# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
(UGC-AUTONOMOUS)
## MCA II Year II Semester (R16) Supplementary End Semester Examinations – Jan 2019
(Regulations: R16)
## DISCRETE MATHEMATICS

Time: 3Hrs                                                                                     Max Marks: 50

| Attempt all the questions. All parts of the question must be answered in one place only. |
| :---: |
| **In Q.no 1 to 5 answer either Part-A or B only** |

Q.1(A)  (i). Show that, for any two propositions p and q, $(p \vee q) \vee (p \leftrightarrow q)$ is a tautology.   3M

(ii). Let $A = \{1,2,3,4\}$ and R= $\{(1,1),(1,2),(2,2),(2,4),(1,3),(3,3),(3,4),(1,4),(4,4)\}$.   7M
Verify that R is a partial order set on A.

**OR**

Q.1(B)  (i). Show that the following three statements are equivalent.   6M
        p1: n is even
        p2: n-1 is odd
        p3: $n^2$ is even

(ii). Test the validity of the following.   4M
$(p \wedge q) \wedge (p \to (q \to r)) \Leftrightarrow r$

Q.2(A)  (i). Give a recursive algorithm to find GCD of two numbers.   5M
(ii). Show that if $n \geq 1$ is an integer, then n can be written as product of primes.   5M

**OR**

Q.2(B)  (i). Find the GCD of 414 and 662 using Euclidean Algorithm.   5M
(ii). Suppose that f is defined recursively by $f(0) = 3$, $f(n+1) = 2f(n)+3$.   
Find  f(2), f(3), f(4)   5M

Q.3(A)  (i). Find the number of ways of distributing 10 identical gifts to 6 persons A,B,C,D,E   6M
and F in such a way that the total number of boxes given to A and B together does
not exceed 4.
(ii). Find the generating function for the following sequence 1, 1, 0, 1, 1, 1,....... .   4M
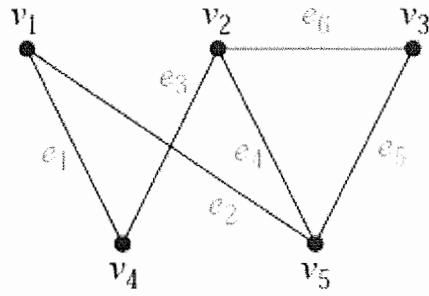
**OR**

Q.3(B)  (i). Show that the inclusion relation $\subseteq$ is a partial ordering on the power set of   5M
        S = {A, B, C}.
(ii). Portray a state diagram for the finite-state machine with the given information.   5M

|  | $f$ | | $g$ | |
| :---: | :---: | :---: | :---: | :---: |
|  | Input | | Input | |
| State | 0 | 1 | 0 | 1 |
| $s_0$ | $s_1$ | $s_3$ | 1 | 0 |
| $s_1$ | $s_1$ | $s_2$ | 1 | 1 |
| $s_2$ | $s_3$ | $s_4$ | 0 | 0 |
| $s_3$ | $s_1$ | $s_0$ | 0 | 0 |
| $s_4$ | $s_3$ | $s_4$ | 0 | 0 |

Q.4(A)    (i). Represent the below figure with incidence matrix.                    5M
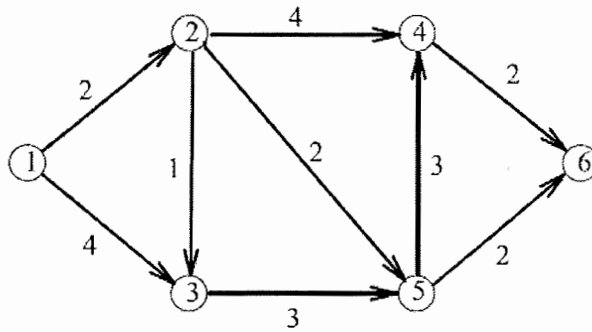


(ii). Define a Graph, Bipartite graph, Complete graph with examples.          5M

**OR**

Q.4(B)    (i). Find the shortest path from the source vertex 1 to destination vertex 6.    6M



(ii). Define Graph coloring, chromatic number of a graph .Find the chromatic number    4M
for $K_5$ graph.

