(DMCS01)

M.Sc. DEGREE EXAMINATION, DEC. – 2016
First Year
COMPUTER SCIENCE
Data Structures

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

Section - A   *(3 x 15 = 45)*

Answer any Three questions

Q1) Construct a binary search tree using the following data 10, 7, 14, 6, 8, 12, 15, 4, 5, 9, 18, 16, 11, 13, 6 and specify the output of traversing the constructed tree using Pre-order, In-order and Post-order Tree traversals.

Q2) What is a Graph? Explain Shortest path problem using Dijkstra algorithm.

Q3) What is a circular linked list? Explain the operations the operation performed on it with the help of an algorithm.

Q4) Define Minimal spanning tree. Explain Prim's algorithm with the help of an example.

Q5) What is DQUEUE? Write pseudocode for implementing all its operations.

Section - B   *(5 x 4 = 20)*

Answer any Five questions

Q6) Explain the merge operation on two binary trees.

Q7) Define Queue and explain in detail it types.

Q8) Write a program to find the factorial of a given number using recursion.

Q9) What is a sparse matrix? How is it represented?

Q10) Explain Topological sorting.

Q11) Explain Heap sort with an example.

Q12) Explain Hamiltonian circuits.

Q13) Explain Quick sort with the help of the following data 38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72.

Section - C   *(5 x 1 = 5)*

Answer All questions

Q14) State the collision resolution techniques.

Q15) Define a B tree.

Q16) Define a Simple Queue.

Q17) State the operation on Arrays.

Q18) What is Recursion?

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(DMCS02)

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

M.Sc. DEGREE EXAMINATION, DEC. – 2016
(First Year)
COMPUTER SCIENCE
Object Oriented Programming

Time : 3 Hours   Maximum Marks : 70

Section - A   *(3 x 15 = 45)*
Answer any Three questions

Q1) Explain the concepts of OOP in detail? State the advantages of OOP over Procedure Oriented Programming.

Q2) Write a short note on : pointer, memory allocation operator, memory deallocation operator.

Q3) Define constructor? Explain different types of constructors.

Q4) Explain inheritance and elaborate its types.

Q5) What is a template? Explain functions and class templates.

Section - B   *(5 x 4 = 20)*
Answer any Five questions

Q6) Explain the uses of scope resolution operator.

Q7) What is an inline function? State its limitations.

Q8) Explain *this* pointer with a program.

Q9) Write a program to implement the concept of unary operator overloading.

Q10) Explain the concept of virtual functions with an example.

Q11) Write a program to display the contents of an existing file.

Q12) Explain different forms of catch().

Q13) Explain the concept of call by value.

Section - C *(5 x 1 = 5)*
Answer All questions

Q14) Define a stream.

Q15) Function prototype.

Q16) Virtual class.

Q17) Namespaces.

Q18) Constructor overloading.

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(DMCS03)

[Total No. of Pages : 02

M.Sc. DEGREE EXAMINATION, DEC. – 2016

(First Year)

COMPUTER SCIENCE

Computer Organization

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

Section - A   *(3 x 15 = 45)*

Answer any Three of the following

Q1) Explain the design procedure of combinational circuits with an example.

Q2) Explain the architecture of ALSU.

Q3) Explain about micro programmed control unit.

Q4) What is complement? Explain about r's and r-1′ complement.

Q5) Explain about Associative memory.

Section - B   *(5 x 4 = 20)*

Answer any Five of the following

Q6) Differentiate Sequential and Combinational circuits.

Q7) Explain stack organization.

Q8) Explain Asynchronous data transfer.

Q9) Explain Cache memory.

Q10) Explain the need of error correcting codes in communications.

Q11) Explain about BUS and Memory transfer.

Q12) Explain about instruction format.

Q13) Explain about counters.

Section - C   *(5 x 1 = 5)*
Answer All of the following

Q14) What is multiplexer.

Q15) What is binary code.

Q16) What is register transfer language.

Q17) What is r-1′s complement.

Q18) What is secondary memory.

