



**BONAM VENKATA CHALAMAYYA ENGINEERING COLLEGE**  
**ODALAREVU – 533 210, Andhra Pradesh, India**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**DETAILED SYLLABUS FOR BR20**

**UG: B.Tech COMPUTER SCIENCE AND ENGINEERING**

**II Year – II SEMESTER**

S.No	Course Code	Courses	L	T	P	Credits
1	20BS4T04	Numerical Methods and Complex Variables	3	0	0	3
2	20CS4T06	Java Programming	3	0	0	3
3	20HS4T02	Managerial Economics and Financial Analysis	3	0	0	3
4	20CS4T07	Operating Systems	3	0	0	3
5	20CS4T08	Mathematical Foundations of Computer Science	3	0	0	3
6	20CS4L07	Java Programming Lab	0	0	3	1.5
7	20CS4L09	Operating System Lab	0	0	3	1.5
8	20CS4L10	UNIX Lab	0	0	3	1.5
9	20CS4S02	Skill Oriented Course - Mongo Data Base	1	0	2	2
<b>Total</b>			<b>16</b>	<b>0</b>	<b>11</b>	<b>21.5</b>



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## **Numerical Methods and Complex Variable**

**(Common to all Branches)**

**Subject code: 20BS4T04**

**L T P C**

**3 0 0 3**

### **Course Objectives:**

COB 1: To help the student Understand the numerical way of solving equations and integration.

COB 2: To become familiar with the concepts of Complex Functions.

### **Course Outcomes:**

At the end of the course, student will be able to:

CO 1: Use Numerical Methods in Solving Equations. (L3)

CO 2: Calculate function value and its integration value by using different numerical methods. (L3)

CO 3: Understand Methods of finding numerical solution of differential equations. (L2)

CO 4: Use the knowledge of Beta and Gamma functions in evaluating improper integrals(L2).

CO 5: Understand Functions of complex variables and will be able to find analytic Function. (L2)

CO 6: Evaluate definite integral of given complex function using Cauchy's theorem and residues. (L5)

### **Unit I: - Solution of Algebraic and Transcendental Equations**

Introduction- Bisection method – Method of false position (Regula-False Method) – Iteration method – Newton- Raphson method (One Variable)

### **Unit II: - Interpolation and Numerical Integration**

Introduction- Errors in polynomial interpolation – Finite differences- Forward differences- Backward Differences –Central differences – Symbolic relations and separation of symbols - Differences of a Polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's Interpolation formula-Trapezoidal rule- Simpson's 1/3rd and 3/8th rule.

### **Unit III: - Numerical solution of Ordinary Differential Equations with initial conditions**

Solution of ordinary differential equations with initial conditions by Taylor's series Method - Picard Method of successive Approximations Euler's method, Modified Euler's Method – Runge-Kutta method (second and fourth order).

### **UNIT IV: Special functions**

Def of improper integral, Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals

### **Unit-V: - Functions of Complex variable & Complex Integration**

Complex function, Real and Imaginary parts of Complex function, Limit, Continuity and Derivative of Complex function, Cauchy-Riemann equations, Analytic function, Entire function, singular point, conjugate

Function,  $C-R$  equations in polar form, Harmonic functions, Milne-Thomson method.



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Line integral of a complex function, Cauchy's theorem (only statement) -Cauchy's Integral Formula (only statement), Taylor's series(only statement),Laurent's series (only statement)-Zeros of an analytic function- Types of Singularities-pole of order m, simple pole- Residues, Residue theorem (only statement).

Evaluation of integrals of the type

(a) Improper real integrals  $\int_{-\infty}^{\infty} f(x)dx$       (b)  $\int_0^{2\pi} f(\cos \theta, \sin \theta)d\theta$

**Text Books:**

1. **B.S.GREWAL**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **B. V. Ramana**, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
3. **Dr T K V Iyengar, Dr B.Krishna Gandhi, S.Ranhanatham** and **Dr. M.V.S.S.N Prasad**, Engineering Mathematics, S.Chand & Company Ltd.

**Reference Books:**

1. **N.P.Bali & Manish Goyal**, A Text book of Engineering Mathematics, Lakshmi Publications.
2. **James ward brown, Ruel V.Churchill**, Complex variable and Applications, Mc.Graw Hill Publications
3. **ERWIN KREYSZIG**, Advanced Engineering Mathematics, 10th Edition, Wiley-India
4. **Steven C. Chapra**, Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education



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**II Year – II SEMESTER**

**L T P C**  
**3 0 0 3**

**JAVA PROGRAMMING 20CS4T06**

**OUTCOMES:**

- Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
- Write, compile, execute and troubleshoot Java programming for networking concepts.
- Build Java Application for distributed environment.
- Design and Develop multi-tier applications.
- Identify and Analyze Enterprise applications.

