

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

BECT301T: Object Oriented Modeling

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

Unit I: Introduction: The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, importance of modeling, principles of modeling, object oriented modeling, *Aggregation and association, Generalization*, Introduction to UML, conceptual model of the UML, Architecture.

Unit II: Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams. Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration Diagrams, iterated messages, use of self in messages. Terms, concepts, depicting asynchronous messages with/without priority, callback mechanism, broadcast messages.

Unit III: Basic Behavioral Modeling: Use cases, Use case Diagrams, Activity Diagrams, State Machine, Process and thread, Event and signals, Time diagram, interaction diagram, *Dataflow diagram*, Package diagram, *sequence diagram, E-R diagram*.

Unit IV: Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Unit V: The Unified process: use case driven, architecture centric, iterative, and incremental. Use case driven process: why use case, capturing use cases, analysis, design, and implementation to realize the use cases, testing the use cases.

Unit VI: Architecture-centric process: architecture in brief, why we need architecture, use cases and architecture, the steps to architecture, an architecture description. Case Study: The Unified Library application.

Text Books:

1. The Unified Modeling Language User Guide by Grady Booch, James Rumbaugh, Ivar Jacobson 2nd Edition, Pearson Education.
2. UML 2 Toolkit by Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado WILEY-Dreamtech India Pvt. Ltd.
3. The Unified Software Development Process by Ivar Jacobson, Grady Booch, James Rumbaugh, Pearson Education

Reference Books:

1. Fundamentals of Object Oriented Design in UML by Meilir Page-Jones Pearson Education.
2. Modeling Software Systems Using UML2 by Pascal Roques WILEY-Dreamtech India Pvt. Ltd
3. Practical Object-Oriented Design with UML by Mark Priestley TATA McGrawHill

BECT301P: Object Oriented Modeling lab: Practical based on above syllabus

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

BECT302T: Database Management System

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

Syllabus

UNIT-I

Introduction to IMs, Introduction to DBMS, architecture, role of database administrator, data dictionary, Traditional Models, three-level architecture, hierarchical model, network model and relational model.

UNIT-II

Relational Database design, **ER modeling**, relational algebra, Tuple relation calculus, Domain relational calculus. Functional Dependencies, Normalization

UNIT-III

PL/SQL Concept. Physical and logical hierarchy. Concept of index, B-trees, hash index, function index, bitmap index, **trigger and assertions**.

UNIT-IV

Overview, measures of query cost, **query optimization**, selection operation, sorting, join, evaluation of expressions, transformation of relational expressions, estimating statistics of expression results, evaluation plans, materialized views.

UNIT-V

Transaction concepts, properties of transactions, serializability of transactions, testing for serializability, System recovery, Two-Phase Commit protocol, concurrent executions of transactions and related problems, Locking mechanism, solution to concurrency related problems, deadlock, , two-phase locking protocol, Isolation, Intent locking.

UNIT-VI

Recovery System: failure classification, recovery and atomicity, log based recovery, checkpoints, buffer management, advanced recovery techniques. Introduction to **various** Sql databases.

TextBooks:

1. Database System Concepts by Silberschatz , Henry F. Korth , S. Sudarshan, Tata McGraw Hill, Fifth Edition
2. Fundamentals of Database Systems – Elmasiri and Navathe, Addison Wesley, 2000.
3. An introduction to Database Systems, C J Date - Wesley

Reference Books:

1. Database Management Systems - by Raghu Ramakrishnan and Johannes Gehrke, Tata McGraw Hill Publication, Third Edition

BECT302P: Database Management System lab: Practical based on above syllabus

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

BECT303T: Operating system

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

Unit I: Introduction: Definition, Functions of Operating Systems, Evolution of Operating Systems, Types of OS, Structural overview, System calls, Process Concept, Process States, Process Scheduling, Operations on Processes, Types of scheduler, Context switch, Threads Overview, Multithreading Models, Threading issues. Examples of WINDOWS Server & LINUX.

Unit II: CPU Scheduling Concepts, Scheduling Criteria and Algorithms. Process Synchronization: The Critical-Section Problem, software and hardware solution, Semaphores, Monitors, Classical inter process communication problems.

Unit III: Deadlocks: Definition & Characterization, Deadlocks Prevention, Avoidance, Detection and Recovery from Deadlock, Goals of Protection.

Unit IV: Memory Management: Background, Swapping, Contiguous Memory Allocation Schemes, Paging, Segmentation, Segmentation with paging, demand paging, page Faults and instruction restart, page replacement algorithms, working sets, Locality. Virtual Memory Management: Background, Demand Paging scheme, Process Creation, Page Replacement Policies, Allocation of Frames, Thrashing.

