Biju Patnaik University of Technology, Odisha B.E./B.Tech CSE Sem 4 syllabus

Computer Organization and Architecture

RCS4C003 Computer Organization and Architecture

Module-I: Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU–registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

Module-II: Data representation: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift- and add, Booth multiplier, carry save multiplier, etc. Division restoring and non- restoring techniques, floating point arithmetic.

Module-III: Introduction to x86 architecture. CPU control unit design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU. Memory system design: semiconductor memory technologies, memory organization. Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers–program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes–role of interrupts in process state transitions, I/O device interfaces – SCII, USB

Module-IV:Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency CPU Basics: Multiple CPUs, Cores, and Hyper-Threading, Introduction to Multiple-Processor Scheduling in Operating System.

Module-V: Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Books:

- "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
- "Computer Organization and Embedded Systems", 6th Edition by CarlHamacher, McGraw Hill Higher Education.
- "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
- "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
- "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education.

Discrete Mathematics

RCS4C001 Discrete Mathematics

Module-I Sets and Propositions: Principle of Inclusion and Exclusion, Mathematical induction, Propositions, Logical Connectives, Conditionals and Bi-conditionals, Logical Equivalences, Predicate Calculus, Quantifiers, Theory of inference, Methods of proof.

Module-II Relations and Functions: properties of binary relations, Closure of relations, Warshall's algorithm, Equivalence relations, Partial ordering relations and lattices, Chains and antichains, Functions, Composition of Functions, Invertible Functions, Recursive Functions, Pigeonhole principle.

Module-III Numeric Functions and Generating Functions: Discrete Numeric functions, Generating Functions, Recurrence Relations and Recursive Algorithms:Recurrence relations, Linear recurrence relations with constant coefficients, Solution of recurrence relations by the method of generating functions, Divide and conquer algorithms.

Module-IV Groups and Rings: groups and subgroups, Cosets and Lagrange's theorem, Codes and Group codes, Error detection and correction using Group codes, Isomorphism, Homomorphism and normal subgroups, Rings, Integral domains and Fields, Boolean

Algebras: Lattices and algebraic systems, Principle of duality, Distributive and complemented lattices, Boolean functions and Boolean expressions, Simplification of logic expressions using Karnaugh Map, Design and Implementation of Digital Networks, Switching Circuits.

Module-V Graphs and Trees: Basic terminology, Diagraphs and relations, representation of Graphs, operations on graphs, paths and circuits, graph traversals, shortest path in weighted graphs, Eulerian paths and circuits, Hamiltonian paths and circuits, Traveling sales person's problem, Planar graphs, Graph Coloring, Trees, Rooted trees, Binary search trees, Spanning trees, Minimum spanning trees, Kruskal's Algorithm, Prim's Algorithm.

Book:

• C. L. Liu, D. P. Mohapatra, Elements of Discrete Mathematics: A computer Oriented Approach, McGraw Hill Education (India) Private Limited, 4th Edition, 2013.
• Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill, 5th Edition, 2003.
• J. P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications, to Computer Science, TataMc-Graw Hill, 2001.
• Joe L. Mott, A. Kandel, and T. P. Baker, Discrete Mathematics for Computer Scientists & Mathematics, Prentice Hall of India, 2nd Edition, 2006.
• N. Deo, Graph Theory with applications to Engineering & Computer Science, Prentice Hall of India, 2006.
• S. Lipschutz, Discrete Mathematics, Tata McGraw Hill, 2005.

Design and Analysis of Algorithms

RCS4C002 Design and Analysis of Algorithms

Module-I Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Module-II: Fundamental Algorithmic Strategies: Brute-Force: : Linear search, selection sort, Greedy: Huffman coding, Fractional knapasack problem, Activity selection Problem,Dynamic Programming: matrix chain multiplication, Longest common

subsequence, Travelling Salesman Problem, Branch- and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving , Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

Module-III: Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

Module-IV: Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems(Clique Decision, Node cover Decision and Chromatic Number Decision problem) and Reduction techniques.

