

SYLLABUS: VII SEMESTER (Computer Technology) (C.B.S)

BECT401T: Compiler Construction

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

UNIT-I

Introduction to Compilers- Compilers and translators, Phases of compiler design, cross compiler, Bootstrapping, Design of Lexical analyzer, LEX. Top down Parsing; LL(1) Parser, recursive descent parser.

UNIT-II

Syntax Analysis- Specification of syntax of programming languages using CFG, Top-down parser, design of LL (1) parser, bottom up parsing technique, LR parsing, Design of SLR, CLR, LALR parsers, YACC.

UNIT-III

Syntax directed translation- Study of syntax directed definitions & syntax directed translation schemes, implementation of SDTS, intermediate notations- postfix, syntax tree, TAC, translation of expressions, controls structures, declarations, procedure calls, Array reference.

UNIT -IV

Code optimization- Important code optimization techniques, loop optimization, control flow analysis, data flow analysis, Loop invariant computation, induction variable removal, Elimination of Common sub expression.

UNIT -V

Code generation- Problems in code generation, Simple code generator, Register allocation and assignment, Code generation from DAG, peephole optimization.

UNIT -VI

Storage allocation & Error Handling- Run time storage administration stack allocation, symbol table management, Error detection and recovery-lexical, syntactic and semantic.

TEXTBOOKS

1. Alfred V. Aho and Jeffery D. Ullman; Principles of Compiler Design; Narosa Pub. House, 1977.
2. Aho, Sethi, and Ullman; Compilers Principles Techniques and Tools; Second Edition, Pearson education, 2008.
3. Vinu V. Das; Compiler Design using Flex and Yacc; PHI Publication, 2008.

BECT401P: Compiler Construction lab: Practical based on above syllabus

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	1	50	25	25	50

BECT402T: Artificial Intelligence

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

UNIT I

Introduction to AI : Definition of AI, Early work in AI, Importance of AI and related fields, Task domains of AI systems, Intelligent agents, Generic architecture of intelligent agent.

UNIT II

Basics of problem solving : Defining the problem on a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in the design of search programs.

Heuristic search techniques: Generate and test, Hill climbing, Best-first search, Problem reduction, Constraint satisfaction, Means-ends analysis.

UNIT III

Knowledge Representation: Representation and mapping, Approaches and Issues. Introduction to proposition logic, Knowledge representation using predicate logic, Unification and resolution. Representing knowledge using rules, procedural Vs declarative knowledge, logic programming, forward Vs backward reasoning, matching.

UNIT IV

Knowledge representation : Network representation schemes - Semantic networks, conceptual graphs, Conceptual dependency, Structured representation schemes – Frames, Scripts.

Statistical reasoning: Symbolic Vs Statistical reasoning, Nonmonotonic and monotonic reasoning, Probability and Bayes' theorem, Certainty factors and rule based systems, Bayesian networks, introduction to fuzzy logic.

UNIT V:

Learning : General learning model, Types of learning - rote learning, learning by taking advice, learning by analogy, induction learning, learning by discovery.

Expert systems: Characteristic features of expert system, Architecture of expert system, Expert system shell, knowledge acquisition and validation, knowledge system building tools.

UNIT VI:

Natural Language Processing : Overview of linguistics, Grammar and languages, basic parsing techniques, semantic analysis and representation structures.

Game playing : Minimax search procedure, adding alpha-beta cutoffs.

TEXT BOOK:

1. E.Rich & K. Knight, " Artificial Intelligence", Tata McGraw Hill Publications.
2. D.W. Patterson, "Introduction to Artificial Intelligence and Expert System" Printice Hall of India.

BECT407T: Pattern Recognition

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

UNIT-I

Introduction: Statistical Decision Theory, Image Processing and Analysis, Probability-Probabilities of events, random variables, joint distribution & densities.

UNIT-II

Moments of random variables, estimation of parameters from samples, minimum risk estimators.

UNIT-III

Non Parametric decision making- Histograms, Kernel and window estimators, nearest neighbor classification techniques, adaptive decision boundaries, adaptive discriminate functions, minimum squared error, estimation functions, choosing a decision making technique.

