G .T.N. ARTS COLLEGE (AUTONOMOUS)

(Affiliated to Madurai Kamaraj University)
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END SEMESTER EXAMINATION - NOVEMBER 2018

Class: **I B.Sc.(CS)**   Date: **16.11.2018**
Course Code: **17UCSC11**   Time: **10.00 a.m to 1.00 p.m**
Course Title : **Programming in C**   Max Marks : **75**

SECTION – A   [10 X 1 = 10]
Answer ALL the Questions.
Choose the Best Answer.

1. Who developed the C language?

    [a] BjarneStroustrup   [b] James Gosling

    [c] Dennis Ritchie   [d] Ray Boyce

2. Which of the following is not an arithmetic operation?

    [a] a *=20;   [b] a/=30;

    [c] a%=40;   [d] a!=50;

3. The value of EOF is _____.

    [a] -1   [b] 0

    [c] 1   [d] 10

4. If and Switch statements are examples of _____.

    [a] control statements   [b] looping statements

    [c] declaration   [d] initialization

5. Set of consecutive memory location is called as _____.

    [a] Function   [b] Loop

    [c] Array   [d] Pointer

6. gets() function is used to read a _____ of text.

    [a] string   [b] character

    [c] number   [d] constants

7. _____ can have elements of different types.

    [a] arrays   [b] structures

    [c] union   [d] interface

8. The keyword _____ declares a structure.

    [a] return   [b] function

    [c] union   [d] struct

9. A Pointer is a _____ datatype in 'C'.

    [a] Built-in   [b] Derived

    [c] Structure   [d] Standard

10. _____ is used to write an integer to a file.

    [a] getw()   [b] putw()

    [c] getc()   [d] putc()

SECTION – B
Answer ALL the Questions. [5 X 7 = 35]

11. a) Explain the Basic structures of C programs.

[OR]

  b) Write short notes on Constants, Variables and Data types.

12. a) Write a C program to find the biggest among two numbers.

[OR]

  b) Discuss about Switch statements.

13. a) Write about one dimensional array with example.

[OR]

  b) What are the string handling functions in C programming?

14. a) Discuss about user defined functions.

[OR]

  b) Write short note on arrays of structures.

15. a) Explain the uses of pointers.

[OR]

  b) Explain about command line arguments.

SECTION – C [3 X
Answer Any THREE Questions.

16. Discuss about Operators and expressions.

17. Explain about Branching and Looping statements with example.

18. Describe Two Dimensional Arrays with example.

19. Differentiate between Structures and Unions.

20. Discuss in detail about Files and its operations.

Reg. No: [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

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END SEMESTER EXAMINATION - NOVEMBER 2018

Class : **B.B.A.** Date : **14.11.2018**
Course Code : **17UCSN11** Time : **10.00 a.m to 1.00 p.m**
Course Title : **Fundamentals of Computer** Max Marks : **75**

SECTION – A [10 X 1 = 10]
Answer ALL the Questions
Choose the Best Answer

1. _____ is used to develop products.

    [a] CAD [b] CAM

    [c] ROBOT [d] Process control

2. The fourth generation computer uses _____.

    [a] Vaccum tubes [b] Transistors

    [c] IC's [d] Microprocessor

3. _____ unit directs the flow of data between different units.

    [a] Control [b] ALU

    [c] Memory [d] Execution unit

4. Printed Circuit Board (PCB) is also called as _____.

    [a] Floppy disk [b] Mother board

    [c] Processor [d] IC

5. The decimal equivalent to octal integer 10 is _____.

    [a] 8 [b] 4

    [c] 9 [d] 2

6. The four bit word is called as _____.

    [a] nibble   [b] word

    [c] byte   [d] double word

7. A sequence of instructions designed to get the desired result is termed as _____.

    [a] algorithm   [b] program

    [c] logic   [d] steps

8. The program that converts the high level language into machine language is _____.

    [a] compiler   [b] assembler

    [c] loader   [d] linker

9. Operating system is a kind of _____.

    [a] application software   [b] system software

    [c] hardware   [d] utility

10. The output of analysis phase is _____.

    [a] Procedure   [b] Objective

    [c] Software   [d] Data Flow Diagram

SECTION – B
Answer ALL the Questions   [5 X 7 = 35]

11. a) Explain the characteristics of Computers.

[OR]

    b) Elucidate the Classification of Computers.

