FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: THIRD
BRANCH: COMPUTER ENGINEERING

Sr. No.	Subject Code	Subjects	Workload				Credit				Marks				
											Theory		Practical		Total Marks
			L	P	T	Total Hrs/Week	L	P	T	Total	Sess.	Univ.	Sess.	Univ.	
1	BECME301T	Applied Mathematics-III	3	-	1	4	3	-	1	4	20	80	-	-	100
2	BECME302T	Digital Electronics	4	-	1	5	4	-	1	5	20	80	-	-	100
3	BECME302P	Digital Electronics Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
4	BECME303T	Concepts in Computer Engineering	3	-	1	4	3	-	1	4	20	80	-	-	100
5	BECME304T	Programming Methodology and Data Structures	4	-	1	5	4	-	1	5	20	80	-	-	100
6	BECME304P	Programming Methodology and Data Structures Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
7	BECME305T	Introduction to Computer Network	3	-	1	4	3	-	1	4	20	80	-	-	100
8	BECME306T	Environmental Engineering -I (Audit Course)	2	-	-	2	-	-	-	-	-	-	-	-	-
9	BECME307P	Computer Lab-I	-	2	-	2	-	2	-	2	-	-	25	25	50
		Total	**19**	**6**	**5**	**30**	**17**	**4**	**5**	**26**	**100**	**400**	**75**	**75**	**650**

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: FOURTH
BRANCH: COMPUTER ENGINEERING

Sr. No.	Subject Code	Subjects	Workload				Credit				Marks				Total Marks
			L	P	T	Total Hrs/Week	L	P	T	Total	Theory		Practical		
											Sess.	Univ.	Sess.	Univ.	
1	BECME401T	**Discrete Mathematics and Group Theory**	3	-	1	4	3	-	1	4	20	80	-	-	100
2	BECME402T	**File Structure and Data Processing**	4	-	1	5	4	-	1	5	20	80	-	-	100
3	BECME403T	**Microprocessor**	4	-	1	5	4	-	1	5	20	80	-	-	100
4	BECME403P	**Microprocessor Lab**	-	2	-	2	-	1	-	1	-	-	25	25	50
5	BECME404T	**Numerical Computational Techniques**	4	-	1	5	4	-	1	5	20	80	-	-	100
6	BECME405T	**Object Oriented Methodology**	4	-	1	5	4	-	1	5	20	80	-	-	100
7	BECME405P	**Object Oriented Methodology Lab**	-	2	-	2	-	1	-	1	-	-	25	25	50
8	BECME406P	**Computer Lab-II**	-	2	-	2	-	2	-	2	-	-	25	25	50
		Total	**19**	**6**	**5**	**30**	**19**	**4**	**5**	**28**	**100**	**400**	**75**	**75**	**650**

Syllabus for
Applied Mathematics- III (IT/CE)
Scheme (Theory: 4 hrs, Tutorial: 1 hr)

UNIT - I: LAPLACE TRANSFORM(14 Hrs)
Definition, Properties, Laplace Transform of Derivatives and Integrals, Evaluation of Integrals by Laplace Transform, Inverse Laplace Transform and its Properties, Convolution Theorem(Statement Only), Laplace Transform of Periodic Functions(Statement Only) and Unit Step Function, Applications of Laplace Transform to solve Ordinary Differential Equations, Simultaneous Differential Equations, Integral Equations & Integro-Differential Equations.

UNIT – II: FOURIER TRANSFORM (06 Hrs)
Definition and Properties(excluding FFT), Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform to Solve Integral Equations.

UNIT – III: Z-TRANSFORM(08 Hrs)
Definition, Convergence of Z-transform and Properties, Inverse Z-transform by Partial Fraction Method, Power Series Expansion, Convolution of two sequences.Solution of Difference Equations with Constant Coefficients by Z-transform method.

UNIT –IV: MATRICES (12 Hrs)
Linear and Orthogonal Transformations, Linear dependence of vectors, Characteristics equation, Eigen values and Eigen vectors, Statement and Verification of Cayley-Hamilton Theorem [without proof], Reduction to Diagonal form, Reduction of Quadratic form to Canonical form by Orthogonal Transformation, Sylvester's Theorem[without proof], Solution of Second Order Linear Differential Equation with Constant Coefficients by Matrix method. Largest Eigen value and Eigen vector by Iteration method.

UNIT – V: THEORY OF PROBABILITY (10 Hrs)
Axioms of Probability, Conditional probability, Baye's Rule, Random variables: Discrete and Continuous random variables, Probability function and Distribution function, Joint distributions, Independent Random Variables, Conditional Distributions.

UNIT – VI: MATHEMATICAL EXPECTATION & STOCHASTIC PROCESS(10 Hrs)
Mathematical Expectation, Variance, Standard Deviation, Moments, Moment generating function, Covariance & Correlation Coefficient, Conditional expectation. Stochastic process: Bernoulli and Poisson process.

Text Books

1. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication.
2. Advanced Engineering Mathematics by Erwin Kreysizig, 8th Edition, Wiley India.
3. Applied Mathematics for Engineers & Physicist by L. A. Pipes and L. R. Harvill.
4. Theory & Problems of Probability and Statistics by M. Spiegel , Schaum's Series, McGraw Hill .
5. Probability and Statistics for Engineers by Miller, Freund and Johnson, 4th ed.PHI.

Reference Books

1. A Text Book of applied Mathematics, Volume II , by P.N. Wartikar & J.N. Wartikar, Poona Vidyarthi Griha Prakashan
2. Introductory methods of Numerical Analysis, by S.S. Sastry, PHI
3. Mathematics for Engineers by Chandrika Prasad
4. Probability, Statistics with Reliability, Queuing and Computer Science Applications by K. S. Trivedi.
5. Probability, Statistics and Randam Processes by T. Veerarajan, Mc Graw-Hill .
6. A text book of Engineering Mathematics by N. P. Bali & M. Goyal, Laxmi Publication.

BECME302T   DIGITAL ELECTRONICS

UNIT I:

Analog V/S, Digital Systems, Transistors as Switch, Boolean Algebra, Boolean identities, Logic problems, Binary, Gray, Octal, Hex, and ASCII Codes, Logic gates, and Truth Tables, D Morgan's Law's , Sum of Product and Product of Sum.

Logic families: TTL, BCL, CMDS etc, Pan-in, Fan-out, propagation delay properties.

UNIT II:

Combinational logic – concepts, SSI, MSI & VLSI circuits Classification standard TTL, CMGS characteristics, Decoders, Encoders. Multiplexers, Demultiplexers, code converters, characteristics of display devices, standard configuration of gates as SSI/MSI/LSI circuits.

UNIT III:

K- Map, simplification of sum of products and products of sum, solution to problems using K-Map; conversion of Decoders / MUX into one another Use of MUX as function generator.

UNIT VI:

Introduction to Flip Flop, Loathers, concept of clock, Memories organization with Flip Flop as basic cell, Ram, RCM, EPROM & one type to another type Flop Flops.

UNIT V:

Excitation tables & introduction to sequential circuits counters-synchronous / asynchronous. Different modular counters with rest / clear facility Design of counters of arbitrary module with K-Maps, Lock free counters.

UNIT IV:

Arithmetic Circuits – Adders, sub tractors, (Half & Full). BCD adder / sub tractor concept of ALU and its design. Integrated circuits version of multivilnators and their design parameters.

Text Books :
1. Modern Digital Electronics by R. P. Jain , TMH Publication
2. Digital Electronics and Computer Design by M. Morris Mano, Pearson Edu.

Reference Books:
1. Digital Integrated Electronics – Herbert Taub Mc Graw Hill.
2. Introduction to Electronics by Earl Gates, 6th edition , Cengage Learning
3. Palmer: Introduction to Digital Introduction to Digital System (Tata Mc Graw Hill).
4. Ryan: Digital Electronics (Mc Graw Hill) Practical based on above syllabus.
5. Digital circuits and Microprocessor: Herbert Taub, Mc Graw Hill.

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BECME302P   DIGITAL ELECTRONICS

Practical based on syllabus.

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BECME303T   CONCEPTS IN COMPUTER ENGINEERING

UNIT I: INPUT/OUTPUT UNITS AND COMPUTER MEMORY
Description of computer input units, other input methods, computer output units. Memory cell, memory organization, read only memory, serial access memory, physical devices used to construct memory, Magnetic hard disk, floppy disk drive, compact disk read only memory (CDROM), magnetic tape drives, DVD.

UNIT II: COMPUTER GENERATIONS AND PROCESSOR
First generation computers, second generation computers, third generation computers, fourth generation computers, fifth generation computers, Moor's law, classification of computers, parallel computers, distributed computing system. Structure of instructions, description of a processor, a machine language program

UNIT III: COMPUTER LANGUAGES
Algorithms, Flowchart, Why programming languages, Generation of Programming languages, Characteristics of good programming languages, Machine level language, assembly language, middle level language-C, high level programming languages. Factors affecting the choice of languages, developing a program Introduction to HTML, Python Programming and compilation.

UNIT IV: COMPUTER SOFTWARES
Introduction, Types of Computer Software, System Management Programs, System Development Programs, Unique Application Programs, Problem Solving, Structuring the logic, using the Computer,

UNIT V: OPERATING SYSTEMS & OPEN SOURCE TECHNOLOGY
Need of operating system, Definition of operating system, types of operating systems. Introduction to Various operating systems-UNIX, MAC OS, LINUX (UBUNTU, FEDORA) and WINDOWS. Open source: history and Open source software development, Free software, Free software license provider, Proprietary Vs. Open source Licensing model, FOSS, GNU project.

UNIT VI: MULTIMEDIA DATA ACQUIAION AND PROCESSING
Representation of an Image, Capturing a moving image with camera, Compression of video data, MPEG Compression standard, Acquiring and storing audio signals, Compression of audio signals, Audio signal processing, speech processing

Textbook:
   1) Fundamentals of Computers, V. Rajaraman, IV edition, PHI
   2) Fundamentals of Computers by E. Balagurusamy, Tata-Mc-Graw Hill Publications

Reference books:
   1) Operating system by Achyut Godbole and Atul Kahate , 3rd edition, Tata-Mc-Graw Publications
   2) Open source technology by Kailash Vadera and Bhawesh Gandhi, Laxmi Publications

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BECME304T   PROGRAMMING METHODOLOGY AND DATA STRUCTURES

UNIT I : Introduction and Arrays using C
Taxonomy and history of Computer Programming Program Execution basics. Problem solving and programming strategies, programming paradigms. Algorithm and flowchart design, Principles of Structured programming C Language Fundamentals,Loop control statements, Arrays One dimensional & Two-dimensional array.Functions – Definition, call, prototypes, block structure, external variables, Recursion

UNIT II : Structure using C
Storage Classes – extern declaration and information hiding. Pointers – Address and indirection operators, Pointer arithmetic – Functions and pointers – Arrays and pointers –
Strings and pointers – Multi-dimensional arrays and pointers – Pointer arrays – Pointers to functions – Dynamic memory management.Structures – Variables, Accessing members, Assignment and nesting – Pointers to Structures – Structures and functions – Structures and arrays – Structures containing pointers – Unions

UNIT III : Searching and Sorting
Introduction to data structures, Searching and sorting techniques- Linear search, Binary search, Indexed search, Insertion sort, selection sort, Bubble Sort, radix Sort, Merge Sort, Hashing, Collision resolution policies.

