SYLLABUS FOR THE SUBJECT OF COMPUTER SCIENCE
PAPER- I

Total Marks: 100

SECTION-A

1. **Introduction to Computing**

Number Systems, Binary numbers, Boolean logic, History Computer system, basic machine organization, Von Neumann Architecture, Algorithm definition, design, and implementation, Programming paradigms and Languages, Graphical programming, Overview of Software Engineering and Information Technology, Operating system, Compiler, Computer networks and Internet, Computer graphics, AI, Social and legal issues.

2. **Programming Solving Techniques**

Algorithms and problem solving, development of basic Algorithms, analyzing problem, designing solution, testing designed solution, fundamental programming constructs, translation of algorithms to programmes, data types, control structures, functions, arrays, records, files, testing programmes.

REFERENCE MATERIAL:

1. *Computers: Information Technology in Perspective, 9/e by Larry Long and Nancy Long. Prentice Hall, 2002/ISBN: 0130929891*
2. *An Invitation to Computer Science, Schneider and Gersting, Brooks/Cole Thomson Learning, 2000*
3. *Computer Science: An overview of Computer Science, Sherer*
4. *Programme Design with Pseudo-code, Bailey and Lundgaard, Brooks/Cole Publishing, 1988*
5. *Simple Programme Design: A step-by-step approach, 4/e, Lesley Anne Robertson, ISBN: o-619-16046-2 © 2004.*

SECTION-B

1. **Computer Communications & Networks**

Analogue and digital Transmission, Noise, Media, Encoding, Asynchronous and Synchronous transmission, Protocol design issues, Network System architecture (OSI, TCP/IP), Error control, Flow Control, Data Link Protocols (HDLC,PPP). Local Area Networks and MAC Layer protocols (Ethernet, Token ring), Multiplexing, Switching and IP Networks, Internetworking, Routing, Bridging, Transport layer protocols TCP/IP, UDP. Network security issues, Programming exercises or projects involving implementation of protocols at different layers.

2. **Digital Logic & Computer Architecture**

Logic design of Digital Systems, Fundamental and advanced concepts of Logic Designs, Boolean Algebra & functions, Designing and implementation of combinational and Sequential logic, minimization techniques, number representation and basic binary arithmetic Logic families and digital integrated circuits, use of CAD tools for logic designs. Topics of Computer Architecture.

REFERENCE MATERIAL:

1. Introduction to Computer Networks, Tanenbaum

2. Unix Network Programming, Richard Stevens.

3. Computer networks: a systems approach, Larry Peterson, Bruce Davie, Princeton Univ., Princeton.

4. *Digital Design, 2nd Ed., M. Morris Mano, Prentice hall, 1991.*

5. Practical Digital Logic Design and Testing, P. K Lala, Prentice Hall, 1996.

SECTION-C

Data Structures and Algorithms

Topics include arrays, stacks, queues, lists, trees; Tree Traversals, Binary Trees; graphs, graph traversals: Depth First Search, Breadth First Search; Sorting algorithms: Insertion Sort, Selection Sort, Merge-sort, Quicksort, Bucket-Sort, Radix-Sort; Hash Tables: Hash Functions, Data Compression: Applications, Huffman Coding

Reference Material:

- Data Structures and Algorithms in C++ by Michael T. Goodrich, Roberto Tamassia, and David Mount (2nd Edition)
- Data Structures and Algorithm Analysis in C++ by Mark Allen Weiss (2nd Edition)
- Data Structures and Algorithm Analysis in C++. 4th Edition, by Weiss, Mark A.

Operating Systems

Types of Operating Systems, I/O Structure, Storage Structure and Storage Hierarchy, Operating System Services, Process Scheduling Algorithms, Inter Process Communication, CPU Scheduling Algorithms, Dead Lock and Dead Lock Prevention and Avoidance, Hardware Protection, Memory Management, Paging, Segmentation, Paging with Segmentation, Virtual Memory

Reference Material:

- Operating Systems Concepts, 6th Edition, Silberschatz
- Modern Operating Systems, 2nd Edition, Tanenmaum, A. S.