12. a) Write short note on Secondary Memory.

[OR]

    b) Explain the components of CPU.

13. a) Define Octal Number. Explain how to add two Octal Numbers.

[OR]

    b) What is meant by Binary Number? Explain how to add two Numbers.

14. a) Convert the following decimal numbers to Binary and Hexa

    i) 34   ii) 197   iii) 245

[OR]

    b) Convert the following octal numbers to Decimal and Binary

    i) 756   ii) 457   iii) 343

15. a) Write short note on System Software.

[OR]

    b) Write short note on Hardware.

SECTION – C   [3 X
Answer Any THREE Questions

16. Explain various Generations of Computers.

17. Explain various Input Devices.

18. Explain Binary Number System.

19. Explain how to convert a Hexadecimal number into Binary and de with an example.

20. Explain various types of Software.

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END SEMESTER EXAMINATION - NOVEMBER 2018

Class : **B.Sc. (CS)**   Date: **16.11.2018**
Course Code: **17UCSC21**   Time: **2.00 p.m to 5.00 p.m**
Course Title : **Visual Programming**   Max Marks : **75**

SECTION – A   [10 X 1 = 10]
Answer ALL the Questions.
Choose the Best Answer.

1. _____ property sets the title of the form.

   [a] Caption   [b] Clip Controls

   [c] Fonts   [d] Control Box

2. _____ controls hold pictures.

   [a] Text   [b] Image

   [c] Message   [d] Option

3. The shortcut key to insert a new line is _____.

   [a] Ctrl + I   [b] Ctrl + N

   [c] Ctrl + K   [d] Ctrl + L

4. _____ property returns or sets the number of characters selected.

   [a] SelLength   [b] SelText

   [c] SelBold   [d] SelStart

5. The first line of the sub procedure is called _____.

   [a] Procedure   [b] String

   [c] Header   [d] Scope of Variables

6. Each control in a control array is called an _____ .

    [a] element   [b] event

    [c] record   [d] file

7. Each grid member is usually called a _____ .

    [a] text   [b] row

    [c] Column   [d] cell

8. _____ doesn't have the ability to let the user type into a cell continuously.

    [a] TextProperty   [b] MSFlexGrid

    [c] KeyPressEvent   [d] GridControls

9. The default scale for forms and picture boxes uses _____ .

    [a] Origin   [b] Points

    [c] Pixel   [d] Twips

10. _____ read or change any byte of a file.

    [a] seek   [b] put

    [c] binary files   [d] unlock

SECTION – B   [5 X 7 = 35]
Answer ALL the Questions.

11. a) Discuss about common form properties.

[OR]

   b) Give the usage of the message box.

12. a) Name and give the purpose of data types available in Visual Basic.

[OR]

   b) Explain RichTextBoxes and its properties.

13. a) Explain any five numeric functions in VB with example.

[OR]

   b) How object browser can be used for navigation?

14. a) Explain about list and combo boxes.

[OR]

   b) Write short notes on Error Trapping.

15. a) Write short note on Line and Shape Control.

[OR]

   b) Discuss in detail, the Mouse Event Procedures.

SECTION – C   [3]
Answer Any THREE Questions.

16. Discuss the properties of command buttons.

17. Explain about determinate and indeterminate loops in VB with example.

18. Explain the new array based String Handling Functions in VB suitable programs.

19. Explain about control arrays in VB with examples.

20. What is the purpose of binary files? Also explain about sharing

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END SEMESTER EXAMINATION – NOVEMBER 2018

Class : **B.Com**   Date : **14.11.2018**
Course Code : **17UCSN21**   Time : **2.00 p.m to 5.00 p.m**
Course Title : **Introduction to Internet**   Max Marks : 75

SECTION – A   [10 X 1 = 10]
Answer ALL the Questions
Choose the Best Answer

1. DNS has the unique number called _____ address.

    [a] Protocol   [b] IP

    [c] System   [d] URL

2. Websites front page is called as_____.

    [a] Browser page   [b] Search page

    [c] Homepage   [d] Book page

3. Network suitable for networking in a building is _____.

    [a] WAN   [b] MAN

    [c] LAN   [d] TELNET

4. IRC stands for _____.

    [a] Internet Reverse Channel   [b] Internet Routing Channel

    [c] Internet Right Channel   [d] Internet Relay Chat

5. Search engine are able to search_____ type of information.

    [a] videos   [b] documents

    [c] images   [d] all of these

6. Web crawler is also called as _____.
   [a] Link
   [c] Web Spider
   [b] Search
   [d] Web Manager

7. In E-mail CC stands for _____.
   [a] Carbon Copy
   [c] Computer Copy
   [b] Compact Copy
   [d] Control Copy

8. Mail access starts with client when user needs to download e-mail from the _____.
   [a] mail box
   [c] mail host
   [b] mail server
   [d] internet

