

**M.Sc. (Previous) DEGREE EXAMINATION, DEC. - 2012**

**(Examination at the end of First Year)**

**Computer Science**

**Paper - I : DATA STRUCTURES**

**Time : 03 Hours**

**Maximum Marks : 75**

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**Section - A ( $3 \times 15 = 45$ )**

*Answer any **Three** questions*

- 1) Discuss various operations on double linked list.
- 2) Discuss the applications of stack with suitable example.
- 3) a) A binary tree has 9 nodes. The in-order and post-order traversal of tree yields the following sequence of the nodes. Draw the binary tree.

In-order : E A C K F H D B G

Post-order : F A E K C D H G B

- b) Write about B-tree indexing.
- 4) Write and implement Heap sort algorithm with suitable example.
- 5) What is minimum spanning tree? Explain about algorithms for constructing MST.

**Section - B ( $5 \times 5 = 25$ )**

*Answer any **Five** questions*

- 6) Write about the stack operations using the array representations.
- 7) Write short notes on circular queue with suitable example.
- 8) Describe the procedure to delete and insert element to the binary tree.
- 9) Give the properties of binary tree.
- 10) Write about quick sort algorithm.
- 11) Write short notes on hashing and collision.
- 12) Explain about the graph representing techniques with example.
- 13) Discuss about the Euler's and Hamiltonian circuits.
- 14) Write about area sub-division method.

**Section - C (5 × 1 = 5)**

Answer **All** questions

- 15) What is an array?
  - 16) Define recursion.
  - 17) Define hashing.
  - 18) What is meant bucket sort.
  - 19) Define graph.
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**Computer Science**

**Paper - II : OBJECT ORIENTED PROGRAMMING**

**Time : 03 Hours**

**Maximum Marks : 75**

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**Section - A ( $3 \times 15 = 45$ )**

*Answer any **Three** questions*

- 1) Discuss various control structures in C++ with suitable example.
- 2) What is constructor? Explain about different types of constructors. Write the limitations to declare constructors.
- 3) Explain Operator overloading. Write a C++ program to overload '==' operator to compare two strings.
- 4) What is inheritance? Explain about different types of inheritances.
- 5) a) How to create template? Give the advantages of templates.  
b) Describe the different types of exceptions.

**Section - B ( $5 \times 5 = 25$ )**

*Answer any **Five** questions*

- 6) Compare C and C++.
- 7) Explain function overloading with suitable example.
- 8) What is friend function? Write the some properties of friend functions?
- 9) Describe the different string handling functions.
- 10) What is multiple inheritance? Explain with suitable example.
- 11) Write short notes on virtual functions.
- 12) Discuss various file operations.
- 13) Write short notes on I/O streams.

**Section - C (5 × 1 = 5)**

Answer **All** questions

- 14) What is purpose of scope resolution operator?
  - 15) Define dynamic binding.
  - 16) What is static data member?
  - 17) Define encapsulation.
  - 18) What is meant by type casting.
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**Computer Science**

**Paper - III : COMPUTER ORGANIZATION**

**Time : 03 Hours**

**Maximum Marks : 75**

**Section - A ( $3 \times 15 = 45$ )**

*Answer any **Three** questions*

- 1) a) Explain briefly regarding Fixed & Floating Point Representation. [8]  
b) Explain Error Detection Codes. [7]
- 2) a) Explain Arithmetic Logic Shift Unit. [7]  
b) Discuss briefly regarding Timing & Control Unit. [8]
- 3) Explain briefly regarding Cache Memory. [15]
- 4) Discuss about  
a) Daisy Chain Priority Interrupts. [7]  
b) DMA [8]
- 5) a) Explain Booth Multiplication Algorithm. [8]  
b) Explain Division Algorithm. [7]

**Section - B ( $5 \times 5 = 25$ )**

*Answer any **Five** questions*

- 6) Explain with a neat diagram  $3 \times 8$  decoder constructed with two  $2 \times 4$  decoders.
- 7) Explain Bidirectional Shift register with parallel load.
- 8) Explain Register Transfer.
- 9) Explain the Design of Control Unit.
- 10) Discuss the general Register Organization.
- 11) Explain briefly regarding Input-Output Interface.
- 12) Explain  
a) Strobe control            b) Handshaking.
- 13) Explain briefly regarding Associative Memory.

