

(DMCS01)

Total No. of Questions : 18]

[Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, DECEMBER – 2018

First Year  
COMPUTER SCIENCE  
Data Structures

Time : 3 Hours

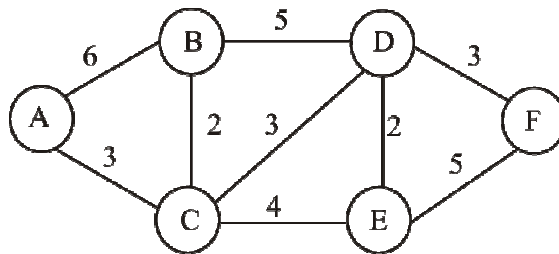
Maximum Marks : 70

SECTION – A

(3 × 15 = 45)

Answer any THREE questions.

- Q1) What is circular queue? Explain about subroutines of circular queue operations using linked list.
- Q2) Discuss about different collision resolution techniques with suitable example.
- Q3) Explain about expression trees, threaded binary trees and B – trees with suitable example.
- Q4) Sort the following list of elements using Shell sort : 189, 205, 986, 421, 97, 192, 535, 839, 562, 674 and also write the pseudo code of Shell sort algorithm.
- Q5) Implement Dijkstra's algorithm to implement shortest path for the following graph assume source node is A.



SECTION – B

(5 × 4 = 20)

Answer any FIVE questions from the following

- Q6) Describe evaluation of postfix expression using stack.

**Q7)** How the polynomial such as  $6x^6 + 4x^3 - 2x + 10$  can be represented by a linked list?

**Q8)** Write about properties of binary trees.

**Q9)** Write a subroutine to insert an element to binary search tree.

**Q10)** What is recursion? Write a program to implement factorial of given number using stack.

**Q11)** Explain about quick sort with example.

**Q12)** Write about different approaches to represent the graphs.

**Q13)** Describe Euler's circuit with example.

**SECTION – C**

**(5 × 1 = 5)**

**Answer all questions**

**Q14)** What is an array?

**Q15)** Define priority queue.

**Q16)** Define balanced tree.

**Q17)** What is hashing?

**Q18)** Define Hamiltonian path.



(DMCS02)

---

Total No. of Questions : 18]

[Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, DECEMBER – 2018

First Year

COMPUTER SCIENCE

Object Oriented Programming

**Time : 3 Hours**

**Maximum Marks : 70**

---

**SECTION – A**

**(3 × 15 = 45)**

**Answer any THREE questions.**

- Q1)** Discuss about different types operators and data type in C++.
- Q2)** What is inheritance? Explain different types of inheritance with example program in C++
- Q3)** What is a virtual function? Illustrate with an example the usage of virtual functions.
- Q4)** Explain about class template and function templates with proper C++ programs.
- Q5)** What is exception? Describe different types of exceptions? How to resolve exception handling mechanism?

**SECTION – B**

**(5 × 4 = 20)**

**Answer FIVE questions from the following**

- Q6)** What is an array? Describe different types of arrays in C++.
- Q7)** Given the any four differences between C and C++.
- Q8)** Write about usage of friend function.
- Q9)** Write about various string handling functions in C++.

**Q10)** What is operator overloading? List the operator overloading restrictions.

**Q11)** Write a note on the visibility of inherited members based on private, public and protected derivations.

**Q12)** Explain static data members and static member functions.

**Q13)** Briefly explain about stream hierarchy.

**SECTION – C**

**(5 × 1 = 5)**

**Answer all questions**

**Q14)** Define constructor.

**Q15)** Define data abstraction.

**Q16)** Define static binding.

**Q17)** What is purpose of new and delete operators?

**Q18)** List down any two file operations.



**(DMCS03)**

Total No. of Questions : 18]

[Total No. of Pages : 02

**M.Sc. DEGREE EXAMINATION, DECEMBER – 2018**

**First Year**

**COMPUTER SCIENCE**

**Computer Organization**

**Time : 3 Hours**

**Maximum Marks : 70**

**SECTION – A**

**(3 × 15 = 45)**

**Answer any three questions**

- Q1)** Explain the floating point addition/subtraction with flowchart and an example.
- Q2)** a) What do you understand by Fetch cycle, instruction cycle, machine cycle. (9)
- b) Explain about instruction and instruction sequencing. (6)
- Q3)** What is DMA? Explain the need for DMA and different types of bus arbitration mechanism.
- Q4)** Explain the function of a memory management unit in a typical computer.
- Q5)** a) Write a short note on : (6)
- i) Excess 3
- ii) Gray code.
- b) Simplify the (a, b, c, d) = (0, 1, 2, 5, 8, 9, 10) Boolean functions using four variable map in sum of product and product of sum form. Verify the results of both using truth table. (9)

**SECTION – B**

**(5 × 4 = 20)**

**Answer any five questions**

- Q6)** Draw and explain the full adder circuit. Also give its truth table.
- Q7)** Subtract 1010100 – 1000011 using 2's Complement.

