UNIVERSITY OF THE PUNJAB

First Semester   2015

Examination: B.S. 4 Years Programme

Roll No. ....

PAPER: Introduction to Computing

Course Code: IT-101

TIME ALLOWED: 2 hrs. & 30 mins.

MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

PART – II (Short Questions)

QUESTION # 2 [20 marks]

Write short answers to all of the following questions:

1. List the functions of control unit in CPU.
2. Consider three processes P1, P2 and P3 in memory. P1 takes 5 ns; P2 takes 3 ns and P3 takes 12ns to complete its execution. What is the total turnaround time if they are executed in Time Shared OS environment having 4 ns for each clock cycle?
3. What is OSI model?
4. What is the difference between database and data base management system?
5. What are cyber ethics? Explain with examples?
6. Write any two applications of Microsoft excel that how it provides ease in business record management.
7. What is Hyperlink in Power Point?
8. Difference between RAM and ROM?
9. List any two methods/algorithms used for information security.
10. What are registers? Name any 4 registers and their purpose.

PART – III (Subjective)

QUESTION # 3 [10 marks]

a) What is CPU? Explain its role and its different parts? [5]
b) What is the difference between File processing system (FPS) and Database management system (DBMS).discuss in detail. [5]

QUESTION # 4 [10 marks]

a) What are the functions of operating system? Discuss in detail. [5]
b) Consider the following table: [5]

P.T.O.

Number	First Name	Last Name	Points
1	Mohsin	Riaz	50
2	Sohaib	Javaid	100
3	Asim	Rasool	150
4	Zeeshan	Shabbir	200
5	Ali	Ahamd	250

Write the html code for above table by using following attribute values:

Page title = table

Cellpadding= 10

Table alignment = center

Cellspacing = 6

Table color = Blue

QUESTION # 5

[10 marks]

a) Draw a flow chart OR write a program that takes 10 numbers from user and display their sum.

UNIVERSITY OF THE PUNJAB

Roll No. ....

First Semester   2015
Examination: B.S. 4 Years Programme

PAPER: Introduction to Computing
Course Code: IT-101

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

PART – I (Objective)

QUESTION # 1   [10 marks]

Select the best option for each of the following MCQs. Overwriting will result ZERO in credit.

1. A domain name is a text version of _____.
   - a) A webpage
   - b) An IP address
   - c) A proxy server
   - d) Memory address

2. _____ memory has the least access time.
   - a) Magnetic Tape
   - b) Main Memory
   - c) Register
   - d) Cache

3. _____ interprets and carries out the basic instructions that operate a computer.
   - a) Cache
   - b) Motherboard
   - c) Memory
   - d) CPU

4. The disk's storage locations are divided into pie-shaped sections called _____.
   - a) Platters
   - b) Tracks
   - c) Cylinders
   - d) Sectors

5. The process of transferring data electronically from one place to another is called _____.
   - a) Data Processing
   - b) Data Communication
   - c) Data sequencing
   - d) Data Transferring

6. Linux is _____ software.
   - a) Application
   - b) System
   - c) Packaged
   - d) E-commerce software

7. _____ tag is used for unordered list.
   - a)
   - b) <uol> </oul>
   - c)
   - d) <dl> </dl>

8. The more widely used _____ are Internet Explorer, Firefox, Opera, Safari, and Google Chrome, etc.
   - a) Search engines
   - b) Operating systems
   - c) Device drivers
   - d) Browsers

9. _____ deceleration case of *doctype* is acceptable in html document.
   - a) <!DOCTYPE html>
   - b) <!doctype html>
   - c) <!DOCTYPE HTML>
   - d) <!Doctype Html>

10. RAM is defined as _____.
    - a) Memory that follows instructions from control Unit
    - b) Memory that holds data permanently into it for usage
    - c) Memory that holds data temporarily into it for usage
    - d) All of above

UNIVERSITY OF THE PUNJAB

Second Semester   2015
Examination: B.S. 4 Years Programme

PAPER: International Relations
Course Code: IR-111 / ....

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Q1. Choose the correct answer of the following. Cutting and over writing is not allowed.