Q.5(A)    Solve the recurrence relation using characteristic root method              10M
$$F_n = 2F_{n-1} - 2F_{n-2}, \quad where \quad F_0 = 1 \quad and \quad F_1 = 3$$

**OR**

Q.5(B)    Employing generating functions, solve the recurrence relation              10M
$$a_n = 5a_{n-1} - 6a_{n-2}, n \geq 2 \ where \ a_0 = 1 \ and \ a_1 = -2.$$

**\*\*\* END\*\*\***

# MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE
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### MCA I Year II Semester (R16) Supplementary End Semester Examinations – Jan 2019
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## DATA BASE MANAGEMENT SYSTEMS

Time: 3Hrs                                                                                          Max Marks: 50

> Attempt all the questions. All parts of the question must be answered in one place only.
> **In Q.no 1 to 5 answer either Part-A or B only**

Q.1(A)  What is DBMS? Explain the characteristics of DBMS.                                          10M

**OR**

Q.1(B)  Explain the components of ER diagram. Develop an ER diagram for Educational   10M
Institute.

Q.2(A)  What is a query? Explain nested queries with examples.                                      10M

**OR**

Q.2(B)  What is a Constraint? Explain various types of Integrity constraints.                       10M

Q.3(A)  Write short notes on                                                                        10M
    i.  Lossy decomposition
    ii. Non loss decomposition

**OR**

Q.3(B)  In detail explain normal forms.                                                             10M

Q.4(A)  What is mean by concurrency control? Explain about Lock based concurrency control   10M
mechanism.

**OR**

Q.4(B)  Define various causes to loss the Data base. Explain about data base recovery   10M
management.

Q.5(A)  i. What is a cursor?                                                                         10M
ii. Explain the cursors in PL/SQL with example.

**OR**

Q.5(B)  What is a trigger? Write a program to create a trigger and execute.                         10M

*** END***

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## DATA STRUCTURES THROUGH C++

Time: 3Hrs                                                                                           Max Marks: 50

Attempt all the questions. All parts of the question must be answered in one place only.
**In Q.no 1 to 5 answer either Part-A or B only**

Q.1(A)  i. Discuss the important features of OOPS. Explain the organization of data and   10M
Functions in OOP.
ii. List a few domain applications of OOP technology.
**OR**

Q.1(B)  i. Explain how an inline function differs from a preprocessor macro? Explain significant   10M
advantage of inline function.
ii. How to overload the binary operators. Explain.

Q.2(A)  i. What is a virtual base class? Why it is important to make a class virtual.   10M
ii. What is abstract class? When do we use the protected visibility specifiers to a class
member?
**OR**

Q.2(B)  i. Why it is necessary to include the file i/o stream in all our program. Write its   10M
Characteristics.
ii. write a program for Bubble Sort using Template Functions

Q.3(A)  i. What are the operations of a singly linked list? Discuss.   10M
ii. Write an algorithm to delete duplicates in a linked list.
**OR**

Q.3(B)  Write a program to convert an infix expression that includes (, ), +, -, *, and / to postfix   10M

Q.4(A)  i. Define hashing and discuss the different hashing functions with an example.   10M
ii. Define skip list. Explain how to insert an element in a skip list with example
**OR**

Q.4(B)  i. Differentiate between doubly linked list and circular linked list.   10M
ii. How to implement stack using queues. Explain with example and neat diagram.

Q.5(A)  i. Write a C++ program to sort the following elements using Heap Sort?   10M
ii. Create Heap for the following elements and then sort them ( 13, 102, 405, 136, 15,
105, 390, 432, 28, 444 )
**OR**

Q.5(B)  What is a threaded binary tree? Give an example with neat diagram of inorder   10M
traversal of threaded binary tree
**\*\*\* END\*\*\***