**Section - C (5 × 1 = 5)**

Answer **All** questions

- 14) What is a Flip Flop.
  - 15) What is the use of Binary counter.
  - 16) What is meant by Mapping process.
  - 17) What is meant by Fetch & Decode.
  - 18) Draw and RAM & ROM chips.
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Total No. of Questions : 18]

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**Computer Science**

**(Paper - IV) : DISCRETE MATHEMATICAL STRUCTURES**

**Time : 03 Hours**

**Maximum Marks : 75**

**Section - A**

**(3 × 15 = 45)**

*Answer any Three questions*

- Q1) a) Construct the truth table for.  
$$[(p \vee q) \wedge (\sim r)] \leftrightarrow (q \rightarrow r)$$
- b) Show that  $[(P \rightarrow Q) \wedge (Q \rightarrow R)] \rightarrow (P \rightarrow R)$  is a tautology
- Q2) Negate and simplify each of the following
- a)  $\forall(x), [p(x) \rightarrow q(x)]$                       b)  $\forall(x), [p(x) \wedge \sim q(x)]$
- Q3) a) Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  be defined as  $f(x) = 3x + 7$  show that  $f$  is one - one and onto. find  $f^{-1}(x)$ .
- b) Show that "a divides b" is a partial order relation on  $\mathbb{Z}^+$ . Draw Hasse diagram for the set  $D_{72}$  divisors of 72.
- Q4) a) Show that the set  $\mathbb{N}$  of natural number is a semigroup under the operation  $x * y = \max\{x, y\}$ . is it monoid.
- b) Show that in a group  $\langle G, * \rangle$ , if for any  $a, b \in G$ ,  $(a * b)^2 = a^2 * b^2$  then  $\langle G, * \rangle$  must abelian.
- Q5) a) State and prove Euler's formula.
- b) Explain about four color problem.

**Section - B**

**(5 × 5 = 25)**

*Answer any Five questions*

- Q6) Describe various normal forms.
- Q7) State and prove demorgans law.
- Q8) Prove that  $A \cap B \subseteq A$  if  $A$  and  $B$  are two sets.
- Q9) Find the identify element of the group of integers with binary operation  $*$  defined by  $a * b = a + b - 2 \forall a, b \in \mathbb{Z}$
- Q10) In Boolean algebra, show that  $(a + b)(a' + c) = ac + a'b = ac + a'b + bc$ .
- Q11) If  $R$  is a symmetric relation defined on a set  $A$  then prove that  $R \cup R^2$  is symmetric.
- Q12) Explain Hamiltonian graph with example.
- Q13) Explain the concept of graph isomorphism.

**Section - C**

**(5 × 1 = 5)**

*Answer All questions*

- Q14) Define well formed formulae.
- Q15) What is recursive function.
- Q16) Define abelian group.
- Q17) Define lattice.
- Q18) What is planar graph?



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**Paper - V : SOFTWARE ENGINEERING**

**Time : 03 Hours**

**Maximum Marks : 75**

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**Section - A ( $3 \times 15 = 45$ )**

*Answer any **Three** of the following*

- 1) Discuss any four (4) software process models with a neat sketch.
- 2) Explain various software process and project metrics with example.
- 3) Describe the process of converting analysis model into design model with sample example.
- 4) What is software Architecture? List and explain any four (4) different architectural styles.
- 5) What is the difference between functional & Structural Testing? Discuss basis path testing techniques with examples.

**Section - B ( $5 \times 5 = 25$ )**

*Answer any **Five** of the following*

- 6) Explain Rapid prototyping model.
- 7) Discuss software myths.
- 8) What is the significance of SQA.
- 9) What is the difference between abstraction and modularity.
- 10) Describe ISO 9126 quality model.
- 11) Explain user Interface design principles.
- 12) Distinguish the difference between coupling & cohesion.
- 13) Discuss the importance of test stubs and drivers in Integration testing.