9. The attributes of <form> tag is _____.
   [a] Module
   [c] Main
   [b] Action
   [d] Page

10. HTML is the subset of _____.
    [a] SGMT
    [c] SGMD
    [b] SGML
    [d] SMSS

SECTION – B
Answer ALL the Questions   [5 X 7 = 35]

11. a) What are the applications of Internet?

[OR]

b) Discuss about Impact of Internet on Society.

12. a) Discuss the various types of network.

[OR]

b) Explain the various communication media.

13. a) Explain the various parts of browser window.

[OR]

b) Write short notes on working with a browser.

14. a) Write down the structure of E-mail.

[OR]

b) Explain about web based E-mail.

15. a) List out any five HTML tags with example.

[OR]

b) Explain about Table tag in HTML.

SECTION – C
Answer Any THREE Questions

16. Elaborate about Growth of Internet and ARPANet.

17. Describe about various Network Topologies.

18. Explain in detail about Search engines.

19. Briefly explain about E-mail.

20. Discuss in detail about Frame Tag with example.

Reg. No: [ ][ ][ ][ ][ ][ ][ ][ ][ ]

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END SEMESTER EXAMINATION - NOVEMBER 2018

SECTION – A   [10 X 1 = 10]
Answer ALL the Questions
Choose the Best Answer

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   [a] Protocol   [b] IP

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--1--

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    [a] mail box   [b] mail server

    [c] mail host   [d] internet

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    [a] Module   [b] Action

    [c] Main   [d] Page

10. HTML is the subset of _____.

    [a] SGMT   [b] SGML

    [c] SGMD   [d] SMSS

SECTION – B   [5 X 7 = 35]
Answer ALL the Questions

11. a) What are the applications of Internet?

[OR]

b) Discuss about Impact of Internet on Society.

12. a) Discuss the various types of network.

[OR]

b) Explain the various communication media.

13. a) Explain the various parts of browser window.

[OR]

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15. a) List out any five HTML tags with example.

[OR]

b) Explain about Table tag in HTML.

SECTION – C
Answer Any THREE Questions

16. Elaborate about Growth of Internet and ARPANet.

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18. Explain in detail about Search engines.

19. Briefly explain about E-mail.

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END SEMESTER EXAMINATION - NOVEMBER 2018

Class : **II B.Sc. Computer Science**   Date: **26.11.2018**
Course Code: **17UCSA31**   Time:**10.00 a.m to 1.00 p.m**
Course Title : **Digital Principles and**   Max Marks : **75**
              Computer Organization

SECTION – A   [10 X 1 = 10]

Answer ALL the Questions.
Choose the Best Answer.

1. The equivalent of the binary number 100 in decimal is_____.

   [a] 3   [b] 4

   [c] 5   [d] 6

2. A binary number with four bit is called _____.

   [a] Byte   [b] nibble

   [c] gate   [d] megabyte

3. Group of four 1's that are horizontally or vertically adjacent is called

   _____.

   [a] quad   [b] pair

   [c] redundant   [d] octet

4. The sum of product method of fundamental products is also called as

   _____.

   [a] Priority code   [b] functional code

   [c] minterms   [d] maxterms

--1--

5. What is the binary addition of 101+11=_____.

  [a] 1000   [b] 1111   [c] 1100   [d] 1010

6. 2's complement does not require _____.

  [a] carry values   [b] sum

  [c] both sum and carry   [d] zero LSB

7. _____counters are sometimes called asynchronous counters.

  [a] Ring   [b] parallel   [c] Ripple   [d] serial

8. _____ is a storage device which retrieves the last item stored as first item.

  [a] Address map   [b] Stack

  [c] Interrupt   [d] Subroutine

9. In _____ mode, the operand is specified in the instruction itself.

  [a] Register   [b] Relative address

  [c] Immediate   [d] Implied

10. The storage element for a static RAM is the_____.

  [a] diode   [b] flipflop   [c] resistor   [d] capacitor

SECTION – B   [5 X 7 = 35]
Answer ALL the Questions.

