

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY,  
HYDERABAD**

**Master of Computer Applications**

**MCA 1<sup>st</sup> Year (I-Semester)**

Code	Subject	T	P
	Discrete Structures	4	-
	Computer Organization	4	-
	Object Oriented Programming (through C++)	4	-
	Probability and Statistics	4	-
	Accountancy and Financial Management	4	-
	English Language Communication Skills	2	-
Practicals	English Language Communication Skills Lab	-	2
	Computer Organization Lab	-	4
	Object Oriented Programming (through C++) Lab	-	4

**MCA 1<sup>st</sup> Year (II-Semester)**

Code	Subject	T	P
	Data Structures (through Java)	4	-
	Operating Systems	4	-
	Organizational Structure and Personal Management	4	-
	Operations Research	4	-
	Business Data Processing	4	-
Practicals	Data Structures (through Java) Lab	-	4
	Business Data Processing Lab	-	4

**MCA 2<sup>nd</sup> Year (III-Semester)**

Code	Subject	T	P
	Database Management Systems	4	-
	Computer Communications	4	-
	Unix Network Programming	4	-
	Management Information Systems	4	-
	Computer Graphics	4	-
Practicals	Database Management Systems Lab	-	4
	Unix Network Programming Lab	-	4

**MCA 2<sup>nd</sup> Year (IV-Semester)**

Code	Subject	T	P
	Software Engineering	4	-
	Advanced Java Programming	4	-
	Data Warehousing and Mining	4	-
	Elective – I	4	-
	Elective – II	4	-
Practicals	Advanced Java Programming Lab	-	4
	Data Mining and Warehousing Lab	-	4

**Elective – I**

Embedded Systems  
Human Computer Interaction  
Perl Programming

**Elective – II**

Distributed Operating Systems  
Mobile Computing  
Systems Programming

**MCA 3<sup>rd</sup> Year (V-Semester)**

Code	Subject	T	P
	E-Commerce	4	-
	Multimedia Application Development	4	-
	Object Oriented Analysis and Design (using UML)	4	-
	Elective-III	4	-
	Elective – IV	4	-
Practicals	UML Lab	-	4
	Multimedia Application Development Lab	-	4

**Elective – III**

Software Project Management  
Middle Ware Technologies  
Information Retrieval Systems

**Elective – IV**

Software Testing Methodologies  
Advanced Databases  
Information Security

**MCA 3<sup>rd</sup> Year (VI-Semester)**

Code	Subject
	Project Seminar
	Dissertation/Thesis
Excellent/Good/Satisfactory/Not-Satisfactory	

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
HYDERABAD

I Year MCA

I Semester

**DISCRETE STRUCTURES**

**UNIT-I:**

**Mathematical Logic:** Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms.

**UNIT-II:**

**Predicates:** Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

**UNIT-III:**

**Set Theory:** Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram. Functions: Inverse Function Comports of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

**UNIT-IV:**

**Algebraic structures:** Algebraic systems Examples and general properties, Semi groups and monads, groups sub groups' homomorphism, Isomorphism.

**UNIT-V:**

**Elementary Combinatorics:** Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion.

**UNIT-VI:**

**Recurrence Relation:** Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating funds. Characteristics roots solution of In homogeneous Recurrence Relation.

**UNIT-VII:**

**Graph Theory:** Representation of Graph, DFS, BFS, Spanning Trees, planar Graphs

**UNIT-VIII:**

Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers

**TEXT BOOKS:**

1. Discrete and Combinatorial Mathematics- An Applied Introduction-5th Edition – Ralph. P.Grimaldi. Pearson Education

2. Discrete Mathematical Structures with applications to computer science Trembly J.P. & Manohar .P, TMH
3. Discrete Mathematics for Computer Scientists & Mathematicians Prentice Hall, 1986  
J.L. Mott, A. Kandel, T.P. Baker.

**REFERENCE BOOKS:**

1. Discrete Mathematical Structures, Bernard Kolman, Roberty C. Busby, Sharn Cutter Ross, Pearson Education/PHI.
2. Discrete Mathematics for Computer science, Garry Haggard and others, Thomson
3. Discrete Mathematical Structures, Mallik and Sen, Thomson
4. Mathematical Foundations of computer science Dr D.S.Chandrasekharaiaha Prism books Pvt Ltd.
5. Discrete Mathematics, Lovasz, Springer.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD**

**I Year MCA**

**I Semester**

**COMPUTER ORGANIZATION**

**UNIT I:**

**NUMBER SYSTEMS-AND COMPUTER ARITHMETIC-** Signed and unsigned numbers, Addition and subtraction, multiplication, division, Floating point representation logical operation, Gray code, BCD codes, Error detecting codes. Boolean algebra, Simplification of Boolean expressions, K-Maps.

**UNIT II:**

**COMBINATIONAL AND SEQUENTIAL CIRCUITS-** decoders, Encoders, Multiplexers, Half and Full adders, Shift registers; Sequential circuits- flip-flops.

**UNIT III:**

**MEMORY ORGANIZATION-**memory hierarchy, Main memory-RAM, ROM chips, Memory address map, memory contention to CPU; Associative Memory-Hardware logic, match, read and write logic; Cache Memory-Associative mapping, Direct mapping, set-associative mapping, hit and miss ratio;

**UNIT IV:**

**BASIC CPU ORGANIZATION-**instruction formats-INTEL-8086 CPU architecture-Addressing modes - generation of physical address- code segment registers, Zero, one, two, and three address instructions.

**UNIT V:**

**INTEL 8086 ASSEMBLY LANGUAGE INSTRUCTIONS-**Data transfer instructions-input-output instructions, address transfer, Flag transfer, arithmetic, logical, shift, and rotate instructions.

**UNIT VI:**

**INTEL 8086 ASSEMBLY LANGUAGE INSTRUCTIONS-** conditional and unconditional transfer, iteration control, interrupts and process control instructions, assembler directives. Programming with assembly language instructions.

**UNIT VII:**

**MICRO PROGRAMMED CONTROL:** Control memory, Address sequencing, Microprogram example, design of control unit Hard wired control. Microprogrammed control

**UNIT VIII:**

**INPUT -OUTPUT ORGANIZATION**-peripheral devices, input-output interface-I/O Bus and interface modules, I/O versus Memory bus, isolated versus memory mapped I/O, Modes of transfer-Programmed I/O, Interrupt-initiated I/O, priority interrupts-Daisy chaining, parallel priority, interrupt cycle, DMA- DMA control, DMA transfer, Input output processor-CPU-IOP communication.

**TEXT BOOKS:**

1. Morris Mano -Computer System Architecture –3<sup>rd</sup> Edition-Pearson Education .
2. Douglas V.Hall Intel 8086-Programming- McGraw-Hill International studies.

**REFERENCE BOOKS:**

Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.

Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.

Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

David A. Paterson and John L.Hennessy-Computer- organization and design-Harcourt Asia Pte Ltd.-2<sup>nd</sup> Edition

Structured Computer Organization – Andrew S. Tanenbaum, 4<sup>th</sup> Edition PHI/Pearson

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**I Year MCA**

**I Semester**

**OBJECT ORIENTED PROGRAMMING (through C++)**

**UNIT-I**

Different paradigms for problem solving, need for OOP, differences between OOP and Procedure oriented programming, Abstraction, Overview of OOP principles, Encapsulation, Inheritance and Polymorphism.

**UNIT-II**

**C++ Basics:** Structure of a C++ program, Data types, Declaration of variables, Expressions, Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Pointers and Arrays, Strings, Structures, References. Flow control statement- if, switch, while, for, do, break, continue, goto statements. Functions-Scope of variables, Parameter passing, Default arguments, inline functions, Recursive functions, Pointers to functions. Dynamic memory allocation and de-allocation operators-new and delete, Preprocessor directives.

**UNIT-III**

**C++ Classes And Data Abstraction:** Class definition, Class structure, Class objects, Class scope, this pointer, Friends to a class, Static class members, Constant member functions, Constructors and Destructors, Dynamic creation and destruction of objects, Data abstraction, ADT and information hiding.

**UNIT-IV**

**Polymorphism:** Function overloading, Operator overloading, Generic programming-necessity of templates, Function templates and class templates.

**UNIT-V**

**Inheritance:** Defining a class hierarchy, Different forms of inheritance, Defining the Base and Derived classes, Access to the base class members, Base and Derived class construction, Destructors, Virtual base class.

**UNIT-VI**

**Virtual Functions And Polymorphism:** Static and Dynamic bindings, Base and Derived class virtual functions, Dynamic binding through virtual functions, Virtual function call mechanism, Pure virtual functions, Abstract classes, Implications of polymorphic use of classes, Virtual destructors.

## **UNIT-VII**

**C++ I/O:** I/O using C functions, Stream classes hierarchy, Stream I/O, File streams and String streams, Overloading << and >> operators, Error handling during file operations, Formatted I/O.

## **UNIT-VIII**

**Exception Handling:** Benefits of exception handling, Throwing an exception, The try block, Catching an exception, Exception objects, Exception specifications, Stack unwinding, Re-throwing an exception, Catching all exceptions, Design issues in exception handling.

## **TEXT BOOKS:**

1. Problem solving with C++, The OOP, 4<sup>th</sup> Edition, Walter Savitch, Pearson Education.
2. C++, The Complete Reference, 4<sup>th</sup> Edition, Herbert Schildt, TMH.