**Section - C (5 × 1 = 5)**

Answer **All** of the following

- 14) What is equivalence testing?
  - 15) What is usability?
  - 16) Explain Reliability.
  - 17) What is Design?
  - 18) What is the difference between alpha & beta testing?
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**Computer Science**

**Paper - VI : DISTRIBUTED OPERATING SYSTEM**

**Time : 03 Hours**

**Maximum Marks : 75**

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**Section - A ( $3 \times 15 = 45$ )**

*Answer any **Three** questions*

- 1) Discuss the design issues to be considered while building a distributed operating system.
- 2) Explain about the Asynchronous Transfer Mode Networks.
- 3) Briefly explain the mutual exclusion algorithms required for synchronization in distributed systems.
- 4) Describe the different processor allocation models and their design issues and implementation issues.
- 5) Explain the page-based distributed shared memory.

**Section - B ( $5 \times 5 = 25$ )**

*Answer any **Five** questions*

- 6) Explain the distributed system hardware.
- 7) Describe the basic RPC operation.
- 8) Explain distributed deadlock detection.
- 9) What is the Bully algorithm used for?
- 10) Explain the Hybrid system model.
- 11) How fault tolerance can be achieved using active replication?
- 12) Explain the semantics of file sharing.
- 13) What are Bus - Based multi processors?

**Section - C (5 × 1 = 5)**

Answer **All** questions

- 14) What is a logical clock?
  - 15) Explain what is a multiprocessor timesharing system?
  - 16) What is shared memory?
  - 17) Define a thread.
  - 18) What are component faults.
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**(Examination at the end of First Year)**

**Computer Science**

**Paper - VII : DATA BASE MANAGEMENT SYSTEMS**

**Time : 03 Hours**

**Maximum Marks : 75**

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**Section - A ( $3 \times 15 = 45$ )**

*Answer any **Three** questions*

- 1) Explain in detail about architecture of database management system.
- 2) Explain design issues of E-R model. Construct E-R diagram for a bank database. Bank maintains data about customers, their loans, their deposits, lockers. Determine the attributes, entities and relationships.
- 3) Explain in detail about various types of SQL statements. What are the advantage of SQL.
- 4) What is normalization? Explain about normal forms with suitable example.
- 5) a) Explain binary locks, shared locks and exclusive locks.  
b) What is two phase locking protocol? How does it guarantee serializability?

**Section - B ( $5 \times 5 = 25$ )**

*Answer any **Five** questions*

- 6) Explain the drawbacks of traditional file processing system with suitable example.
- 7) Define the difference between a weak entity and strong entity set.
- 8) Describe the equivalences of relational algebra.
- 9) Explain B-tree index.
- 10) Explain lossless join decomposition with an example.
- 11) Explain about ACID properties.
- 12) Explain about string operations in SQL.
- 13) Explain about time stamped based protocol and validation based protocol.

**Section - C (5 × 1 = 5)**

Answer **All** questions

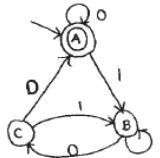
- 14) What is aggregation?
  - 15) What are the primary and foreign keys?
  - 16) Define functional dependence.
  - 17) Define hashing.
  - 18) What is meant by indexing?
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**Section - A**

(3 × 15 = 45)

*Answer any Three of the following*

- Q1) Prove that “L be a set accepted by NFA, then there exists a DFA that accepts L”.
- Q2) Construct finite automata for the following regular expression
  - a)  $a(a + b)^*bb$
  - b)  $10 + (0 + 11)0^*1$
- Q3) Construct regular expression corresponding to the state diagram.



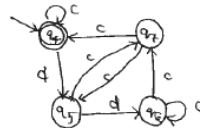
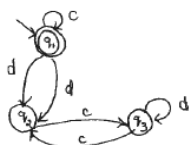
- Q4) Design PDA for the language  $L = \{w \in \{a, b\}^* / w \in \{a, b\}^*\}$ .
- Q5) Explain about types of turing machines and also short notes on universal turing machine.