UNIT IV : Stack and Queue
Stack and queue - Array representation of stacks, Queues and Dequeue, Circular queue, Polish notation, Implementation of stack using arrays, Application of stack & queue: Conversion from Infix to Postfix , Evaluation of postfix expressions, Priority Queues
Linked list- Singly linked list: Operations on linked list, Searching, Insertion, Deletion

UNIT V : Linked List
Linked list- Singly linked list: Operations on linked list, Searching, Insertion, Deletion,
Doubly linked list, Operations on doubly linked list, Sorted Linked List, circular list, , sparse matrix storage using linked list

UNIT VI : Trees and Graph
Trees- Definition, Binary Trees, Binary tree Traversal, Pre-order , Inorder , Post Order ,
Expression trees , Balanced Binary Trees . Different tree traversal algorithms,
Graphs - Mathematical Properties, Degree, Connectedness, Directed Graphs, Directed Acyclic Graph, Representation of Graphs and Applications: Adjacency matrix, path matrix, Linked Representation of a graph, Graph traversal - DFS & BFS, Shortest path,

Text Books :-
1) Let us C ,Yashavant Kanetkar,– BPB Publications. 2002 Fundamentals of Data Structure by Horowitz and Sahani (CBS Publications)
2) Introduction to Data Structure in C by Ashok N. Kamthane, Pearson Education

Reference Books:-
1) Data Structures using C by Tenenbaum (Pearson Education)
2) An Introduction to DS with applications by Trembley and sorenson(Mc Graw Hill)
3) Data Structure and Programme Design in C by Kruse, Leung and Tondo,(PHI)
4) Data structure and Algorithm by Lafore(BPB)
5) Schaum's outline: Date Structures by Seymour Lipschutz (Tata Mc Graw Hill)

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BECME304P   PROGRAMMING METHODOLOGY AND DATA STRUCTURES   LAB

Practical based on syllabus (Not restricted to following list)

1) Menu driven program for Selection Sort, Bubble Sort for n elements.
1) Menu driven program for Sort, Insertion Sort, Quick sort, Merge sort for n elements.
2) Program to implement Binary Search for n elements using Recursion.
2) Program to implement Linear Search for n elements using Recursion.
3) Program to convert Infix to postfix expression.
3) Program to convert Infix to prefix expression.
4) Menu driven program to perform PUSH, POP and Traversal on a Stack.
4) Menu driven program to perform INSERT, DELETE and Traversal on a Queue.
5) Program to implement Circular Queue.
5) Program to implement D-Queue.
6) Program to perform different operations on Singly Link List.
6) Program to perform different operations on Circular Link List.
7) Menu driven program to perform Inorder, Preorder & Postorder traversal on Binary Tree
8) Program To create a Binary Search Tree and perform Addition of a node, Deletion of a node and display.
9) Program to implement Depth First Search on a graph.
10) Program to implement Breath First Search on a graph.

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BECME305T   INTRODUCTION TO COMPUTER NETWORK

UNIT 1:   Introduction
Data and Signal, Bandwidth, Data Communication – Components, Data Representation, Data Flow, Networks – Network Criteria, Physical Structure (Types of Connection, Physical Topology), Categories of Network (LAN, WAN, MAN), Interconnection of Network – Internet, Protocols and Standards, Network Model – Layered Tasks, The OSI Reference Model, Introduction to TCP/IP Protocol Suite, Addressing – Physical, Logical, Port, Specific

UNIT 2:   Physical Layer
Physical Layer Objectives, Transmission Media – Wired and Wireless, Switching – Circuit switching Network, Datagram Network, Virtual Circuit Network, Digital Transmission (Digital to Digital Conversion, Analog to Digital Conversion), Analog Transmission (Digital to Analog Conversion, Analog To Analog Conversion), Modem.

UNIT 3:   Data Link Layer
Design Issues of Data Link Layer, Framing, Logical Link Control – Protocols for Noiseless Channel (Simplest, Stop-and-Wait), Protocols for Noisy Channel (Stop-and-Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ), Multiple Access Control – Random Access Protocols (ALOHA, CSMA, CSMA/CD, CSMA/CA), IEEE Standard 802 for LAN – 802.3, 802.4, 802.5

UNIT 4:   Network Layer
Need for Network Layer, Internet as a Datagram Network, Logical Addressing – Classfull Addressing in IPv4, Routing – Routing Algorithm (Distance Vector Routing, Link State Routing), Congestion and Congestion Control – (Open Loop, Closed Loop)

UNIT 5:   Transport Layer
Objectives of Transport Layer, Process to Process Delivery, Addressing – (IANA Ranges, Socket Addresses), Multiplexing and De – multiplexing, Reliable and Unreliable Services, Quality of Service - Traffic Shaping policies

UNIT 6:   User Support Layers – Session, Presentation, Application
Session Layer – Introduction, Presentation Layer – Data Compression, Network Security and Privacy – Introduction to Cryptography (Symmetric and Asymmetric), Digital Signature, Authentication (Message and Entity), Application Layer – Domain Name System, Electronic Mail, Architecture of Browser

Textbook:
1.   Data Communications and Networking, Behrouz A Forouzan, Fourth Edition, (McGraw Hill)
References Books:
1.   Computer Communication Network design and analysis by Schwartz.
2.   Computer Networks (PHI) by Andrew S. Tanenbaum.
3.   Data and Computer Communication by William Stallings.
4.   Computer Networks : A Top-Down Approach by Behrouz A Forouzan, Firouz Mosharraf, Mc-Graw Hill.

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BECME306T   **ENVIRONMENTAL ENGINEERING –I**
                                (Audit Course)

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BECME307P   COMPUTER LAB – I

Practicals based on Web Technologies
Introduction to web design: Web page & web site, Web Publishing. Introduction to HTML: Structure tags: <html>,<head>, <title>, <body> Block level tags: Headings, Paragraph, Comments, Breaks, Center, Division, Preformatted, Text alignment and font size. Text level tags: Bold, Italic, Underlined, Strike-through, superscript, subscript. Horizontal Rules Colors' in web page: Background color, Text color, Link color. Lists: Ordered Lists, Unordered Lists, Definition List, Nesting lists. Linking HTML Documents.URLs Types of URLs: Absolute URLs, Relative URLs. Linking HTML Documents: The Anchor tag, linking to document in same folder, Linking to document in Different folder, Linking to document on the web, Linking to specific location within document.

Inserting E-mail links Including Images: Image formats Linking HTML Documents: The Anchor tag, Linking to document in same folder, Linking to document in Different folder, Linking to document on the web, Linking to specific location Within document. Inserting E-mail links tables, Forms, Frames: Tables: Creating Tables, Editing of rows and columns of table, rowspan, colspan, formatting tables using attributes border, Border colour, back ground, align, width, cell spacing, cell height. Forms: Creating Forms, Forms controls: text controls, Password fields, Radio Buttons, Check boxes, Reset and Submit buttons. The <TEXTAREA>, <SELECT> and <OPTION> tags. Frames: Introduction to frames, Advantages and disadvantages of frames, creating basic frames Frame targeting. Style sheets: Adding style sheet to document: Linking to a Style sheet, Embedding style sheet, Using inline Style

sheet Building a small web site   Text Book: HTML,XHTML,CSS & XML By Example Teodoru Gugoiu, Firewall Media
Reference Books:
1. Castro, HTML 4 for World Wide Web, 3rd ed. Pearson education.
2. Barrett, Essential JavaScript for web professionals, Pearson Education.

Group 1: HTML Tags
1. Develop and demonstrate a HTML document that illustrates
   a) the use of Formatting Text.
   b) Headings tags(H1,H2,H3,H4,H5,H6)
   c) Font Details (Font Size,Style, Type, Color)
   d) Setting Color(BG Color)

Group 2: Table & Lists
2. Develop and demonstrate a HTML document that illustrates
   a) Unordered List(UL)
   b) Ordered List(OL) and Definition list (DL)
   c) Table Alignment (Cell Spacing, Cell Padding ,Height ,Width, Border, Rowspan , colspan)
   d) Setting Different Table Attributes(Color, Image)

Group 3: Image & Link
3. Develop and demonstrate a HTML document that illustrates
   a) Image as a background
   b) Hyperlink using an image
   c) Hyperlink with another web page(A, Base, Href)
   d) Link to email address, FTP Websites

Group 4: Forms and Frames
   a) Develop and demonstrate a HTML document that illustrates
   b) Create "Website Login Form" which consists of following details UserName , Password Address, Phno, Sex, Hobbies, Date Of Birth ,Country , along with submit and Reset Button.
   c) Create a Web page having Main Frame along with three Sub Frames(Windows)
   d) Create a Frame which will consider as a Main Frame along with other Sub Frame. when the particular link gets selected from the main frame it will displayed the output on target frame.
   e) Create a login form as above which will use the post method by sending data on another form.

Group 5 :Multimedia
   a) Develop a web page to play audio file using <a> Tag.
   b) Develop a web page to play video file using <Embed> Tag.

Group 6 DHTML
   a)   Create a CSS document on Internal style sheet
   b)   Create a CSS document on External style sheet
   c)   Create a CSS document on Inline style sheet
   d)   Create a CSS document on placing Images at different position

From above practical list perform at least two practical from each group.

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SYLLABUS FOR
DISCRETE MATHEMATICS AND GRAPH THEORY
BE IV Semester (CS/CT/CE/IT)
Scheme (Theory: 4 hrs. & Tutorial:1 hr.)

UNIT-I: Mathematical Logic and Set Theory (08 Hrs)
Propositions and Logical Operations, Quantifiers, Conditional Statements and Tautologies, Methods of Proof, Principle of Mathematical Induction. Basic concepts of set theory, Operations on Sets, The power set.

UNIT-II: Relations and Functions(12 Hrs)
Relations: Ordered pairs and n-tuples, Product Sets and Partitions, Relations and Digraphs, Matrix of Relation, Paths in Relations and Digraphs, Properties of Relations, Equivalence Relations & Partitions, Compatible Relation, Manipulation of Relations, Composition of Relations, Transitive Closure of a relation, Partial order relation, Partially ordered set, Hasse Diagrams.
Functions: Definition, Composition of functions, Types of Functions, Invertible Function, Permutation Function, Characteristics function of a set with Theorems.

UNIT-III: Group Theory (12 Hrs)
Binary Operations, Properties, Semigroups, Monoids,Subsemigroup,Submonoid, Isomorphism & Homomorphism, , Groups(only definitions and examples) Subgroups and Homomorphism, Cosets and Lagrange's Theorem, Normal subgroups.

Unit- IV:Rings, Lattices & Boolean Algebra(10 Hrs)

Rings, Fields, Integral Domain, Ring Homomorphism (definitions & examples), Lattices: Properties, Types of Lattices, Sub lattices, Isomorphic Lattices, Complemented & Modular Lattices (definitions & examples), Boolean Algebra: Definition, Properties, Simplification of Switching Circuits.

Unit-V: Graph Theory (12 Hrs)

Basic concepts of Graph Theory, Digraphs, Basic definitions, Paths and Circuits, Reachability and Connectedness, Matrix representation of graphs, Subgraphs & Quotient Graphs, Isomorphic digraphs & Transitive Closure digraph, Euler's Path & Circuit (only definitions and examples). Trees, Binary Tree, Labeled Trees, Undirected Trees, Spanning Trees of Connected Relations, Prim's Algorithm to construct Spanning Trees, Weighted Graphs, Minimal Spanning Trees by Prim's Algorithm & Kruskal's Algorithm.