1- Treaty of West Phalia was signed in.............

   a. 1618   b. 1648   c. 1919   d. 1789

2- The theory Clash of Civilization is proposed by..............

   a. Francis Fukuyama   b. John Lock   c. Samuel p. Huntington   d. Waltz

3- .... is a school of thought that deals with power.

   a. Nationalism   b. Idealism   c. Imperialism   d. Realism

4- NATO was formed in.............

   a. 1949   b. 1951   c. 1945   d. 1963

5- ....is a peaceful settlement of dispute through negotiation.

   a- International relations   b. Meeting   c. Diplomacy   d. Treaty

6- Cuban Missile crisis occurred in..........

   a. 1961   b.1962   c. 1963   d. 1953

7- UNO was formed in.............

   a. 1948   b.1919   c.1918   d.1945

8- The elements of state are..........

   a. 4   b. 2   c. 3   d. 5

9- WWII was occurred in.............

   a. 1914   b. 1918   c. 1939   d.1945

10-Incident of 9/11 occurred in..........

   a. 2005   b. 2001   c. 2002   d1999

UNIVERSITY OF THE PUNJAB

Second Semester   2015
Examination: B.S. 4 Years Programme

Roll No. ....

PAPER: International Relations
Course Code: IR-111 / ....

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Q2. Short Questions: (4x5=20)

1. What is diplomacy?

2. Define nationalism.

3. Briefly define the ways of promoting national interest.

4. What is cold war?

Long Questions: (3x10=30)

Q3. Define International Relations and its scope.

Q4. Explain the techniques of Balancing the Power.

Q5. Explain the theory of Realism.

UNIVERSITY OF THE PUNJAB

Second Semester   2015
Examination: B.S. 4 Years Programme

PAPER: Programming Fundamentals
Course Code: IT-102, ⋯⋯⋯⋯

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Question # 01:- Write the selected option (**A or B**) on your answer sheet against each of the following [1 x 10 = 10]

1. Computers can do many different jobs because they can be programmed? **A.** True **B.** False
2. Pseudo code is not an actual programming language. **A.** True **B.** False
3. A variable must be defined before it can be used? **A.** True **B.** False
4. A computer can directly understand machine languages and high-level languages. **A.** True **B.** False
5. The = operator and the == operator perform different operation? **A.** True **B.** False
6. A computer can directly understand machine languages and high-level languages. **A.** True **B.** False
7. x != y is the same as (x > y || x < y || x==y)? **A.** True **B.** False
8. The do-while loop is a post conditional loop? **A.** True **B.** False
9. Static local variables are not destroyed when a function returns? **A.** True **B.** False
10. The last element in an array is accessed by the subscript 4 of an array with 5 elements? **A.** True **B.** False

UNIVERSITY OF THE PUNJAB

Second Semester   2015
Examination: B.S. 4 Years Programme

Roll No. ....

PAPER: Programming Fundamentals
Course Code: IT-102, ...

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Question # 02:- Write a brief description about each of the following   [2 x 10 = 20]

1. What is the difference between a syntax error and a logical error?

2. How can you get the size in bytes of any data type exist in C++.

3. Write a statement that declares a variable num of integer type as a constant having a value 5.

4. What value will be displayed on the console by the program;   `float f = 5.00F;    cout << f;`

5. How the && operator works.

6. Write an if statement that sets the variable minutes to 0 when the flag variable is set to false.

7. Which loop should you use when you know the number of required iterations?

8. How global variables are different from local variables?

9. How do you return a value from a function?

10. When you return an array name from a function, what is actually being returned?

Question # 03:- Answer the following questions   [3 x 10 = 30]

1. Write a program that display the following output

| 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 |

2. Write a program that display the average of all the values exists in between 0 and 1000.

3. Write a program that take three float variables from the user and display them in their ascending order.

UNIVERSITY OF THE PUNJAB

Roll No. ....

Second Semester 2015
Examination: B.S. 4 Years Programme

PAPER: Digital Logic Design
Course Code: IT-104 / ....

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Q1. Multiple Choice Questions: (10 marks)

1. A digital signal represents 8 discrete values, the minimum number of bits required to represent each discrete value of the signal are:

   a)2   b)4   c)3   d)8

2. Binary equivalent for $(456.75)_d$ is:

   a) 110101111.110 b) 111010011.110 c) 111001000.101 d) 100111110.011

3. De-Morgan Law is _____

   a) (ab)'=a'+b'   b) (a+b)'=a'.b'   c) Both a and b   d) None of these

4. In Boolean algebra X+X = ____

   a) 1   b) 0   c)X   d)2X

5. The simplest answer of the expression A'+A'B+B'C+1 is:

   a)   A+B+C   b)   A+B   c)   A+C   d)1

6. _____ is known as universal gate:

   a)   NAND   b)   AND c)   NOT d)   OR

7. Decoder with enable input also called

   a) De- multiplexer b) Multiplexer   c) Encoder   d) None of these

8. Which type of RAM need to refresh periodically

   a) SRAM   b) DRAM   c) both a and b   d) None of these

9. The _____ Flip flop is a single-input version of JK flipflop:

   a)   T Flipflop   b) D Flipflop   c) RS Flipflop   d)None of these

10. Number of Flipflops required to design a sequential circuit consisting of n possible states is:

    a)   n   b)   2n   c)$Log_2 n$ d)   2n

UNIVERSITY OF THE PUNJAB

Second Semester 2015
Examination: B.S. 4 Years Programme

Roll No. ....

PAPER: Digital Logic Design
Course Code: IT-104 / ....

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Q2.   Short Questions: (20 marks)

a) Perform **1631 - 745** using 10's complement   (3)

b) Simplify the given Boolean function using Theorems and postulates: (3)
   F (A, B, C, D) = A'C' + ABC + AC'

c) What is meant by canonical form explain briefly with example.   (3)

d) Simplify following function using K-Map in SOPs form   (3)
   F (A,B,C,D) = Σ (0,1,2,3,8,9,10,15)

e) Construct a **Full subtractor** using a **Full Adder**.   (3)

f) Implement $F(x,y,z) = \sum (0, 2, 4, 7)$ using block diagram of a decoder and

   external gate.   (3)

g) Define why RAM called random access and its two types.   (2)

Q3. Long Questions: (30 marks)

a) (i)   Construct a Full Adder using Half Adders   (5)

   (ii)   Design a 4-to-16 Decoder using 2-to-4 Decoders   (5)

b) Write a detail note on 8 to 3 bit priority encoder.   (10)

c) Design a synchronous BCD Counter with T flipflop   (10)

UNIVERSITY OF THE PUNJAB

Third Semester   2015

Examination: B.S. 4 Years Programme

Roll No. ....

PAPER: Object Oriented Programming
Course Code: IT-201/.........

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE

Question # 02:-

Give precise and short answers of the following:

$(4 \times 5 = 20)$

1. Arguments passed by value and by reference.

2. Aggregation and Composition.

3. Over-loaded and Over-ridden functions.

4. Virtual and Pure Virtual functions.

Question # 03:-

[30]

Provide the implementation of a class named **Algebra** having **two data** members (a and b) of type integer with **private** access.

1. **Data member** of this class should contain **positive data** or **0 (default value)** for a particular object. Write all the **set functions** for each data member to **set** their values. [02 + 02 + 02]

2. Implement **default** (sets all data members to 0), **parameterized** and **copy constructor**. [02 + 02 + 02]

3. Implement **putData** member function to display the data of an object on the console. [02]

4. Overload **arithmetic assignment operator (+=)** to add and assign the data of one object to another. [03]

5. Overload **stream extraction operator** for taking the inputs for a particular object's data. [03]

6. Overload **arithmetic minus (−) operator** to return the result of two objects after subtraction. [03]

7. Overload **unary plus (+) operator**, returns true if an object contains data greater than zero, false otherwise. [03]

8. Implement **countEqualObjects** member function which accepts an array of **Algebra** objects and return the **total count** of all the objects which is equal to the left hand side object. [05]

UNIVERSITY OF THE PUNJAB

Third Semester 2015
Examination: B.S. 4 Years Programme

PAPER: Object Oriented Programming
Course Code: IT-201/

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

OBJECTIVE

Question # 01:- Write the selected option (**A or B**) on your answer sheet against each of the following   **[1 x 10 = 10]**

1. The analysis, design and implementation of information systems using object oriented programming languages, technologies and techniques is called object-oriented development?   **A.** True   **B.** False

2. The pointer, automatically supplied when you call a non-static class member function is this?   **A.** True   **B.** False

3. When you call a public static function from outside its class, you can use an object?   **A.** True   **B.** False

4. A member function can always access the data in the private part of its class?   **A.** True   **B.** False

5. Game(); is a legal constructor for the Game class?   **A.** True   **B.** False

6. The primary advantage to overloading functions is use one function name for many types of items?   **A.** True   **B.** False

7. If you do not overload an = operator for a class the compiler will not give an error?   **A.** True   **B.** False

8. The number of associations possible between classes of objects is called multiplicity?   **A.** True   **B.** False

9. An advantage of inheritance includes facilitating abstract classes?   **A.** True   **B.** False

10. A virtual function is a function that causes its class to be abstract?   **A.** True   **B.** False

UNIVERSITY OF THE PUNJAB

Third Semester   2015
Examination: B.S. 4 Years Programme

PAPER: Computer Organization and Assembly Language   TIME ALLOWED: 30 mins.
Course Code: IT-203/.   MAX. MARKS: 10

_____

Attempt this Paper on this Question Sheet only.