PAPER II
SECTION- A

Total Marks:100

1. Theory of Automata and Formal Languages.

Finite State Models: Language definitions preliminaries, Regular expressions/Regular languages, Finite automatas (FAs), Transition graphs (TGs),NF As, kleene's theorem, Transducers (automata with output), Pumping lemma and non regular language *Grammars and PDA:* Context free grammars, Derivations, derivation trees and ambiguity, Simplifying CFLs , Normal form grammars and parsing, Push-down Automata, Pumping lemma and non-context free languages, Decidability, Chomsky's hierarchy of grammars, *Turing Machines Theory:* Turing machines, Post machine, Variations on 1M, 1M encoding, Universal Turing Machine, Context sensitive Grammars, Defining Computers by TMs.

REFERENCE MATERIAL:

1. *Introduction to Computer Theory, Denial Cohen, John Wiley & Sons, Inc.*
2. *Introduction to Automata Theory, Languages and Computation, J Hopcraft, D. Ullman.*
3. *Languages and Machines, An Introduction to the Theory of Comp. Sc., 2/e Thomas A Sudkamp, Addison Wesley.*

2 Compiler Theory & Design

Compiler techniques and methodology. Organization of compilers. Lexical and syntax analysis. Parsing techniques. Object code generation and optimization, detection and recovery from errors. Comparison between compilers and interpreters.

REFERENCE MATERIAL:

1. *Compiler Design and Construction, by Alfred V. Aho, Ravi Sethi, Hardcover 2nd edition, 1987, Van Nostrand Reinhold,. ISBN: 0317636367.*

3. Numerical Methods

Mathematical Preliminaries, Solution of Equations in one variable, Interpolation and Polynomial Approximation, Numerical Differentiation and Integration, Initial Value Problems for Ordinary Differential Equations, Direct Methods for Solving Linear Systems, Iterative Techniques in Matrix Algebra, Solution of non-linear equations, Approximation Theory, Eigenvalues and Eigenvector computation.

REFERENCE MATERIAL:

1. *Elements of Numerical Analysis, Dr. Faiz, M. Afzal*

SECTION -B

I. Data Base Systems

Basic database concepts, Entity Relationship modelling, Relational data model and algebra, Structured Query language, RDBMS; Database design, functional dependencies and normal forms, Transaction processing and optimization concepts, concurrency control and recovery techniques, Database recovery techniques, Database security and authorization. Small Group Project implementing a database. Physical database design: Storage and file structure, indexed files, hashed files, signature files, b-trees, files with dense index, files with variable length records, database efficiency and tuning Data Warehousing and Data Mining, Emerging Database Technologies and Applications.

REFERENCE MATERIAL:

1. *Database Systems, C.J. Date, Addison Wesley Pub. Co. (2004).*
2. *Database Systems: A Practical Approach to Design, Implementation and Management,*
3. *R Connolly and P .Begg, Addison-Wesley Pub. Co (2003).*
4. *Fundamentals of Database Systems, 3/E, Elmasri and Navathe, Addison-Wesley, ISBN: 0-201-74153-9.*

2. Software Engineering

Software Engineering, Process Models, Software verification and validation. Techniques are introduced to evaluate software correctness, efficiency, performance and reliability, integration of these techniques into a verification and validation plan. Technical reviews, software testing, programme verification, prototyping, and requirement tracing. Attitude of industry toward reliability and performance.

REFERENCE MATERIAL:

1. *Software Engineering: A Practioner's Approach, Roger Pressman, McGraw-Hill, 2001.*
2. *Software Engineering, Ian Sommerville, Addison-Wesley 2001, ISBN: 0-201-39815-X.*

SECTION -C

1. Artificial Intelligence

Introduction to Common Lisp. AI classical systems: General Problem Solver, rules, simple search, means-ends analysis. EIIZA, pattern matching, rule based translators, OPS-5. Knowledge Representation: Natural language, rules, productions, predicate logic, semantic networks, frames, objects, scripts. Searching, Depth first search, breadth first search, best first search, hill climbing, min-max search. Symbolic Mathematics: student solving algebra problems, translating English equations, solving algebraic equations, simplification rules, re-write rules, meta-rules, Macsyma, PRESS, ATLAS. Logic Programming: Resolution, unification, horn-clause logic, Prolog, Prolog programming. Sample case studies of shells and Knowledge Based Systems. A brief appreciation of state of the art computational techniques like neural networks, genetic algorithm, fuzzy sets.