Module-V: Advanced Topics: Approximation algorithms: Node cover problem, Travelling sales man problem, Randomized algorithms: Quick sort, n-queen problem, Min cut, Class of problems beyond NP – P SPACE

Books:

• Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
• Fundamentals of Algorithms – E. Horowitz et al.
• Design and Analysis of Algorithms, M.R.Kabat, PHI Learning
• Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
• Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
• Algorithms—A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

Constitution of India

RCN4F001 Constitution of India

Basic features and fundamental principles:

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article

368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America. The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

Analog Electronic Circuits

RCS4G001 Analog Electronic Circuits

MODULE – I MOS Field-Effect Transistor: Principle and Operation of FETs and MOSFETs; P-Channel and N- Channel MOSFET; Complimentary MOS; V-I Characteristics of E- MOSFET and D-MOSFET; MOSFET as an Amplifier and as a Switch. Biasing of BJTs: Load lines (AC and DC); Operating Points; Fixed Bias and Self Bias, DC Bias
with Voltage Feedback; Bias Stabilization; Examples. Biasing of FETs and MOSFETs: Fixed Bias Configuration and Self Bias Configuration, Voltage Divider Bias and Design

MODULE – II Small Signal Analysis of BJTs: Small-Signal Equivalent-Circuit Models; Small Signal Analysis of CE, CC, CB amplifiers. Effects of RS and RL on CE amplifier operation, Emitter Follower; Cascade amplifier, Darlington Connection and Current Mirror Circuits. Small Signal Analysis of FETs: Small-Signal Equivalent-Circuit Model, Small Signal Analysis of CS, CD, CG Amplifiers. Effects of RSIG and RL on CS Amplifier; Source Follower and Cascaded System.

MODULE – III High Frequency Response of FETs and BJTs: High Frequency equivalent models and frequency Response of BJTs and FETs; Frequency Response of CS Amplifier, Frequency Response of CE Amplifier.

MODULE – IV Feedback amplifier and Oscillators: Concepts of negative and positive feedback; Four Basic Feedback Topologies, Practical Feedback Circuits, Principle of Sinusoidal Oscillator, Wein-Bridge, Phase Shift and Crystal Oscillator Circuits, Power Amplifier (Class A, B, AB, C).

MODULE – V Operational Amplifier: Ideal Op-Amp, Differential Amplifier, Op-Amp Parameters, Non-inverting Configurations, Open-loop and Closed-loop Gains, Differentiator and Integrator, Instrumentation amplifier.

Books:

• Microelectronics Circuits, Adel Sedra and Kenneth C Smith, Oxford University Press, New Delhi, 5th Edition, International Student Edition,2009. (Selected portion of Chapter 2,4, 5, 6, 8, 13, and 14)
• Electronic Devices and Circuits theory, R.L. Boylestad and L. Nashelsky, Pearson Education, New Delhi , 9th/10th Edition,2013. (Selected portions of Chapter 4, 5, 6, 7, 8, 9, 10, 11, 12, and 14)
• Milliman’s Electronics Devices and Circuits, J. Milliman, C. Halkias, S. Jit., Tata McGraw Hill
• Electronic Devices and Circuits, Jimmie J. Cathey adapted by Ajay Kumar Singh, Tata McGraw Hill Publishing Company Ltd., New Delhi, 3rd Edition, (For Problem Solving)
• Electronics Circuits Analysis and Design, Donald A. Neamen, Tata McGraw Hill Publishing Company Ltd., New Delhi, 3rd Edition,2002.
• Integrated Electronics: Analog and Digital Circuits and Systems, J. Milliman, C. Halkias, Tata McGraw Hill Publishing Company Ltd., New Delhi,2nd Edition.2004.
• Microelectronic Circuits: Analysis and Design, M.H. Rashid, PWS Publishing Company, a division of Thomson Learning Inc. India

Edition.
• Electronic device and circuits, David A. Bell, Oxford University Press, 5thedition,2008.
• Electronics devices and circuits, Anil.K.Maini, Wiley India Pvt.Ltd,2009

Microprocessor and Microcontroller

RCS4D002 Microprocessor and Microcontroller

Module-I Introduction to 8 bit and 16 bit Microprocessors-H/W architecture

Introduction to microprocessor, computer and its organization, Programming system; Address bus, data bus and control bus, Tristate bus; clock generation; Connecting Microprocessor to I/O devices; Data transfer schemes; Architectural advancements of microprocessors. Introductory System design using microprocessors; 8086 – Hardware Architecture; External memory addressing; Bus cycles; some important Companion Chips; Maximum mode bus cycle; 8086 system configuration; Memory Interfacing; Minimum mode system configuration, Interrupt processing.

Module -II 16-bit microprocessor instruction set and assembly language programming:

Programmer's model of 8086; operand types, operand addressing; assembler directives, instruction Set-Data transfer group, Arithmetic group, Logical group.

Module-III Microprocessor peripheral interfacing:

Introduction; Generation of I/O ports; Programmable Peripheral Interface (PPI)-Intel 8255; Sample-and-Hold Circuit and Multiplexer; Keyboard and Display Interface; Keyboard and Display Controller (8279).