OBJECTIVE

Part - I

Question # 1:   [10]

Answer all parts in this question on answer sheet. Write on the answer sheet the part number and your answer against it. **No need to write the question statement on the answer sheet.**

1. _____ converts the programs written in assembly language into machine instructions.
    a) Machine compiler
    b) Interpreter
    c) Assembler
    d) Converter

2. The instructions like MOV or ADD are called as _____.
    a) OP-Code
    b) Operators
    c) Commands
    d) None of the above

3. The Assembly code that do not appear in the object program is called as _____.
    a) Redundant instructions
    b) Exceptions
    c) Comments
    d) Assembler Directives

4. The assembler directive EQU, when used in the instruction : Sum EQU 200 does,
    a) Finds the first occurrence of Sum and assigns value 200 to it
    b) Replaces every occurrence of Sum with 200
    c) Re-assigns the address of Sum by adding 200 to its original address
    d) Assigns 200 bytes of memory starting the location of Sum

5. The directive used to perform initialization before the execution of the code is _____.
    a) DB
    b) DW
    c) DD
    d) All of above

6. The last statement of the source program should be _____.
    a) Stop
    b) Return
    c) OP
    d) End

(P.T.O.)

7. When dealing with the branching code the assembler,
   a) Replaces the target with its address
   b) Does not replace until the test condition is satisfied
   c) Finds the Branch offset and replaces the Branch target with it
   d) Replaces the target with the value specified by the DATAWORD directive

8. The assembler stores all the names and their corresponding values in _____.
   a) Special purpose Register
   b) Symbol Table
   c) Value map Set
   d) None of the above

9. The utility program used to bring the object code into memory for execution is _____.
   a) Loader
   b) Fetcher
   c) Extractor
   d) Linker

10. The _____ instruction produces 1 only when the input bits are different.
    a) AND
    b) OR
    c) XOR
    d) TEST

UNIVERSITY OF THE PUNJAB

Third Semester   2015

Examination: B.S. 4 Years Programme

PAPER: Computer Organization and Assembly Language
Course Code: IT-203/.

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

SUBJECTIVE

Part - II

Question # 2:   [20]

a) What are the three basic steps in instruction execution cycle?

b) The CPU is connected to the rest of the computer using what three buses?

c) Is A5h is valid hexadecimal constant? (Yes/No)

d) What will be the result when we apply Shift Left on '1000000' ?

e) Name the four basic parts of an assembly language instruction.

f) How does the CALL instruction works?

g) What is the purpose of USES operator?

h) What is the purpose of INVOKE directive?

i) Which data type can hold a 32-bit signed integer?

j) Write instructions that contain a loop to display 1 to 5 integers.

Part - III

Question # 3:   [10]

Write an assembly language program that reads a character from keyboard and determines whether the character is a vowel or consonant. Your program should display proper message.

Question # 4:   [10]

a) Write an assembly language program that calculates the factorial on an integer number

Question # 5:   [10]

a) Write an assembly language program that alphabetically sorts an array of ten characters.

UNIVERSITY OF THE PUNJAB

Roll No. ....

Fourth Semester   2015
Examination: B.S. 4 Years Programme

PAPER: Web Engineering
Course Code: IT-205 /

TIME ALLOWED: 30 mins.
MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Question # 01:- Write the selected option (**A or B**) on your answer sheet against each of the following   [1 x 10 = 10]

1.	<title> is a HTML tag use to insert a page title?	A. True	B. False
2.	 is a HTML tag use to insert a new line in the page?	A. True	B. False
3.	<p> is a HTML tag use to insert a new paragraph in the page?	A. True	B. False
4.	<a> tag is use to insert a hyper reference in HTML page?	A. True	B. False
5.	Static website pages can be identified with extension .html or .htm?	A. True	B. False
6.	<sub> tag is used to create a subscript in HTML page?	A. True	B. False
7.	The JavaScript code is placed inside the <script> tag of HTML page?	A. True	B. False
8.	XML stands for Extreme Markup Language?	A. True	B. False
9.	Java Server Pages (JSP) can be identified with the extension .js?	A. True	B. False
10.	Java Script and XML makes up the AJAX?	A. True	B. False

UNIVERSITY OF THE PUNJAB

Fourth Semester   2015
Examination: B.S. 4 Years Programme

PAPER: Web Engineering
Course Code: IT-205 / ....