**Q8)** What are priority and vectored interrupts. Discuss.

**Q9)** Register A holds the 8 – bit binary 11011001. Determine the B operand and the logic micro operation to be performed in order to change the value in A to :

a) 01101101

b) 11111101

**Q10)** Describe the organization of a stack.

**Q11)** Illustrate the use of stack in subroutine processing with suitable diagram.

**Q12)** Define the terms hit, hit rate, miss rate, miss penalty.

**Q13)** Draw the block diagram of associate memory and explain.

**SECTION – C**

**(5 × 1 = 5)**

**Answer all questions**

**Q14)** What is underflow and overflow case in single precision?

**Q15)** What is shift register in digital computer.

**Q16)** What do you understand by Indexed Addressing Mode?

**Q17)** What is Cache memory?

**Q18)** Define micro instruction.



(DMCS04)

Total No. of Questions : 18]

[Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, DECEMBER – 2018

First Year

COMPUTER SCIENCE

Discrete Mathematical Structures

Time : 3 Hours

Maximum Marks : 70

SECTION – A

(3 × 15 = 45)

Answer any three questions

- Q1)** a) Give the reasons for each step needed to show that the following argument is valid, using rules of inference :  $[p \wedge (p \rightarrow q) \wedge (s \vee r) \wedge (r \rightarrow \neg q)] \rightarrow (s \vee t)$ .  
b) What is tautology? Verify if the following statements are tautology :  
 $[(p \vee q) \rightarrow [q \rightarrow (p \wedge q)]]$
- Q2)** Show that for any three set A, B and C
- a)  $A - (A \cap B) = A - B$
- b)  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
- Q3)** a) Let  $A = \{a, b, c\}$ ,  $R = \{(a, a), (a, b), (b, c), (c, c)\}$ , Find reflexive closure, symmetric closure and transitive closure.  
b) Let  $A = \{1, 2, 3, 4\}$  and  $R_1$  and  $R_2$  be relations on A given below :  
 $R_1 = \{(1, 1), (2, 1), (2, 2), (3, 3), (4,4), (4, 3)\}$   
 $R_2 = \{(1, 1), (1, 2), (2, 1), (2, 2), (3, 1), (3, 3), (1, 3), (4, 1), (4, 4)\}$  verify that  $R_1$  and  $R_2$  not equivalent relations.
- Q4)** a) If the binary operation \* on Z is given by  $x*y = x + y + 1$ . Verify that (Z, \*) is abelian group.  
b) If G is group, prove that for all  $a, b \in G$ ,  
i)  $(a)^{-1^{-1}} = a$   
ii)  $(ab)^{-1} = b^{-1}a^{-1}$
- Q5)** a) State and explain graph coloring problem. Give its applications.  
b) Prove that a simple graph with n vertices and k components can have at most  $(n - k)(n - k + 1) / 2$  edges.

**SECTION – B**

**(5 × 4 = 20)**

**Answer any Five questions from the following**

**Q6)** Obtain the principle of conjunctive normal form of  $(\neg p \rightarrow q) \wedge (q \leftrightarrow p)$ .

**Q7)** Find the negations of the following quantified statements :

$$\forall x, \exists y, [(p(x, y) \wedge q(x, y)) \rightarrow r(x, y)]$$

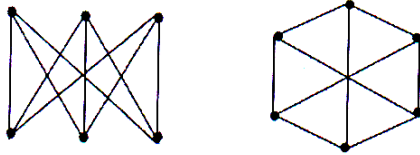
**Q8)** Define invertible function. Let  $f : \mathbb{R} \rightarrow \mathbb{R}$ , is a function where  $\mathbb{R}$  is the set of real numbers, define by  $f(x) = x^2$ . Is  $f$  is invertible?