UNIT-IV

Component Analysis and dimension reduction: Principal Component Analysis, Fisher Linear Discriminant, Locally Linear Embedding.

UNIT-V

Feature Generation Introduction Basis Vectors and images, The Karhunen- Loeve Transform, The Singular Value Decomposition, Independent Component Analysis, The Discrete Fourier Transform, The Haar Transform.

UNIT-VI

Clustering- Introduction, hierarchical clustering, partition clustering.

TEXTBOOKS:

1. Pattern recognition & Image Processing by Eair Gose, Richard Johnson daugh & Steve Jost. (PHIPub.).
2. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification" 2nd Edition, John Wiley.

REFERENCE BOOKS:

1. Pattern recognition by Sergios Theodoridis, Konstantinos Koutroumbas 3rd Ed.

BECT408T: Digital Image Processing

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

UNIT-I

Introduction: Fundamental Steps in Image Processing, Elements of DIP systems, Elements of Visual Perception, Fundamentals of Image processing, Image formation in the Eye, A Simple Image Model, Sampling and Quantization, Some Basic Relationships between Pixels, representing image in digital form, Zooming and Shrinking of image.

UNIT-II

Image Enhancement in the Spatial Domain: Introduction to Spatial and Frequency methods, Basic Gray Level Transformations, Histogram Equalization, Histogram Processing, Local Enhancement, Image Subtraction, Image Averaging, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters.

UNIT-III

Image Enhancement in the frequency Domain: Filtering in the Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency-Domain Filters, Homomorphic Filtering, Implementation

UNIT-IV

Image Compression and Morphological processing. Introduction to image compression and its need, Compression models, Elements information theory, Error free compression, Lossy compression, Introduction to morphological processing, Dilation and Erosion, Opening and closing , Some basic morphological algorithm (Boundary extraction, Region filling, Convex hull, Skeleton)

UNIT-V

Image Segmentation: Point Detection, Line Detection, Edge Detection, Gradient Operator, Edge Linking and Boundary Detection, Thresholding, Region-oriented Segmentation.

UNIT-VI

Image Representation: Chain Codes, Polygonal Approximations, Signatures, Boundary Segments, Skeleton of a Region. Description: Boundary Descriptors, Shape Numbers, Fourier Descriptors, Regional Descriptors, Simple Descriptors, Topological Descriptors, introduction to image file formats: TIFF, JPEG, BMP, etc.

TEXT

1. Digital Image Processing by Rafael C. Gonzalez and Richard, E. Woods, 3 rd edition, Prentice Hall.
2. Digital Image Processing by Jayaraman, S. Esakkirajan, T. Veerakumar, publication Tata McGrawHill.

BECT403T: Software Architecture

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

UNIT-I

Introduction to Software Architecture, Architecture Business Cycle, What is software architecture, software architecture requirements, Architecture structures and views, Documenting software architectures, Opportunities and Advances in software architectures.

UNIT-II

Introduction to Quality Attributes, Need of quality attributes, Understanding quality attributes, architecture and quality attributes, achieving quality attributes. Case study of quality attributes in software architecture templates. Deriving Quality Attributes for software architectures

UNIT-III

Design Patterns: history, principles and expectations. Study of a number of representative patterns like Singleton, Factory, Adaptor, Facade, Proxy, Iterator, Observer, Mediator, composite, Ways of using patterns. Case studies of patterns in software architecture

UNIT-IV

Introduction to Middleware, Middleware as infrastructure, Types of Middleware, RPC, Object brokers; CORBA: System Architecture, CORBA: Dynamic Service Selection and Invocation, Message oriented middleware. Specifications and Characteristics of Middleware Technologies. Recent advances in Middleware Technologies

UNIT-V

Introduction to three tier and n-Tier Web Architectures, XML, Client side technologies HTML, DHTML, Java Applets, Active X controls, DOM, AJAX. Need of Client side technology in multi-tier architectures Examples of three tier and n-tier architectures, client side technologies.

UNIT-VI

Need of server side technology in multi-tier architectures, Java Web Services, Server side technologies: JSP, SOA.