Unit V: File System: Directory Structure, File-System Mounting, File Sharing & Protection. File-System Structure, File-System Implementation. Directory Implementation, Disk space management and space allocation strategies File Recovery, disk arm scheduling strategies.

Unit VI: I/O Systems : Overview, I/O Hardware, Application I/O Interface, and Kernel I/O Subsystem. Transforming I/O to Hardware Operations. Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure.

Text Books:

1. Operating System concepts by Silberchatz & Galvin, Addison Wesley, 6th edition.
2. Modern Operating Systems by Tanenbaum, 2nd edition Pearson Education.

Reference Books:

1. Operating System concepts and design by Milan Milenkovic McGraw-Hill
2. Operating Systems by William Stallings
3. Operating Systems by D M Dhamdhere

BECT303P: Operating system lab: Practical based on above syllabus

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

BECT304T: Design & Analysis of Algorithms

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

UNIT-I

Mathematical foundations, summation of arithmetic and geometric series, n , n^2 , bounding summations using integration, recurrence relations, solutions of recurrence relations using technique of characteristic equation, Complexity calculation of various standard functions, principles of designing algorithms

UNIT-II

*Asymptotic notations of analysis of algorithms, analyzing control structures, worst case and average case analysis, amortized analysis, application of amortized analysis, advanced data structures like Fibonacci heap, disjoint set representation, and their applications, **Divide and conquer basic strategy, binary search, quick sort, merge sort, matrix operations, Multiplication Algorithm***

UNIT-III

Greedy method – basic strategy, Knapsack Problem, application to job sequencing with deadlines problem, minimum cost spanning trees, single source shortest path, Optimal Search Patterns.

UNIT-IV

Dynamic Programming basic strategy, multistage graphs, all pairs shortest path, single source shortest paths, optimal binary search trees, traveling salesman problem, Longest Common Subsequence, *0/1 Knapsack problem.*

UNIT-V

Connected components, Backtracking basic strategy, 8-Queen's problem, *sum of subsets, Knight tour's problem*, graph coloring, Hamiltonian cycles etc, Introduction to Approximation algorithm.

UNIT-VI

NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP-complete, decision and optimization problems, graph based problems on NP Principle.

Text Books:

1. Introduction to Algorithms By Thomas H. Cormen et.al. Prentice Hall of India.
2. Design & Analysis of Algorithms By ParagHimanshu Dave, HimanshuBhalchandra Dave, second Edition, Pearson Publication.
3. Computer Algorithms- Inroduction to Design and Analysis By Sara Baase, Allen Van Gelder, Third Edition, Pearson Publication.
4. The Design and Analysis of Algorithms By Alfred V. Aho, John E. Hopcraft, Jeffrey D. Ullman, Pearson Publication.

Reference Books:

1. Computer AlgorithmsBy Horowitz, Sahani, Rajsekharam, Galgotia Publications Pvt.

BECT304P: Design & Analysis of Algorithms Lab: Practical will be based on above syllabus

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

BECT305T: Data Communication

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

UNIT - 1

Analog and digital signals; periodic and non periodic signals analog signals time and frequency domains; COMPOSITE SIGNALS: Frequency spectrum and Bandwidth; TRANSMISSION MODES: Serial and Parallel transmission, Asynchronous and Synchronous Transmission, Simplex, Half-Duplex and Full-Duplex communication.

UNIT - 2

Signal conversions: digital-to-digital conversion, digital-to-analog conversion, analog to digital conversion ,analog-to-analog conversion in detail.

UNIT - 3

COMMUNICATION MEDIA: guided media and unguided media, Radio frequency allocation, Propagation of Radio waves, Terrestrial microwave, Satellite communication, Cellular Telephony

UNIT - 4

Multiplexing and Spread Spectrum, frequency division multiplexing (FDM). Time division multiplexing (TDM): inverse multiplexing, wave-division multiplexing, FHSS AND DSSS multiplexing applications: the telephone system: Common carrier services and hierarchies, Analog services, Digital Services; DIGITAL SUBSCRIBER LINE (DSL): ADSL, RADSL, HSDL, SDSL, VDSL

UNIT - 5

Multimedia: Digitizing Audio and Video, Compression of Audio and Video, Real Time Interactive Audio/Video, RTP, HTTP and WWW.

UNIT - 6

DATA COMPRESSION: Huffman code, Run-Length Encoding, Relative Encoding, Lempel-Ziv Encoding, Image Compression, JPEG, MPEG

Text / Reference Books:

1. Data Communications and Networking by Behrouz A. Forouzan, 4thEdition, Tata McGraw Hill
2. Understanding Data Communications and Networks by William A. Shay, 2nd Edition, Vikas Publishing House.
3. Electronic communication Systems by Kennedy.