**UNIT-I:**

Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JDK, JVM, program structure. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

**UNIT-II:**

Arrays, command line arguments, Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, nested classes.

**UNIT-III:**

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package. Exception handling, importance of try, catch, throw, throws and finally block, user defined exceptions, Assertions.

**UNIT-IV:**

Multithreading: introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

**UNIT-V:**

Applets: Applet class, applet structure, life cycle, sample applet programs; Event Handling: event delegation model, sources of events, Event Listeners, Adapter classes, inner classes. Introduction to Java FX, AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

**TEXT BOOKS:**

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
3. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

**REFERENCE BOOKS:**

1. Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in
2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.



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## MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (Common to all Branches)

Course Code: 20HS3T02 (II- I CAD)	L	T	P	C
Course Code:20HS4T02 ( II-II CE,ME,ECE,EEE,CSE)	4	0	0	3

### Course Objectives:

**COB 1:** To understand the Business environment, study the basic principles of managerial economics, and to know various factors influencing demand of the products.

**COB 2:** To analyze production and cost concepts and know the nature of markets, Methods of Pricing in the different market structures.

**COB 3:** To learn accounting practices and financial management techniques for effective business decision making and to promote entrepreneurial abilities for engineers.

### Course Outcomes:

At the end of the course, student will be able to:

CO 1:	Assess various types of Business & Business Environment.
CO 2:	Define Managerial Economics and Measure demand of a particular product or services by applying various methods in given situations.
CO 3:	Analyze the concepts of production, cost & break-even analysis.
CO 4:	Determine the price of a product or services in given market condition.
CO 5:	Prepare accounting concepts and able to analyze financial systems and calculate the capital budgeting methods to manage the projects.

### Unit I: - Business & Environment:

Introduction & features of Business Organization. Forms of business organisations - Sole Proprietorship, Partnership, and Joint Stock Company, Startups - Features - Process  
Internal and External factors affecting Business Environment

### Unit II:- Introduction to Managerial Economics and Estimation of Demand

Introduction to Managerial economics, Definition, Nature and Scope,

**Demand Analysis:** Definition-types of demand - Demand Determinants, Law of Demand.

**Elasticity of Demand:** Definition, Types – Price Elasticity – Income Elasticity – Cross Elasticity – Advertising Elasticity its Significance.

**Demand Forecasting:** definition, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, judgmental approach to demand forecasting)

### Unit III:-Concepts of production, cost & break-even analysis

**Concept of Production:** Production Function – Types – One variable input factor - Two variables – Law of returns to Scale -Cobb-Douglas Production function, Economies of Scale.

**Cost Analysis:** Definition of cost and Types of Cost concepts,

**Break-even Analysis (BEA):** Managerial Significance and limitations of Break-Even Analysis - CVP (Simple numerical problems)

### Unit IV: -Markets& Pricing strategies:



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**Market structures:** Introduction to Market Structures – Types & features of perfect competition, monopoly and monopolistic competition.

**Pricing Strategies:** Methods of Pricing - Factors Effecting Pricing.

**Unit V: - Introduction to Financial Accounting& Analysis of Financial Statements:**

Accounting Principles, Double-Entry Book Keeping, Journal, Ledger, and Trial Balance.

**Final Accounts** (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments)

**Capital Budgeting:**

Introduction of capital and types of capital - Capital Budgeting -Traditional Methods (payback period, accounting rate of return) and Modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

**Text Books:**

1. R.L.Varshney& K.L Maheswari, “Managerial Economics”, 5th Edition, S.Chand Publishers, 2005.
2. Dr. A. R. Aryasri, “Managerial Economics and Financial Analysis”, 3rd Edition, TMH, 2011
3. Dr. D.M.Mithani, “Introduction To Economics” , Himalaya Publishing House.
4. P Venkata Rao, J.V.Prabhakar Rao “Managerial Economics and Financial Analysis”, 1st Edition, Maruti Publications, 2012.
5. Dr. N. AppaRao, Dr. P. Vijay Kumar: ‘Managerial Economics and Financial Analysis’, Cengage Publications, New Delhi – 2011.
6. Dr. D. Raghunathareddy, M.V. Narasimha chary, “Managerial Economics and Financial Analysis”, Scitech publication(India) Pvt.Ltd.,