## **REFERENCE BOOKS:**

1. C++ Primer, 3<sup>rd</sup> Edition, S.B.Lippman and J.Lajoie, Pearson Education.
2. The C++ Programming Language, 3<sup>rd</sup> Edition, B.Stroutstrup, Pearson Education.
3. OOP in C++, 3<sup>rd</sup> Edition, T.Gaddis, J.Walters and G.Muganda, Wiley DreamTech Press.
4. Object Oriented Programming in C++, 3<sup>rd</sup> Edition, R.Lafore, Galigotia Publications pvt ltd.
5. Computer Science, A Structured Programming Approach Using C++, B.A.Forouzan and R.F.Gilberg, Thomson

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**I Year MCA**

**I Semester**

**PROBABILITY AND STATISTICS**

**UNIT-I:**

**Probability:** Sample space and events – Probability – The axioms of probability - Some elementary theorems - Conditional probability – Baye’s theorem.

**UNIT-II:**

**Random variables** – Discrete and continuous – Distribution – Distribution function.

**UNIT-III:**

**Distribution** - Binomial, poisson and normal distribution – related properties.

**UNIT-IV:**

**Sampling distribution:** Populations and samples - Sampling distributions of mean (known and unknown) proportions, sums and differences.

**UNIT-V:**

**Estimation:** Point estimation – interval estimation - Bayesian estimation.

**UNIT-VI:**

**Test of Hypothesis** – Means and proportions – Hypothesis concerning one and two means – Type I and Type II errors. One tail, two-tail tests.

**UNIT-VII:**

**Tests of significance** – Student’s t-test, F-test,  $\chi^2$  test. Estimation of proportions.

**UNIT-VIII:**

**Curve fitting:** The method of least squares – Inferences based on the least squares estimations - Curvilinear regression – multiple regressions – correlation for univariate and bivariate distributions.

**TEXT BOOKS:**

1. Probability and statistics for engineers:Erwin Miller And John E.Freund.  
Prentice-Hall of India / Pearson , Sixth edition.
2. Text book of Probability and Statistics by Dr.Shahnaz Bathul, V.G.S.Publishers  
2003.

**REFERENCE BOOKS:**

1. Probability, Statistics and Random Processes Dr.K.Murugesan & P.Gurusamy by  
Anuradha Agencies, Deepti Publications.

2. Advanced Engineering Mathematics (Eighth edition), Erwin Kreyszig, John Wiley and Sons (ASIA) Pvt. Ltd., 2001.
3. Probability and Statistics for Engineers: G.S.S.Bhishma Rao,sitech., Second edition 2005.
4. Probability, Statistics and Queuing Theory, 2<sup>nd</sup> Edition, Trivedi, John Wiley and Sons

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**I Year MCA**

**I Semester**

**ACCOUNTANCY AND FINANCIAL MANAGEMENT**

**UNIT I:**

**Accounting:** Principles, concepts, conventions, double entry system of accounting, introduction of basic books of accounts ledgers.

**UNIT II:**

**Preparation of trial balance** - Final accounts - company final accounts.

**UNIT III:**

**Financial Management** - meaning and scope, role, objectives of time value of money - over vitalization - under capitalization - profit maximization - wealth maximization - EPS maximization.

**UNIT IV:**

**Ratio Analysis** - advantages - limitations - Fund flow analysis - meaning, importance, preparation and interpretation of Funds flow and cash flow statements-statement of changes in working capital.

**UNIT V:**

**Costing** - nature and importance and basic principles. Absorption costing vs. marginal costing - Financial accounting vs. cost accounting vs. management accounting.

**UNIT VI:**

**Marginal costing and Break-even Analysis:** nature, scope and importance - practical applications of marginal costing, limitations and importance of cost - volume, profit analysis.

**UNIT VII:**

Standard costing and budgeting: nature, scope and computation and analysis - materials variance, labor variance and sales variance - budgeting - cash budget, sales budget - flexible Budgets, master budgets.

**UNIT VIII:**

Introduction to computerized accounting system: coding logic and codes, master files, transaction files, introduction documents used for data collection, processing of different files and Outputs obtained.

**TEXT BOOKS :**

1. Van Horne, James, C : Financial Management and Policy. Pearson Education, 12<sup>th</sup> Edition.
2. Financial Accounting, S.N.Maheshwari, Sultan Chand Company
3. Financial Management, S.N.Maheshwari, Sultan Chand Company

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**I Year MCA**

**I Semester**

**ENGLISH LANGUAGE COMMUNICATION SKILLS**

**Unit –I:**

Features of Indian English - Correction of sentences - Structures - Tenses - ambiguity - idiomatic distortions.

**UNIT-II:**

Informal conversation Vs Formal expression Verbal and non-verbal communication, barriers to effective communication – kinesics

**UNIT - III:**

Types of Communication - - Oral, aural, Writing and reading - Word-Power - Vocabulary- Jargon - rate of speech, pitch, tone - Clarity of voice

**UNIT - IV:**

Technical presentations - types of presentation –video conferencing-- participation in meetings - chairing sessions.

**UNIT - V:**

Formal and informal interviews – ambiance and polemics - interviewing in different settings and for different purposes e.g., eliciting and giving information, recruiting, performance appraisal.

**UNIT - VI:**

Written communication - differences between spoken and written communication - features of effective writing such "as clarity, brevity, appropriate tone clarity, balance etc.- GRE. TOEFL models

**Unit – VII:** Letter-writing - business letters – pro forma culture - format - style – effectiveness, promptness - Analysis of sample letters collected from industry - email, fax.

**Unit – VIII:** Technical Report writing - Business and Technical Reports – Types of reports - progress reports, routine reports - Annual reports - format - Analysis of sample reports from industry - Synopsis and thesis writing

**REFERENCE BOOKS:**

Essentials of Business Communication, Rajendra Pal, J S KorlahaHi : Sultan Chand & Sons, New Delhi.

Basic Communication Skills for Technology, Andrea J. Rutherford: Pearson Education Asia, Patparganj, New Delhi-92.

Advanced Communication Skills, V. Prasad, Atma Ram Publications, New Delhi.

Raymond V. Lesikav; John D. Pettit Jr.; Business Communication; Teory & Application, All India Traveller Bookseller, New Delhi-51.

Business Communication, RK Madhukar, Vikas Publishing House Pvt Ltd

K.R. Lakshminarayana : English. for Technical Communication – vols. 1 and 2, SCITECH Publications (India) Pvt. Ltd., T. Nagar, Chennai-600 017.

Edmond H Weiss: Writing Remedies: Practical Exercises for Technical Writing, Universities Press, Hyderabad.

Cliffs Test Prep for GRE and TOEFL: Computer Based Test, IDG Books. India (P) Ltd. New Delhi-002.

GRE and TOEFL; Kaplan and Baron's English in Mind, Herbert Puchta and Jeff Stranks, Cambridge

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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I Year MCA

I Semester

**English Language Communication Skills Lab**

**Objectives:**

The language Lab focuses computer-aided multi-media instruction and language acquisition to achieve the following targets:

- To expose the students to a variety of self-instructional, learner-friendly modes of language learning.**
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such GRE, TOEFL, GMAT etc.**
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.**
- To train them to use language effectively to face interviews, group discussions, public speaking.**
- To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.**

However, depending upon the available of infrastructure and budget, the above targets can also be achieved by procuring the minimum required equipment suggested for the establishment of a Conventional Lab the details of which are given below. The lab should cater to the needs of the students to build up their confidence to help them develop leadership qualities through their communicative competence.

**ENGLISH LANGUAGE LABORATORY PRACTICE**

**Syllabus**

**The following course content is prescribed for the  
English Language Laboratory Practice**

- Introduction to Phonetics.**
- Introduction to Vowels and Consonants and associated Phonetic symbols.**
- Introduction to Accent, Intonation and Rhythm.**
- Situational Dialogues / Role Play.**
- Public Speaking.**
- Debate**
- Group discussions**
- Facing Interviews**
- Resume preparation**
- e-correspondence**

## Minimum Requirement

**Computer aided multi media language lab with 30 systems with LAN facility.**

**Conventional Language Lab. with audio and video systems, speakers, headphones and a teacher console to accommodate 30 students.**

### Suggested Software:

**Cambridge Advanced Learners' Dictionary with exercises**  
**The Rosetta Stone English Library**  
**Clarity Pronunciation Power**  
**Mastering English in Vocabulary, Grammar, Spellings, Composition**  
**Dorling Kindersley series of Grammar, Punctuation, Composition etc.**  
**Oxford Advanced Learner's Compass, 7<sup>th</sup> Edition**  
**Language in Use, Foundation Books Pvt Ltd**  
**Learning to Speak English - 4 CDs**  
**Microsoft Encarta**  
**Murphy's English Grammar, Cambridge**  
**Time series of IQ Test, Brain-teasers, Aptitude Test etc.**  
**English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge**

### Books Suggested for English lab :

1. **Developing Communication Skills** by Krishna Mohan & Meera Benerji (Macmillan)
2. **Speaking English Effectively** by Krishna Mohan & NP Singh (Macmillan)
3. **Better English Pronunciation** by JDO Connor (UBS – Cambridge)
4. **Oxford Practice Grammar with Answers**, John Eastwood, Oxford
5. **Handbook of English Grammar and Usage**, Mark Lester and Larry Beason, Tata McGraw-Hill
6. **A text book of English Phonetics for Indian Students** by T.Balasubramanian (Macmillan)
7. **Lingua TOEFL CBT Insider**, by Dreamtech
8. **TOEFL & GRE**( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
9. **English Skills for Technical Students**, WBSCTE with British Council, OL
10. **A Handbook of English for Competitive Examinations**, by B Shyamala Rao, Blakie Books, Chennai.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**I Year MCA**

**I Semester**

**COMPUTER ORGANIZATION LAB**

write assembly language programs for the following using MASAM.