**Q9)** Let  $S = \{a, b, c\}$  and  $A = P(S)$ . Write the power set of  $S$  and draw the Hasse diagram.

**Q10)** What is isomorphism of two semigroups. Show that the semigroup  $(\mathbb{Z}, +)$  and  $(E, -)$  where  $E$  is set of even integers, are isomorphic.

**Q11)** Show that in Boolean algebra for any  $a$  and  $b : (a \wedge b) \vee (a \wedge b') = a$ .

**Q12)** Show that the following graphs are isomorphic.



**Q13)** Write about Hamiltonian graph with suitable example.

**SECTION – C**

**(5 × 1 = 5)**

**Answer all questions**

**Q14)** Define well – formed formulas.

**Q15)** Define binary relations.

**Q16)** Define monoid.

**Q17)** Define chromatic number.

**Q18)** What is planer graph?





(DMCS05)

---

Total No. of Questions : 18]

[Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, DECEMBER – 2018

COMPUTER SCIENCE

First Year

SOFTWARE ENGINEERING

**Time : 3 Hours**

**Maximum Marks : 70**

**SECTION – A**

**(3 × 15 = 45)**

**Answer any THREE questions.**

- Q1)** Explain how both waterfall model and prototyping model can be accommodated in the spiral process model.
- Q2)** Discuss the differences between project metrics and process metrics.
- Q3)** Describe decomposition levels of abstraction and modularity concepts in software design.
- Q4)** Explain in the interface design activities. What steps do we perform to accomplish interface design?
- Q5)** a) What guidelines lead to a successful software testing strategy?
- b) What is a test case? How test cases can be derived?

**SECTION – B**

**(5 × 4 = 20)**

**Answer any five questions from the following**

- Q6)** What is software prototyping? Explain its significance in software engineering.
- Q7)** Write short notes on quality assurance.
- Q8)** Briefly explain about Behavioral Modeling.

**Q9)** What is Coupling? What are the various types of coupling?

**Q10)** What is an architectural pattern? How can the architectural style be assessed?

**Q11)** Write a procedure to mapping data flow into a software architecture.

**Q12)** What is cyclomatic complexity? Explain how to compute the cyclomatic complexity?

**Q13)** What is system testing? Give a case study of a system testing for operating system?

**SECTION – C**

**(5 × 1 = 5)**

**Answer all questions**

**Q14)** Define unit testing.

**Q15)** Name evolutionary process models.

**Q16)** What is meant by user interface design?

**Q17)** Distinguish between validation and verification.

**Q18)** Define cohesion.



(DMCS06)

---

Total No. of Questions : 18]

[Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, DECEMBER – 2018

First Year

COMPUTER SCIENCE

Distributed Operating Systems

Time : 3 Hours

Maximum Marks : 70

---

SECTION – A

(3 × 15 = 45)

Answer any THREE questions from the following

- Q1) Discuss different issues in Remote procedure call.
- Q2) What is mutual exclusion? Discuss about mutual exclusion algorithms.
- Q3) Discuss about process allocation model and design issues in process allocation models.
- Q4) Discuss about various consistency models in distributed shared memory.
- Q5) Explain about distributed file system implementation.

SECTION – B

(5 × 4 = 20)

Answer any five questions from the following

- Q6) Write about multiprocessor time sharing systems.
- Q7) Explain about bus based and switch based multi computers.
- Q8) Explain about Ring election algorithm.
- Q9) Write about concurrency control mechanism in distributed systems
- Q10) Explain about fault tolerance using primary backup.

**Q11)** Write about processor pool system model.

**Q12)** Describe semantics of file sharing.

**Q13)** Write about shared variable distributed shared memory.

**SECTION – C**

**(5 × 1 = 5)**

**Answer all questions**

**Q14)** What is thread?

**Q15)** What is group communication?

**Q16)** What is meant by fault tolerance?

**Q17)** What is sequential consistency?

**Q18)** Define caching.



**(DMCS07)**

Total No. of Questions : 18]

[Total No. of Pages : 02

**M.Sc. DEGREE EXAMINATION, DECEMBER – 2018**

**First Year**

**COMPUTER SCIENCE**

**Database Management Systems**

**Time : 3 Hours**

**Maximum Marks : 70**

---

**SECTION – A**

**(3 × 15 = 45)**

***Answer any THREE questions.***

- Q1)** Discuss the division and the various types of join operations in the relational algebra with suitable example.
- Q2)** What is constraint in database? Explain types of constraints with suitable example.
- Q3)** Consider the following relations :
- Supplier (S#, sname, status, city)
  - Parts (P#, pname, color, weight, city)
  - SP(S#, P#, quantity)
- Answer the following queries in SQL
- i) Find name of supplier for city = 'Delhi'
  - ii) Find suppliers whose name start with 'AB'.
  - iii) Find all suppliers whose status is 10, 20 or 30.
  - iv) Find total number of city of all suppliers.
  - v) Find s# of supplier who suppliers 'red' part.
- Q4)** What is normalization? What is need of normalization? Illustrate different normal forms with suitable example.
- Q5)** Explain the various ways in which concurrency control can be implemented in a database.