**Section - B**

(5 × 5 = 25)

*Answer any Five of the questions*

- Q6) Design DFA to accept string with a and b's such that number of a's are divisible by 3.
- Q7) Check the following FSM's are equivalent or not



- Q8) State and prove arder's theorem.
- Q9) What is ambiguity? Show that  $S \rightarrow SS / (S) / \epsilon$  is ambiguous.
- Q10) Convert the following grammar to GNF
 

$S \rightarrow AB$	$A \rightarrow BS/b$	$B \rightarrow SA/a$
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- Q11) Show that  $L = \{a^p / p \text{ is prime number}\}$  is not CFL.
- Q12) Design turing machine for the language  $L = \{a^n b^n / n \geq 1\}$ .
- Q13) Write about chomsky hierarchy of languages.

**Section - C**

(5 × 1 = 5)

*Answer All of the questions*

- Q14) Define NFA and DFA.
- Q15) What are left and right linear grammar?
- Q16) Define PDA?
- Q17) What is CNF?
- Q18) What is counter machine.



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**Paper - IX : COMPUTER NETWORKS**

**Time : 03 Hours**

**Maximum Marks : 75**

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**Section - A ( $3 \times 15 = 45$ )**

*Answer any **Three** questions*

- 1) Discuss TCP/IP and OSI reference models.
- 2) Discuss the features of HTTP and FTP protocols.
- 3) Explain about Multiplexing and demultiplexing.
- 4) Explain about hierarchical routing algorithm.
- 5) Discuss about error detection and correction techniques.

**Section - B ( $5 \times 5 = 25$ )**

*Answer any **Five** questions*

- 6) Write about packet switching.
- 7) Write short notes e-mail in the internet.
- 8) What are the elements of TCP header?
- 9) Describe the elements of transport layer.
- 10) Describe the IP address format.
- 11) Write about IPv6.
- 12) Describe the 802.11 LANS.
- 13) Write short notes on ARP and Ethernet.

**Section - C (5 × 1 = 5)**

Answer **All** questions

- 14) What is switch?
  - 15) What is purpose of hub?
  - 16) Give the services of WWW.
  - 17) What is meant by network topology?
  - 18) What is point to point protocol?
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**Paper - X : DESIGN & ANALYSIS OF ALGORITHMS**

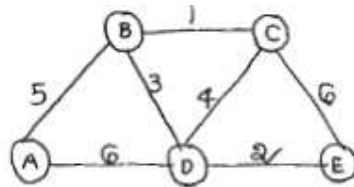
**Time : 03 Hours**

**Maximum Marks : 75**

**Section - A ( $3 \times 15 = 45$ )**

Answer any **Three** questions of the following

- 1) a) State and explain basic properties of an algorithm.  
b) Explain different types of asymptotic notations.
- 2) Give the general method for divide and conquer strategy explain any one application that can be solved by divide and conquer method.
- 3) Apply prims algorithm to find minimum spanning tree for the following graph.



- 4) Explain graph traversing techniques with suitable example.
- 5) Solve the following instance of Knapsack problem by branch and bound algorithm.  
(Knapsack capacity  $w = 16$ )

Item	Weight	value
1	10	\$ 100
2	7	\$ 63
3	8	\$ 56
4	4	\$ 12

**Section - B ( $5 \times 5 = 25$ )**

Answer any **Five** questions of the following

- 6) Write a procedure to solve recursive algorithm.
- 7) Explain merge sort with an example.

- 8) Explain strassen's matrix multiplication.
- 9) Write an algorithm for constructing the optimal binary search trees.
- 10) Write about different tree traversing techniques.
- 11) Describe the n-queen's problem.
- 12) Explain about graph coloring problem.
- 13) Write about travelling sales man problem using dynamic programming.

**Section - C (5 × 1 = 5)**

Answer **All** questions

- 14) Define order of growth.
  - 15) What best and worst case of an algorithm?
  - 16) What is basic principle of greedy method?
  - 17) What is meant by principle of optimality?
  - 18) Define back tracking.
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