Write assembly language programs to evaluate the expressions:

i)  $a = b + c - d * e$

ii)  $z = x * y + w - v + u / k$

- a. Considering 8-bit, 16 bit and 32 bit binary numbers as b, c, d, e.
- b. Considering 2 digit, 4digit and 8 digit BCD numbers.

Take the input in consecutive memory locations and results also.

Display the results by using "int xx" of 8086. Validate program for the boundary conditions.

Write an ALP of 8086 to add two exponential numbers which are in IEEE 754 notation. Display the results by using "int xx" of 8086. Validate program for the boundary conditions.

Write an ALP of 8086 to take N numbers as input. And do the following operations on them.

Arrange in ascending and Descending order.

Find max and minimum

Find average

Considering 8-bit, 16 bit binary numbers and 2 digit, 4digit and 8 digit BCD numbers. Display the results by using "int xx" of 8086.

Validate program for the boundary conditions.

- 4. Write an ALP of 8086 to take a string of as input (in 'C' format)and do the following Operations on it.
  - a. Find the length
  - b. Find it is Palindrome or not
  - c. Find whether given string substring or not.
  - d. Reverse a string
  - e. Concatenate by taking another sting

Display the results by using "int xx" of 8086.

- 5. Write the ALP to implement the above operations as procedures and call from the main procedure.

- 6. Write an ALP of 8086 to find the factorial of a given number as a Procedure and call from the main program which display the result.

- 7. A computer uses RAM chips of 1024 X 1 capacity.

- a. How many chips are needed, and how should their address lines be connected to provide a memory capacity of 1024 bytes?
- b. How many chips are needed to provide a memory capacity of 16K bytes?

- 8 A computer uses RAM chips of 1024 X 1 capacity.
- How many chips are needed, and how should their address lines be connected to provide a memory capacity of 1024 bytes?
  - How many chips are needed to provide a memory capacity of 16K bytes?
- 9 A computer employs RAM chips of 256X8 and ROM chips of 1024 X 8. The computer needs 2K bytes of RAM, 4K bytes of ROM, and four interface units, each with four registers. A memory-mapped I/O configuration is used. The two highest-order bits of the address bus are assigned 00 for RAM, 01 for ROM, 10 for interface registers.
- How many RAM and ROM chips are needed?
  - Draw a memory-address map for the system.
  - Give the address range in hexadecimal for RAM, ROM and interface.
- 10 Obtain the complement function for the match logic of one word in an associative memory. Draw the logic diagram for it and compare with the actual match logic diagram.
- 11 A two-way set associative cache memory uses blocks of four words. The cache can accommodate a total of 2048 words from main memory. The main memory size is 128K X 32.
- Formulate all pertinent information required to construct the cache memory.
  - What is the size of the cache memory?
- 12 A digital computer has a memory unit of 64K X 16 and a cache memory of 1K words. The cache uses direct mapping with a block size of four words.
- How many bits are there in each word of cache, and how are they divided into functions? Include a valid bit.
  - How many bits are there in the tag, index, block, and word fields of the address format?
  - How many blocks can the cache accommodate?
- 13 An address space is specified by 24 bits and the corresponding memory space by 16 bits.
- How many words are there in the address space?
  - How many words are there in the memory space?
  - If a page consists of 2K words, how many pages and blocks are there in the system.
- 14 A virtual memory has a page size of 1K words. There are eight pages and four blocks. The associative memory page table contains the following entries. Make a list of all virtual addresses(in decimal) that will cause a page fault.

Page	Block
0	3
1	1
4	2
6	0

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**I Year MCA**

**I Semester**

**OBJECT ORIENTED PROGRAMMING ( THROUGH C++ ) LAB**

1. Write a C++ program to find the sum of individual digits of a positive integer.
2. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C++ program to generate the first n terms of the sequence.
3. Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write C++ programs that use both recursive and non-recursive functions
  - To find the factorial of a given integer.
  - To find the GCD of two given integers.
  - To find the nth Fibonacci number.
5. Write a C++ program that uses a recursive function for solving Towers of Hanoi problem.
6. Write a C++ program that uses functions
  - a) To swap two integers.
  - b) To swap two characters.
  - c) To swap two reals. Note: Use overloaded functions.
7. Write a C++ program to find both the largest and smallest number in a list of integers.
8. Write a C++ program to sort a list of numbers in ascending order.
9. Write a C++ program that uses function templates to solve problems-7&8.
10. Write a C++ program to sort a list of names in ascending order.
11. Write a C++ program to implement the matrix ADT using a class. The operations supported by this ADT are:
  - a) Reading a matrix.
  - b) Printing a matrix.
  - c) Addition of matrices.
  - d) Subtraction of matrices.
  - e) Multiplication of matrices.
12. Implement the matrix ADT presented in the problem-11 using overloaded operators (<<, >>, +, -, \*) and templates.

13. Implement the complex number ADT in C++ using a class. The complex ADT is used to represent complex numbers of the form  $c=a+ib$ , where  $a$  and  $b$  are real numbers. The operations supported by this ADT are:

- a) Reading a complex number.
- b) Writing a complex number.
- c) Addition of Complex numbers.
- d) Subtraction of complex numbers.
- e) Multiplication of complex numbers.
- f) Division of complex numbers.

14. Write a C++ program that overloads the  $+$  operator and relational operators (suitable) to perform the following operations:

- a) Concatenation of two strings.
- b) Comparison of two strings.

15. Implement the complex number ADT in C++ using a class. The complex ADT is used to represent complex numbers of the form  $c=a+ib$ , where  $a$  and  $b$  are real numbers. The operations supported by this ADT are:

- a) Reading a complex number.
- b) Writing a complex number.
- c) Addition of Complex numbers.
- d) Subtraction of complex numbers.
- e) Multiplication of complex numbers.
- f) Division of complex numbers.

Note: 1. overload  $\ll$  and  $\gg$  operators in part a and part b.  
2. overload  $+$ ,  $-$ ,  $*$ ,  $/$  operators in parts c, d, e and f.

16. Write a template based C++ program that determines if a particular value occurs in an array of values.

17. Write a C++ program that uses functions to perform the following operations to:

- a) Insert a sub-string in to the given main string from a given position.
- b) Delete  $n$  characters from a given position in a given string.

18. Write a C++ program that uses a function to reverse the given character string in place, without any duplication of characters.

19. Write a C++ program to make the frequency count of letters in a given text.

20. Write a C++ program to count the lines, words and characters in a given text.

21. Write a C++ program to determine if the given string is a palindrome or not.

22. Write a C++ program to make frequency count of words in a given text.

23. Write a C++ program that displays the position or index in the string  $S$  where the string  $t$  begins, or  $-1$  if  $S$  doesn't contain  $t$ .

24. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C++ program to find the 2's complement of a binary number.
25. Write a C++ program that counts the number of 1 bit in a given integer.
26. Write a C++ program to generate Pascal's triangle.
27. Write a C++ program to construct of pyramid of numbers.
28. Write a C++ program to compute the Sine series.
29. Write a C++ program that converts Roman numeral into an Arabic integer.
30. Write a C++ program which converts a positive Arabic integer into its corresponding Roman Numeral.
31. Write a C++ program to display the contents of a text file.
32. Write a C++ program which copies one file to another.
33. Write a C++ program to that counts the characters, lines and words in the text file.
34. Write a C++ program to change a specific character in a file.  
Note: Filename , number of the byte in the file to be changed and the new character are specified on the command line.
35. Write a C++ program to reverse the first n characters in a file.
36. Write a C++ program that uses a function to delete all duplicate characters in the given string.
37. Write a C++ program that uses a function ( i to a ) which converts a number to a character string.
38. Write a C++ program that uses a recursive function to find the binary equivalent of a given non-negative integer n.
39. Write a C++ program to generate prime numbers up to n using Sieve of Eratosthenes method.
40. Write a C++ program
  - a) To write an object to a file.
  - b) To read an object from the file.

41. Write C++ programs that illustrate how the following forms of inheritance are supported:

- a) Single inheritance
- b) Multiple inheritance
- c) Multi level inheritance
- d) Hierarchical inheritance

42. Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.

43. Write a C++ program that illustrates how run time polymorphism is achieved using virtual functions.

44. Write a C++ program that illustrates the role of virtual base class in building class hierarchy.

45. Write a C++ program that illustrates the role of abstract class in building class hierarchy.

46. Write a C++ program that uses functions:

- a) To create a singly linked list of elements
- b) To display the elements of the above list.

**Note:** Use the following in solving the above problems wherever they make sense:

- a) Constructors and destructors.
- b) Overloaded functions.
- c) Overloaded operators.
- d) Function and class templates.
- e) Exception handling mechanism.