**Reference Books:**

1. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012.
2. D N Dwivedi, “Managerial Economics”, 8th Edition, PHI, 2010.
3. Prasanna Chandra, “Financial Management Theory and Practice”, 7<sup>th</sup> Edition, TMH publishing company limited.
4. Lipsey &Chrystel, Economics, Oxford University Press.
5. Vyuptakesh Sharan, “International Financial Management”, 5<sup>th</sup> Edition, PHI learning Private Limited, NewDelhi – 2010.
6. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI Pvt,Ltd., - 2006
7. ManabAdhikary, “Business Economics”, 2<sup>nd</sup> Edition, Excel Books, New Delhi – 2002
8. James C. Van Horne(Stanford University), “Financial Management And Policy”, PHI Pvt,Ltd., - 2001
9. H. Craig Peterson & W. Cris Lewis, “Managerial Economics”, 4th Edition, Pearson Education Ltd.,



## OPERATING SYSTEMS

Course Code: 20CS4T07

### Course Objectives:

The objectives of this course is to

- Introduce to the internal operation of modern operating systems
- Define, explain, processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and file systems
- Understand File Systems in Operating System like UNIX/Linux and Windows
- Understand Input Output Management and use of Device Driver and Secondary Storage (Disk) Mechanism
- Analyze Security and Protection Mechanism in Operating System

### UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, Computing environments, Open-Source Operating Systems. System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure.

### UNIT II

Process Concept: Process scheduling, Operations on processes, Inter-process communication. Multithreaded Programming: Multithreading models, Thread libraries, Threading issues. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms. Inter-process Communication: Critical Regions, Semaphores, Monitors, Message passing, Classical IPC Problems - Dining philosophers problem,

### UNIT III

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management: Introduction, Demand paging, Page replacement, Thrashing.

### UNIT IV

Deadlocks: Resources, Conditions for deadlocks, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.

### UNIT V

File Systems: Files, Directories, File system implementation. Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure.

### Text Books:

- 1) Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
- 2) Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (for Interprocess Communication and File systems.)

### Reference Books:

- 1) Dhamdhare D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.



**II Year – II SEMESTER**

**L T P C**  
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**MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE**

**Course Code: 20CS4T08**

**OBJECTIVES:**

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

**UNIT -I:**

**Mathematical Logic:** Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

**UNIT -II:**

**Set Theory:** Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, *Relations:* Properties of Binary Relations, Relation MaTriex and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams

**UNIT -III:**

*Functions:* Bi-jjective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

**UNIT- IV:**

**Algebraic Structures:** *Algebraic Structures:* Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism

**UNIT -V:**

**Combinatorics:** Basics of counting, Permutations, Permutations with Repetitions, Circular Permutations, Combinations, Generating functions of permutations and combinations, Binomial and Multinomial coefficients, Binomial and Multinomial theorems. The principles of Inclusion-Exclusion, Pegeonhole principle and its applications.

**Reccurece Relations:** Generating functions, function of sequences, Partial fractions, Calculating coefficient of generating functions, Reccurece Relations, Formulation as Reccurece relations, Solving Reccurece relation by substitution ad generating functions, Method of Characteristic roots, Solving homogeneous reccurece relations

**TEXT BOOKS:**

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3<sup>rd</sup> Edition, Tata McGraw Hill.

**REFERENCE BOOKS:**

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel,





**JAVA PROGRAMMING LAB (20CS4L07)**

**Exercise - 1 (Basics)**

- Write a JAVA program to display default value of all primitive data type of JAVA
- Write a case study on **public static void main(250 words)**

**Exercise - 2 (Operations, Expressions, Control-flow, Strings)**

- Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- Write a JAVA program using StringBuffer to delete, remove character.

**Exercise - 3 (Class, Objects)**

- Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
- Write a JAVA program to implement constructor.

**Exercise - 4 (Methods)**

- Write a JAVA program to implement constructor overloading.
- Write a JAVA program implement method overloading.

**Exercise - 5 (Inheritance)**

- Write a JAVA program to implement multi level Inheritance
- Write a java program for abstract class to find areas of different shapes

**Exercise - 6 (Inheritance - Continued)**

- Write a JAVA program give example for “super” keyword.
- Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

**Exercise - 7 (Exception)**

- Write a JAVA program that describes exception handling mechanism
- Write a JAVA program Illustrating Multiple catch clauses.
- Write a JAVA program that implements Runtime polymorphism

**Exercise – 8 (User defined Exception)**

- Write a JAVA program to Illustrate try, catch.
- Write a JAVA program to Illustrate finally
- Write a JAVA program for creation of User Defined Exception

**Exercise – 9 (Threads)**

- Write a JAVA program that creates threads by extending Thread class .First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds ,(Repeat the same by implementing Runnable)
- Write a program illustrating **isAlive** and **join ()**
- Write a Program illustrating Daemon Threads.
- Write a JAVA program Producer Consumer Problem

**Exercise – 10 (Packages)**



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- a). Write a JAVA program illustrate class path
- b). Write a JAVA program to create an import a package.