**SECTION – B**

**(5 × 4 = 20)**

**Answer any FIVE questions**

- Q6)** Describe various components of DBMS architecture.
- Q7)** What are the Weak Entity set and Derived attribute? Give an example.
- Q8)** Write about the following SQL commands with syntax :
- a) Drop
  - b) Truncate
  - c) Alter
  - d) Commit
- Q9)** What is a view? Explain the syntax.
- Q10)** How to database indexing by the B+ - trees?
- Q11)** Write about file organization methods.
- Q12)** Explain about atomicity and durability.
- Q13)** Briefly explain about two – phase locking protocol.

**SECTION – C**

**(5 × 1 = 5)**

**Answer all questions**

- Q14)** Define candidate key.
- Q15)** What is instance and schema?
- Q16)** What are the Correlated Queries?
- Q17)** Define trigger.
- Q18)** Define concurrency.



**DMCS08)**

Total No. of Questions : 18]

[Total No. of Pages : 02

**M.Sc. DEGREE EXAMINATION, DECEMBER – 2018**

**First Year**

**COMPUTER SCIENCE**

**Theory of Automata and Formal Languages**

**Time : 3 Hours**

**Maximum Marks : 70**

**SECTION – A**

**(3 × 15 = 45)**

***Answer any THREE questions***

**Q1)** What is meant by  $\epsilon$  - transitions? Eliminate  $\epsilon$  - transitions from the following NFA:

Present State	Next State			
	$\epsilon$	0	1	2
$\rightarrow A$	{B}	{A}	--	--
B	{C}	--	{B}	--
*C	--	--	--	{C}

**Q2)** Construct NFA's for the following regular expressions.

- a)  $(0 + 1)(01)^*(011)^*$
- b)  $0(0 + 1)^*1$
- c)  $0^*10^*10^*$

**Q3)** Consider the grammar  $S \rightarrow (L) \mid a, L \rightarrow L, S \mid S$ . Derive expression  $(a, ((a, a), (a, a)))$  by leftmost derivation and rightmost derivation and also construct derivation tree.

**Q4)** Design Push down automata for the language  $L = \{wcw^R \mid w \in \{a, b\}^*\}$ .

**Q5)** Design Turing machine that computes the following functions.

- a)  $f(m, n) = \begin{cases} m - n & m \geq n \\ 0 & m < n \end{cases}$
- b)  $f(m, n) = m + n$

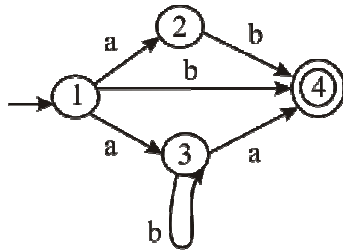
**SECTION – B**

**(5 × 4 = 20)**

**Answer any five questions**

**Q6)** Write about NFA and DFA with example.

**Q7)** Convert the following NFA into its equivalent DFA.



**Q8)** Show that  $L = \{a^n b^n \mid n \geq 1\}$  is not regular.

**Q9)** Eliminate all the  $\epsilon$  - productions from the following CFG :

$$S \rightarrow AaB \mid aaB, A \rightarrow \epsilon, B \rightarrow bbA \mid \epsilon$$

**Q10)** Construct CNF for the following CFG :

$$S \rightarrow \sim S \mid [S \supset S] \mid a$$

**Q11)** Describe the Chomsky hierarchy of languages.

**Q12)** Explain about Universal Turing Machine (UTM).

**Q13)** State and explain about Post correspondence problem.

**SECTION – C**

**(5 × 1 = 5)**

**Answer all questions**

**Q14)** Define Moore machine.

**Q15)** Give regular expression for the language begins with 00 and ends with 11 over  $\{0, 1\}^*$

**Q16)** Define ambiguity in CFG.

**Q17)** Define PDA.

**Q18)** What is counter machine?





**(DMCS09)**

Total No. of Questions : 18]