Unit-VI: Combinatorics(06Hrs)

Generating Functions, Recurrence Relations, Counting: Permutations & Combinations, Pigeonhole Principle with Simple Applications.

Text Books

1. Discrete Mathematical Structures(3rd Edition) by Kolman, Busby & Ross PHI.
2. Discrete Mathematical Structures with Applications to Computer Science byTremblay &Manohar, Tata McGraw- Hill.
3. Combinatorial Mathematics, C.L.Liu (McGraw Hill)

Reference Books

1. Discrete Maths for Computer Scientists & Mathematicians by Mott, Kandel, Baker.
2. Elements of Discrete Mathematics by C. L. Liu.
3. Discrete Mathematics by Lipschutz.
4. Discrete Mathematics by R.Johnsonbaugh.
5. Higher Engineering Mathematics by B.S. Grewal, 40th Edition, Khanna Publication

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BECME402T   FILE STRUCTURE AND DATA PROCESSING

UNIT I :
Introduction: File structure design, File processing operations :open, close, read, write, seek. Unix directory structure. Secondary storage devices: disks, tapes, CD-ROM. Buffer management. I/O in Unix.

UNIT II :
File Structure Concepts: Field & record organization, Using classes to manipulate buffers, Record access, Record structures, file access & file organization, Abstract data models for file access. Metadata. Extensibility, Portability & standardization.

UNIT III:
Data Compression, Reclaiming spaces in files, Introduction to internal sorting and Binary searching. Keysorting. Indexing concepts. Object I/O. Multiple keys indexing. Inverted lists, Selective indexes, Binding.

UNIT IV :
Cosequential processing : Object-Oriented model, its application. Internal sorting: a second look. File Merging : Sorting of large files on disks. Sorting files on tapes. Sort merge packages. Sorting and Cosequential processing in Unix. 08 Hrs

UNIT V:
Multilevel indexing : Indexing using Binary Search trees. OOP based B-trees. B-tree methods Search, Insert and others. Deletion, merging & redistribution. B*trees. Virtual B-trees. VL records & keys. Indexed sequential file access and Prefix B+trees.

UNIT VI:
Hashing : Introduction, a simple hashing algorithm. Hashing functions and record distributions. Collision resolution. Buckets. Making deletions. Pattern of record access. External hashing. Implementation. Deletion. Performance. Alternative approaches.

Text Book:
Michael J.Folk, Bill Zoellick, Greg Riccard :File Structures : An
Object-Oriented Approach using C++. (Addison-Wesley) (LPE)
Reference Books:
1. M, Loomis: "Data Management & File Processing" (PHI)
2. O.Hanson: "Design of Computer Data Files" McGraw-Hill (IE)
3. D. E. Knuth: " The Art of Computer Programming", Volume 3, (Addison
Wesley).
4. James Bradly: " Files and Database Techniques", (Mc Graw Hill).

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BECME403T   MICROPROCESSOR

UNIT I:
8086 architecture and pin configuration, Software model of 8086 microprocessor. Memory addresses space and data organization. Data types. Segment registers, memory segmentation. IP & Data registers, Pointer, Index registers. Memory addresses generation.

UNIT II:
8086 Instruction set overview, addressing modes. 8086 instruction formats. 8086 programming : Integer instructions and computations: Data transfer instructions, Arithmetic instructions and their use in 8086 programming.

UNIT III:
8086 programming: logical instructions. Shift and rotate instructions and their use in 8086 programming. 8086 flag register and Flag control instructions, compare instruction, control flow and jump instructions, Loops & loop handling instructions. 8086 programming using these instructions.

UNIT IV:
The 8086 stack segment and stack related instructions. 8086 I/O Address space. Subroutines and related instructions, Parameter passing, Concept of Macros, Status saving on stack. Concept of recursion at assembly program level. 8086 Programming using subroutines, recursion and macros.

UNIT V:
8086 I/O: Types of input output, isolated I/O interface, input output data transfers, I/O instructions and bus cycles. Programmable Peripheral Interface 8255 PPI: pin diagram, internal organization, modes of operation. 8086 I/O programming using 8255.

UNIT VI:
8086 Interrupts types, priority and instructions. Interrupt vector table, External hardware-interrupt interface signals & interrupts sequence. Software interrupts. Non-maskable interrupts. Programmable Interrupt Controller 8259: pin diagram, internal organization, modes of operation. 8086 Interrupt-driven programming using 8259.

TEXT BOOKS:

1. W. A. Triebel & Avatar Singh: The 8088/8086 Microprocessors (4e) (PHI /Pearson Education)
2. Liu & Gibson: The 8088/8086 Microprocessor (2/e) (PHI)

REFERENCES:

1. Barry B. Brey : The Intel Microprocessor Architecture, Programming & Interfacing (6/e)(PHI)
2. Ray & Bhurchandi: Advanced Microprocessors & Peripherals (TMH).
3. John P Uffenbeck, "8086/8088 Families: Designing, Programming and Interfacing". Prentice Hall .
4. 8086 Microprocessor and its applications by Nagoor Kani 2nd edition, Mc Graw Hill

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BECME403P   MICROPROCESSOR LAB

Practical based on syllabus.

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BECME404T   NUMERICAL COMPUTATION TECHNIQUES

Unit 1:
Problem solving & computers, Numerical methods for roots of equations, polynomial, transcendental, quadratic equations. Bisection, False Position, Newton-Raphson & Direct substitution methods.

Unit 2:
Solution of Simultaneous Equations: Gauss Elimination, Gauss Seidel, Gauss- Jordan Methods. Matrix methods & Inversion Interpolation : Linear & polynomial.

Unit 3:
Numerical differentiation by polynomial fit, Numerical integration by Trapezoidal Rule, Simpson Rule, Gaussion Quadratre.

Unit 4:
Sampling frequency distribution, measures of central tendency, dispersion moments. Discrete probability distributions. Probability, Various types of distributions.

Unit 5:
Regression : Linear LS fit, Nonlinear fit. Polynomial function. Correlation : Coefficient, Properties of correlation coefficient. Multiple, Partial and Rank correlation.

Unit 6:
Test of significance: Introduction, The $\chi 2$-test. The t-test, the F-test .

Text Books:
1. V Rajaraman : Computer Oriented Numerical Methods (PHI)
2. J.N. Kapoor : Mathematical Statistics (MCG)
Reference :
1. Sastry: Numerical Computation Methods(PHI)
2. M.R. Spiegal: Statistics (McGraw Hill)

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BECME405T   OBJECT ORIENTED METHODOLOGY

UNIT I:

Introduction ,object oriented development ,object oriented Terms, object module, object & classes link and associations,generalization,grouping constructs, a sample object module ,advanced object modeling, aggregation, abstract classes, multiple inheritance,metadata,candidate keys, constraints

UNIT II:

Dynamic modeling events & states, nested state diagrams, concurrency advanced dynamic modeling concepts, a sample dynamic module, relation of objects & dynamic module, functional models, data flow diagrams,specufying operations,constraints,a sample functional module.

UNIT III:

Design methodology, overview of analysis, problem statement, TM network, object modeling, various phases, dynamic modeling, various phases, adding operations, refining the object model,

UNIT IV:

system design, overview ,sub systems, allocating subsystems, management of data stores,choosing software control,implementation,handling boundary conditions, trade offs.

UNIT V:

Object design, overview ,designing algorithms, design optimization ,optimization of control, adjustment of inheritance, design of associations, object representations, physical packaging,documenting,design decisions.

UNIT VI:

Comparison of methodologies ,information modeling ,notations, implementations ,programming languages ,data base systems ,object oriented reusability ,extensibility ,robustness

Text Books:

1.Object oriented modeling and design by James Rumbaugh, Michal Blaha, Williams premeriani, frwderick Eddy,William Lorenson FHL1997.

Reference Books:

1. Fundamentals of Object oriented design in UML by Meilir Page jones Addison-Wesley Professional, 2000
2. Object Oriented Modelling and design with UML, 2nd edition by Blaha, Pearson Education, India

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BECME405P   OBJECT ORIENTED METHODOLOGY LAB

Practical based on syllabus.

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BECME406P   COMPUTER LAB-II

GROUP I :
1. Study of working of various storage media.
2. Study of COBOL coding sheet.
3. Write a program to demonstrate the use of different editing characters.
4. Write a menu driven program to accept two numbers from keyboard and
perform its addition, subtraction, multiplication and division based on choice.

GROUP II :

5. Write a program to demonstrate STRING and UNSTRING verb.
6. Write a program to single and multidimensional table handling in COBOL.
7. Write a program to demonstrate various conditions in COBOL.
8. Write a program to demonstrate various table sorting methods.

GROUP III :

9.   Write a program to create sequential file and display all the records.
10. Write a program to create indexed sequential file and display all the records.
11. Write a program to create relative file and display all the records.
12. Write a program to demonstrate Master and Transaction file working together
13. Write a program to demonstrate addition and deletion of records in a file

GROUP IV :

14. Write a program to demonstrate sorting of a file.
15. Write a program to demonstrate merging of files.
16. Write a program to design output layout and generation of report.
17. Write a program to demonstrate hashing algorithm

Minimum 8-10 practicals must be conducted compulsorily selecting min. 2 from each group

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Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
Absorption Scheme for New course(C.B.S.) to Old course of Third Semester
B. E. (Computer Engineering)

As per Old course scheme of RTM, Nagpur University | | | | As per New course(C.B.S.) scheme of RTM, Nagpur University | | |

Sr. No	Sub Code	Subjects	Th/Pr	Subject Code	Subjects	Th/Pr
1	3CE-1	Applied Mathematics – III	Th	BECME301T	Applied Mathematics-III	Th
2	3CE-4	Digital Electronics Circuits	Th	BECME302T	Digital Electronics	Th
3	3CE-4	Digital Electronics Circuits	Pr	BECME302P	Digital Electronics Lab	Pr
4	-----	-----		BECME303T	Concepts in Computer Engineering	Th
5	3CE-5	Introductions To Programming	Th	BECME304T	Programming Methodology and Data Structures	Th
6	3CE-5	Introductions To Programming	Pr	BECME304T	Programming Methodology and Data Structures	Pr
7	6CE-3	Computer Network		BECME305T	Introduction to Computer Network	Th
8	4CE	Enviromental Studies		BECME306P	Environmental Engineering-I	Pr
9	3CE-6	Computer Workshop – I	Pr	BECME307P	Computer Lab-I	Pr
10	3CE-2	Electronic Devices And Circuits	Th	-----	-----	
11	3CE-2	Electronic Devices And Circuits	Pr	-----	-----	
12	3CE-3	Network Theory	Th	-----	-----	

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Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
Absorption Scheme for New course(C. B. S.) to Old course of Fourth Semester
B. E. (Computer Engineering)