**Suggested Books for lab:**

1. **C++ programming from Problem Analysis to Program Design**, 2<sup>nd</sup> Edition, D.S.Malik, Thomson.
2. **Object-Oriented Programming with C++**, M.P.Bhave, S.A.Patekar, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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I Year MCA

II Semester

**DATA STRUCTURES (THROUGH JAVA)**

**UNIT-I**

**Java Basics:** Creation of java, java buzzwords, data types, variables, operators, expressions, **control flow statements-** if and switch statements, **loops-** for, while, do-while, jump statements, classes, objects, class modifiers, class members and access control, methods, simple input and output statements, an example program, string handling, **inheritance-** super and sub classes, member access rules, method overriding, dynamic method dispatch, abstract classes, Object class, **interfaces-** implementing interfaces, multiple inheritance in interfaces.

**UNIT-II**

**Packages, Exception Handling And Multi Threading: Packages-** defining, creating and accessing a package, importing packages, **exception handling-** concepts of exception handling, types of exceptions, usage of try, catch, throw, throws and finally key words, creating own exception sub classes, **multi threading-** thread life cycle, creating multiple threads using Thread class, Runnable interface, **java library-** java.util, java.io.

**UNIT-III**

**Introduction To Algorithms And Data Structures:** Notion of algorithm, pseudo code, **performance analysis-** time complexity and space complexity, asymptotic notation (big-oh, omega, theta), data abstraction, concept of ADT, linear and non linear data structures, sequential and linked allocation, arrays and linked lists, representation of single, two and multi dimensional arrays, sparse matrices and their representation, **the list ADT-**array based implementation and linked list implementation.

**UNIT-IV**

**Stacks And Queues: Stack ADT-**array based implementation, linked list implementation, **applications-**infix to postfix conversion, postfix evaluation, implementation of recursion, **Queue ADT-** array based implementation, linked list implementation, circular queues, **Dequeue ADT-** array based implementation, linked list implementation, **Priority Queues ADT-** implementation, heaps.

**UNIT-V**

**Trees And Graphs: Trees-** Terminology and basic properties, tree ADT, binary tree ADT, **data structures for representing binary trees-**a vector based structure and linked structure, traversals of a binary tree, representing general trees with binary trees, threaded binary trees, **graphs-** graph ADT, basic terminology, **data structures for representing**

**graphs-** edge list structures, adjacency list structures, adjacency matrix, **graph traversals-** DFS, BFS.

#### **UNIT-VI**

**Search Trees:** Binary search trees, **operations-** insertion, deletion and searching, AVL trees, **operations-** insertion and searching, B-trees, **operations-**insertion, deletion and searching, comparison of performance of search trees.

#### **UNIT-VII**

**Searching And Sorting:** Linear search, binary search, **hashing-**hash table, its implementation, hash functions, collision handling schemes, bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort, radix sort, comparison of searching and sorting methods.

#### **UNIT-VIII**

**Text Processing: Pattern matching algorithms-** Brute force, the Boyer-Moore algorithm, the KMP algorithm, **tries-** standard tries, compressed tries, suffix tries, **text compression-** Huffman coding algorithm.

#### **TEXT BOOKS:**

1. Data Structures And Algorithms in Java, 2<sup>nd</sup> edition, M.T.Goodrich and R.Tamassia, John Wiley and Sons, Inc.
2. Data Structures and Algorithms in Java, 2<sup>nd</sup> edition, A.Drozdek, Thomson.
3. Data Structures and Software Development in an Object Oriented Domain, Java Edition, Tremblay, Pearson Education

#### **Reference Books:**

1. Data Structures and Java Collections Frame Work, W.J.Collins, McGraw Hill.
2. Data Structures Using Java, Yedidyah Langsam, Moshe Augenstein, Aaron M. Tenenbaum, Pearson Education.
3. Data Structures with Java, J.R.Hubbard and A.Huray, Pearson Education/PHI.
4. The Complete Reference Java J2SE, 5<sup>th</sup> Edition, Herbert Schildt, TMH.
5. Big Java, C. Horstmann, John Wiley.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
, HYDERABAD**

**I Year MCA**

**II Semester**

**OPERATING SYSTEMS**

**UNIT I:**

**Operating System Introduction**, Structures - Simple Batch, Multi programmed, time-shared, Personal Computer, Parallel, Distributed Systems ,Real-Time Systems , System components, Operating-System services, System Calls, Virtual Machines, System Design and Implementation.

**UNIT II:**

**Process and CPU Scheduling** - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling.

**UNIT III**

**Memory Management and Virtual Memory** - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging , Performance of Demanding Paging , Page Replacement ,Page Replacement Algorithm, Allocation of Frames, Thrashing.

**UNIT IV:**

**File System Interface and Implementation** -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

**UNIT V:**

**Process Management and Synchronization** - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

**UNIT VI:**

**Deadlocks** - System Model, Dead locks Characterization, Methods for Handling Dead locks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

**UNIT VII:**

**Case Study-1- UNIX** - Design Principles, Programmer Interface, User Interface, Process Management, Memory Management, File System, I/O System, Inter process Communication.

**UNIT VIII:**

**Case Study-II-Linux System** - Design Principles, Kernel modules, Process Management, Scheduling Memory Management, File Systems, Input and Output, Interposes Communication , Network Structure , Security .

**TEXT BOOKS:**

- 1 Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7<sup>th</sup> Edition, John Wiley
- 2 Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI

**REFERENCE BOOKS:**

1. Operating System A Design Approach-Crowley, TMH.
2. Modern Operating Systems, Andrew S Tanenbaum 2<sup>nd</sup> edition Pearson/PHI
3. Operating Systems, Dhamdhere, TMH

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
HYDERABAD**

**I Year MCA** **II Semester**  
**ORGANIZATIONAL STRUCTURE AND PERSONAL MANAGEMENT**

**UNIT-I**

Classical Theories of organization: Functional approach, classical theories of organization, division of labour, levels of authority, span of control, authority & responsibility, efficiency of management.

**UNIT-II**

Behavioral theories of organization, limitations of formal organization, human relation, group behaviour, committee and group making, motivation and morale.

**UNIT-III**

Decision process approach: Parts of organization system, development of corporate strategy, dynamics of decision, role of system, types models, mathematical planning models, deterministic and probabilistic models.

**UNIT-IV**

Personnel Function: Evaluation, objectives, principles, philosophies and policies, duties & responsibilities of the manager, position of the personnel department in the organization, line and staff relationship & the changing concept of personnel management in India.

**UNIT-V**

Manpower planning: Uses benefits problems and limitations, manpower, inventory, manpower forecasting, job description, recruitment, job specification and job selection interviewing techniques, transfers, promotion and its policies.

**UNIT-VI**

Training and development: Objectives and policies planning, organizing the training department, training manager and his job, on and off the job training, techniques, career planning, objectives of performance appraisal.

**UNIT-VII**

Strategic management: Objectives, importance policies, concept of core competence capability of organizational learning.

**UNIT-VIII**

Communication: Importance of communication, interpersonal communication barriers of communication, communication in organizations, using communication skills to manage conflicts.

**Text Book:**

Rudrabasavaraj M.N.: Dynamic personnel Administration, 2<sup>nd</sup> Edn. Himalaya Publishing House, Bombay, 1979.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
HYDERABAD**

**I Year MCA**

**II Semester**

**OPERATIONS RESEARCH**

**UNIT-I**

**DEVELOPMENT DEFINITION:** Characteristics and phases scientific Method, Types of models, General methods for solving. Operations Research models.

**ALLOCATION:** Introduction, Linear programming Formulation, Graphical solution, Simplex method, artificial variable technique, Duality principle.

**UNIT-II**

**TRANSPORTATION PROBLEM:** Formulation, optimal solution, un-balanced transportation problem, Degenracy. Assignment problem: formulation optimal solution, variations. 1.a non-square (mxn) Matrix, Restrictions.

**UNIT-III**

**EEQUE CEING:** Introduction, optimal solution for processing each of n-jobs through three machines, travelling salesman problem i.e., shortest acyclic route models.

**UNIT-IV**

**REPLACEMENT:** Introduction, replacement of items that deteriorate when money value is not counted and counted, replacement items that fail completely i.e., group replacements.

**UNIT-V**

**WAITING LINES:** Introduction, single channel, poisson arrivals, exponential service times, unrestricted queue, with infinite population and finite population models, single channel, poisson arrivals, exponential service times with infinite population and restricted queue, multi channel, poisson arrivals, exponential service times with infinite population and unrestricted queue.

**UNIT-VI**

**INVENTORY:** Introduction, single item deterministic models, production is instantaneous or at a constant rate, shortages are allowed or not allowed and withdrawals from stock is continuous, purchase inventory model with one price break, shortages are not allowed, Instantaneous production demand, production or purchase cost is relevant, stochastic models, demand may be discrete or variable or instantaneous production, instantaneous demand and no setup cost.

**UNIT-VII**

**THEORY OF GAMES:** Introduction, Minimax (maximum) criterion and optimal strategy, solution of games with saddle points, rectangular games without saddle points.

## **UNIT-VIII**

**DYNAMIC PROGRAMMING:** Introduction, Bellman's Principle of optimality, solution of problems with finite number of stages.