Module-IV (8-bit microcontroller- H/W architecture instruction set and programming:

Introduction to 8051 Micro-Controllers, Architecture; Memory Organization; Special Function register; Port Operation; Memory Interfacing, I/O Interfacing; Programming 8051 resources, interrupts; Programmer's model of 8051; Operand types, Operand addressing; Data transfer instructions, Arithmetic instructions, Logic instructions, Control transfer instructions; Programming.

Module-V 8086: Maximum mode system configuration, Direct

memory access, Interfacing of D-to-A converter, A-to-D converter, CRT Terminal Interface, Printer Interface, Programming of 8051 timers, 8051 serial interface, Introduction to 80386 and 80486 Microprocessor family.

Books:

• Microprocessor Architecture, Programming and application with 8085, R.S. Gaonkar, PRI Penram International publishing PVT. Ltd., 5th Edition
• Microprocessors and Interfacing, Programming and Hardware, Douglas V Hall, TMH Publication, 2006.
• Microprocessors and Interfacing, N. Senthil Kumar, M. Saravanan, S. Jeevananthan and S.K. Shah, Oxford University Press.
• The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.M C Kinlay, Pearson Education, Second Edition, 2008.
• Microcontrollers: Principles and Application, Ajit Pal, PHI Publication
• Microprocessors and Microcontrollers Architecture, programming and system design using 8085, 8086, 8051 and 8096, Krishna Kant, PHI Publication, 2007.
• Advanced Microprocessors and Peripherals, A.K. Ray, K M Bhurchandi, TMH Publication, 2007.
• Textbook of Microprocessor and Microcontroller, Thyagarajan, Scitech Publication.

Organisational Behaviour

ROB4E002 ORGANISATIONAL BEHAVIOUR

3 CREDITS

Module-I:

Fundamentals of OB: Definition, scope and importance of OB, Relationship between OB and the individual, Evolution of OB, Theoretical framework (cognitive), behavioristic and social cognitive), Limitations of OB.

Module-II:

Attitude: Importance of attitude in an organization, Right Attitude, Components of attitude, Relationship between behavior and attitude, Developing Emotional intelligence at the workplace, Job attitude, Barriers to changing attitudes.

Personality and values: Definition and importance of Personality for performance, The Myers-Briggs Type Indicator and The Big Five personality model, Significant personality traits suitable to the workplace (personality and job – fit theory), Personality Tests and their practical applications.
Perception: Meaning and concept of perception, Factors influencing perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect).
Motivation: Definition & Concept of Motive & Motivation, The Content Theories of Motivation (Maslow's Need Hierarchy & Herzberg's Two Factor model Theory), The Process Theories (Vroom's expectancy Theory & Porter Lawler model), Contemporary Theories – Equity Theory of Work Motivation.

Module-III:
Foundations of Group Behavior: The Meaning of Group & Group behavior & Group Dynamics, Types of Groups, The Five – Stage Model of Group Development.
Managing Teams: Why Work Teams, Work Teams in Organization, Developing Work Teams, Team Effectiveness & Team Building.
Leadership: Concept of Leadership, Styles of Leadership, Trait Approach Contingency Leadership Approach, Contemporary leadership, Meaning and significance of contemporary leadership, Concept of transformations leadership, Contemporary theories of leadership, Success stories of today's Global and Indian leaders.

Module-IV:
Organizational Culture : Meaning & Definition of Organizational Culture, creating & Sustaining Organizational Culture, Types of Culture (Strong vs. Weak Culture, Soft Vs. Hard Culture & Formal vs. Informal Culture), Creating Positive Organizational Culture, Concept of Workplace Spirituality.

Module-V:
Organizational Change: Meaning, Definition & Nature of Organizational Change, Types of Organizational Change, Forces that acts as stimulants to change.
Implementing Organizational Change : How to overcome the Resistance to Change, Approaches to managing Organizational Change, Kurt Lewin's-Three step model, Seven Stage model of Change & Kotter's Eight-Step plan for Implementing Change, Leading the Change Process, Facilitating Change, Dealing with Individual & Group Resistance, Intervention Strategies for

Facilitating Organizational Change, Methods of ImplementingNOrganizational Change, Developing a Learning Organization.

Books:

1. Understanding Organizational Behaviour, Parek, Oxford
2. Organizational Behaviour, Robbins, Judge, Sanghi, Pearson.
3. Organizational Behaviour, K. Awathappa,HPH.
4. Organizational Behaviour, VSP Rao, Excel
5. Introduction to Organizational Behaviour, Moorhead, Griffin, Cengage.
6. Organizational Behaviour, Hitt, Miller, Colella, Wiley