As per Old course scheme of RTM, Nagpur University

As per New course (C. B. S.)scheme of RTM, Nagpur University

Sr. No	Sub Code	Subjects	Th/ Pr	Subject Code	Subjects	Th/ Pr
1	4CE-1	Discrete Mathematics And Graph Theory	Th	BECME401T	Discrete Mathematics and Graph Theory	Th
2	-----	-----		BECME402T	File Structure and Data Processing	Th
3	5CE-3	Microprocessor and Interfacing techniques	Th	BECME403T	Microprocessor	Th
4	5CE-3	Microprocessor and Interfacing techniques	Pr	BECME403P	Microprocessor Lab	Pr
5	5CE-1	Numerical Computational Techniques	Th	BECME404T	Numerical Computational Techniques	Th
6	4CE-4	Data Structures	Th	BECME405T	Object Oriented Methodology	Th
7	4CE-4	Data Structures	Pr	BECME405P	Object Oriented Methodology	Pr
8	4CE-6	Computer Workshop – II	Pr	BECME406P	Computer Lab-II	Pr
9	4CE-2	Basic Electrical Machines	Th	-----	-----	
10	4CE-2	Basic Electrical Machines	Pr	-----	-----	
11	4CE-3	Digital Logic Design	Th	-----	-----	
12	4CE-5	Electronic Measurements	Th	-----	-----	
13	4CE-5	Electronic Measurements	Pr	-----	-----	
14	4CE	Environmental Studies	Pr	-----	-----	

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Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
Absorption Scheme for New course(C. B. S.) to Old course of Fifth Semester
B. E. (Computer Engineering)

As per Old course scheme of RTM, Nagpur University

As per New course (C. B. S.)scheme of RTM, Nagpur University

Sr. No	Sub Code	Subjects	Th/ Pr	Subject Code	Subjects	Th/ Pr
1	-----	-----		BECME501T	Theory of Computation	Th
2	6 CE-1	Computer Architecture and Organization	Th	BECME502T	Computer Architecture and Organization	Th
3	5 CE-4	Data Communication	Th	BECME503T	TCP/IP and Internet	Th
4	5 CE-4	Data Communication	Pr	BECME503P	TCP/IP and Internet Lab	Pr
5	5 CE-2	Computer Graphics	Th	BECME504T	Computer Graphics	Th
6	5 CE-2	Computer Graphics	Pr	BECME504P	Computer Graphics Lab	Pr
7	-----	-----		BECME505T	Industrial Economics and Enterprenuership Developmenet	Th
8	7 CE-3	Visual Techniques	Pr	BECME506P	Computer Lab-III	Pr
9	5 CE-1	Numerical Computational Techniques	Th	-----	-----	
10	5 CE-3	Microprocessor and Interfacing techniques	Th	-----	-----	
11	5 CE-3	Microprocessor and Interfacing techniques	Pr	-----	-----	
12	5 CE-5	System Programming	Th	-----	-----	

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Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
Absorption Scheme for New course(C. B. S.) to Old course of Sixth Semester
B. E. (Computer Engineering)

As per Old course scheme of RTM, Nagpur University

As per New course (C. B. S.)scheme of RTM, Nagpur University

Sr. No	Sub Code	Subjects	Th/ Pr	Subject Code	Subjects	Th/ Pr
1	5 CE-5	System Programming	Th	BECME601T	System Software	Th
2	6 CE-4	Object Oriented Programming in C++	Th	BECME602T	Design and Analysis of Algortihms	Th
3	6 CE-4	Object Oriented Programming in C++	Pr	BECME602P	Design and Analysis of Algortihms Lab	Pr
4	6 CE-2	Database Management System	Th	BECME603T	Database Management System	Th
5	6 CE-2	Database Management System	Pr	BECME603P	Database Management System Lab	Pr
6	8 CE-4	Object Oriented Software Engineering(Elective- II)	Th	BECME604T	Software Engineering and Project Management	Th
7	-----	-----		BECME604P	Software Engineering and Project Management Lab	Pr
8	-----	-----		BECME605T	Functional English	Th
9	-----	-----		BECME606P	Mini Project and Industrial Visit	Pr
10	6 CE -1	COMPUTER ARCHITECTURE AND ORGANIZATION	Th	-----	-----	
11	6 CE -3	COMPUTER NETWORK	Th	-----	-----	
12	6 CE -5	DIGITAL SIGNAL PROCESSING	Th	-----	-----	

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Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
Absorption Scheme for New course(C. B. S.) to Old course of Seventh Semester
B. E. (Computer Engineering)

As per Old course scheme of RTM, Nagpur University

As per New course (C. B. S.)scheme of RTM, Nagpur University

Sr. No	Sub Code	Subjects	Th/ Pr	Subject Code	Subjects	Th/ Pr
1	7 CE −1	OPERATING SYSTEM	Th	BECME701T	Operating System	Th
2	8 CE −2	ADVANCE MICROPROCESSOR AND MICROCONTROLLERS	Th	BECME702T	Advanced Microprocessors & Microcontrollers	Th
3	8CE −2	ADVANCE MICROPROCESSOR AND MICROCONTROLLERS	Pr	BECME702P	Advanced Microprocessors & Microcontrollers Lab	Pr
4	7 CE −4	INTRNET AND JAVA PROGRAMMING	Th	BECME703T	Information Assurance and Network Security	Th
5	7 CE −4	INTRNET AND JAVA PROGRAMMING	Pr	BECME703P	Information Assurance and Network Security Lab	Pr
6	7 CE −5	ARTIFICIAL NEURAL NETWORKS AND FUZY LOGIC	Th	BECME704T(i)	Soft Computing	Th
7	7 CE −2	PRINCIPLES OF COMPILER DESIGN	Th	BECME704T(ii)	Compiler Construction	Th
8	-----	-----		BECME704T(iii)	Data Warehousing & Mining	Th
9	6 CE -5	DIGITAL SIGNAL PROCESSING	Th	BECME705T(i)	Digital Signals & Image Processing	Th
10	-----	-----		BECME705T(ii)	Web Technologies	Th
11	-----	-----		BECME705T(iii)	Enterprise Resource Planning	Th
12	7 CE −3	VISUAL TECHNIQUES	Th	-----	-----	Th
13	7 CE −3	VISUAL TECHNIQUES	Pr	-----	-----	Pr

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Absorption Scheme for New course(C. B. S.) to Old course of Eighth Semester

B. E. (Computer Engineering)

**As per Old course scheme of RTM,
Nagpur University**

**As per New course (C. B. S.)scheme of RTM,
Nagpur University**

Sr. No	Sub Code	Subjects	Th/ Pr	Subject Code	Subjects	Th/ Pr
1	8 CE –1	UNIX AND SHELL PGROGRAMMING	Th	BECME801T	UNIX & Shell Programming	Th
2	8 CE –1	UNIX AND SHELL PGROGRAMMING	Pr	BECME801P	UNIX & Shell Programming Lab	Pr
3	-----	-----		BECME802T	Distributed Systems and Grid Computing	Th
4	-----	-----		BECME802P	Distributed Systems and Grid Computing Lab	Pr
5	8 CE –3(1)	MODERN COMPUTER NETWORKING(Elective-I)	Th	BECME803T(i)	Wireless Communication & Mobile Computing	Th
6	8 CE –4(1)	OBJECT ORIENTED SOFTWARE ENGINEERING	Th	BECME803T(ii)	Software Testing & Quality Assurance	Th
7	-----	-----		BECME803T(iii)	Bio-informatics & Cyber Security	Th
8	-----	-----		BECME804T(i)	Real Time Systems	Th
9	8 CE–3(2)	COMPUTER VISION(Elective-II)	Th	BECME804T(ii)	Expert System Design	Th
10	-----	-----		BECME804T(iii)	Multimedia System	Th
11	8 CE –5	Project & Seminar	Pr	BECME85P	Project	
12	8 CE –2	ADVANCE MICROPROCESSOR AND MICROCONTROLLERS	Th	-----	-----	
13	8CE –2	ADVANCE MICROPROCESSOR AND MICROCONTROLLERS	Pr	-----	-----	
14	8 CE-4(2)	Object Oriented Methodology (Elective- II)	Th	-----	-----	

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FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SEVENTH
BRANCH: COMPUTER ENGINEERING

Sr. No.	Subject Code	Subjects	Workload				Credit				Marks				Total Marks
											Theory		Practical		
			L	P	T	Total Hrs/Week	L	P	T	Total	Sess.	Univ.	Sess.	Univ.	
1	BECME701T	**Operating System**	4	-	1	5	4	-	1	5	20	80	-	-	100
2	BECME702T	**Advanced Microprocessors & Microcontrollers**	4	-	1	5	4	-	1	5	20	80	-	-	100
3	BECME702P	**Advanced Microprocessors & Microcontrollers Lab**	-	2	-	2	-	1	-	1	-	-	25	25	50
4	BECME703T	**Information Assurance and Network Security**	4	-	1	5	4	-	1	5	20	80	-	-	100
5	BECME703P	**Information Assurance & Network Security Lab**	-	2	-	2	-	1	-	1	-	-	25	25	50
6	BECME704T	**Elective -I**	3	-	1	4	3	-	1	4	20	80	-	-	100
7	BECME705T	**Elective -II**	3	-	1	4	3	-	1	4	20	80	-	-	100
8	BECME706P	**Seminar on Project**	-	2	-	2	-	2	-	2	-	-	50	-	50
		Total	18	6	5	29	18	4	5	27	100	400	100	50	650

BECME704T	**Elective-I**	BECME705T	**Elective-II**
BECME704T(i)	**Soft Computing**	BECME705T(i)	**Digital Signals & Image Processing**
BECME704T(ii)	**Compiler Construction**	BECME705T(ii)	**Web Technologies**
BECME704T(iii)	**Data Warehousing & Mining**	BECME705T(iii)	**Enterprise Resource Planning**

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: EIGHTH
BRANCH: COMPUTER ENGINEERING

Sr. No.	Subject Code	Subjects	Workload				Credit				Marks				Total Marks
											Theory		Practical		
			L	P	T	Total Hrs/Week	L	P	T	Total	Sess.	Univ.	Sess.	Univ.	
1	BECME801T	UNIX & Shell Programming	4	-	1	5	4	-	1	5	20	80	-	-	100
2	BECME801P	UNIX & Shell Programming Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
3	BECME802T	Distributed Systems and Grid Computing	4	-	1	5	4	-	1	5	20	80	-	-	100
4	BECME802P	Distributed Systems and Grid Computing Lab	-	2	-	2	-	1	-	1	-	-	25	25	50
5	BECME803T	Elective -III	4	-	1	5	4	-	1	5	20	80	-	-	100
6	BECME804T	Elective-IV	3	-	1	4	3	-	1	4	20	80	-	-	100
7	BECME805P	Project	-	6	-	6	-	6	-	6	-	-	75	75	150
		Total	15	10	4	29	15	8	4	27	80	320	125	125	650

BECME803T	**Elective-III**	BECME804T	**Elective-IV**
BECME803T(i)	**Wireless Communication & Mobile Computing**	BECME804T(i)	**Real Time Systems**
BECME803T(ii)	**Software Testing & Quality Assurance**	BECME804T(ii)	**Expert System Design**
BECME803T(iii)	**Bio-informatics & Cyber Security**	BECME804T(iii)	**Multimedia System**

R.T.M. Nagpur University, Nagpur

SYLLABUS OF FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE

SEMESTER: SEVENTH

BRANCH: COMPUTER ENGINEERING (CBS)

BECME701T   **Operating System**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
1	**BECME701T**	Operating System	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:
UNIT I:

INTRODUCTION: What is operating system do, Types of operating system, Operating system services, User-operating system Interface, System calls, Types of system calls, System programs, operating system structure, Virtual machines. FILE SYSTEM: File concepts, Access methods, Directory & Disk structure, File system Mounting, File sharing, protection, File system structure, File system implementation, Directory implementation, Allocation method, Free-space management, Efficiency & performance, recovery

UNIT II:

PROCESS MANAGEMENT: Process concepts, process scheduling, operation on processes, inter-process communication. THREADING: Multithreaded programming: overview, multithreading models. PROCESS SCHEDULING: Basic concepts, scheduling criteria, scheduling algorithm, multiprocessor scheduling algorithm evaluation

UNIT III:

PROCESS SYNCHRONIZATION: Background, critical section problem, Peterson's solution, synchronization, hardware, semaphore, classic problems of synchronization, monitors

UNIT IV:

DEADLOCKS: System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock. SECONDARY STORAGE STRUCTURE: Overview of mass storage structure, disk structure, disk attachment, disk scheduling, disk management, Introduction to RAID structure

UNIT V:

MEMORY MANAGEMENT: Background, swapping, contiguous memory allocation, paging, structure of page table, segmentation. VIRTUAL MEMORY MANAGEMENT: Background, demand paging, copy-on-write, page replacement, allocation of frames, thrashing, memory mapped file, Allocating kernel memory, other consideration.