### **TEXT BOOKS:**

1. S.D.SHARMA : Operations Research
2. P.K.GUPTA & D.S.HIRA : Operations Research
3. R.D.ASRHEDKAR & R.V.KULKARNI : Operations Research.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
HYDERABAD**

**I Year MCA**

**II Semester**

**BUSINESS DATA PROCESSING**

**UNIT - I:**

**Introduction** : Computer Programming - An Overview, The Applications Program Development Process, The Nature of COBOL, Techniques for Improving program Design.

The IDENTIFICATION and ENVIRONMENT DIVISIONS : Basic Structure of a COBOL program, Coding Requirements of the Identification Division, The Sections of the Environment division, Assigning files to Devices in the Environment Division.

**UNIT - II**

**The DATA DIVISION** : Systems Design considerations, Forming Data-Names, The FILE SECTION of the Data Division, Types of Data, The working-Storage section of the Data division.

Coding Complete COBOL Programs: The PROCEDURE DIVISION, The format of the Procedure division, Statements typically coded in the Main Module of Batch Programs, Statements typically coded for Processing Input records and Producing output records.

**UNIT - III**

Moving Data, Printing Information, and Displaying Output Interactively, The instruction formats of the MOVE STATEMENT , Numeric MOVE, Nonnumeric or Alphanumeric MOVE, Other Options of the MOVE STATEMENT. PRINTING OUTPUT, Interactive output that is displayed on a screen.

Computing in COBOL: The Arithmetic Verbs and Intrinsic Functions, The Basic Arithmetic Verbs, Options Available with Arithmetic Verbs, The COMPUTE Statement, Use of Signed Numbers in Arithmetic Operations, Improving Program Efficiency with the USAGE Clause.

**UNIT - IV**

Decision Making Using the IF and EVALUATE Statements, Selection using a simple IF statement, Selection using other Options of the IF statement, CONDITION-NAMES.

Iteration : The simple PERFORM, Iteration using other types of PERFORMS, Using Nested PERFORM varying statements.

**UNIT - V**

Control Break Processing : An introduction to control break processing, Program Requirements for control break processing, Multiple-level control breaks.

Data Validation : Avoiding logic errors by validating input, What to do if input errors occur, When data should be validated, Understanding program interrupts.

**UNIT - VI**

Single level OCCURS clause, Processing data stored in an array, Using an OCCURS clause for Table Handling, Use of the Search statement for Table and Array processing, Varying option of SEARCH verb

SEARCH ALL statement, Multiple level OCCURS Clause.

Systems overview of Sequential processing: Sequential file updating, Validity checking in update procedures, Update procedures with multiple transaction records, Rewriting records on a disk.

### **UNIT - VII**

Sorting and Merging: The SORT features - an overview, Processing data before/after sorting, MERGE statement,

Indexed and Relative File Processing : Systems considerations for organizing disk files, Features of magnetic disks and disk drives, Processing indexed disk files, Processing relative Disk Files, Converting a key field to a relative key.

### **UNIT - VIII**

Program performance : The COPY, CALL and other Statements, COPY statement, CALL statement, Text Manipulation with the STRING and UNSTRING STATEMENT.

The Report Writer Module: Introduction, The benefits of the report writer module, The report section in the data division, Procedure division statements.

### **Text Book :**

Cobol Programming – Collopy – Pearson Ed.

Nancy Stern and Robert A.Stern - Structured COBOL programming 8<sup>th</sup> Ed. - John Wiley & Sons

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**I Year MCA**

**II Semester**

**DATA STRUCTURES (THROUGH JAVA) LAB**

1. Write a Java program that prints all real solutions to the quadratic equation  $ax^2 + bx + c = 0$ . Read in a, b, c and use the quadratic formula. If the discriminant  $b^2 - 4ac$  is negative; display a message stating that there are no real solutions.
2. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non-recursive functions to print the nth value in the Fibonacci sequence.
3. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that. Integer.
4. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
5. Write a Java program for sorting a given list of names in ascending order.
6. Write a Java program to multiply two given matrices.
7. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (use StringTokenizer class)
8. Write a Java program that reads a file name from the user then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
9. Write a Java program that reads a file and displays a file and displays the file on the screen, with a line number before each line.
10. Write a Java program that displays the number of characters, lines and words in a text file.
11. Write a Java program for creating multiple threads
  - a) Using Thread class
  - b) Using Runnable interface
12. Write a Java program that illustrates how run time polymorphism is achieved.

13. Write a java program that illustrates the following
  - a) Creation of simple package.
  - b) Accessing a package.
  - c) Implementing interfaces.
  
14. Write a java program that illustrates the following
  - a) Handling predefined exceptions
  - b) Handling user defined exceptions
  
15. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:
  - a) Linear search
  - b) Binary search
  
16. Write java programs to implement the following using arrays and linked lists
  - d) List ADT
  - a) Write Java programs to implement the following using an array.
    - a) Stack ADT
    - b) Queue ADT
  
18. Write a java program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).
  
19. Write a java program that determines whether parenthetic symbols ( ), { } and < > are nested correctly in a string of characters (use stack ADT).
  
20. Write a java program that uses both stack and queue to test whether the given string is a palindrome.
  
21. Write Java programs to implement the following using a singly linked list.
  - a) Stack ADT
  - b) Queue ADT
  
22. Write Java programs to implement the deque (double ended queue) ADT using
  - a) Array
  - b) Singly linked list
  - c) Doubly linked list.
  
23. Write a java program to implement priority queue ADT.
  
24. Write a Java program to perform the following operations:
  - a) Insert an element into a binary search tree.
  - b) Delete an element from a binary search tree.
  - c) Search for a key element in a binary search tree.

25. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.
26. Write a Java program to implement circular queue ADT using an array.
27. Write Java programs that use recursive and non-recursive functions to traverse the given binary tree in
  - a) Preorder
  - b) Inorder and
  - c) Postorder.
28. Write Java programs for the implementation of bfs and dfs for a given graph.
29. Write Java programs for implementing the following sorting methods:
 

a) Bubble sort	d) Quick sort	g) Radix sort
b) Selection sort	e) Merge sort	h) Binary tree sort
c) Insertion sort	f) Heap sort	
30. Write a Java program to perform the following operations
  - a) Insertion into a B-tree
  - b) Deletion from a B-tree
31. Write a Java program to perform the following operations
  - a) Insertion into an AVL-tree
  - b) Deletion from an AVL-tree
32. Write a Java program for implementing KMP pattern matching algorithm.
33. Write a java program that displays node values in a level order traversal (traverse the tree one level at a time, starting at the root node) for a binary tree.
34. Write a java program that uses recursive functions
  - a. To create a binary search tree.
  - b. To count the number of leaf nodes.
  - c. To copy the above binary search tree.
35. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.

**Suggested Books for lab:**

1. Data Structures, Algorithms and Applications in Java, 2<sup>nd</sup> Edition, S.Sahani, Universities Press
2. Data Structures and Java Collections Frame Work, W.J.Collins, McGraw Hill.
3. Java How to Program, 5<sup>th</sup> Edition, Dietel & Dietel, Pearson Education

# **JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**

**I Year MCA**

**II Semester**

## **BUSINESS DATA PROCESSING LAB**

1. Develop a COBOL program to understand the arithmetic verbs viz., ADD, SUBTRACT, DIVIDE, MULTIPLY and COMPUTE.
2. Develop a COBOL program for the creation of a sequential data file. Assume suitable record structure.
3. Develop a COBOL program to access a desired record from a sequential file and to print it. Assume appropriate record structure.
4. Develop a COBOL program to create and manipulate an INDEXED file. The manipulation includes accessing a particular record, modify a desired record, add a record and delete a record. Assume a suitable record structure.
5. Develop a COBOL program to create and manipulate a RANDOM file. The manipulation includes accessing a particular record, to modify a desired record, to add a record to an existing file and to delete a record.
6. Develop a COBOL program to illustrate the concepts of REDEFINES and RENAMES clauses in COBOL.
7. Develop a COBOL program illustrating the usage of level-88 entry.
8. Develop a COBOL program for the implementation of 'mid-square' technique.
9. Develop a COBOL program illustrating the OCCURS clause.
10. Develop a COBOL program illustrating the SORT verb. Assume appropriate record structure.
11. Develop a COBOL program illustrating the MERGE verb. Assume appropriate record structure.
12. Develop a COBOL program to implement 'Bubble sort' technique on a file. Assume appropriate record structure.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
, HYDERABAD**

**II Year MCA**

**III Semester**

**DATA BASE MANAGEMENT SYSTEMS**

**UNIT – I:**

Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor – History of Data base Systems. Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

**UNIT – II:**

**Relational Model:** Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying /altering Tables and Views.

**Relational Algebra and Calculus:** Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

**UNIT – III:**

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOTR – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases.

**UNIT – IV:**

Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – forth Normal Form.

**UNIT – V:**

**Overview of Transaction Management:** ACID Properties – Transactions and Schedules – Concurrent Execution of transaction – Lock Based Concurrency Control – Performance Locking – Transaction Support in SQL – Introduction to Crash recovery.

#### **UNIT – VI:**

**Concurrency Control:** Serializability, and recoverability – Introduction to Lock Management – Lock Conversions – Dealing with Dead Locks – Specialized Locking Techniques – Concurrency without Locking.