SEMESTER: SIXTH (C.B.S.)
BRANCH: COMPUTER TECHNOLOGY

BECT306T: Computer Graphics

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

UNIT I

Introduction to Computer Graphics

Overview of Computer Graphics, Computer Graphics Application and Software, Graphics Areas, Graphics Pipeline, Graphics API's, Hardcopy Technologies, Display Technologies – Raster scan Display System, Video Controller – Vector scan display system, Random Scan Display Processor, Input Devices for Operator Interaction,

UNIT II

Basic Raster Graphics Algorithms for Drawing 2D primitives, aliasing and antialiasing, Polygon filling methods: Scan Conversion Algorithms: Simple Ordered edge list, Edge Fill, Fence fill and Edge Flag Algorithm. Seed fill Algorithms: Simple and Scan Line Seed Fill Algorithm, Halftoning techniques

UNIT III

2D Clipping algorithms for regular and irregular windows: Sutherland Cohen Outcode, Sutherland Cohen Subdivision, Mid-Point subdivision, Cyrus Beck and Sutherland Hodgman, Cohen-Sutherland Polygon clipping Algorithm. Clipping about Concave regions. Curves and Surfaces: Polygon Mesh, Parametric Cubic Curves, Parametric Bicubic Surfaces, Quadratic Surface, Bezier Curves and B-spline curves.

UNIT IV

*2D Transformations, Translation, Rotation, Reflection, Scaling, Shearing Combined Transformation, Rotation and Reflection about an Arbitrary Line. Normalized Device Coordinates and Viewing Transformations. **Homogeneous coordinate system.***

UNIT V

3D System Basics and 3D Transformations, 3D graphics projections, parallel, perspective, viewing transformations. 3D graphics hidden surfaces and line removal, painter's algorithm, Z - buffers, Warnock's algorithm.

UNIT VI

Graphics Programming using OPENGL: Why OpenGL, Features in OpenGL, OpenGL operations, Abstractions in OpenGL – GL, GLU & GLUT, 3D viewing pipeline, viewing matrix specifications, a few examples and demos of OpenGL programs.

Text Books:

1. Fundamentals of Computer Graphics, Peter Shirley and Steve Marschner, Third Edition.
2. Procedural Elements of Computer Graphics III Edition, Rogers, McGraw Hill.
3. Computer Graphics - Principles and Practice, J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, Second Edition in C, Pearson Education.
4. Computer Graphics with OpenGL, Donald D. Hearn, M. Pauline Baker, Warren Carithers, Fourth Edition, Pearson Education.
5. Computer Graphics, Hearn and Baker, PHI, India

BECT306P: Computer GraphicsLab: Practical will be based on above syllabus.

Load	Credit	Total marks	Sessional marks	University marks	Total
2 hrs	1	50	25	25	50

(Practical)					
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BECT307T Computer Networks

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

UNIT I

Introduction to Networks –Components and categories ,Types of connections ,Topologies – ,Protocols and standards ,ISO / OSI model **and TCP/IP model**,Transmission media ,Coaxial cable , Fiber optics , Line coding ,Modems . RS232interfacing sequences.

UNIT II

DATA LINK LAYER

Error – Detection and correction, Parity, LRC, CRC, Hamming code, Flow Control and error control , Stop and wait , Go back-N ,ARQ – Selective repeat ARQ –Sliding window , HDLC –,LAN – Ethernet IEEE 802.3 , IEEE 802.4 , IEEE 802.5.

MEDIUM ACCESS SUBLAYER

Channel allocation in LAN's and MAN's Network: Protocols-persistent and Non Persistent CSMA, CSMA with collision detection, binary countdown, Limited Contention protocol.

UNIT III

NETWORK LAYER

Internetworks – Packet switching and datagram approach ,IP addressing methods ,Subnetting , Routing ,Distance vector routing , Link state routing , Routers, **Congestion control.**

UNIT IV

TRANSPORT LAYER

Duties of transport layer, Multiplexing – Demultiplexing, Sockets, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Quality of Services (QOS) – Integrated services.

UNIT V

APPLICATION LAYER

DNS; SMTP, SNMP, FTP, HTTP & WWW; Security: Cryptography, user authentication, security protocols in internet, Firewalls.

UNIT VI

ISDN services &ATM ; DSL technology, Sonet.Wireless LAN: IEEE 802.11; Introduction to blue-tooth, VLAN's, Cellular telephony & Satellite network.

Text Books:

1. B. A. Forouzan – “Data Communications and Networking (3rd Ed.) “ – TMH
2. A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI
3. W. Stallings – “Data and Computer Communications (5th Ed.)” – PHI/ Pearson Education

Reference Books:

1. Kurose and Rose – “Computer networking -A top down approach featuring the internet” – Pearson Education
2. Leon, Garica, Widjaja – “Communication Networks” – TMH

BECT307P: Computer NetworksLab: Practical will be based on above syllabus.