11. a) Convert the Following:

  (i) $(25.75)_{10}=(?)_2$

  (ii) $(7AF4)_{16}=(?)_2$

  (iii) $(6ABC.2A)_{16}=(?)_{10}$.

[OR]

  b) What is gray code? Write the procedure for converting binary to gray with an example.

--2--

12. a) Simplify the Boolean Equation using karnaugh map and circuit for the following:

  $Y=F(A,B,C,D)=\sum m(1,3,4,5,7,9,10,11)+ \sum d (6,8)$.

[OR]

  b) What is decoder? Explain the 1-of-16 decoder with neat

13. a) Write down the four rules for binary addition. And Add using 2's Complement representation.

  (i) +48, +65

  (ii) +68, -43

[OR]

  b) Discuss in detail about 2's Complement arithmetic with a

14. a) Explain about Computer registers and Common Bus Syste

[OR]

  b) What is address sequencing? Write down the capabilities sequencing.

15. a) Write about Stack Organization.

[OR]

  b) Explain the concept of Cache Memory.

SECTION – C
Answer Any THREE Questions.

16. Construct the truth tables and diagram for AND, OR, NOT gates.

17. Illustrate sum of product simplification with an example.

18. Discuss about the arithmetic building blocks.

19. Explain in detail about an instruction cycle.

20. Describe the data transfer and manipulation instructions

--3--

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END SEMESTER EXAMINATION - NOVEMBER 2018

Class : **II B.Sc. (CS)**   Date : **15.11.2018**
Course Code: **17UCSC31**   Time : **10.00 a.m to 1.00 p.m**
Course Title : **Object Oriented**   Max Marks : **75**
                 Programming with C++

SECTION – A   [10 X 1 = 10]
Answer ALL the Questions.
Choose the Best Answer.

1. What is default access specifier for data members or member functions declared within a class without any specifier, in C++ ?

    [a] Private   [b] Protected

    [c] Public   [d] Depends on compiler

2. In CPP, dynamic memory allocation is done using _____ operator.

    [a] calloc()   [b] malloc()

    [c] allocate   [d] New

3. The default return type for every function is _____.

    [a] int   [b] char

    [c] float   [d] string

4. A static member function can be called using the _____ instead of its objects.

    [a] variable name   [b] function name

    [c] Class name   [d] object name

--1--

[a] !   [b] ?

[c]   [d] $

6. Which of the following operators cannot be overloaded?

    [a] ?: (Ternary or Conditional Operator)

    [b] :: (Scope Resolution Operator)

    [c].* (Pointer-to-member Operator)

    [d] All the Above

7. The derivation of Child class from Base class is indicated by _____ symbol.

    [a] :   [b] .

    [c] .   [d] |

8. If a derived class object is created, which constructor is called first?

    [a] Base Class Constructor

    [b] Derived Class Constructor

    [c] Depends on how we call the object

    [d] Not Possible

9. A virtual function that has no definition within the base class is called

    [a] Pure virtual function   [b] Pure static function

    [c] Pure Const function   [d] Friend function

10. Which stream class is to only write on files?

    [a] ofstream   [b] ifstream

    [c] fstream   [d] iostream

11. a) Write a C++ program to find the ....

[OR]

    b) Differentiate While and Do....While with an example

12. a) What is a class? How does it accomplish data hiding?

[OR]

    b) How can you pass object as function arguments? Give ac...

13. a) Write a short note on constructors with an Example?

[OR]

    b) What are the operators cannot be overloaded in C++? ...these operators.

14. a) Explain the concept of Multilevel Inheritance?

[OR]

    b) What is Virtual Base Class? Explain.

15. a) Write a short note on 'this' pointer.

[OR]

    b) Write a C++ program to read and write a character usi... I/O function.