**Crash recovery:** Introduction to ARIES – the Log – Other Recovery related Structures – the Write-Ahead Log Protocol – Check pointing – recovering from a System Crash – Media recovery – Other approaches and Interaction with Concurrency control.

#### **UNIT – VII:**

**Overview of Storage and Indexing:** Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning.

#### **UNIT – VIII:**

**Storing data: Disks and Files:** - The Memory Hierarchy – Redundant Arrays of Independent – Disks – Disk Space Management – Buffer Manager – Files of records – Page Formats – record formats.

**Tree Structured Indexing:** Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure.

**Hash Based Indexing:** Static Hashing – Extendable hashing – Linear Hashing – Extendable vs. Linear hashing.

#### **TEXT BOOKS:**

Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3<sup>rd</sup> Edition

Data base System Concepts, Silberschatz, Korth, McGraw hill, IV edition.

3. Database Management Systems P. Radha Krishna HI-TECH Publications 2005

#### **REFERENCE BOOK:**

1. Introduction to Database Systems, C.J.Date Pearson Education
2. Data base Systems design, Implementation, and Management, Rob & Coronel 5<sup>th</sup> Edition. Thomson
3. Data base Management System, Elmasri Navrate Pearson Education
4. Data base Management System Mathew Leon, Leon Vikas.
5. Data base Systems, Connoley Pearson education

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**II Year MCA**

**III Semester**

**COMPUTER COMMUNICATIONS**

**UNIT-I**

**Introduction:** Uses of computer Networks, Network H/w, Network S/W, Reference Models, Example Networks , Network Standardization.

**UNIT-II**

**Physical Layer:** Guided transmission media – Magnetic media, Twisted Pair, coaxial cable, fiber optics .

**Data Link Layer:** Design Issues, Error detection and correction , Elementary Data Link Protocols, Sliding Window Protocols, Protocol Verification, Example Data Link protocols.

**UNIT-III**

**The Medium Access Sub Layer :** The channel allocation problem, Multiple access Protocols, Ethernet , Wireless LANs , Broadband Wireless, Bluetooth ,Data Link Layer Switching.

**UNIT-IV**

**The Network Layer :** Network Layer Design Issues, Routing Algorithms ,Congestion Control Algorithms ,Quality Of Service, Internet Working ,Network Layer in Internet.

**UNIT-V**

**The Transport Protocol:** The Transport Service, Elements of transport protocol , A simple Transport Protocol , Internet Transport Protocols UDP, Internet Transport Protocols TCP, Performance Issues.

**UNIT-VI**

**The Application Layer:** DNS-(Domain Name System), Electronic Mail, World Wide Web Multimedia,

**UNIT-VII**

**Network Security:** Cryptography , Symmetric \_key Algorithms, Public–Key Algorithms, Digital Signatures, Management of public keys.

**UNIT-VIII**

**Communication Security,** Authentications Protocols, E-mail Security, Web security, Social Issues.

**TEXT BOOKS:**

1. Computer Networks -- Andrew S Tanenbaum, 4<sup>th</sup> Edition. Pearson Education/PHI

**REFERENCE BOOKS:**

1. Computer Communications and Networking Technologies –Michael A.Gallo, William M .Hancock - Thomson Publication
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**II Year MCA**

**III Semester**

**UNIX NETWORK PROGRAMMING**

**UNIT-I**

**Unix Utilities**-Introduction to Unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, unmask, ulimit, ps, who, w, finger, arp, ftp, telnet, rlogin, text processing utilities and backup utilities, detailed commands to be covered are cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, tar, cpio.

**UNIT-II**

**Problem solving approaches in Unix:** Using single commands, using compound Commands, shell scripts, C programs, building own command library of programs.  
**Working with the Bourne shell:** what is a shell, shell responsibilities, pipes and input Redirection, output redirection, here documents, the shell as a programming language, shell meta characters, shell variables, shell commands, the environment, control structures, shell script examples.

**UNIT-III**

**Unix Files:** Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, creat, read, write, close, lseek, stat, fstat, octl, umask, dup, dup2.

The standard I/O (fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar, fgets, gets ), formatted I/O, stream errors, streams and file descriptors, file and directory maintenance (chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd), Directory handling system calls (opendir, readdir, closedir,rewinddir, seekdir, telldir)

**UNIT-IV**

**Unix Process and Signals:** What is process, process structure, starting new process, waiting for a process, zombie process, process control, process identifiers, **system call interface for process management**-fork, vfork, exit, wait, waitpid, exec, system, **Signals**- Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions.

**UNIT-V**

**Interprocess Communication Overview:** Introduction to IPC,IPC between processes on a single computer system, IPC between processes on different systems, file and record locking, other unix locking techniques, pipes, FIFOs, streams and messages, namespaces, introduction to three types of IPC(system-V)-message queues, semaphores and shared memory.

## **UNIT-VI**

**Message Queues**-Unix system-V messages, unix kernel support for messages, unix APIs for messages, client/server example.

## **UNIT-VII**

**Semaphores**-Unix system-V semaphores, unix kernel support for semaphores, unix APIs for semaphores, file locking with semaphores.

**Shared Memory**-Unix system-V shared memory, unix kernel support for shared memory, unix APIs for shared memory, semaphore and shared memory example.

## **UNIT-VIII**

**Sockets**: Berkeley sockets, socket system calls for connection oriented protocol and connectionless protocol, example-client/server program.

## **TEXT BOOKS:**

1. Unix Network Programming, W.R.Stevens Pearson/PHI.
2. Unix Concepts and Applications, 3rd Edition, Sumitabha Das, TMH.
3. Advanced Unix Programming, 2<sup>nd</sup> Edition, M.J.Rochkind, Pearson Education.

## **REFERENCE BOOKS:**

1. Unix system programming using C++, T.Chan, PHI.
2. Unix for programmers and users, 3<sup>rd</sup> Edition, Graham Glass, King Ables, Pearson Education.
3. Unix System-V Network Programming, Stephen A.Rago, Pearson Education.
4. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
HYDERABAD**

**II Year MCA**

**III Semester**

**MANAGEMENT INFORMATION SYSTEM**

**UNIT I:**

The meaning and role of MIS : What is MIS?, Decision support systems, systems approach, the systems view of business, MIS organization within the company, Managers view of Information systems.

**UNIT II:**

Management organizational theory and the systems approach Development of organizational theory, management and organizational behavior, management, information, and the systems approach , using Information systems for feedback.

**UNIT III:**

Information systems for decision making : Evolution of an information system, Basic information systems, decision making and MIS, MIS as a technique for making programmed decisions, decision assisting information systems. Communication systems basics.

**UNIT IV:**

Strategic and project planning for MIS: General business planning, appropriate MIS response, MIS planning-general, MIS planning-details.

**UNIT V:**

Conceptual system design: Define the problems, set system objectives, establish system constraints, determine information needs, determine information sources, develop alternative conceptual designs and select one, document the system concept, prepare the conceptual design report.

**UNIT VI:**

Detailed system design : Inform and involve the organization, aim of detailed design, project management of MIS detailed design, identify dominant and trade off criteria, define the subsystems, sketch the detailed operating subsystems and information flows, determine the degree of automation of each operation, inform and involve the organization again, inputs, outputs, and processing, early system testing, software, hardware and tools, propose an organization to operate the system, document the detailed design, revisit the manager-user.

**UNIT VII:**

Implementation, evaluation and maintenance of the MIS : Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files, test the system, cutover, document the system, evaluate the MIS, control and maintain the system.

**UNIT VIII:**

Pitfalls in MIS development : Fundamental weaknesses, soft spots, in planning, design problems, implementation : the TAR PIT. Applications of information systems to business. Security and ethical issues of information systems.

**TEXT BOOK:**

1. Information systems for modern management, 3<sup>rd</sup> Edition by R.G Murdick, J.E Ross and J. R clagget, PHI-1994.

**REFERENCE BOOK:**

1. Management information Systems, 4<sup>th</sup> edition by Robert Schultheis, Mary Sumner, PHI-1999.
2. Management Information Systems, 9/e, Laudon & Laudon, V.M.Prasad, Pearson, 2005,

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**II Year MCA**

**III Semester**

**COMPUTER GRAPHICS**

**UNIT-I:**

Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices (p.nos 22-90 of text book-1).

**UNIT-II:**

**Output primitives:** Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms (p.nos 103-123, 137-145, 147-150, 164-171 of text book-1, p.nos. 72-99 of text book-2).

**UNIT-III:**

**2-D geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems (p.nos 204-227 of text book-1).

**UNIT-IV:**

**2-D viewing :** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm (p.nos 237-249, 257-261 of text book -1, p.nos. 111-126 of text book-2).

**UNIT-V:**

3-D object representation : Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods. (p.nos 324-331, 340-342, 347-364, 516-531, 542-546 of text book-1, p.nos 473-529, 721-739 of text book-2).

**UNIT-VI:**

**3-D Geometric transformations:** Translation, rotation, scaling, reflection and shear transformations, composite transformations. **3-D viewing :** Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping (p.nos 427-443, 452-481 of text book -1).

**UNIT-VII:**

**Visible surface detection methods** : Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods(p.nos 489-505 of text book -1, Chapter 15 of of text book-2).