REFERENCE MATERIAL:

1. *Artificial Intelligence by Luger, 4th edition, Pearson Education.*

2. Computer Graphics

Graphics hardware, Fundamental algorithms, Applications of graphics. Interactive graphics programming -graph plotting, windows and clipping, and segmentation. Programming raster display systems, panning and zooming. Raster algorithms and software Scan-Converting lines, characters and circles. Region filling and clipping. Two and three dimensional imaging geometry and transformations. Curve and surface design, rendering, shading, colour and animation.

REFERENCE MATERIAL:

1. *Computer Graphics, Principles and Practice, J. D. Foley, A van Dam, S. K. Feiner and J. F. Hughes, Addison-Wesley ISBN: 0-201-12110-7.*
2. *Computer Graphics, F.S.Hi1I, Maxwell MacMillan ISBN: 0-02-354860-6.*

FURTHER SUGGESTED READINGS

1. *Computers: Tools for an Information Age, 8th Ed. H I Capron, Adison Wesley, 2003. Paul Wilton.*
2. *Computer Concepts, 3rd Ed, ITP 1998; J.J.Parsond & D. Oja*

3. *Siberschatz. Galvin & Gagne, Operating System Concepts, 6th Ed. 2002. John Wiley & Sons, Inc. ISBN 0-471-41743-2.*
4. *Tanenbaum. A.S., Modern Operating Systems, 2nd. Ed, 2001.*
5. *Deitel & Deitel, C++, How to Program, 4th Ed. Prentice Hall.*
6. *Tocci & Widmer, Digital Systems, Principles and Applications, 8th Ed.. Published by Pearson Education.*
7. *John F. Wakerly, Digital Designs, Principles & Practices, 3rd. Ed. Published by Prenice Hall.*
8. *M. Morris Mano, Digital Logic & Computer Design, Prentice Hall, 1979, ISBN 0-132-14510-3.*
9. *Jim Keogh, C++, Programmers Notebook, 2nd Ed.*
10. *Sipser, Introduction to the Theory of Computation, 2nd Ed. Thomson Course Technology, 2006.*
11. *Ian Sommerville, Software Engineering, 6th Ed. Adison Wesley,2001 12. M. A. Weiss, Data Structures and Algorithm Analysis in C. Pearson Education 2nd Ed. 1997.*
13. *Elmasri & Navathe, Fundamentals of Database Systems, 4th Ed.*
14. *Expert Systems and Applied Artificial Intelligence by Efrain Turban 15. Artificial Intelligence by Rich & Knight.*
16. *Artificial Intelligence by George F. Luger.*
17. *Donald Hearn and M. Pauline Baker. Computer Graphics and Open GL, 3rd Ed.*
18. *Foley, Van Dam, Feiner, and Hughes, Computer Graphics Principle & Practices.*
19. *Mathematical Structures for Computer Science, Freeman & Company; G.L.Gersting.*
20. *Java Script; The Definitive Guide, 2nd Ed, O. Reilly, 1997. D. Flanagan. 21. The HTML, Sourcebook, Wiley 1996. I.S. Graham.*
22. *Computer Science; An Overview 6th Ed. Addison Wesley, 1998. J.G. Brookshear.*
23. *Java; An Object First Approach, Addison Wesley, 1996. F. Culwin.*
24. *Web Page Scripting Techniques, Hayden Books,1996. J. Bloomberg, J. Kawski. J & P. Treffers.*
25. *Kenneth H. Rosen, Discrete Mathematics and its Application, 5th Ed. 2003, McGraw-Hill.*
26. *T .H. Cormen, C.E. Leiserson, R.L. Rivest, and C.D. Stein, Introduction of Algorithms, MIT Press. 2nd Ed. 2001.*
27. *Assembly language programming of IBM PC by Ytha Yu and Charles Marut. McGraw Hill, 1992.*
28. *Saeed Bhatti & Naeem Bhatti, a first course in Numerical Analysis, 4th Ed. 2003.*
29. *David A Patterson, John L. Hennessy, Computer Organization and Design, 3rd Ed.*
30. *Hennessy, J.I. & Patterson .D.A., Computer Architecture; A quantitative Approach, 2nd Ed. Morgan Kaufmann, 1996.*
31. *Introduction to Digital Systems by Ercegovac, Lang & Moreno, Wiley, 1999.*
32. *Introduction to Wireless Systems by P.M. Shankar, John Wiley & Sons,2002.*
33. *Advanced Digital Designs with the Verling HDL by Michael D. Ciletti. Prentice Hall, 2003.*