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(DMCS 04)

M.Sc. DEGREE EXAMINATION, DECEMBER – 2016
First Year
COMPUTER SCIENCE
Discrete Mathematical Structures

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

Section - A   *(3 x 15 = 45)*
Answer any Three of the following questions

Q1) a) Show that,
$(\neg P \wedge (\neg Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \Leftrightarrow R.$

b) Show that $(x)(P(x) \vee Q(x)) \Rightarrow (x)P(x) \vee (\exists x)Q(x).$

Q2) a) Show that, the function $f(x) = \dfrac{x}{2}$ is a partial recursive function.

b) Prove that, the minimum weight of the non-zero code word in a group code is equal to its Minimum distance.

Q3) a) Let $(L, *, \oplus)$ be a lattice. For any $a, b, c \in L$ the following holds.
$a \le c \Leftrightarrow a \oplus (b * c) \le (a \oplus b) * c.$

b) Simplify the following Boolean expressions

i) $(a*b)^1 \oplus (a \oplus b)^1$

ii) $(a^1 * b^1 * c) \oplus (a * b^1 * c) \oplus (a * b^1 * c^1).$

Q4) a) Prove that, a complete bipartite graph $K_{m,n}$ is planar iff $m \le 2$ (or) $n \le 2$.

b) Prove that, a graph G is 2 Colorable iff G is bipartite.

Q5) a) Prove that, a non empty subset S of G is a subgroup of a group $(G, *)$ if and only if for any $a, b \in S$, $a * b^{-1} \in S$.

b) Prove that, if $(G, *)$ is an abelian group, then for all $a, b \in G$, $(a*b)^n = a^n * b^n$

Section - B

(5 x 4 = 20)

Answer any Five of the following questions

Q6) Prove $\neg(P \uparrow Q) \Leftrightarrow (\neg P \downarrow \neg Q)$.

Q7) Prove that, every cyclic group is an abelian group.

Q8) Define Primitive recursive function and show that $f(x, y) = x^y$ is a primitive recursive function.

Q9) Prove that in any non-directed graph, sum of the degrees of the vertices is even.

Q10) Let G and H be two groups with respective multiplication. Let $f : G \rightarrow H$ be a on-to homomorphism. Then, prove that Kernal of f is a subgroup of G.

Q11) Prove that, every chain is a distributive lattice.

Q12) State and prove De Morgan's laws in Boolean algebra.

Q13) Prove that, in a distributive lattice every element has a unique complement.

Section - C

(5 x 1 = 5)

Answer all questions

Q14) Define regular function with example.

Q15) Define Transitive closure of a relation.

Q16) Define Boolean algebra.

Q17) Show that, in a lattice L for any $a, b \in$ L, $a*b = a$ iff $a \oplus b = b$.

Q18) Define Bipartite Graph.

(DMCS05)

M.Sc. DEGREE EXAMINATION, DEC. – 2016
(First Year)
COMPUTER SCIENCE
Software Engineering

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

Section - A   *(3 x 15 = 45)*
Answer any Three questions

Q1) Explain RAD and Spiral Process models.

Q2) Discuss about various design engineering concepts in detail.

Q3) Discuss about software reviews and formal technical reviews in connection with SQA.

Q4) What is a metric? Discuss about process and product metrics.

Q5) Describe the architectural design metrics and MOOD metrics suit for design model.

Section - B   *(5 x 4 = 20)*
Answer any Five questions

Q6) Explain the pros and cons of Personal and Team process models.

Q7) Explain Coupling and Cohesion.

Q8) Develop different levels of DFD for safe home security function.

Q9) Explain system engineering hierarchy.

Q10) What are architectural styles and patterns? Explain.

Q11) Stt the golden rules of User Interface Design.

Q12) Explain Scenario-based testing.

Q13) Discuss about formal Technical Reviews.

Section - C   *(5 x 1 = 5)*
Answer All questions

Q14) What is verification?

Q15) What is validation?

Q16) What is a metric?

Q17) Define Testing.

Q18) What is a review?