**UNIT-VIII:**

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.( p.nos 604-616 of text book -1, chapter 21 of text book-2)

**TEXT BOOKS:**

1. "Computer Graphics *C version*", Donald Hearn and M.Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

**REFERENCE BOOKS:**

1. "Computer Graphics", second Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education.
2. "Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc-Graw hill edition.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2<sup>nd</sup> edition.
4. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
5. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
6. Computer Graphics, Steven Harrington, TMH

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**II Year MCA**

**III Semester**

**DATABASE MANAGEMENT SYSTEMS LAB**

1. Creating tables for various relations (in SQL)
2. Implementing the queries in SQL for
  - a) Insertion
  - b) Retrieval (Implement all the operation like Union, Intersect, Minus, in, exist, aggregate functions (Min.,Max...) etc...
  - c) Updation
  - d) Deletion
3. Creating Views
4. Writing Assertions
5. Writing Triggers
6. Implementing Operations on relations (tables) using PL/SQL
7. Creating FORMS
8. Generating REPORTS.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
, HYDERABAD**

**II Year MCA**

**III Semester**

**UNIX NETWORK PROGRAMMING LAB**

1. Write a shell script to generate a multiplication table.
2. Write a shell script that copies multiple files to a directory.
3. Write a shell script that counts the number of lines and words present in a given file.
4. Write a shell script that displays the list of all files in the given directory.
5. Write a shell script (small calculator) that adds, subtracts, multiplies and divides the given two integers. There are two division options: one returns the quotient and the other returns remainder. The script requires 3 arguments: The operation to be used and two integer numbers. The options are add (-a), subtract (-s), multiply (-m), quotient (-c) and remainder (-r).
6. Write a shell script to reverse the rows and columns of a matrix.
7. Write a C program that counts the number of blanks in a text file.  
Using standard I/O  
Using system calls.
8. Implement in C the following Unix commands using system calls.
  - a) cat
  - b) ls
  - mv
9. Write a program that takes one or more file/directory names as command line input and reports the following information on the file:
  - a) File type.
  - b) Number of links.
  - c) Time of last access.
  - d) Read, Write and Execute permissions.
10. Write a C program that illustrates uses of the mkdir, opendir, readdir, closedir, and rmdir APIs.
11. Write a C program that illustrates how to execute two commands concurrently with a command pipe.

12. Write a C program that illustrates the following:
- Two-way communication with unidirectional pipes.
  - Two-way communication with bidirectional pipes
13. Write a C program that illustrates the creation of child process using fork system call.
14. Write a C program that displays the real time of a day every 60 seconds.
15. Write a C program that illustrates file-locking using semaphores.
16. Write a C program that implements a producer-consumer system with two processes. (Using semaphores)
17. Write a C program that illustrates inter process communication using shared memory system calls.
18. Write a C program that illustrates the following.
- Creating a message queue.
  - Writing to a message queue.
  - Reading from a message queue.
19. Write a C program to develop simple client and server application using sockets (system calls).

**Suggested textbooks for lab:**

- Advanced Unix Programming**, N.B.Venkateswarulu, BS Publications.
- Unix and Shell programming**, B.A.Forouzan and R.F.Gilberg, Thomson.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
HYDERABAD

II Year MCA

IV Semester

**SOFTWARE ENGINEERING**

**UNIT-I:**

**Introduction to Software Engineering:** The evolving role of software, Changing Nature of Software, Software myths.

**A Generic view of process:** Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

**UNIT-II:**

**Process models:** The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

**Software Requirements:** Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

**UNIT-III:**

**Requirements engineering process:** Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

**System models:** Context Models, Behavioral models, Data models, Object models, structured methods.

**UNIT-IV:**

**Design Engineering:** Design process and Design quality, Design concepts, the design model.

**Creating an architectural design:** software architecture, Data design, Architectural styles and patterns, Architectural Design.

**UNIT-V:**

**Object-Oriented Design:** Objects and object classes, An Object-Oriented design process, Design evolution.

**Performing User interface design:** Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

**UNIT-VI:**

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

**Product metrics:** Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

**UNIT-VII:**

**Metrics for Process and Products:** Software Measurement, Metrics for software quality.

**Risk management:** Reactive vs Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

**UNIT-VIII:**

**Quality Management:** Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

**TEXT BOOKS:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6<sup>th</sup> edition. McGrawHill International Edition.
2. Software Engineering- Sommerville, 7<sup>th</sup> edition, Pearson education.

**REFERENCE BOOKS:**

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
3. Systems Analysis and Design- Shely Cashman Rosenblatt, Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**II Year MCA**

**IV Semester**

**ADVANCED JAVA PROGRAMMING**

**UNIT-I:**

**HTML Common tags-** List, Tables, images, forms, Frames; Cascading Style sheets; Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script

**UNIT -II:**

**XML:** Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

**UNIT- III:**

Review of Applets, Class, Event Handling, AWT Programming

**Introduction to Swing:**

JApplet, Handling Swing Controls like Icons – Labels – Buttons – Text Boxes – Combo – Boxes – Tabbed Pains – Scroll Pains – Trees – Tables Differences between AWT Controls & Swing Controls Developing a Home page using Applet & Swing

**UNIT - IV:**

Java Beans Introduction to Java Beans, Advantages of Java Beans, JDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizers, Java Beans API

**UNIT - V:**

Introduction to Servlets: Lifecycle of a Servlet, JSDK The Servlet API, The javax.servelet Package, Reading Servlet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues

**UNIT -VI:**

Introduction to JSP The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing.

JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

**UNIT - VII:**

**JSP Application Development:** Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Data between Pages – Sharing Session and Application Data – Memory Usage Considerations

**UNIT - VIII:**

Database Access Database Programming using JDBC Studying Javax.sql.\* package  
Accessing a Database from a JSP Page Application – Specific Database Actions  
Deploying JAVA Beans in a JSP Page. Introduction to struts framework.

**TEXT BOOKS:**

Internet and World Wide Web – How to program by Dietel and Nieto Pearson  
Education Asia. (Chapters: 3, 4, 8, 9, 10, 11, 12 – 18)

The complete Reference Java 2 Third Edition by Patrick Naughton and Herbert  
Schildt. (Chapters: 19, 20, 21, 22, 25, 27)

Java Server Pages by Hans Bergstan. (Chapters: 1 – 9)

**REFERENCE BOOKS:**

1. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson  
Education Asia.
2. Jakarta Struts Cookbook , Bill Siggelkow, S P D O'Reilly for chap 8.
3. Murach's beginning JAVA JDK 5, Murach, SPD
4. An Introduction to web Design and Programming –Wang-Thomson
5. Web Applications Technologies Concepts-Knuckles,John Wiley
6. Programming world wide web-Sebesta,Pearson
7. Building Web Applications-NIIT,PHI
8. Web Warrior Guide to Web Programmimg-Bai/Ekedaw-Thomas
9. Beginning Web Programming-Jon Duckett WROX.
10. Java Server Pages, Pekowsky, Pearson.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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II Year MCA

IV Semester

**DATA WAREHOUSING AND MINING**

**UNIT-I**

**Introduction:** Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining,

**UNIT-II**

**Data Preprocessing:** Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, Online Data Storage.

**UNIT-III**

**Data Mining Primitives, Languages, and System Architectures:** Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems,

**UNIT-IV**

**Concepts Description: Characterization and Comparison:** Data Generalization and Summarization-Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

**UNIT-V**

**Mining Association Rules in Large Databases:** Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

**UNIT-VI**

**Classification and Prediction:** Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

**UNIT-VII**

**Cluster Analysis Introduction :**Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

## **UNIT-VIII**

**Mining Complex Types of Data:** Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

### **TEXT BOOKS:**

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
2. Data Mining Techniques – ARUN K PUJARI, University Press
3. Building the DataWarehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd..

### **REFERENCE BOOKS:**

1. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY.  
Pearson Edn Asia.
2. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION
3. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION
4. Data Mining Introductory and advanced topics –MARGARET H DUNHAM,  
PEARSON EDUCATION

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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II Year MCA

IV Semester

**EMBEDDED SYSTEMS**

**(ELECTIVE-I)**

**UNIT - I**

**Embedded Computing:** Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples. (Chapter I from Text Book 1, Wolf)

**UNIT - II**

**The 8051 Architecture :** Introduction, 8051 Micro controller Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts. (Chapter 3 from Text Book 2, Ayala)

**UNIT -III**

**Basic Assembly Language Programming Concepts :** The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. (Chapters 4,5 and 6 from Text Book 2, Ayala)

**UNIT - IV**

Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts. (Chapter 7 and 8 from Text Book 2, Ayala)

**UNIT -V**

**Applications:** Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication. (Chapter 10 and 11 from Text Book 2, Ayala)

**UNIT - VI**

**Introduction to Real – Time Operating Systems:** Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment (Chapter 6 and 7 from Text Book 3, Simon)

**UNIT - VII**

**Basic Design Using a Real-Time Operating System:** Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded

Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System. (**Chapter 8,9,10 and 11 from Text Book 3, Simon**)

#### **UNIT - VIII**

Introduction to advanced architectures: ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I<sup>2</sup>C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.

(Chapter 8 from Text Book 1, Wolf)

#### **Text Books:**

Computers and Components, Wayne Wolf, Elsevier.

