks user to enter a sentence. Count the total number of spaces in the input.

- Q.7. (20)
- Create a University class with data member as name and location. It should also have two member functions:-
- a. getInfo(), which allows the user to enter name and location of the university and store it in the object.
  - b. showInfo(), which displays the university information on console.

- Q.8. (20)
- Make an abstract class Book with a title data member. Make a default constructor and an abstract function to set title. You have to create another class that extends the abstract class. Implement the set title abstract method in this inherited class. Now in main, create an instance of the new class to set the title taken from user and print accordingly.





# UNIVERSITY OF THE PUNJAB

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

Paper: V (Data Communication and Computer Networks + Internet Architecture and Protocols)

Time: 30 Min. 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.

**Q.1.(a) Write your selected option (True / False) only on your answer sheet against each of the following. (10x1=10)**

- 1 TCP is the Network layer protocol used on the internet today True / False
- 2 TCP portion of TCP/IP performs linking to the application layer True / False
- 3 The Latest of IP VPs 7, which increase the address space from 128 bits to 256 bits True / False
- 4 The standard port number for the Telnet is 53. True / False
- 5 ~~Connectionless routing set up a TCP connection, or virtual circuit between a sender and receiver~~ True / False
- 6 TCP/IP operate only as connection-oriented True / False.
- 7 The data link layer is generally encoded in a network card by the card's Manufactured. True / False
- 8 14.23.120.8 address lies in the class A True / False
- 9 We consider the TCP/IP architecture to be a seven-layer model, of which the top three layers (application, transport, and internet) are most common in the Internet True / False
- 10 Node-to-node communication between two directly connected devices is handled by the data link layer. True / False

**(b) Answer the following short questions. (5x2=10)**

1. Define DNS?

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2. Change the following IPv4 address 10000001 00001011 00001011 11101111 from binary notation to dotted-decimal notations.

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3. Find the error, of any in the following IPv4 address

- a) 111.56.045.78 b) 221.34.78.20 c) 75.45.301.14 d) 1110010.23.14.67

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4. List some WAN technologies.

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5. Define CBT protocol?

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# UNIVERSITY OF THE PUNJAB

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

Paper: V (Data Communication and Computer Networks +  
Internet Architecture and Protocols)

Roll No. ....

Time: 2 Hrs. & 30 Min. 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 Communication and Computer Networks**

- Q.2. (10+10=20)  
A. What are different types of Guided and unguided media? Give details.  
B. What is meant by terms addressing and naming in computer Networks
- Q.3. (10+10=20)  
A. What is difference between Baseband and Broadband Transmission?  
B. Write a note on TDM and WDM
- Q.4. (10+10=20)  
A. Discuss the architecture of TCP/IP Model  
B. Explain the working of cable modems.

## **SECTION 2 : Internet Architecture and Protocols**

- Q.5. (10+10=20)  
A. Explain the layer 2 protocol in detail.  
B. Explain the various attributes present in TCP header.
- Q.6. (10+10=20)  
A. Differentiate b/w IPv4 & IPv6  
B. Differentiate b/w CSMA/CD & CSMA/CA?
- Q.7. (10+10=20)  
A. What is difference b/w link state and distance vector routing protocols?  
Explain any of those in detail.  
B. An ISP is granted a block of addresses starting with 190.100.0.0. the ISP needs to distribute these addresses to three branches including main branch. Give the network address broadcasting address effective range of each branch.



**SECTION 1 : Software Engineering**

**NOTE: Question No. 1 is compulsory. Attempt any TWO questions from rest of the section.**

**Question 1: (Marks 5 x 2=10)**

1. What is Quality Assurance?
2. Write down the formula to calculate “cyclometric complexity”.
3. Why Risk Analysis is important in Software Engineering?
4. “Software does not wear out but is can deteriorate”. Explain with example?
5. Differentiate “Event” with respect to “state transition diagram”

**Question 2: (Marks 20)**

Discuss Waterfall Model with suitable diagram. Give its merits and demerits?

**Question 3: (Marks 20)**

What is human Computer Interface? Why it is important? How it benefits in Software Design?

**Question 4: (Marks 20)**

Explain the method in detail to calculate project cost by using COCOMO.

**SECTION 2 : Project Management**

**NOTE: Question No. 5 is compulsory. Attempt any TWO questions from rest of the section.**

**Question 5: (Marks 5 x 2=10)**

1. Explain Staffing management plan
2. Write two roles of project manager.
3. What is WBS .
4. What are Software Quality Standards?
5. Name two technique of Cost Estimating.

**Question 6: (Marks 20)**

What are main process involved in project scope management? Explain in detail.

**Question 7: (Marks 20)**

Explain project Monitoring and controlling in detail

**Question 8: (Marks 20)**

Explain at least three techniques of conflict resolution and how project manager implements them.