UNIT VI:

SYSTEM PROTECTION: Goals of protection, principles of protection, domain of protection, Access Matrix, Access Matrix implementation, Access control, Revocation of access Right, capability based systems, language based protection. SYSTEM SECURITY: Security problems,

program threats, system & network threats, cryptography as a security tool, user authentication, implementing security defenses, Firewall.

TEXT BOOKS:
1.Operating system Principles -7th Edition-Abraham Silberschatz, Peter Baer Galvin , Greg Gagne   Publisher -Willey

REFERENCE BOOKS:

1. Operating system Third Edition, Achyart S.Godbole, Atul Kahate,Tata M GrawHill.
2. Operating system concepts & design -2nd Edition ,Milan Milenkovic Tata M GrawHill.
3. Milan Milenkovic,' Operating Systems Concepts and Design' Second Edition, TataMcGrawHill
4. Android application Development for Java Programmers by James c. Sheusi, CENGAGE Learning

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SEVENTH
BRANCH: COMPUTER ENGINEERING (CBS)

BECME702T   **Advanced Microprocessors & Microcontrollers**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
2	**BECME702T**	Advanced Microprocessors & Microcontrollers	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

UNIT I

Introduction to 32-bit processors. Historical evolution of 80286,386 & 486 processor, real & protected modes, segmentation, paging mechanism & privilege mechanism & protection mechanism, pipe lining & task switching.

UNIT II

Pentium features & architecture, pin description, functional description, Pentium real mode, Pentium RISC features ,Pentium super-scalar architecture- pipelining, instruction paring rules, branch prediction, instruction and data caches, the floating unit

UNIT III

Basic Pentium programming, programmer's model, register set, addressing modes, instruction set, data types, data transfer instructions,

UNIT IV

Advanced Pentium programming: String instructions, arithmetic instructions, logical instructions, bit manipulations instruction, program transfer instructions & processor control instruction

UNIT V

8051 Micro-controller: Micro-controller NCS-51 family architecture, on-chip data memory & program memory organization-register set, register bank , SFRs, external memory & program memory, interrupt structure, timers & their programming, serial port & programming, design of minimum system using 8051 micro-controller for various applications

UNIT VI

Overview of 8096 Micro-controller: General description, processor section, on-chip data I/O section. Basic software examples: using the 8096's processing section, using the I/O section

TEXT BOOKS:

1. A.K.Ray, K.M.Bhurchandi "Advanced Microprocessor & peripherals" , 2nd edition, Tata MC GrawHill, 2006

2. Barry B Brey "The Intel Microprocessor",8th edition, Prentice- Hall Publication

3.Kenneth. J.Ayala "The 8051 Microcontroller Architecture, Programming & Applications" 2nd edition, Penram Internationalization

REFERENCE BOOKS:

1. Krishna Kant, "Microprocessor and Microntrollers- Architecture Programming, system design 8085, 8086, 8051, 8096, PHI

2.Ajay Deshmukh , "Microcontrollers theory & applications" Tata MCGraw Hill

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SEVENTH
BRANCH: COMPUTER ENGINEERING (CBS)

BECME702P   **Advanced Microprocessors & Microcontrollers Lab**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
3	**BECME702P**	Advanced Microprocessors & Microcontrollers Lab	-	2	-	2	-	1	-	1	-	-	25	25	50

Syllabus:
Practical based on syllabus of **BECME702T.**

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SEVENTH
BRANCH: COMPUTER ENGINEERING (CBS)

BECME703T   **Information Assurance and Network Security**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
4	**BECME703T**	Information Assurance and Network Security	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

UNIT I   Security Fundamentals

Introduction, Terminology, Attacks, Security Goals : Authentication, Authorization, Cipher Techniques: Substitution and Transposition, One Time Pad, Modular Arithmetic, GCD, Euclid's Algorithms, Chinese Remainder Theorem, Discrete Logarithm, Fermat Theorem, Block Ciphers, Stream Ciphers, Secret Splitting and Sharing

UNIT II   Cryptography

Symmetric Key Algorithms: DES, AES, BLOFISH, Attacks on DES. Modes of Operations, Linear Cryptanalysis and Differential Cryptanalysis. Public Key Algorithms: RSA, Key Generation and Usage, ECC. Hash Algorithms: SHA-1, MD5.

UNIT III   Key Management

Introduction, Key Management: Generations, Distribution, Updation, Digital Certificate, X.509 certificates, Digital Signature, Diffiee Hellman Key Exchange. One Way Authentication, Kerberos.

UNIT IV   Network Security

Layer Wise Security Concerns, IPSEC- Introduction, AH and ESP, Tunnel Mode, Transport Mode, Security Associations, SSL- Introduction, Handshake Protocol, Record Layer Protocol. IKE-Internet Key Exchange Protocol. Intrusion Detection Systems: Introduction, Anomaly Based, Signature Based, Host Based, Network Based Systems.

UNIT V   Security Management and Applications

Intruders, Intrusion detection, Password management, Worms, viruses, Trojans, Virus countermeasures, Firewalls, Firewall design Principals, Trusted system, Electronic Payment: Introduction, Payment types, Smart Cards, Chip card transactions and attacks, Payment over internet, Mobile Payments, Electronic Cash.

UNIT VI   Cyber Crimes & Laws

Introduction, Computer Forensics, Online Investigative tool, tracing and recovering electronic evidence, Internet fraud, Cyber Stalking, Identity Theft, Industrial Espionage, Cyber Terrorism. Indian IT laws: Introduction and briefs about IT Law clauses.

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SEVENTH
BRANCH: COMPUTER ENGINEERING (CBS)

TEXT BOOKS:

1. Bruice Schneier, "Applied Cryptography- Protocols, Algorithms and Source code in C", 2 nd Edition, Wiely India Pvt Ltd, ISBN 978-81-265-1368-0
2. William Stallings, "Cryptography and Network security: Principal and practice", Pearson ed.
3. Bernard Menezes, "Network Security and Cryptography ", Cengage Learning, ISBN-978-81-315-1349

REFERENCE BOOKS:

1. Nina Godbole, " Information Systems Security", Wiley India Pvt Ltd, ISBN -978-81-265-1692-6
2. Mark Merkow, " Information Security-Principles and Practices", Pearson Ed. 978-81-317-1288-7
3. Berouz Forouzan,"Cryptography and Network Security", 2 edition, TMH, ISBN : 9780070702080
4. CK Shyamala et el., "Cryptography and Security", Wiley India Pvt Ltd, ISBN 978-81-265-2285-9

BECME703P   **Information Assurance and Network Security Lab**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
5	**BECME703P**	Information Assurance and Network Security Lab	-	2	-	2	-	1	-	1	-	-	25	25	50

Syllabus:

Practical based on syllabus of **BECME703T.**

BECME704T (i)   **Elective –I :   Soft Computing**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
6	**BECME704T(i)**	Soft Computing	3	-	1	4	3	-	1	4	20	80	-	-	100

Syllabus:

UNIT I

Comparison of Soft Computing Methods-Neural networks, Fuzzy Logic, Genetic Algorithm with Conventional Artificial Intelligence [hard computing].
Neural Networks - Introduction to Biological Neural Networks, Mathematical Model of ANN, Neuron physiology, specification of the brain, the eye's Neural Network. Artificial Neural Network Concepts: Neural attributes, modeling and learning in ANN, characteristics of ANN, ANN topologies,

UNIT II

Neural Network Learning Algorithms- Hebbian Learning rule, Perceptron learning rule. Delta Learning Rule, Generalized Delta Learning Rule for Multiperceptron. Back propagation Algorithm.
Neural Network Paradigm: MCulloch-Pitts Model, the perception, Back-propagation networks. Associative Memory, Adaptive Resonance (ART) paradigm, Hopfield Model, Competitive learning Models.

UNIT III

Fuzzy Logic:- Introduction to Fuzzy sets: Fuzzy set theory Vs Probability Theory, classical set theory, properties of Fuzzy sets, Operation on Fuzzy sets. Fuzzy relations, Operations of Fuzzy relation, the extension principle. Fuzzy Arithmetic,

UNIT IV

Approximate reasoning: Introduction, linguistic variables, Fuzzy proposition, Fuzzy if-then rules.
Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models Rule base and data base Inference engine, choice of fuzzyfication. Difuzzificatin procedures.

UNIT V

Genetic Algorithms: Fundamentals of Genetic Algorithms. Encoding, Fitness function, Reproduction, Genetic modeling: Cross over, Inversion & Deletion, Mutation Operator, Bit wise Operators, Convergence of Genetic Algorithm.

UNIT VI

Hybrid Approach- GA based Fuzzy Model Identification. Fuzzy Logic controlled Genetic Algorithm, Neuro- Genetic Hybrids & Fuzzy – Genetic Hybrids, latest applications of soft computing.

TEXT BOOK

1. S, Rajasekaran& G.A. VijayalakshmiPai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis &applications, PHI Publication.
2. Fuzzy sets: Uncertainty and Information, Klir and Folger, PHI
3. Introduction to Soft Computing: Neuro-Fuzzy and Genetic Algorithms, S.Roy , U. Chakraborty (Pearson Education)

REFERENCE BOOKS:

1. "Introduction of Artificial neural networks", By-Jecek Zurada (Jaico Publishing)
2. "Neural networks & Fuzzy system", By-Bart Kosko (PHI)
3. "Fuzzy sets: Uncertainty & information", Klir and Folger (PHI)
4. "Fuzzy Logic with Engineering Applications", Timothy J.Ross (McGraw-Hill)
5. "Genetic Algorithms", David E Goldberg,(Person Education)
6. "Neuro-fuzzy and Soft computing", J S R Jang, C T Sun, E Mizutani, (PHI International/ Pearson Education)

BECME704T(ii) Elective –I : **Compiler Construction**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
6	**BECME704T(ii)**	Compiler Construction	3	-	1	4	3	-	1	4	20	80	-	-	100

Syllabus:
UNIT I

Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, tool based approach to compiler construction. Lexical analysis: interface with input, parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, error reporting, and implementation. Regular definition, Transition diagrams,LEX.

UNIT II

Syntax analysis: context free grammars, ambiguity, associativity, precedence, top down parsing, recursive descent parsing, transformation on the grammars, predictive parsing, Bottom up parsing, operator precedence grammars, LR parsers (SLR, LALR, LR), YACC. Dynamic storage allocation.