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(DMCS06)

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

M.Sc. DEGREE EXAMINATION, DEC. – 2016
First Year
COMPUTER SCIENCE
Distributed Operating Systems

Time : 3 Hours   Maximum Marks : 70

Section - A   *(3 x 15 = 45)*
Answer any Three questions

Q1) Explain in detail protocol layers and transfer mode networks.

Q2) Discuss about algorithms for implementing share memory in Distributed system.

Q3) Discuss about process synchronization in Distributed system.

Q4) Discuss about scheduling in Distributed system.

Q5) Write a short note on RAID and kernel module with respect to a distributed system.

Section - B   *(5 x 4 = 20)*
Answer any Five questions

Q6) Define distributed system and state its types.

Q7) What is a Thread? How is it different from process?

Q8) Explain Remote procedure call.

Q9) Discuss about election algorithm.

Q10) Write a note on real time scheduling.

Q11) Explain file allocation methods.

Q12) What are logical clocks? Explain.

Q13) Differentiate between nested and distributed transaction.

Section - C

Answer All questions

Q14) What is fault tolerance.

Q15) Define protocol.

Q16) What is atomic transaction?

Q17) What is server interface?

Q18) Explain processor pool?

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(DMCS 07)

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

M.Sc. DEGREE EXAMINATION, DECEMBER – 2016
First Year
COMPUTER SCIENCE
Database Management Systems

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

Section - A *(3 x 15 = 45)*
Answer any Three questions

Q1) How are database users classified? Explain the functions of DBA.

Q2) What is an SQL? Explain DDL and DML commands in SQL.

Q3) Define Normalization. Explain any 1NF, 2NF and BCNF.

Q4) Explain the process of handling Deadlocks by DBMS.

Q5) Write a short note on Queries, sub queries and nested queries.

Section - B *(5 x 4 = 20)*
Answer any Five questions

Q6) What is a view? How is it different from a table?

Q7) Draw the symbols used to construct ER diagram and also state their purpose.

Q8) Explain CREATE command of SQL completely.

Q9) What is Embedded SQL? Explain.

Q10) Explain functional dependency? State its types.

Q11) Explain B-Tree index files.

Q12) State the pros and cons of static hashing.

Q13) Explain domain constraints used in SQL.

Section - C (5 **x** *1 = 5)*

Answer All questions

Q14) What is a candidate key?

Q15) Define Entity.

Q16) What is atomicity?

Q17) What is a Trigger?

Q18) What is a view?

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(DMCS08)

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

M.Sc. DEGREE EXAMINATION, DEC. – 2016

(First Year)

COMPUTER SCIENCE

Theory of Automata and Formal Languages

Time : 3 Hours Maximum Marks : 70

Section - A (3 x 15 = 45)

Answer any Three of the following

Q1) Prove that if r be a regular expression, then there exists an NFA with epsilon transitions that accepts L(r)?

Q2) Explain the decision algorithms for regular sets?

Q3) State and prove three closure properties of Context Free Language?

Q4) Prove the un-decidability of post correspondence problem?

Q5) Draw a transition diagram for a Turing machine accepting the following language?
$\{a^n b^n c^n \,|\, n > 0\}$

Section - B (5 x 4 = 20)

Answer any Five of the following

Q6) State and prove the pumping lemma for regular sets? Show that L={ww|w belongs to {a,b}*} is not regular.

Q7) Prove the language L={$0^n 1^n 2^n | n \geq 1$} is not a CFL?

Q8) Construct a Finite Automata for the regular expression (a+b)* ab?

Q9) Prove the following statements.
  a) If L is regular then LT is also regular.

b) If L is regular set over Σ, then Σ*-L is also regular over Σ.

Q10) Construct a PDA accepting the language of palindromes over the alphabet {a,b}?

Q11) Prove the equivalence of acceptance by final state and empty stack in PDA?

Q12) Explain universal Turing machine?

Q13) Explain Chomsky hierarchy?

Section - C   *(5 x 1 = 5)*
Answer All of the following

Q14) Define regular grammar?

Q15) Define deterministic push down automata?

Q16) Define context sensitive language?

Q17) Define ambiguity in CFL?

