(DMCS01)

M.Sc. DEGREE EXAMINATION, MAY – 2018
First Year
COMPUTER SCIENCE
Data Structures

Time : 3 Hours   Maximum Marks :70

SECTION - A
Answer any three questions.   (3 × 15 = 45)

Q1) a) Write a sub-routine to implement PUSH ( ) and POP ( ) operations using linked list.

   b) Explain about open hashing and closed hashing.

Q2) How to create double linked list? Explain about various operations of double linked list.

Q3) Discuss about tree traversing techniques with suitable example and also how to represent binary trees.

Q4) Write a step by step procedure to create a heap from the following sequence of nodes and sort them: 76, 22, 64, 46, 100, 68, 118, 91, 55, 76.

Q5) Construct Minimum Spanning Tree for the following graph using Prims's algorithm
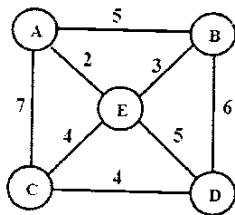
SECTION - B
Answer any five questions.   (5 × 4 = 20)

Q6) Write about memory allocation for one and two dimensional arrays.

Q7) Briefly explain about priority queue.

Q8) What is expression tree? Draw the expression tree for a * (b+c) * (d * e+f).

Q9) Write a sub routine to delete operation in binary tree.

Q10) How to sort large objects.

Q11) Write about B – tree indexing with example.

Q12) Represent the following graph by Adjacency Matrix, Adjacency list.

Q13) Explain about Hamiltonian circuit with suitable example.

SECTION - C
Answer all questions. (5 × 1 = 5)

Q14) What is dequeuer?

Q15) Define recursion.

Q16) What is threaded binary tree?

Q17) What is bucket sort?

Q18) Define spanning tree.

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M.Sc. DEGREE EXAMINATION, MAY – 2018
First Year
COMPUTER SCIENCE
Object Oriented Programming

Time : 3 Hours Maximum Marks :70

SECTION - A
Answer any three questions. (3 × 15 = 45)

Q1) Discuss different control structures used in C++ with syntax.

Q2) Illustrate function overloading with suitable example.

Q3) Explain about constructors and destructors with suitable example and also give limitations of constructors.

Q4) Explain about class, object, encapsulation, message passing and data abstraction in OOP.

Q5) What are I/O streams in C++? Give the stream class hierarchy.

SECTION - B
Answer any five questions. (5 × 4 = 20)

Q6) Write about constants and identifiers of C++.

Q7) Explain about inline function in C++ with syntax.

Q8) Describe any four string handling functions with its purpose.

Q9) Explain about multiple inheritance with example.

Q10) Write about dynamic and late binding.

Q11) What is pure virtual function? Explain with an example.

Q12) Illustrate function template with suitable example.

Q13) What is an exception? Give any four exceptions.

Answer all questions. (5 × 1 = 5)

*Q14)*Define polymorphism.

Q15) What is operator overloading?

Q16) What is use of 'this' pointer?

Q17) Define template.

Q18) What is use of scope resolution operator?

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M.Sc. DEGREE EXAMINATION, MAY - 2018
First Year
COMPUTER SCIENCE
Computer Organization

Time : 3 Hours   Maximum Marks : 70

SECTION - A   *(3 × 15 = 45)*
Answer any three questions

Q1) Simplify the following Boolean functions using three variable map in sum of product form

     a) $f(a,b,c) = \Sigma (1,4,5,6,7)$.

     b) $f(a,b,c) = \Sigma (0,1,5,7)$.

     c) $f(a,b,c) = \Sigma (1,2,3,6,7)$.

     d) $f(a,b,c) = \Sigma (3,5,6,7)$.

     e) $f(a,b,c) = \Sigma (0,2,3,4,6)$.

Q2) What is an Interrupt? Explain about software and Hardware interrupts. How these are used in a microprocessor?

Q3) Explain various addressing modes in detail.

Q4) What is virtual memory? Explain how a virtual address gets translated into a physical address with the help of a TLB.

Q5) a)   Define ASCII and EBCDIC codes.   *(6)*

     b)   Write an algorithm of summation of a set of numbers.   *(9)*

SECTION - B   *(5 × 4 = 20)*
Answer any five questions

Q6) What are guard bits? What are the ways to truncate guard bits?

Q7) Subtract 3250-72532 using 1's complement.

Q8) Define bus. Write about Synchronous and asynchronous bus.

Q9) Differentiate between arithmetic shift and logic shift.

Q10) Explain micro programmed control.

Q11) Write about DMA transfer.

Q12) Define the terms : Seek time, Rotational Delay, Access time, Locality of Reference.

Q13) Discuss the different mapping techniques used in cache memory.