UNIT III

Type system, specification of simple type checker, equivalence of type expression, type conversion, polymorhism, type checking algorithms, source language issues, storage organizations, storage allocation strategies, parameter passing, symbol table, dynamic storage allocation techniques.

UNIT IV

Intermediate code generation: intermediate representations, translation of declarations, Intermediate Code generation for control flow, boolean expressions and procedure calls, implementation issues.

UNIT V

Code generation and instruction selection: issues, basic blocks and flow graphs, register allocation, code generation, DAG representation of programs, code generation from dags, peep hole optimization, code generator generators, specifications of machine.

UNIT VI

Code optimization, source of optimizations, optimization of basic blocks, loops, global dataflow analysis, solution to iterative dataflow equations, Code improving transformations, dealing with aliases, data flow analysis of structured flow graphs

TEXT BOOKS:

1. Compilers Principle, Techniques and tools, Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Pearson Education.
2. Compiler Design by O.G.Kakde, Laxmi Publications Pvt Limited

REFERENCE BOOKS:

1.. "Introduction to Compiling Techniques: First Course Using ANSI C, Lex and Yacc", J.P. Bennett, McGraw-Hill Publication

2. "Building Your Own Compiler with C++" , Jim Holmes, Prentice Hall

3. Kenneth C. Louden, "Compiler Construction: Principles and Practice" 1997c ISBN 9780534939724 Edition 1 Published: 1997 by Cengage Learning US
4. Principles of Compiler design, Alfred V. Aho, Jeffrey D. Ullman, NAROSA Publications
5. Compiler Construction for digital computer, Gres D. (Wiley, New York)

BECME704T(iii)   **Elective –I :   Data Warehousing & Mining**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
6	**BECME704T(iii)**	Data Warehousing & Mining	3	-	1	4	3	-	1	4	20	80	-	-	100

Syllabus:

UNIT I

Introduction to data warehousing, evolution of decision support systems, Data warehouse life cycle, building a data warehouse, Data Warehousing Components, Data Warehousing Architecture, Trends in data warehousing Data marts, Metadata

UNIT II

On Line Analytical Processing,. ,OLAP in the Data Warehouse: Demand for Online analytical processing, need for multidimensional analysis, fast access and powerful calculations, limitations of other analysis methods, OLAP definitions and rules, OLAP characteristics, major features and functions, OLAP models the MOLAP model, the ROLAP model, ROLAP versus MOLAP,

UNIT III

Multidimensional Data Models: Types of Data and Their Uses, from Tables and Spreadsheets to Data Cubes, Identifying Facts and Dimensions, Designing Fact Tables, Designing Dimension Table, Data Warehouse Schemas, Introduction to OLTP.

UNIT IV

Data Mining: Introduction: Motivation, Importance, Data Mining Functionalities Knowledge Discovery Process, KDD and Data Mining, Data Mining vs. Query Tools, , interesting patterns, Classification of data mining systems, Major issues, from Data warehousing to data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discrimination and Concept Hierarchy Generation.

UNIT V

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods - Prediction

UNIT VI

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods - K- means – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data Constraint – Based Cluster Analysis – Outlier Analysis .
Data Mining Applications. Social Impacts of Data Mining Case Studies: Mining WWW Mining Text Database Mining Spatial Databases

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, Elsevier,2nd Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

REFERENCE BOOKS:
1. Data Mining Techniques – Arun K Pujari,2nd edition, Universities Press.
2. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Edn Asia.
3. Insight into Data Mining,K.P.Soman,S.Diwakar,V.Ajay,PHI,2008.
4. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SEVENTH
BRANCH: COMPUTER ENGINEERING (CBS)

BECME705T(i)   **Elective –II :   Digital Signals & Image Processing**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
7	**BECME705T(i)**	Digital Signals & Image Processing	3	-	1	4	3	-	1	4	20	80	-	-	100

UNIT I: Discrete –Time Signals and Systems:

Introduction to DSP, Advantages, basic elements of DSP system, sampling theorem, quantization. Elementary discrete-time sequences. Discrete-time systems: description, representation, classification (linear, time-invariant, static, casual, stable).

UNIT II: z- Transform and LTI Systems:

Definition of z- Transform, properties, rational z-Transforms, evaluation of the inverse z-Transforms, properties, System Function, Application of Z- Transform, Unilateral Z-Transform, LTI system, Freqency domain representation of DTS & Signals. Convolution, Correlation.

UNIT III: Fourier Transforms, the DFT and FFT:

Definition & properties of Fourier transform relation with z-transform. Finite duration sequences and the discrete Fourier transform (DFT), properties, circular convolution, Fast algorithms for the computation of DFT: radix-2 and radix-4 FFT algorithms.

UNIT IV: Introduction to Digital Image Processing Systems:

Introduction, Fundamental steps in digital Image Processing, Components of an Image Processing System, Brightness adoption and discrimination , Image sampling and quantization, basic relationship between pixels.

UNIT V: Image Enhancement in the Spatial Domain:

spatial &frequency methods, Basic Grey Level Transformation, histogram Equalization, Histogram Proceeding, Local Enhancement, Image Subtraction, Image Averaging, Basics of Spatial Filtering, smoothing Spatial filters, sharpening spatial filters.

UNIT VI: Color Image Processing:

Color fundamentals, Color models, Pseudo color Image Processing, Basic of Full-Color Image Processing, Color Transformation, Smoothing and Sharpening, Image Segmentation Based on colors.

TEXT BOOKS:

1. Introduction to Digital signal processing. John G. Proakis, D.G. Manolakis (Maxwell Macmillan Int.)

2. R. C.Gonsales R.E.Woods, .Digital Image Processing., Second edition, Pearson Education

3. C.Britton&Rorabaugh,DSPPRIMER",TMHPublication

4. A.Nagoor Kani,'DigitalSignalProcessing'2ndEditionTMHPublication

REFERENCE BOOKS:

1. S.Salivahanan . Digital Signal Processing . TMH

2. Anil K.jain, Fundamentals of Image Processing., PHI

3.S.Jayaraman , S Esakkirajan , T Veerakumar . Digital Image Processing . Mc Graw Hill.

4. TAMAL BOSE . Digital Signal and Image Processing . John Wiley & Sons , Inc.

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SEVENTH
BRANCH: COMPUTER ENGINEERING (CBS)

BECME705T(ii)   **Elective –II :   Web Technologies**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
7	**BECME705T(ii)**	Web Technologies	3	-	1	4	3	-	1	4	20	80	-	-	100

Syllabus:

UNIT I

Web Essentials, client server communications, Web Browser, Markup Languages - HTML, XHTML, SHTML, XML, simple XHTML page style sheets, Introduction to CSS, Need for CSS, basic syntax and extrusion, DHTML.

UNIT II

Client side programming, Java Script Language, host objects: Browsers and the DOM, AJAX.

UNIT III

JAVA Applets, server side programming: Java Servlets - basics, simple program, separating programming and presentations, JSP basics, simple JSP pages.

UNIT IV

Representing web data - database connectivity, JDBC, Dynamic web pages, XML, DTD, XML schema, DOM, SAX, Parsing XML Document using DOM/SAX parser.

UNIT V

Email Tools, FTP Tools, WWW, TELNET, PUTTY, DNS, Web Services & Feeds - SOAP, RSS feeds.

UNIT VI

Building web Applications, Cookies sessions, Open Source Environment, PHP - MySQL case studies, APACHE TOMCAT, Accessibility, Internationalization, Types of Web Attack & Intrusions.

TEXT BOOKS:
1. "Web Technologies - A Computer Science Perspective", 1st Edition, Jeffrey C. Jackson
2. "Web Programming (Building Internet Applications)", 3rd Edition, Chris Bates

REFERENCE BOOKS:
1. "Developing Web Applications" 2nd Ed, Raplh Moseley, M. T. Savaliya.
2. "Web Technologies - Black Book", DT Editorial Services, DreamTech Press.
3. "Teach Yourself Web Technologies" - Ivan Bayross, BPB Publications.
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FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SEVENTH
BRANCH: COMPUTER ENGINEERING (CBS)

BECME705T(iii) **Elective –II : Enterprise Resource Planning**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
7	**BECME705T(iii)**	Enterprise Resource Planning	3	-	1	4	3	-	1	4	20	80	-	-	100

Syllabus:
Unit I:
Enterprise: An overview, Business Processes, Introduction to ERP, basic ERP concepts, benefits of ERP, ERP and related Technologies, ERP Architecture.
Unit II:
Business Process re-engineering, data - warehousing, data mining on the analytical processing supply chain management.
Unit III:
ERP Implementation: Basics, lifecycle, package selection, transition strategies, Implementation Processes, Consultants, Vendors and Employees, after ERP Implementation.
Unit IV:
The Business Modules, Business modules in an ERP package. Finance, Manufacturing, Human Resource, Plant maintenance, Material management, Quality management, Sales & distribution.
Unit V:
Selection of ERP, SWOT analysis of various ERP products, supply chain Enabled ERP.
Unit VI:
ERP and Electronic Data Interchange (EDI) integration, Enterprise Application Integration, ERP in manufacturing and non-manufacturing Industries.

TEXT BOOKS:

1. ERP Demystified : Alexis Leon, 3rd Edition, THM
2. EBusiness and ERP: Transforming the Enterprise: Arant Noris, James R. Hurley, Price Waterhouse Cooper publication

REFERENCE BOOKS:

1. Enterprise Resource Planning: Parag Diwan and Sunil Sharma, PHI.
2. Class A ERP implementation: Donald H. Sheldon, J. Ross Publishing

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: SEVENTH
BRANCH: COMPUTER ENGINEERING (CBS)

BECME706P : **Seminar on Project**

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
7	**BECME706P**	Seminar on Project	-	2	-	2	-	2	-	2	-	-	50	-	50

Syllabus:
    Seminar topic should be assigned individually based on recent trends in computer engineering. Senior faculty members should work as guide. The research paper publication / presentation in reputed national and international journals / conferences should be given some weightage while evaluation. Seminar reports should be written using technical research writing tools (e.g. Latex) and submitted to the department for evaluation.

R.T.M. Nagpur University, Nagpur

SYLLABUS OF FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE

SEMESTER: EIGHTH

BRANCH: COMPUTER ENGINEERING (CBS)

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: EIGHT
BRANCH: COMPUTER ENGINEERING (CBS)

BECME801T   UNIX & Shell Programming

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
1	BECME801T	UNIX & Shell Programming	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

Unit I:

Introduction :System structure, user perspective, operating system services, system commands, Shell programming - Bourn shell and C shell programming, variables, constants, loop control structures, decision control structures, case control structures shell scripts examples.

Unit II:

Introduction to kernel -Architecture of UNIX operating system, introduction to system concepts, kernel data structures, system administration. Buffer cache -Buffer headers, structure of buffer pool, different scenarios for retrievals of a buffer cache, reading and writing disk blocks.

Unit III:

Internal representation of a file :- Inode, structure of regular files, directories, conversation of path name of Inode , super block, Inode assignment to a file, allocation of disk blocks, other file types.

Unit IV:

System calls of the file system:- Open, Read ,Write, file and record locking, seek, close, file creation, creation of special files, change directory and change root, change owner and change mode , START and FSTART pipes, dup, mounting and unmounting file system , link and unlink , file system abstraction, file system maintenance.