Text Book:

1. Len Bass, Paul Clements, Rick Kazman, "Software Architecture in Practice", Second Edition, Pearson ,ISBN 978-81-775-8996-2
2. Erich Gamma, Design Patterns
3. G. Alonso F. Casati, H. Kuno, V. Machiraju "Web Services Concepts, Architectures & Applications", Springers Publication ISBN 978-3-540-44008-6
4. Java Sever Programming|| Black Book dreamTech Press ISBN: \978-81-7722-835-9
5. xyz, PHI Publications

Reference Book:

1. James L. Weaver, Kevin Mukhar, "Beginning J2EE 1 .4: From Novice to Professional
2. Richard N. Taylor, Nenad M.—Software Architecture Foundation Theory and practice, Wiley ISBN: 978-81-265-2802-8.
3. Java6 Programming, Black Book dreamTech Press ISBN:978-81-7722-736-9

BECT406T: Cyber and Information Security

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

UNIT 1

CRYPTOGRAPHY: Services, Mechanisms and attacks, the OSI security architecture-Network security model classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition Techniques, steganography)

UNIT II

FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields-Polynomial Arithmetic -Prime numbers-Fermat's and Euler's theorem-Testing for primality -The Chinese Remainder theorem- Discrete logarithms.

UNIT III

BLOCK CIPHERS Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced, Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm.

UNIT IV

FIREWALLS& RFID: Basics: Firewall functionality, Policies and Access Control list, Firewall Types, Practical Issues: Placement of Firewall, Firewall Configuration, RFID basic, Application, Security Issues, Electronic Passport.

UNIT -V

Intrusion Detection and Prevention: Introduction, Prevention vs Detection, Types of Intrusion Detection System, DDoS Attack Prevention/Detection, IP Traceback, Malware Detection: Worm Detection, Worm Signature Extraction, Virus Detection.

UNIT- VI

Electronic Payment: Introduction: Payment types, Enabling Technologies: Communication Technologies, Smart Card and Smart Phones, Cardholder Present E-Transactions: Attack, Chip Card Transaction, Payment Over the Internet: Issues and Concern, Secure Electronic Transaction, On-Line Rail Ticket Booking, Mobile Payment and Electronic Cash.

REFERENCE BOOKS:

1. William Stallings, *"Cryptography and Network Security"*, Pearson Education, 6th Edition, 2013.
2. Bernard Menezes, *"Network Security and Cryptography"*, 3rd edition, Cengage Learning, 2014.
3. AtulKahate, *"Cryptography and Network Security"*, McGraw Hill Education India (Pvt Ltd), 2nd edition.
4. Charles Pfleeger, Shari Lawrence Pfleeger *"Security in computing"*, Prentice Hall, 4th Edition, 2006.

BECT406P: Cyber and Information Security: Practical based on above syllabus

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	1	50	25	25	50

BECT403T: Advanced Database Management Systems

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

UNIT-I

Introduction to Distributed Databases, DDBMS architectures, Comparison of Homogeneous and Heterogeneous Databases, Concurrency control in distributed databases, Distributed query processing, Distributed data storage, Distributed transactions, Commit protocols, Availability, Directory systems-LDAP.

UNIT-II

Introduction to Parallel databases, Parallel database architecture, speedup, scale-up I/O parallelism, Comparison of Inter-query and Intra-query parallelism, parallel query evaluation, Implementation issues of Parallel query evaluation, Design of parallel systems.

UNIT- III

Object-based databases - Complex data types, structured types and inheritance in SQL, table inheritance, array and multi-set types in SQL, object identity and reference types in SQL, implementing OR features, Persistent programming languages, Object-oriented vs Object-Relational.

UNIT-IV

Introduction to XML, Structure of XML data, Document type definition, XML Document Schema, Querying and Transformation, XPATH, XSLT, XQUERY, API in XML, XML data storage, XML applications.

UNIT-V

Introduction to Data warehouse, Data Warehouse architecture, Creating and maintaining a warehouse, Multidimensional data model, OLAP and data cubes, Operations on cubes, pre-processing, Analysis of Data pre-processing.

UNIT-VI

Security and integrity threats, Defence mechanisms, Statistical database auditing & control, Security issue based on granting/revoking of privileges, introduction to statistical database security. PL/SQL Security - Locks - types and levels of locks, Implicit locking, explicit locking.