SECTION - C   *(5 × 1 = 5)*
Answer all questions

Q14) Give the IEEE standard for floating point numbers for single precision number.

Q15) Which logic name is known as universal logic?

Q16) Differentiate between auto increment and auto decrement addressing mode.

Q17) What do you mean by interleaved memory?

Q18) What is data stripping?

M.Sc. DEGREE EXAMINATION, MAY – 2018
First Year
COMPUTER SCIENCE
Discrete Mathematical Structures

Time : 3 Hours   Maximum Marks :70

SECTION - A

Answer any three questions.   **(3 x 15 = 45)**

Q1) a) Quantify the following arguments into predicate form:

i)   Some integers are divisible by 3.

ii)   All real numbers are complex numbers.

iii) Every living thing is a plant or an animal.

iv)   Everybody likes somebody.

b) Prove that $(p \rightarrow q) \wedge [\neg q \wedge (r \vee \neg q)] \equiv \neg(q \vee p)$ are logically equivalent.

Q2) Let $\mu = \{x : x \in N, 1 \le x \le 12\}$ be the universal set and A = {1, 9, 10}, B = {3, 4, 6, 11,12} and C = {2, 5, 6} are the subsets of μ. Find the sets

i) $(A \cup B) \cap (A \cup C)$ ii) $(\overline{A \cup B \cup C})$.

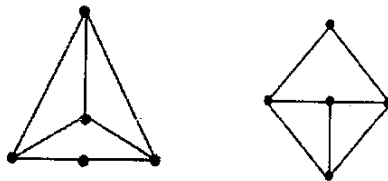**Q3)** a) If R and S are equivalence relations on a set A. Prove that R ∩ S is an equivalence Relation.

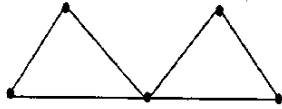b) Draw the Hasse diagram representing the positive divisors of 36.

Q4) a) In any group (G, *), by proving the inverse of every element is unique. Show that $(a * b)^{-1} = b^{-1} * a^{-1}, \forall a, b \in G$.

b) Show that in Boolean algebra, $(a + b)(a^1 + c) = ac + a^1 b + bc.$

Q5) a) Show that the following graphs are isomorphic.

b) Show that the following graph contains Euler's circuit.

SECTION - B

Answer any five of the following questions.   (5 x 4 = 20)

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

Q7) Show that $R \rightarrow S$ can be drawn from the premises $P \rightarrow (Q \rightarrow S), \neg R \vee P$ and Q.

Q8) Let f(x) = x+2, g(x) = x–2 and h(x) = 3x for x $\in$ R, Find g o f and f o h o g.

Q9) Prove that every subgroup of a cyclic group is cyclic.

Q10) Let U = {1, 2, 3, … 9, 10}, A = {1, 2, 3, 4, 5}, B = {3, 4, 5, 6, 7}. Find A Δ B, A – B and B – A.

Q11) Write about any four Boolean function.

Q12) State and explain about four color problem.

Q13) Determine the order |V| of the graph G = (V, E) in the following cases:

   a)   G is cubic graph with 9 edges.
   b)   G is regular with 15 edges.

SECTION - C

Answer all questions.   (5 x 1 = 5)

Q14) Define rule of inference.

Q15) Define lattice.

Q16) What is recursive function?

Q17) Define sub group.

Q18) Define bipartite graph.

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Total No. of Questions : 18] [Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, MAY – 2018

First Year

COMPUTER SCIENCE

Software Engineering

Time : 3 Hours Maximum Marks :70

SECTION - A

Answer any three of the following questions. **(3 x 15 = 45)**

Q1) Explain about Incremental and Waterfall Process Models.

Q2) What are system requirements? What notations are used for requirements specifications?

Q3) Explain in detail about the characteristics and criteria for a good design.

Q4) a) Describe golden rules of User Interface Design.
   b) Explain context diagram and data flow diagram (DFD) with suitable example.

Q5) a) Explain black box testing methods and its advantages and disadvantages.
   b) What do you mean by system testing? Give a case study of a system testing for operating system?

SECTION - B

Answer any five of the following questions. **(5 x 4 = 20)**

Q6) What are the fundamental activities of a software process?

Q7) How will you measure software quality assurance? Explain.

Q8) Compare and contact personal and team process models.

Q9) How do we learn what the user wants from the User Interface?

Q10) Write about metrics for analysis model and design model.

Q11) What is a cohesive module? What are the different types of Cohesion?

Q12) Write short notes on boundary value analysis.

Q13) Distinguish between alpha and beta testing.

Answer all of the following questions.   **(5 x 1 = 5)**

Q14) Define software process.

Q15) What is use of CMM?

Q16) Define behavioral modeling.

Q17) Define vertical partitioning.