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

BECT308T:Software Engineering & Project Management

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

UNIT- I

Introduction: Software Characteristics, Software Engineering- A Layered Technology, Software Process Framework, Software Process Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process Model, Agile Process Models.

UNIT- II

Software Engineering Principles and Practice: Communication, planning and modeling practices, System engineering and modeling, Business process engineering, Requirements Engineering

UNIT- III

Software Analysis & Design :Modeling Approaches, Data Modeling, Object-Oriented Modelling, Scenario-Based Modeling, Flow-Oriented Modeling, Class-based Modeling, Behavioral Model. Design Engineering Concepts, Design Model, Pattern-Based Software design Design Concepts : Abstraction Architecture, pattern modularity, information hiding, design classes, refactoring.

UNIT -IV

Software Testing :Testing Fundamentals , Black-Box Testing, White-Box Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging.

UNIT -V

An overview, Software Quality, A Framework for Product Metrics, Metrics for Analysis & Design Models, Metrics for Source Code, Metrics for Testing & Maintenance. Project management – the management spectrum, Metrics for process & project – Software measurement, Metrics for software quality, Project scheduling.

UNIT -VI

Risk management – Risk strategies, Software risks, Risk identification, Risk refinement, RMMM Quality Management – Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Review, Statistical Software Quality Assurance, Software Reliability, Change Management – Software Configuration Management, SCM Repository, SCM Process, Reengineering – Software reengineering, Reverse engineering, Restructuring, Forward Engineering

Text Books:

1. Software Engineering-A Practitioner’s Approach (Sixth Edition)-Roger Pressman (TMH)
2. Software Engineering (Ninth Edition)-Ian Sommerville (Pearson Education)
3. Software Engineering : Theory and Practice (Fourth Edition) – Pfleeger (Pearson Education)
4. Software Engineering- Mishra /Mohanty (Pearson Education)

Reference Books:

1. Software Engineering-Schaum’s Series (TMH)
2. Software Project Management - Sanjay Mohapatra (Cengage Learning)
3. Software Engineering for Students –(Fourth Edition) – Bell (Pearson Education)

BECT308P: Software Engineering & Project Management Lab: Practical will be based on above syllabus.

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

BECT309T: Embedded System Design

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

UNIT - 1

Introduction to an embedded systems design: Microcontroller, Memory Devices, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES, *embedding software on target machine.*

UNIT - 2

Inter Process Communication And Synchronization: *Tasks and Threads, SharedData problem, Use of semaphore(s), Priority inversion problem and deadlocksituations, Inter process communications using signals, Semaphore flag or mutex asresource key, Message queues, Mailboxes, Pipes, Virtual (Logical) sockets, Remote Procedure Calls (RPCs).*

UNIT – 3

Introduction to real time operating systems: Real Time Operating Systems: OS Services, I/O Subsystems, Interrupt Routines in RTOS Environment, RTOS Task Scheduling model, Interrupt Latency and Response times of the tasks. Case study of embedded systems

UNIT - 4

Overview of Microcontroller: Microcontroller and Embedded Processors, Overview of 8051 Microcontroller family: Architecture, basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits ad PSW Register, 8051 Register Banks and Stack Instruction set, Loop and Jump Instructions, Call Instructions, Time delay generations and calculations, I/O port programming Addressing Modes, accessing memory using various addressing modes, Arithmetic instructions and programs, Logical instructions, Single-bit instruction programming, Programming of 8051 Timers, Counter Programming

UNIT - 5

Communication with 8051: Basics of Communication, Overview of RS-232, I²C Bus, UART, USB, 8051 connections to RS-232, 8051 serial communication programming, 8051 interrupts, Programming of timer interrupts, Programming of External hardware interrupts, Programming of the serial communication interrupts, Interrupt priority in the 8051

UNIT - 6

Interfacing with 8051: Interfacing an LCD to the 8051, 8051 interfacing to ADC, Sensors, Interfacing a Stepper Motor, 8051 interfacing to the keyboard, Interfacing a DAC to the 8051, 8255 Interfacing with 8031/51, 8051/31 interfacing to external memory

Text / Reference Books:

1. Raj Kamal, "Embedded Systems", TMH, 2004.
2. M.A. Mazidi and J. G. Mazidi, "The 8051 Microcontroller and Embedded Systems", PHI, 2004.
3. David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.
4. K.J. Ayala, "The 8051 Microcontroller", Penram International, 1991.
5. Dr. Rajiv Kapadia, "8051 Microcontroller & Embedded Systems", Jaico Press
6. Dr. Prasad, "Embedded Real Time System", Wiley Dreamtech, 2004.