Unit V:

Structure of process:- Process states and Transitions , layout of system memory. The context of a process, saving the Context of a process, manipulation of the process address space, sleep. process control :Process Creation, signals, termination, Awaiting process, invoking other programs, User ID(UID) of a process , changing size of process , the shell, the system boot and The INIT process.

Unit VI:

Inter-process Communication:- Process Tracing, System V IPC, Network Communication and Sockets, Managing the system and network connection in any LINUX version: Monitoring resources, Mastering Time, Managing boot process, Controlling startup and Run levels. Configuring networks from the GUI, Managing Network Interface cards, Connections: using wireless connections, Troubleshooting network problems.

TEXT BOOKS:

1. The design of UNIX operating system , M . J BACH (PHI)

2.UNIX and Shell Programming Y. Kanetkar (BPB)

REFERENCE BOOKS:

1. UNIX Network programming , W. RICHARD STEVENCS (PHI)

2. A user guide to a UNIX system, THOMAS & YALES (MGH)

3. Advance UNIX - programmer's guide, S. PRATA (BPB)

4. Unix programming, PIKE (PHI)

5. Unix utilities- A programmer's reference, R.S TARE (MCGRAW HILL)

6. Unix shell programming – SUBITABA DAS (PHI)

7. Ubuntu Linux, Toolbox 2nd edition by CHRISTOPHER NEQUS, WILEY

8. Basics of OS,Unix and shell Programmimg ISRD GROUP (MCGRAW hill)

BECME801P   UNIX & Shell Programming Lab

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
2	BECME801P	UNIX & Shell Programming Lab	-	2	-	2	-	1	-	1	-	-	25	25	50

Syllabus:
   Practical based on syllabus of **BECME801T**

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: EIGHT
BRANCH: COMPUTER ENGINEERING (CBS)

BECME802T   Distributed Systems and Grid Computing

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
3	BECME802T	Distributed Systems and Grid Computing	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:
Unit I:
Motivation and goals, broad overview and advantages of distributed systems main characteristics: absence of global clock and state and possibility of large network delays. Issues in distributed systems such as transparency, scalability, security, resource management
Unit II:
Time and Global States-Introduction-Clocks, events and process states-Synchronizing physical clocks-Logical time and logical clocks-Global states-Distributed debugging. Coordination and Agreement-Distributed mutual exclusion.
Unit III:
Distributed file systems – design issues, Distributed Shared Memory-Introduction-Design and implementation issues, CORBA Case Study- Introduction-CORBA RMI-CORBA services
Unit IV:
Introduction to the Grid Computing, Grid Computing models & protocols Types of Grid : Desktop Grid, clusters & Cluster Grids, HPC Grid, Data Grids.
Unit V:
Message Passing Interface (MPI) Standard: Overview, Procedures and Arguments, Data Types, Processes,   Error Handling, Platform independence, Point-to-Point Communication, Collective Communication, Groups — Contexts Communicators, Process Technologies.
Unit VI:
Introduction to cloud computing, characteristics of cloud computing, Benefits of cloud, cloud models : Service models : IaaS, PaaS, SaaS, Deployment models : Public cloud, private cloud, Hybrid cloud, community cloud, cloud Architecture
TEXT BOOKS:
1. George Coulouris, Jean Dollimore & Tim Kindberg, "Distributed Systems - Concept and Design" 4th Edition,
Publisher: Pearson (LPE). ISBN - 978-81-317-1840-7
2. Andrew S. Tanenbaum & Maarten van Steen, "Distributed Systems - Principals and Paradigms", Publisher: PHI.
3. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing", Publisher: Tata McGraw Hill.
REFERENCE BOOKS
1. "Cloud Computing - A hands on Approach", Arshadeep Bahga, Vijay Madisetti
2. Ahmar Abbas, " Grid Computing , A Practical Guide to Technology and App.", Firewall Medi.

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: EIGHT
BRANCH: COMPUTER ENGINEERING (CBS)

BECME802P   Distributed Systems and Grid Computing Lab

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
4	BECME802P	Distributed Systems and Grid Computing Lab	-	2	-	2	-	1	-	1	-	-	25	25	50

Syllabus:
Practicals based on syllabus of **BECME802T**

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: EIGHT
BRANCH: COMPUTER ENGINEERING (CBS)

BECME803T (i)   Elective –III :   Wireless Communication & Mobile Computing

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
5	BECME803T(i)	Wireless Communication & Mobile Computing	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

Unit I

WIRELESS COOMUNICATION: Introduction to Wireless communication, Radio Frequencies, Objectives, The cellular Concept, System design & fundamentals, Frequency reuse, Channel Assignment & handoff strategies, Adjacent Channel interference, cell splitting, Sectoring.

Unit II

INTRODUCTION TO GSM: Architecture, Radio Subsystem, Channel types, Gsm frames structure , SDMA-FDMA-TDMA-CDMA, Cellular wireless networks, Wireless LAN-IEEE 802.11 standards: Architecture ,services, MANET: Wifi& Wimax, Wireless local loop, routing, HIPERLAN, Bluetooth.

Unit III

MOBILE NETWORKS: Sensor Networks, Peer to Peer networks, mobile routing protocols:- DSR,AODV, reactive routing- Location Aided routing- Mobility models- Entity based-group mobility-Random ways point mobility model.

Unit IV

MOBILE NETWORKS LAYER: Mobile IP, dynamic host, configuration protocols, Adhoc Networks.
MOBILE TRANSPORT LAYER: Traditional TCP, Indirect TCP, Snooping TCP, Mobile -TCP, Transaction oriented TCP.

Unit V

MOBILE NETWORKS: Issues & challenges- Security issues, Authentication in Mobile application, privacy issues, power management, Energy awareness computing, Mobile IP& Adhoc Network -VOIP application.

Unit VI

PROTOCOLS & TOOLS: Wireless Application protocol-WAP: Introduction of WAP, architecture, treatment of protocols. Bluetooth: User Scenarios, physical layer, MAC layer, Networking security, Link management & J2ME.

TEXT BOOKS:

1. Theodore S. Rappaport- Wireless Communication Principals & Practice Prentice Hall

2. Mobile Communication-Jochen Schiller, Adison Wesley, 2000

3. Wireless Communication & Networks-W. Stallings, Prentice Hall.

REFERENCE BOOKS:

1. Lee. W. C.Y- Mobile Communication Engineering, Theory & Application ,II Edition

2. Principles of wireless Networks- Pahlavank & krishnamurthy. P

3. Mobile & wireless Networks-Black U.D.
4. Mobile Computing Technology, Applications and Service Creation Asoke K Talukder, Roopa R Yavagal, 2009, TATA McGraw Hil

BECME803T (ii)   Elective –III :   Software Testing & Quality Assurance

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
5	BECME803T(ii)	Software Testing & Quality Assurance	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

Unit I:

BASIC CONCEPTS: Need of testing, Errors, Faults, Defects, failures, Unit Testing, Integration Testing system, System testing, Objectives of Testing, Central issue in Testing, Testing activities, V-model, Sources Of information for Test Cases, Monitoring & measuring test execution, Test Tools & Automation, Limitation Of Testing

Unit II:

UNIT TESTING: Concept of unit testing, Static unit testing, Defect Preventions, Dynamic unit testing, Mutation testing, Debugging, Unit Testing in extreme programming , tools for unit Testing

Unit III:

CONTROL FLOW TESTING: Outline of control flow testing, control flow graph, Path in control flow graph, Path selection Criteria: All path coverage criteria, Statement coverage, Path coverage, Predicate coverage criteria, Generating Test input, example of Test data selection

Unit IV:

DATA FLOW TESTING & SYSTEM INTEGRATION: Introduction to Data flow testing, Data flow graph, Data flow Testing criteria, Comparison of Data flow Test selection criteria. System Integration: Introduction, Different types of interfaces & interfaces errors, System integration techniques, Software & Hardware integration, Test Plan for System integration, Off-the Shelf component integration

Unit V:

SYSTEM TEST CATEGORIES & TEST DESIGN: Taxonomy of system Test, Basic Test, Functionality test, Robustness Test, Performance Test, Scalability Test, Stress Test, Load & scalability Test, Reliability Test, Regression test, Documentation test   TEST DESIGN: Test Cases and Necessity of Test Case Documentation, Test case Design methods, Functional specification based Test Case Design, Use Cases based Test Case Design, Application based Test cases Design, Levels of Test Execution.

Unit VI:
ACCEPTANCE TESTING & QUALITY ASSURANCE: Types of acceptance Testing, Acceptance criteria, Selection of acceptance criteria, Acceptance Test Plan, Acceptance test execution, Acceptance Test report SOFTWARE QUALITY: Fine views of software Quality, ISO 9126 quality characteristics, ISO 9000:2000 software quality Standard

TEXT BOOKS:

1. Software Testing & Quality Assurance by Kshirsagar Naik & Priyadarshi Tripathi (Wiley)

2. Software Testing Concepts & Tools by Nageswara Rao Pusuluri (DreamTech)

3.Software Testing, Second Edition By: Ron Patton, Pearson Education ISBN-13: 978-0-672-32798-8

4.Gopalswamy Ramesh and Srinivasan Desikan, "Software Testing: Principles and Practices", Pearson Education, New Delhi, 2006.

REFERENCE BOOKS:

1. Nina S Godbole, "Software Quality Assurance: Principles and Practice", Narosa Publishers, New Delhi, 2004.

2. John D McGregor and David A Sykes, "A Practical Guide to Testing Object-Oriented Software", Addison-Wesley Professional, USA, 2001.

3. Metric and Model in Software Quality Engineering, By Stephen H Kan, Pearson Education ISBN 81-297-0175-8

4. Glenford J Myers, Corey Sandler, Tom Badgett and Todd M Thomas, "The Art of Software Testing", Wiley, USA, 2004.

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: EIGHT
BRANCH: COMPUTER ENGINEERING (CBS)

BECME803T (iii) Elective –III : Bio-informatics & Cyber Security

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
5	BECME803T(iii)	Bio-informatics & Cyber Security	4	-	1	5	4	-	1	5	20	80	-	-	100

Syllabus:

Unit I:

Introduction: History of Bioinformatics, Bioinformatics Applications ,Biological information resources and retrieval system, Knowledge Discovery and data mining, data characteristics and presentation

Unit II:

Protein Information Resources: Biological databases, Primary sequence databases, protein sequence databases, Secondary databases, protein pattern databases, quantitative randomness, data analysis, tool selective and structure classification databases.

Unit III:

Data mining and pattern matching Methods & Technology overview, infrastructure, pattern recognition & discovery, machine learning, text mining & tools, dot matrix analysis, substitution metrics, dynamic programming, word methods, multiple sequence alignment, tools for pattern. matching.

Unit IV:

Modeling, Simulation & Collaboration Drug discovery, fundamentals, protein structure, System biology, collaboration & communications, standards, Issues. Bioinformatics tools Introduction, working with FASTS, working with BLAST, FASTA & BLAST algorithms & comparison.

Unit V:

Pre-requisites in Information and Network Security: Overview of Networking Concepts, Information Security, Security Threats and Vulnerabilities, Cryptography / Encryption, Security Management. Encryption Techniques RSA,Diffie Helman, DES.