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Question # 02:- Write a brief description about each of the following   **[2 x 10 = 20]**

1. How can you create a comment in HTML?

2. What do you mean by internal CSS.

3. Differentiate between static website and dynamic website.

4. Differentiate between stateless and state-full protocols.

5. Differentiate between 2-tier and 3-tier web architecture.

6. What protocol(s) is used to access webpages?

7. What do you mean by query string, what kind of data can be sent in it?

8. For what purpose session variables are used?

9. Differentiate between servlet and java server pages.

10. How do you put a message in the browser's status bar using JavaScript?

Question # 03:- Answer the following questions   **[3 x 10 = 30]**

1. What is MVC? Explain the purpose of its each component with the help of examples.

2. What do you mean by Servlet? Explain its life cycle by giving the name and purpose of each function that is called in it.

3. What do you mean by AJAX? What advantages are provided by the AJAX technology in the website development over the existing ones'?

PAPER: Software Engineering   TIME ALLOWED: 30 mins.
Course Code: IT-206 / ....   MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Objective Type Questions (Total Marks 10)

Choose the right option:

1. Waterfall model is not suitable for?
   a. Small Projects
   b. Complex Projects
   c. Accommodating changes
   d. None of the above

2. Software Engineering aims at developing?
   a. Reliable software   c. Both 'a' and 'b'
   b. Cost effective software   d. None of the above

3. White box testing, a software testing technique is sometimes called?
   a. Basic path   c. Loop testing
   b. Graph testing   d. Glass box testing

4. Black box testing, a software testing technique is sometimes called?
   a. Data flow testing   c. Behavioral Testing
   b. Loop testing   d. Graph based testing

5. In object oriented design of software, objects have?
   a. Attributes and names only   c. Attributes, name, and
   b. Operations and names only   operations
                                     d. None of the above

6. Which of the following is a tool in design phase?
   a. Abstraction   c. Information hiding
   b. Refinement   d. There is no such activity

7. Which one of the following is not type of maintenance?
   a. Correction   c. Enhancement
   b. Adaptation   d. testing

8. Which type of requirements is generally stated by customer?
   a. Non Functional   c. Both 'a' and 'b'
      Requirements   d. None of the above
   b. Functional Requirements

9. In data flow diagram, it is possible that a process has an input but there is no output.
   a. True
   b. False

10. For architectural design, main input comes from?
    a. Entity Relationship Diagram
    b. State Transition Diagram
    c. Data Flow Diagram
    d. All of the above

UNIVERSITY OF THE PUNJAB

Fourth Semester   2015
Examination: B.S. 4 Years Programme

PAPER: Software Engineering
Course Code: IT-206 / ....

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Short Questions (Marks 20)

Each question is of 4 marks

Question # 1:
"Software does not wear out but it can deteriorate". Explain with example?

Question # 2:
Why does "Line of code based estimation" heavily dependent on historical data?

Question # 3:
Explain "requirement validation" with respect to "requirement engineering" by taking relevant example?

Question # 4:
Differentiate "Event" and "action" with respect to "state transition diagram"?

Question # 5:
Define "Software Quality Assurance"?

Subjective Questions (Marks 30)

Each question is of 10 marks

Question # 1:
Write down the procedure to draw a complete "Data Flow Diagram" by taking an example?

Question # 2:
Explain cohesion and coupling by taking relevant examples?

Question # 3:
Explain "user interface design" process by taking relevant example?

PAPER: Data Structure and Algorithm   TIME ALLOWED: 30 mins.
Course Code: IT-207 / ....   MAX. MARKS: 10

Attempt this Paper on this Question Sheet only.

Part-I (Objective)

QUESTION # 1   [10 marks]

Select the best option for each of the following multiple choice questions (MCQs). Only one option is correct. Cutting and overwriting in this question will be considered wrong.