**Exercise - 11 (Applet)**

- a).Write a JAVA program to demonstrate applet life cycle.
- b). Write a JAVA program to create different shapes and fill colors using Applet.

**Exercise - 12 (Event Handling)**

- a).Write a JAVA program that display the x and y position of the cursor movement using Mouse.
- b).Write a JAVA program that identifies key-up key-down event user entering text in a Applet.



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**II Year – II SEMESTER**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

### **OPERATING SYSTEM LAB**

**Course code:20CS4L09**

#### **Objective:**

- To provide an understanding of the design aspects of operating system

#### **Recommended Systems/Software Requirements:**

Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space

#### **Lab Experiments:**

1. Simulate the following CPU scheduling algorithms
  - a) Round Robin b) SJF c) FCFS d) Priority
2. Loading executable programs into memory and execute System Call implementation-read(), write(), open () and close()
3. Multiprogramming-Memory management- Implementation of Fork(), Wait(), Exec() and Exit() System calls
4. Simulate all File allocation strategies
  - a) Sequenced, b)Indexed, c) Linked
5. Simulate MVT and MFT
6. Simulate all File Organization Techniques
  - a) Single level directory b) Two level c) Hierarchical d) DAG
7. Simulate Bankers Algorithm for Dead Lock Avoidance
8. Simulate Bankers Algorithm for Dead Lock Prevention.
9. Simulate all page replacement algorithms.
  - a) FIFO b) LRU c) LFU etc....
10. Simulate Paging Technique of memory management.



## **UNIX LAB**

### **Course Code:20CS4L10**

1.     a) Study of Unix/Linux general purpose utility command list  
man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history,  
chmod, chown, finger, pwd, cal, logout, shutdown.  
b) Study of vi editor.  
c) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.  
d) Study of Unix/Linux file system (tree structure).  
e) Study of .bashrc, /etc/bashrc and Environment variables.
2.     Write a C program that makes a copy of a file using standard I/O, and system calls
3.     Write a C program to emulate the UNIX ls -l command.
4.     Write a C program that illustrates how to execute two commands concurrently  
with a command pipe. Ex: - ls -l | sort
5.     Write a C program that illustrates two processes communicating using shared memory
6.     Write a C program to simulate producer and consumer problem using semaphores
7.     Write C program to create a thread using pthreads library and let it run its function.
8.     Write a C program to illustrate concurrent execution of threads using pthreads library.



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II Year - II Semester	Code: 20CS4S02	L	T	P	C
		0	0	3	1.5
<b>Skill Oriented Course: MONGO DB</b>					
<b>Course Outcomes:</b> Upon successful completion of the course, the student will be able to: <ul style="list-style-type: none"><li>• Installing and configuring mongo DB in windows</li><li>• Perform all database operations using mongo DB</li><li>• Develop applications by integrating mongo DB with java/PHP.</li></ul>					
<b>List of Experiments:</b> <ol style="list-style-type: none"><li>1. Mongo DB installation and configuration in windows.</li><li>2. Demonstrate how to create and drop a database in Mongo DB.</li><li>3. Creating the Collection in Mongo DB on the fly</li><li>4. Creating collection with options before inserting the documents and drop the collection created.</li><li>5. Mongo DB insert document<ol style="list-style-type: none"><li>a. Insert single document</li><li>b. Insert multiple documents in collection</li></ol></li><li>6. Querying all the documents in json format and Querying based on the criteria.</li><li>7. Mongo DB update document<ol style="list-style-type: none"><li>a. Using update() method.</li><li>b. Using save() method.</li></ol></li><li>8. Mongo DB delete document from a collection.<ol style="list-style-type: none"><li>a. Using remove() method.</li><li>b. Remove only one document matching your criteria</li><li>c. Remove all documents</li></ol></li><li>9. Mongo DB Projection</li><li>10. limit(), skip(), sort() methods in Mongo DB</li><li>11. Mongo DB indexing<ol style="list-style-type: none"><li>a. Create index in Mongo DB</li><li>b. Finding the indexes in a collection</li><li>c. Drop indexes in a collection</li><li>d. Drop all the indexes</li></ol></li><li>12. Mongo DB with java and PHP<ol style="list-style-type: none"><li>a. Create a simple application that uses Mongo DB with Java</li><li>b. Create a simple application that uses Mongo DB with PHP</li></ol></li></ol>					
<b>Web References:</b> <ol style="list-style-type: none"><li>1. <a href="https://beginnersbook.com/2017/09/mongodb-tutorial/">https://beginnersbook.com/2017/09/mongodb-tutorial/</a></li></ol>					