Unit VI:

Information and Network Security, Access Control and Intrusion Detection ,Server Management and Firewalls , Security for VPN and Next Generation Technologies .System and Application Security : Security Architectures, System Security, OS Security ,Wireless Network and Security

TEXT BOOKS :

1. S.C.Rastogi, N.Mendiratta, P.Rastogi "Bioinformatics-Methods & Application",

2. T.K 3. Higgins D, Taylor W (eds): "Bioinformatics: Sequence, Structure and Databanks".

3. Attwood And D J Parry-Smith Addison" Introduction to Bioinformatics" Wesley longman

REFERENCE BOOKS:

1. Harshvardhan Bal, "Bioinformatics: Principles and Applications"TMH publication.

2. Andreas D.Baxevanis & B.F.Francis ouellette, "Bioinformable : A A practical guide & the analysis of Genes and Protein willey publication"

BECME804T (i)   Elective –IV: Real Time Systems

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
6	BECME804T(i)	Real Time Systems	3	-	1	4	3	-	1	4	20	80	-	-	100

Syllabus:

Unit I:

Definition of RTS, Issues in real time computing –Constraints, Structure of RTS, Typical real time applications — Digital Control, Signal Processing, Characterizing RTS. Performance measures of RTS- properties of performance measure, Performabitity - cost function and hard deadline - Estimating program real time, Analysis of source code, pipelining, dependencies.

Unit II:

Task Assignment and scheduling Types of tasks, Timings, precedence, resource constraints, classification of scheduling algorithms, priority driven approach for periodic and aperiodic task, Non preemptive method(EDD), preemptive methods(EDF and LST), Rate monotonic, deadline monotonic, EDF and its variants for periodic tasks, Resource and resource access scheduling protocols: blocking and priority inversion, priority inheritance and priority ceiling protocols

Unit III:

Programming languages, tools and databases Language Characteristics. Data typing. Control structures, facilitating hierarchical decomposition, packages, error handling, Overloading & Generics, Use of POSIX Programming API in RTS Basic definition of databases. Real Time versus General Purpose databases, Main memory databases. Transaction priorities, Aborts, Concurrency control issues, Two phase approach to improve predictability, Maintaining serialization consistency, Databases for hard Real Time Systems.

Unit IV:

Real Time Communication Network topologies- Sending messages, Network architecture issues, Protocol -Contention based, Token based. Stop & Go Multi hop Protocol. The Pooled Bus. Hierarchical Round Robin Deadline, based. Fault tolerant Routing, medium access control protocols of broadcast networks, Internet and resources reservation protocols.

Unit V:

Real Time Kernel and Operating Systems Time services, features of RTOS, Program and processes Threads, sharing resources, Resources management: memory management and process management, fore ground/background systems, operating system architecture, Real time POSIX standards, capabilities of RTOS.

Unit VI:

Fault Tolerance and Reliability, UML For Real Time Systems Fault types, detection, error containment, Redundancy- Hardware, Software, Time, Information redundancy, Data diversity. Reversal checks, Malicious or Byzantine failures, Integrated failure handling, Reliability models:

Hardware and software error models, Modeling for time, resource, schedulability, performance, RT UML profile

TEXT BOOKS:
1. C.M. Krishna , "Real Time systems", Tata Mc Graw Hills publications
2. Jane W.S. Liu, "Real Time Systems", Pearson Education
3. Douglass, "Real Time UML", Pearson Education

REFERENCE BOOKS:
1. Stuart bennet, "Real Time Computer control, An Introduction" Pearson Publications
2. C. Sivraman Murthy and G. Maniraman, "Resource Management in real time systems and Network" MIT ISBN – 51-203-2682-2

BECME804T (ii)   Elective –IV: Expert System Design

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
											Theory		Practical		
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Sessional	University	Sessional	University	Total Marks
6	BECME804T(ii)	Expert System Design	3	-	1	4	3	-	1	4	20	80	-	-	100

Syllabus:
Unit I:
> Expert system & AI, Expert System characteristics, Expert System Structure, Heuristic Reasoning, User Interface.

Unit II:
> Logic and Resolution: propositional logic, first order predicate logic, causal logic form of logic, inference rules, resolution and propositional logic, resolution and first order predicate logic, resolution strategies.

Unit III:
> Production Rules and Inference: Knowledge representation in a production system, Inference in a production system, Pattern recognition and production rules, Production rules as a representation formalism.

Unit IV:
> Frames and Inheritance: Semantic nets, Frames and single inheritance:tree like frame taxonomies, exceptions, inheritance and attribute facts, Frames and multiple inheritance, frames as a representation formalism.

Unit V:
> Reasoning with Uncertainty : Production rules, inference and uncertainty, probability theory: the probability function, conditional probabilities and Bayes' theorem, application in rule based expert system. The subjective Baysian method, the certainty factor model, the Dempster-Shafer theory, Network model.

Unit VI:
> History of artificial neural networks, Neural information processing, hybrid intelligence, basic concept of neural network, biological neural system, single layer perceptrons, multilayer perceptrons, supervised and unsupervised learning, neural network learning

TEXT BOOKS:
> 1. Peteer J.F. Lucas and Linda C. Van Der Gaag, "Priniplces of Expert Systems ",
>   Addision Wesley Publication.
> 2. Limin Fu, " Neural Networks in Computer Intelligence", TMH publications.

3. Ritch and Knight, " Artificial Intelligence", 3rd edition, TMH publications

REFERENCE BOOKS:

1. Artificial Intelligent by Patric H. Winston

2. Expert Systems- Principles and Practice A Bonnet,JP Haton, J-M Troung NGOC (Prentice Hall)

3. Decision support and Expert Systems- Management Support Systems Efrain Turban (Macmillan Publishing Company)

4. A practical Guide to Designing Expert Systems-Sholon M. Weiss and casimir A Kulikowski (Rowmann Allanheld)

1. Decision support & Intelligent system s 6th Edition by Efram Turban, Jay E. Aronson(Pearson Education)

2. Introduction to Expert Systems- Peter Jack son (Addison Wesley)(Pearson Education)Asia

BECME804T (iii)   Elective –IV :   Multimedia System

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
6	BECME804T(iii)	Multimedia System	3	-	1	4	3	-	1	4	20	80	-	-	100

Syllabus:
Unit I:

Introduction : Definition of multimedia - Multimedia Basics - Where to use Multimedia - Multimedia Elements –Multimedia Applications Multimedia Systems Architecture: Multimedia Workstation Architecture - High resolution Graphic displays - Multimedia Architecture Based on interface bus - Network architecture for Multimedia systems. Evolving Technologies For Multimedia Systems: Hyper Speech - HDTV and UDTV - 3D Technologies and Holography - Virtual Reality -Video conferencing.

Unit II:

Hardware: Macintosh Versus Windows Platform – Connections -Memory and Storage Devices - Input Devices - Output Hardware - Communication Devices
Basic Software Tools : Text Editing - Word Processing - OCR Software - Painting and Drawing Tools - 3D Modeling and Animation Tools - Image Editing - Sound Editing –Animation – Video - Digital Movie tools - Movie Editors - Compressing Movie Files Making instant Multimedia : Linking Multimedia Object – office suites- word processors – spread sheets – databases – presentation tools – power point Multimedia authoring tools: Types of authoring tools – card and page based authoring tools – Icon based authoring tools – Time based authoring tools.

Unit III:

Text: About Fonts and Faces - Using Text in Multimedia - Designing with Text - Hypermedia and Hypertext - The Power of Hypertext - Using Hypertext - Hypermedia Structures - Hypertext Tools, Images: Making Still Images – Bitmaps - 1 bit images - 8-bit gray level images - 8-bit color images- Dithering- 24 bit color images - Vector Drawing - Vector-Drawn Objects vs. Bitmaps- 3-D Drawing and Rendering – Color - Understanding Natural Light and Color - Computerized Color - Color Palettes - Color Look-up table. Sound : The Power of Sound - Digital Audio - Making Digital Audio Files - MIDI Audio - MIDI vs. Digital Audio - Multimedia System Sounds - Adding Sound to Your Multimedia Project - Audio Recording - Keeping Track of Your Sounds - Audio CDs - Sound for Your Mobile - Sound for the Internet. Animation: the Power of Motion- Principles of Animation - Animation by Computer –Animation Techniques. Video: Using Video- How Video Works and Is Displayed - Analog Video - Digital Video, Displays - Digital Video Containers – Codec - Video Format Converters - Obtaining Video Clips - Shooting and Editing Video.

Unit IV:

Data Compression: Need for Data compression - General Data compression Scheme - Compression standards - Non-lossy compression for images - Lossy compression for Photographs and video - Hardware Vs Software Compression.

Compression Schemes and standards:(Only Concepts of) Binary image compression, Color, Gray Scale image compression - JPEG, video image compression - Multimedia Standards for Video - Requirements for Full-motion Video Compression – MPEG - Audio compression - Fractal compression - advantages / disadvantages.

Unit V:

Data and File Format Standards: Popular File Formats - RTF, RIFF, GIF, PNG, TIFF, MIDI, JPEG, JFIF, AVI,WAV, BMP,WMF, MIX, MPEG standards - TWAIN. Multimedia Databases, Storage and Retrieval - Database Management systems - Database Organization and Transaction management for multimedia systems. Multimedia Skills: The Team - Project Manager - Multimedia Designer - Interface Designer – Writer - Video Specialist - Audio Specialist - Multimedia Programmer - Producer of Multimedia for the Web.

Unit VI:

Designing and Producing: Designing - Designing the Structure - Designing the User Interface – Producing – Tracking – Copyrights - Virtual reality designing and modeling (VRML). The Internet and Multimedia: The Bandwidth Bottleneck - Internet Services – MIME Types - Multimedia on the Web - Web Page Makers and Site Builders - Plug-ins and Delivery Vehicles. Designing for the World Wide Web: Developing for the Web - The Desktop Workspace and the Small-Device Workspace - Text for the Web - Images for the Web - GIF and PNG Images - JPEG Images - Clickable Buttons - Client-Side Image Maps - Sound for the Web - Animation for the Web - GIF89a - Video for the Web. Delivering: Testing-Preparing for Delivery -File Archives - Delivering on CD-ROM - Delivering on DVD.

TEXT BOOKS:
    1.Multimedia: Making It Work By Tay Vaughan Eighth Edition, TMH
    2.Fundamental of Multimedia - Ze-Nian Li & M. S. Drew ,PHI
    3.Multimedia Systems Design - Prabhat k.Andleigh, Kiran Thakra
    4.Multimedia Systems - John F.Koegel Buford
REFERENCE BOOKS:
    1.Computer Graphics Multimedia and Animation - Malay K. Pakhira PHI , New Delhi - Second edition.
    2.Principles of Multimedia by Ranjan Parekh - 2nd Edition TMH.
    3.Computer Graphics and Multimedia - Anirban Mukhapathyay, Aruop Chattopadhyay - Vikas Publishing Ltd - Second Edition
    4.Multimedia Technology & Applications- David Hillman Galgotia Publications Pvt Ltd.- Second Edition

BECME805P   Project

Sr. No.	Subject Code	Subject	Workload				Credit				Marks				
			Lecture	Practical	Tutorial	Total Hrs/Week	Lecture	Practical	Tutorial	Total	Theory		Practical		Total Marks
											Sessional	University	Sessional	University	
7	BECME805P	Project	-	6	-	6	-	6	-	6	75	75	-	-	150

Syllabus:

     Project should be based on recent trends and technological development based on core and advance subjects of Computer Engineering and/or allied branches.