Q18) Define Chomsky normal form?

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(DMCS09)

M.Sc. DEGREE EXAMINATION, DEC. – 2016
(First Year)
COMPUTER SCIENCE
Computer Networks

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

Section - A   *(3 x 15 = 45)*
Answer any Three questions

Q1) Explain in detail TCP/IP reference model with neat diagram.

Q2) What is Cryptography? Explain Symmetric and Asymmetric Key Cryptography.

Q3) Explain Routing Principles and Routing in the Internet.

Q4) What is switching? Explain its types in detail.

Q5) Explain the concept of Multiple Access Protocols in detail.

Section - B   *(5 x 4 = 20)*
Answer any Five questions

Q6) Write about the Error Correction Techniques.

Q7) Explain the applications of Networking.

Q8) Explain about Naming Techniques.

Q9) Write about different topologies.

Q10) Compare the guided and unguided transmission media.

Q11) Write about DES algorithm.

Q12) Write about Hierarchical Routing.

Q13) Write about IP address calculation.

Section - C   *(5 x 1 = 5)*

Answer All questions

Q14) E-Mail.

Q15) What is Internet.

Q16) Define Hub and Switches.

Q17) What is Multiplexing.

Q18) What is routing.

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(DMCS10)

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

M.Sc. DEGREE EXAMINATION, DEC. – 2016
(First Year)
COMPUTER SCIENCE
Design & Analysis of Algorithms

Time : 3 Hours   Maximum Marks : 70

Section - A   *(3 x 15 = 45)*
Answer any Three of the following

Q1) Read the sequence of integers as input, terminated by -1? Write an algorithm to find the second largest element? [NO use of arrays]

Q2) Explain the behavior of union and weighted union with an algorithm?

Q3) Explain prims algorithm for the construction of minimum cost spanning trees on a example graph? Write the prims algorithm

Q4) Solve the N-queen's problems with an algorithm and calculate its complexity?

Q5) Explain FIFO branch and bound technique 15-puzzle problem?

Section - B   *(5 x 4 = 20)*
Answer any Five of the following

Q6) Show that the following equalities are correct?
   a) $5n^2-6n = \theta(n^2)$
   b) $6*2^n+n^2 = O(2^n)$
   c) $10n^2 + 4n+2 = \Omega(n^2)$

Q7) Explain the merge sort sorting procedure with an algorithm and calculate its best and worst case time complexity?

Q8) Explain single source shortest path problem with an example graph?

Q9) Explain Kruskals algorithm for the construction of minimum cost spanning trees on a example graph? Write the Kruskals algorithm?

Q10) Use function OBST to compute w(i,j), r(i,j) and c(i,j), $0 \leq i < j \leq 4$ for the identifier set (a_1, a_2, a_3, a_4) = (cout, float, if, while) with p(1) = 1/20, p(2) = 1/5, p(3) = 1/10 and p(4) = 1/20, q(0) = 1/5, q(1) = 1/10, q(2) = 1/5, q(3) = 1/20 and q(4) = 1/20 using the r(i,j)'s construct the optimal binary search tree?

Q11) Let w = {5, 7, 10, 12, 15, 18, 20} and m = 35. Find all possible subsets of w that sum to m using sub of subsets?

Q12) Explain Hamiltonian cycle problem on a graph with an algorithm?

Q13) Solve TSP problem using FIFO-branch and bound technique.

$$\begin{pmatrix} \alpha & 20 & 30 & 10 & 11 \\ 15 & \alpha & 16 & 4 & 2 \\ 3 & 5 & \alpha & 2 & 4 \\ 19 & 6 & 18 & \alpha & 3 \\ 16 & 4 & 7 & 16 & \alpha \end{pmatrix}$$

Section - C   (5 x 1 = 5)
Answer all of the following

Q14) Define Big Oh and Theta Asymptotic notation?

Q15) Write the iterative algorithm for binary search?

Q16) Explain control abstraction of greedy method?

Q17) Explain the principle of optimality in dynamic programming?

Q18) Define branch and bound algorithm design method?