Q18) Define debugging.

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(DMCS06)

Total No. of Questions : 18]　　　　　　　　　　　[Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, MAY - 2018

(First Year)

COMPUTER SCIENCE

Distributed Operating Systems

Time : 3 Hours　　　　　　　　　　　　　　　Maximum Marks : 70

<u>**SECTION - A**</u>　　　　　　　*(3 × 15 = 45)*
<u>Answer any three questions from the following</u>

Q1) Discuss advantages of distributed systems over centralized and independent PC's and also give the disadvantages of distributed systems.

Q2) Explain about distributed deadlock detection and prevention.

Q3) Discuss about design issues for thread packages.

Q4) Explain about process allocation models and process allocation algorithm.

Q5) Discuss about page based distributed shared memory and object based distributed shared memory.

<u>**SECTION - B**</u>　　　　　　　*(5 × 4 = 20)*
<u>Answer any five questions from the following</u>

Q6) Write about the features of client server model.

Q7) Write about ATM physical layer and adaption layer.

Q8) Describe transaction model in distributed system.

Q9) Briefly explain about clock synchronization algorithm.

Q10) Explain about fault tolerance using active replication.

Q11) Write about scheduling in distributed systems.

Q12) Briefly explain about directory server interface.

Q13) Write short notes on NUMA multiprocessors.

SECTION - C   *(5 × 1 = 5)*
Answer all questions

Q14) Define fault tolerance in distributed operating systems.

Q15) What is mutual exclusion?

Q16) Define shared memory.

Q17) What is logical clock?

Q18) What is ATM switching?

Total No. of Questions : 18]   [Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, MAY – 2018
First Year
COMPUTER SCIENCE
Database Management Systems

Time : 3 Hours   Maximum Marks :70

SECTION - A
Answer any three questions.   (3 x 15 = 45)

Q1) Explain about various data models. And also give the applications of DBMS.

Q2) Consider the following relations:
Suppliers (sid, sname, address)
Parts (pid, pname, color)
Catalog (sid, pid, cost)
Write the following queries in relational algebra, tuple relational calculus, and domain relational calculus:
a) Find the names of suppliers who supply some red part.
b) Find the sids of suppliers who supply some red or green part.
c) Find the sids of suppliers who supply every part.

Q3) Explain the following in SQL with examples.
a) Nested Queries   b) Correlated Queries   c) Triggers

Q4) Discuss in detail about B+ - tree and hash based indexing techniques.

Q5) Explain in detail about Timestamp based and validation based protocols.

SECTION - B
Answer any five questions.   (5 x 4 = 20)

Q6) What are the responsibilities of a DBA?

Q7) Write about generalization and specialization in E – R diagram.

Q8) Explain commit and rollback command.

Q9) Describe various DDL and DML commands in SQL with syntax.

Q10) Write about first and second normal forms with example.

Q11) Briefly explain about data dictionary storage.

Q12) How are deadlocks handled in transaction processing?

Q13) What is concurrency? What are the three problems due to concurrency?

SECTION - C
Answer all questions.   **(5 x 1 = 5)**

Q14) Define weak entity.

Q15) Define primary key.

Q16) Define functional dependency.

Q17) Define serializability.

Q18) What is meant by database views?

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(DMCS08)

M.Sc. DEGREE EXAMINATION, MAY – 2018

First Year

COMPUTER SCIENCE

Theory of Automata and Formal Languages

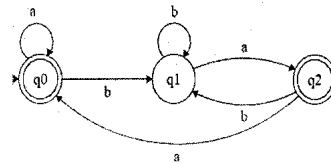Time : 3 Hours   Maximum Marks :70

SECTION - A

Answer any three questions.   **(3 x 15 = 45)**

Q1) a) Construct DFA for the language $L = \{w : |w| \bmod 3 \neq 0, w \in \{a,b\}*\}$.

b) Prove that "Let L be the language accepted by NFA then there exists it accepts DFA".

Q2) Give the regular expression for the following DFA and also give right linear grammar and left linear grammar:

Q3) a) Find the CFG with no useless symbols equivalent to the following grammar.

$S \rightarrow AB \,|\, CA, B \rightarrow BC \,|\, AB, A \rightarrow a, C \rightarrow aB \,|\, b$

b) Construct GNF grammar for the following CFG:

$S \rightarrow AA \,|\, b, A \rightarrow SS \,|\, a$

Q4) Design pushdown automata for the language: $L = (a^i b^j c^k \,|\, i = j + k\}$ trace it for String "bbbbbccccc".

Q5) Design Turing machine for the language $L = \{a^n b^n \,|\, n \geq 1\}$ and also give different types of Turing machines.

SECTION - B

Q6) Differentiate Moore and Mealy machines.