SECTION - C
Answer Any THREE Questions

16. Explain the Basic Concepts of Object Oriented Programming.

17. What is a friend function? What are the merits and demerits of friend functions?

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END SEMESTER EXAMINATION – APRIL 2019

Programme : B.Sc. Computer Science
Course Code: 17UCSC21
Course Title : Visual Programming

Date : 02.05.2019
Time: 10.00 a.m. to 1.00 p.m.
Max Marks :75

SECTION – A   [10 X 1 = 10]
Answer ALL the Questions
Choose the Correct Answer

1. _____ property determines how the form looks like at the run time

   [a] Visible   [b] Window State

   [c] Name   [d] Caption

2. _____ control automatically activated after it is placed on a form

   [a] Pointer   [b] Label

   [c] Text Box   [d] Command

3. _____ is the shortcut key to view object browser

   [a] F1   [b] F2

   [c] F3   [d] F4

4. The older keyword for comment line is _____.

   [a] Rem   [b] Single Quotation

   [c] Double Quotation [d] Print

5. _____ are thus generalized of the event procedures.

   [a] The Choice   [b] Sub Procedure

   [c] Add Procedure   [d] Function Template

6. The original variable retains its original value after the procedure terminated is called _____.

    [a] Passing by Reference   [b] Passing by Value

    [c] Passing by Arguments   [d] Reference Variables

7. _____ is a property of both list and combo boxes.

    [a] List Count   [b] List Index

    [c] Text   [d] All of the above

8. Windows maintains list of pending events in what is called _____.

    [a] Tight Loop   [b] Event Queue

    [c] Property   [d] Idle

9. _____ visual basic saves an image only as large as the current size of the box.

    [a] Auto Review   [b] Resizable

    [c] Picture Box   [d] All of the above

10. The default scale for forms and picture boxes uses _____.

    [a] Origin   [b] Points

    [c] Pixel   [d] Twips

SECTION – B   [5 X 7 = 35]
Answer ALL the Questions

11. a) Define the following :

        i) Typos   ii) Creating Stand-Alone Windows Programs

[OR]

    b) Explain briefly the Text Boxes and its properties in VB.

12. a) Explain the imp...

[OR]

    b) Explain the conditionally control statements used in VB example

13. a) Discuss any three Financial Functions in VB with an ex...

[OR]

    b) Define an Array. Explain One Dimensional Array with example

14. a) Explain   i) With statement   ii) Enu...

[OR]

    b) Explain about Combo Boxes with an example.

15. a) What are the features of Clipboard? Explain

[OR]

    b) Explain   i) File Handling Functions   ii) Shape

SECTION – C   [3
Answer any THREE Questions

16. Describe the properties of simple event procedures for C... Buttons with example

17. What are the various Data types in VB ? Explain with e...

18. Explain any six String Functions in VB with an example

19. Explain in detail about Flex Grid Control and its propert... example.

20. Explain the following with neat diagram

    i) File List Boxes   ii) Directory List Boxes

    iii) Drive List Boxes

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END SEMESTER EXAMINATION - APRIL 2019

Programme : B.Sc. Computer Science
Course Code : 17UCSC31
Course Title : Object Oriented
             Programming with C++

Date : 03.05.2019
Time : 2.00 p.m. to 5.00 p.m.
Max Marks: 75

Section – A
[10 X 1 = 10]
Answer ALL the Questions.
Choose the Correct Answer.

1. Methods are also known as _____.

    [a] member function   [b] instances

    [c] objects   [d] constructors

2. Which operator is having the highest precedence in C++?

    [a] array subscript   [b] scope resolution operator

    [c] static_cast   [d] dynamic_cast

3. The default return type for every function is_____.

    [a] int   [b] char   [c] float   [d] string

4. Where does keyword 'friend' should be placed?

    [a] friend declaration   [b] function definition

    [c] main function   [d] function prototype

5. A constructor that accepts _____ parameters is called the default constructor.

    [a] one   [b] two   [c] no   [d] three

6. Operator overloading is also called _____ polymorphism.

    [a] run time   [b] initial time

    [c] compile time   [d] completion time

7. The derivation of child class from base class is indicated by _____ symbol.

    [a] ::   [b] :   [c] ;   [d] |

8. _____ members of base class are inaccessible to derived class.

    [a] Private   [b] Protected

    [c] Public   [d] Friend

9. A virtual function that has no definition within the base class is called _____.

    [a] pure virtual function   [b] pure static function

    [c] pure const function   [d] friend function

10. Which stream class is to only write on files?

    [a] ofstream   [b] ifstream

    [c] fstream   [d] iostream

Section – B   [5 X 7 = 35]
Answer ALL the Questions.

11. a) Discuss about the benefits of OOP.
                   [OR]

   b) Explain the derived data types with an example.