[Total No. of Pages : 02

**M.Sc. DEGREE EXAMINATION, DECEMBER – 2018**

**COMPUTER SCIENCE**

**First Year**

**COMPUTER NETWORKS**

**Time : 3 Hours**

**Maximum Marks : 70**

---

**SECTION – A**

**(3 × 15 = 45)**

***Answer any THREE questions from the following***

- Q1)** Explain functions of different layers of OSI model.
- Q2)** Explain sliding window protocol for sender and receiver.
- Q3)** Discuss in detail about various aspect of Ipv6.
- Q4)** a) Discuss about Ethernet hubs, Bridges and switches.  
b) Describe the features of point – to – point protocol.
- Q5)** Explain how congestion control is achieved in TCP?

**SECTION – B**

**(5 × 4 = 20)**

***Answer any five questions from the following***

- Q6)** Explain about features of FTP and give its limitations.
- Q7)** Compare datagram subnet and virtual – circuit subnets.
- Q8)** Explain multimode fiber and single mode fiber and how the transmission of light through fiber.
- Q9)** Explain Distance Vector Routing with example.

**Q10)** Write about OSPF (open shortest path first). Which four classes of routers are distinguished by OSPF?

**Q11)** Describe various design issues of Datalink Layer.

**Q12)** What is channel allocation? How CSMA helps to solve problem?

**Q13)** Explain CRC technique with example.

**SECTION – C**

**(5 × 1 = 5)**

**Answer all questions**

**Q14)** What is use of DNS?

**Q15)** Define flooding.

**Q16)** What is datagram?

**Q17)** What is use of check sum in UDP header.

**Q18)** Define hamming distance.



(DMCS10)

Total No. of Questions : 18]

[Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, DECEMBER – 2018

First Year

COMPUTER SCIENCE

Design & Analysis of Algorithms

Time : 3 Hours

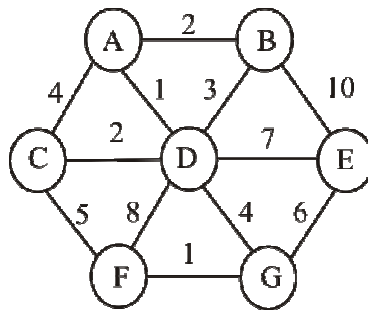
Maximum Marks : 70

SECTION – A

(3 × 15 = 45)

Answer any THREE questions

- Q1) a) Write recursion tree method for solving recursive algorithms.  
b) Describe the characteristics of good algorithm.
- Q2) For the given graph, construct minimum spanning tree using Kruskal's algorithm and also compute its complexity.



- Q3) Explain about merge sort algorithm by divide – and – conquer technique and also derive best case, average case and worst case time complexities.
- Q4) Draw an Optimal Binary Search tree for  $n = 4$  identifiers  $(a_1, a_2, a_3, a_4) = (\text{do}, \text{if}, \text{read}, \text{while})$   $P(1 : 4) = (3, 3, 1, 1)$  and  $Q(0 : 4) = (2, 3, 1, 1, 1)$ .
- Q5) What is basic principle of Branch and Bound strategy? Solve the following Knapsack problem using Branch – and – Bound technique knapsack capacity = 10.

Item	Weight	Value
1	4	40
2	7	42
3	5	25
4	3	12

**SECTION – B**

**(5 × 4 = 20)**

**Answer five questions from the following**

- Q6)** Describe the basic asymptotic efficiency classes?
- Q7)** Write about various disjoint set operations.
- Q8)** State and explain about quick hull problem.
- Q9)** Explain job sequence problem with suitable example.
- Q10)** Differentiate greedy search and dynamic programming.
- Q11)** Consider a set  $S = \{5, 10, 12, 13, 15, 18\}$  and  $d = 30$ . Solve it for obtaining sum of subset.
- Q12)** Give a topological sort for the following relation :  
( $a < b, a < c, d < b, e < c, a < e, a < d$ )
- Q13)** What is a Backtracking and give the 4 – Queen’s solution.

**SECTION – C**

**(5 × 1 = 5)**

**Answer all questions**

- Q14)** Complexity of recurrence :  $T(n) = 2T(\sqrt{n}) + \log n$ .
- Q15)** What is basic principle of Divide and Conquer method?
- Q16)** What is meant by Hamilton Cycles?
- Q17)** Define small “o” and small “ω”.
- Q18)** What is Huffman tree?