1. Two main measures for the efficiency of an algorithm are
   - A. Processor and memory
   - B. Complexity and capacity
   - C. Time and space
   - D. Data and space

2. The Worst case occur in linear search algorithm when
   - A. Item is somewhere in the middle of the array
   - B. Item is not in the array at all
   - C. Item is the last element in the array
   - D. Item is the last element in the array or is not there at all

3. The complexity of the average case of an algorithm is
   - A. Much more complicated to analyze than that of worst case
   - B. Much more simpler to analyze than that of worst case
   - C. Sometimes more complicated and some other times simpler than that of worst case
   - D. None or above

4. The result of a postfix expression 8 2 3 ^ / 2 3 * + 5 1 * - with single digit operands is:
   - A. 1
   - B. 2
   - C. 3
   - D. 4

5. The complexity of Bubble sort algorithm is
   - A. $O(n)$
   - B. $O(\log n)$
   - C. $O(n^2)$
   - D. $O(n \log n)$

6. Which of the following data structure is not linear data structure?
   - A. Arrays
   - B. Linked lists
   - C. Graphs
   - D. None of above

7. Which of the following is not the required condition for binary search algorithm?
   - A. The list must be sorted
   - B. There should be the direct access to the middle element in any sublist
   - C. There must be mechanism to delete and/or insert elements in list
   - D. None of above

8. Suppose that you insert the following values (in the given order) into an empty binary search tree:

   8 4 7 6 2 9 5

   How many levels will be there in the resulting binary search tree?
   - A. 4
   - B. 5
   - C. 6
   - D. 7

9. When inorder traversing a tree resulted **E A C K F H D B G**; the preorder traversal would return
   - A. FAEKCDBHG
   - B. FAEKCDHGB
   - C. EAFKHDCBG
   - D. FEAKDCHBG

10. The time complexity to sort n elements by using merge sort technique, is always $\log_2(n)$
    - A. True
    - B. False

UNIVERSITY OF THE PUNJAB

Fourth Semester   2015
Examination: B.S. 4 Years Programme

Roll No. ....

PAPER: Data Structure and Algorithm
Course Code: IT-207 / ....

TIME ALLOWED: 2 hrs. & 30 mins.
MAX. MARKS: 50

Attempt this Paper on Separate Answer Sheet provided.

Part-II (Short Questions)

QUESTION # 2   [4 x 5 = 20 marks]

1. Draw the **Binary Search Tree (BST)** obtained when the following values are inserted (in the given order) into an initially empty BST:

   14 10 8 9 15 13 16 14

   You only have to show the final BST which results after inserting all of the above values.

2. Compute the running time of the program fragment shown below.
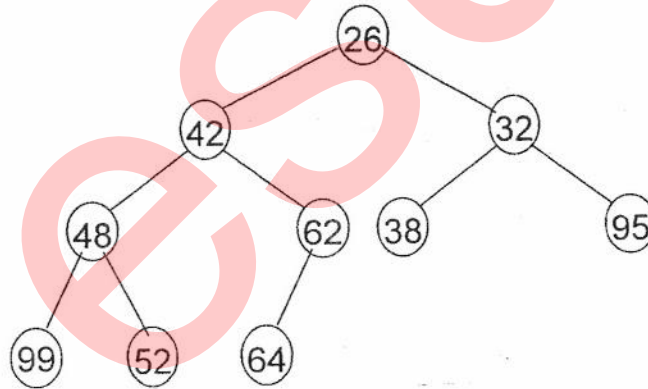
```
num = 0;
for(i=N; i>0; i--)
{
   if(i > j)
   {
        num = num + 1;
   }
   else
   {
        for(k=N; k > 0; k--)
        num = num - 1;
   }
}
```

3. Write a C++ function **leastDifference** that finds the least difference between any two elements of an array. For example:

   Array: 20   24   30   45   32   19
   Least Difference: 2 (between 30 and 32)

4. Perform deletion operation of minimum value only one time in the following min- heap and draw the resultant tree after deletion.

P.T.O.

Part-III (Subjective)

QUESTION # 3   [10 marks]

Convert following In-fix expression to Pre-fix expression. Evaluate both In-fix and Post-fix expression to compare results?

$$(12/(6 * 4)) + ((27/(3 * 3) + 1)/8)$$

QUESTION # 4   [10 marks]

Write a C++ function that removes duplicates from a Linked List. Consider the following scenarios, just for examples, before and after applying your function:

```
Before:     23   24   23   45   39   45   78   45   90
After:      23   24   45   39   78   90

Before:     1    3    4    5
After:      1    3    4    5
```

QUESTION # 5   [10 marks]

Write a C++ function **leafCount** that counts the leaves of a binary tree.

Good Luck