12. a) Discuss the concepts of function prototyping.
                   [OR]

   b) Write short notes on Nesting of member functions.

13. a) Explicate Copy constructor.   , [OR]

   b) List out the rules for overloading operators.

14. a) Explain about Multiple inheritance with example.
                   [OR]

   b) Write a program to use virtual base class.

15. a) Explain about this pointer with example.
                   [OR]

   b) Briefly explain about the Virtual functions.

Section – C
Answer any THREE Questions.

16. Describe the basic concepts of Object Oriented Program[m]

17. Explain briefly about the inline functions with an illustra[tion]

18. Explain overloading binary operator using friend functio[n] example.

19. Explain the Hybrid inheritance with an example program

20. Explain the Unformatted Console I/O operations in C++.

--2--

Section – A
[10 X 1 = 10]

Answer ALL the Questions.
Choose the Correct Answer.

1. The memory address of the first element of an array is called _____.

   [a] floor address   [b] foundation address

   [c] first address   [d] base address

2. _____ field indicate end of the list.

   [a] Data   [b] Address

   [c] Null   [d] Next

3. _____ function is used to add an element on top of the stack.

   [a] Push   [b] Pop

   [c] Create   [d] Show Top

4. A _____ allows insertion and deletions at both ends.

   [a] dequeue   [b] circular queue

   [c] array based queue   [d] all the above

5. Node at the top hierarchy of the tree is called _____.

   [a] root   [b] end   [c] child   [d] leaf

--1--

6. A strictly binary tree with n leaves will have _____ nodes.

    [a] 2n   [b] n+1   [c] 2n+1   [d] 2n-1

7. An identifier begins with a _____.

    [a] block

    [c] digit

                       [b] symbol

                       [d] letter

8. _____ describes the action of binary search on n elements.

    [a] internal path length   [b] external path length

    [c] binary decision tree   [d] worst case time

9. The _____ merge patterns can be represented by binary merge tree.

    [a] one way   [b] two way

    [c] multiple way   [d] four way

10. _____ that finds a minimum spanning tree for a weighted undirected graph.

    [a] Dijkstra's algorithm   [b] Prim's algorithm

    [c] Merge sort   [d] Heap sort

Section – B   [5 X 7 = 35]
Answer ALL the Questions.

11. a) Define Data Structure and explain its types.

[OR]

  b) How do you represent 2D arrays using row major order? Write its addressing function.

12. a) Write short note on Circular Queues.

[OR]

  b) Write the algorithm for insertion and deletion operation in queue implementation using arrays.

13. a) Explain about binary trees.

[OR]

  b) Write short note on threaded trees.

14. a) Discuss about binary search trees.

[OR]

  b) Explain about quick sort with example.

15. a) Write short note on knapsack problem.

[OR]

  b) Explain about minimum cost spanning trees.

Section – C   [3 X]
Answer any THREE Questions.

16. Discuss about singly linked lists.

17. Explain about applications of stack.

18. Write in detail about binary tree traversals.

19. Explain about Kruskal's Algorithm.

20. Discuss about single source shortest path.

G.T.N. ARTS COLLEGE (AUTONOMOUS)

(Affiliated to Madurai Kamaraj University)
(Accredited by NAAC with 'B' Grade)

END SEMESTER EXAMINATION - APRIL 2019

Programme : B.Sc. Computer Science
Course Code : 17UCSA31
Course Title : Digital Principles and Computer Organization

Date : 08.05.2019
Time : 2.00 p.m. to 5.00 p.m.
Max Marks: 75

Section – A   [10 X 1 = 10]
Answer ALL the Questions.
Choose the Correct Answer.

1. What is the decimal value of binary 1011.11?

   [a] 11.00   [b] 11.75   [c] 11.25   [d] 11.01

2. _____ code is not good for arithmetic operation.

   [a] Excess 3   [b] Gray

   [c] BCD   [d] EBCID

3. The Demorgan's theorem $(A+B)' = $ _____.

   [a] $A' + B'$ [b] $A' . B'$

   [c] $A + B$ [d] $A . B$

4. A half adder adds _____ bits at a time.

   [a] 2   [b] 4   [c] 8   [d] 16

5. The 2's complement of $(101100)_2$ is _____.

   [a] 010101   [b] 010100

   [c] 101011   [d] 010011