Q7) Find regular expression for following over the alphabet {0, 1}
    i) Language of all strings containing exactly two 0's.
    ii) Language of all strings that begins or ends with 00 or 11.

Q8) Prove that regular language is closed under union and intersection.

Q9) Construct NFA for the regular expression (a+b)*abb.

Q10) What is meant by ambiguous grammar? Show that $S \rightarrow aSb \,|\, bSa \,|\, SS \,|\, \varepsilon$ ambiguous Grammar.

Q11) Show that the language L = $\{a^p \,|\, p$ is prime number$\}$ is not regular.

Q12) Show that "Post Correspondence Problem is un-decidable".

Q13) Briefly explain about Church hypothesis.

SECTION - C
Answer all questions. **(5 x 1 = 5)**

Q14) Construct the DFA for the language L = $\{aba^n \,|\, n \geq 1\}$

Q15) Define PDA.

Q16) Define Chomsky Normal form.

Q17) What unit production?

Q18) What is decidable problem?

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Total No. of Questions : 18] [Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, MAY – 2018

First Year

COMPUTER SCIENCE

Computer Networks

Time : 3 Hours Maximum Marks :70

SECTION - A

Answer any three of the following questions. **(3 x 15 = 45)**

Q1) Explain about FTP and HTTP and also describe their uses, strengths and weaknesses.

Q2) With neat architecture explain about UDP.

Q3) Explain in detail about cyclic redundancy check with an example.

Q4) Explain about link state routing algorithm with suitable example.

Q5) Explain in detail about the frame format of IEEE 802.11 with role of access points in wireless communication.

SECTION - B

Answer any five of the following questions. **(5 x 4 = 20)**

Q6) Explain the e-mail architecture and services.

Q7) Explain congestion control in datagram subnets.

Q8) Write about multiplexing and de-multiplexing.

Q9) Enlist various guided media used for data transmission.

Q10) What is routing? How flooding can be used for routing?

Q11) Explain Fast Ethernet and Gigabit Ethernet.

Q12) What is Hamming Code? Explain how it is useful in error correction.

Q13) Explain ALOHA protocol with its varieties.

SECTION - C
Answer all of the following questions.   (5 x 1 = 5)

Q14) Define tunneling.

Q15) Differentiate static and dynamic routing.

Q16) Define packet switching.

Q17) What is Ethernet?

Q18) What is bridge?

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Total No. of Questions : 18]   [Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, MAY – 2018
First Year
COMPUTER SCIENCE
Design & Analysis or algorithms

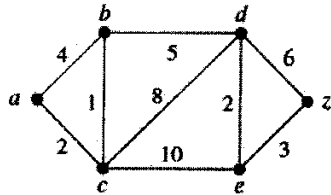**Time : 3 Hours**   **Maximum Marks :70**

SECTION - A
Answer any three of the following questions.   **(3 × 15 = 45)**

Q1) Explain all asymptotic notations used in algorithm analysis.

Q2) Using Dijkstra's Algorithm to Find a Shortest Path from a to z.

Q3) Explain quick sort algorithm using divide – and – conquer method. Derive best, worst and average time complexities of quick sort.

Q4) Solve following knapsack problem using dynamic programming algorithm with given Capacity W=5, Weight and Value are as follows: (2, 12), (1, 10), (3, 20), (2, 15).

Q5) a)   Write the solution of 4-Queens Problem using Backtracking Method.
      b)   Solve the Travelling Salesman problem using branch and bound technique.

SECTION - B
Answer any five of the following questions.   **(5 × 4 = 20)**

Q6) Briefly explain about amortized analysis of an algorithm.

Q7) Explain the basic principle of Divide and Conquer method.

Q8) Write about Strassen's matrix multiplication.

Q9) Explain string matching algorithm with suitable example.

Q10) Constrict Huffman code for the following data

Character	A	B	C	E	
Probability	0.35	0.1	0.2	0.2	0.15

Q11) Differentiate DFS and BFS.

Q12) Find the subset from the given sum using back tracking.
   $S = \{1, 2, 5, 7\}$ and $d = 8$.

Q13) Solve the all-pair shortest path problems for given adjacent matrix graph using

Floyd's Algorithm.

$$\begin{bmatrix} 0 & 4 & 8 & \infty \\ \infty & 0 & 5 & 12 \\ \infty & \infty & 0 & 7 \\ 5 & \infty & \infty & 0 \end{bmatrix}$$

SECTION - C
Answer all questions.   **(5 × 1 = 5)**

Q14) Express the function $f(n) = 5n^3 + 5n^2 + 10n$ in Θ notation.

Q15) Define spanning tree.

Q16) Define principle of optimality.

Q17) Define 0/1 knapsack problem.

Q18) What is basic principle of Branch and Bound method?

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