Textbooks:

1. Database System Concepts" by Korth, Sudarshan,Silberschatz.,
2. Fundamentals of Database Systems" by Elmasari , Navathe.,
3. Database Systems": A Practical Approach to Design, Implementation & Management, by Thomas Connolly, Carolyn Begg.
4. Data Mining": Concepts and techniques, by Han, Kamber, Pei
5. Handbook of DatabaseSecurity", Applications and Trends, by Gertz, Jajodia,

BECT40P: Advanced Database Management Systems: Practical based on above syllabus

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs (Practical)	1	50	25	25	50

BECT404T: Architecture of Web Application

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

UNIT-I

Web Architecture and Framework

Basic Web Architecture, Web Server, Application Server, Web development framework, TCP/IP Architecture, TCP/IP Application Services.

UNIT-II

HTTP, HTML & its roots

Uniform Resource Locator, fundamentals of http, information through header, evolution of http protocol, standard generalized markup language, html rendering.

UNIT-III

XML & Introduction to Web server

Core XML, XHTML, XSL, Basic operation of web servers, mechanism for dynamic content recovery, Server configuration, Server security

UNIT-IV

Overview of browser functionality

Architecture Considerations, Processing flow in Browser, Processing HTTP Request, Processing HTTP Responses, Cookie coordination, Privacy & P3P.

UNIT-V

Active Browser Pages

Java Script, Cascading Style Sheets, DHTML, AJAX, CGI scripts and clickable maps

UNIT-VI

Internet Telephoning, Virtual reality over the web, Intranet and Extranet, Firewall Design Issues.

Text Books:

1. Leon Shklar & Rich Rosen "Web Application Architecture Principles, Protocols & Practices 2nd Edition.

BECT404T: Wireless Sensor Network

Load	Credit	Total marks	Sessional marks	University marks	Total
4 hrs (Theory) 1 hr (Tutorial)	5	100	20	80	100

UNIT- I

Introduction, Sensor network application, Factors influencing sensor network design: Fault tolerance, Scalability, Production cost, Operating environment, sensor network topology, hardware constraints, transmission media and power consumption. Sensor network communication architecture, Characteristics, Technical Challenges, and Design Directions

UNIT- II

Models for Programmability in Sensor Networks

Introduction, Differences between Sensor Networks and Traditional, Data Networks, Aspects of Efficient Sensor Network Applications, Need for Sensor Network Programmability, Major Models for System-Level Programmability: Database Model, Active Sensor Model, Active Networks, Mobile Agents, Frameworks for System: Level Programmability, Directed Diffusion with In-Network Processing, Cougar, Tiny DB, SCTL, Smart Messages, Spatial Programming, Mate , Sensor ware, Magnet OS, DFuse.

UNIT- III

Routing Techniques

Motivation and Design Issues in WSN Routing, Routing Challenges in WSNs, Routing Protocols in WSNs: Flat Routing, Hierarchical Routing, Adaptive Routing, Multipath Routing, Query-Based Routing, Negotiation-Based Protocols

UNIT- IV

Communication Protocol for WSN

Introduction, Applications/Application Layer Protocols: Sensor Network Applications, Application Layer Protocols, Localization Protocols, Time Synchronization Protocols.

UNIT- V

Transport Layer Protocols: Event-to-Sink Transport, Sink-to-Sensors Transport, Network Layer Protocols, Data Link Layer Protocols: Medium Access Control, Error Control

UNIT- VI

Security and Privacy Protection in WSN

Introduction, Unique Security Challenges in Sensor Networks and Enabling Mechanisms: Security-Related Properties, System-Level Security, Mobile, Code, Metering, Security Architectures: Cell-Based WSNs, Ad Hoc Sensor Networks, Privacy Protection: Principle of Minimal Generalization, Privacy of Location Information.

REFERENCE BOOKS:

1. Mohammad Ilyas and Imad Mahgoub, Handbook of Sensor Networks: Compact Wireless and Wired sensing systems, CRC Press, 2005.
2. C.S. Raghavendra, Krishna M. Sivalingam and TaiebZnati, Wireless Sensor Networks, Springer, 2005.
3. Anna Hac, Wireless Sensor Network Designs, John Wiley & Sons Ltd., 2003.