The 8051 Microcontroller, Third Edition, Kenneth J. Ayala, Thomson.

An Embedded Software Primer, David E. Simon, Pearson Education.

#### **Reference Books:**

Embedding system building blocks, Labrosse, via CMP publishers.

Embedded Systems, Raj Kamal, TMH.

Micro Controllers, Ajay V Deshmukhi, TMH.

Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.

Microcontrollers, Raj kamal, Pearson Education.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**II Year MCA**

**IV Semester**

**HUMAN COMPUTER INTERACTION  
(ELECTIVE I)**

**UNIT-I**

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design,

**UNIT-II**

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics-Principles of user interface.

**UNIT-III**

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

**UNIT-IV**

Screen Designing:- Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

**UNIT-V**

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls.

**UNIT-VI**

Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

**UNIT-VII**

Software tools – Specification methods, interface – Building Tools.

**UNIT-VIII**

Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

**TEXT BOOKS:**

The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.

Designing the user interface. 3<sup>rd</sup> Edition Ben Shneidermann , Pearson Education  
Asia

**REFERENCE BOOKS:**

1. Human – Computer Interaction. Alan Dix, Janet Finckay, Greg Goryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech,
3. User Interface Design, Soren Lauesen , Pearson Education.

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**II Year MCA**

**IV Semester**

**PERL PROGRAMMIG  
(Elective – I)**

**UNIT-I**

Introduction to perl: # ! , Basic I/O, Variables variables & Backslash Interpolation, Scalar/list control operators, operator procedure, if unless, loops, loop control (ch1, ch3, pg 60-65, 69-72, III-127)

**UNIT-II**

Debugging perl scripts: Debugging commands, Debugger customization, Unattended execution, Debugging support, the perl profiler.

**UNIT-III**

Built in Function: Perl functions by category, Perl functions in alphabetical order.

**UNIT-IV**

Regular expressions: Pattern Matching, operators, Meta character and meta symbols. Character classes, quantifiers, Pointers, capturing & clustering, Alternation, staying in control.

**UNIT-V**

Subroutines Syntax: Syntax, Semantics, parsing references, prototypes, subroutine attributes.

Formats: Format variables, Fosters.

**UNIT-VI**

References: Creating References, using hard references, symbolic references, Braces, Brackets and quotes.

Data Structure: Arrays of Arrays, Hashes of arrays, Arrays of Hashes, Hashes of Hashes, Hashing as function , Elaborate records, Hashes of functions.

## **UNIT-VII**

CGI Programming: CGI Basic, Forms, Methods.

## **UNIT-VIII**

More CGI : Here Docs, Emailing, Cookies, File uploading, E-mail.

### **Text Books:**

1. Programming Perl, O'Reily. 3<sup>rd</sup> Edition.
2. CGI Programming with Perl Scott Guelich, et al., O'Reily

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**II Year MCA**

**IV Semester**

**DISTRIBUTED OPERATING SYSTEMS  
(Elective – II)**

**UNIT-I**

Introduction to Distributed Systems:

Distributed systems : Goals Hardware Concepts Software - design

**UNIT-II**

Communication distributed systems:

Layered Protocol: ATM Networks client server model - remote procedure call - group communication.

**UNIT-III**

Synchronization:

Clock synchronization - mutual exclusion - election atomic transactions - dead locks.

**UNIT-IV**

Process and Processors:

Threads - System models processor allocation - scheduling fault tolerance - real time distributed systems.

**UNIT-V**

Distributed file systems:

File system design and implementation - trends in distributed file systems.

**UNIT-VI**

Shared Memory:

Introduction - bus based multi processors ring based multiprocessors switched multiprocessors - NUMA comparison of shared memory systems -

**UNIT-VII**

consistency models - page based distributed shared memory - shared variable distributed shared memory - object based distributed shared memory.

**UNIT-VIII**

Case studies : MACH and CHORUS

**Text Book:**

1. Andrew S.Tanenbaum: Distributed Operating System, Prentice Hall International Inc. 1995.

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**II Year MCA**

**IV Semester**

**MOBILE COMPUTING  
(Elective – II)**

**UNIT – I Introduction to Network Technologies and Cellular Communications:**

HIPERLAN: Protocol architecture, physical layer, Channel access control sub-layer, MAC sub-layer, Information bases and networking

WLAN: Infrared vs. radio transmission, Infrastructure and ad hoc networks, IEEE 802.11. Bluetooth.: User scenarios, Physical layer, MAC layer, Networking, Security, Link management

GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture

**UNIT –II (Wireless) Medium Access Control:** Motivation for a specialized

MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

**UNIT –III Mobile Network Layer:**

Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

**UNIT – IV Mobile Transport Layer:**

Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

**UNIT – V Database Issues:**

Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

**UNIT – VI Data Dissemination:**

Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

**UNIT – VII Mobile Ad hoc Networks (MANETs):**

Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

**UNIT – VIII Protocols and Tools:**

Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

**Text Books:**

- 1) **Jochen Schiller**, “Mobile Communications”, *Addison-Wesley*. (Chapters 4, 7, 9, 10, 11), second edition, 2004.
- 2) **Stojmenovic and Cacute**, “Handbook of Wireless Networks and Mobile Computing”, *Wiley*, 2002, ISBN 0471419028. (Chapters 11, 15, 17, 26 and 27)

**Reference Books:**

- 1) Reza Behravanfar, “Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML”, ISBN: 0521817331, Cambridge University Press, October 2004,

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
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**II Year MCA**

**IV Semester**

**SYSTEMS PROGRAMMING  
(Elective – II)**

**UNIT-I**

Introduction to Device Drivers: Role of Device Drivers, splitting the kernel, classes of Devices and modules, security issues, version numbering, building and running modules Kernel modules Vs. Applications, compiling & loading, kernel symbol table, preliminaries, Interaction and shutdown, module parameters, doing it in user space.

**UNIT-II**

Char Drivers: Design of scull, major and minor numbers, important data structures, char device registration, open and release, memory usage, read, write, playing with the new devices.

**UNIT-III**

Introduction to the Kernel – Important Data structures, Main Algorithms, Implementation of system calls.

Debugging Techniques:. Design support in the Kernel, debugging by printing, querying, watching, system faults..

#### **UNIT-IV**

Memory Management: Architecture Independent memory models, Virtual address space of a process, block device caching, Paging under Linux.

Allocating memory – Kmalloc, lookaside caches, get free page and friends, vmalloc and friends, per – CPU variables, obtaining large Buffers.

#### **UNIT-V**

Concurrency and race Conditions: Pitfalls in scull, concurrency & its management, semaphores and mutexes, completions, spin locks, loading traps, alternatives to Locking.

#### **UNIT-VI**

Time, Delays, Deferred Work: Measuring time lapses, Knowing current time, delaying execution, kernel timers, tasklets, workqueues.

#### **UNIT-VII**

Interrupt handling: Preparing the parallel port, installing an Interrupt handler, implementing a handler, Top and bottom Halves, Interrupt Sharing, interrupt driven I/O. Communicating with H/W: I/O ports and I/O Memory, Using I/O ports, An I/O port example, using I/O memory.

#### **UNIT-VIII**

Data types in Kernel: Uses of structured C types, assigning an explicit size to data items, interface specific types, other portability issues, linked lists.

Advanced Cache Driver Operations: ioctl, blocking I/O, poll and select, Asynchronous Notification, Seeking a Device, Access control on a device file.

#### **Text Books:**

1. Linux Device Drivers- 3<sup>rd</sup> Edition, J. Corbet, Rubini & Greg K. Hartman, O'Reilly.
2. Linux Kernel Programming – Third Edition, M. Beck *et al*, Pearson Education.

#### **References:**

Running Linux, 4<sup>th</sup> edition, Welsh et al, O'Reilly

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**IV Semester**

**Advanced Java Programming Lab**

1. Develop static pages (using Only HTML) of an online Bookstore. The pages should resemble: [www.amazon.com](http://www.amazon.com). The website should consist the following pages.

- Home page
  - Registration and user Login
  - User Profile Page
  - Books catalog
  - Shopping Cart
  - Payment By credit card
  - Order Conformation
2. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
3. Create and save an XML document at the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
4. Bean Assignments
- a. Create a Java Bean which gives the exchange value of INR (Indian Rupees) into equivalent American/Canadian/Australian Dollar value.
  - b. Create a simple Bean with a label - which is the *count* of number of clicks. Than create a Bean Info class such that only the “*count*” property is visible in the Property Window.
  - c. Create two Beans-a) Key Pad .b) Display Pad. After that integrate the two Beans to make it work as a Calculator.
  - d. Create two Beans Traffic Light (Implemented as a Label with only three background colors-Red, Green, Yellow) and Automobile (Implemented as a Text Box which states its state/movement). The state of the Automobile should depend on the following Light Transition Table.

Light Transition	Automobile State
Red ---> Yellow	Ready
Yellow ---> Green	Move
Green --> Red	Stopped

5. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
6. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information

and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

7. Implement the “Hello World!” program using JSP Struts Framework.

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**IV Semester**

**DATA MINING AND WAREHOUSING LAB**

The objective of the lab exercises is to use data mining techniques to identify customer segments and understand their buying behavior and to use standard databases available to understand DM processes using WEKA (or any other DM tool)

- 1. Gain insight for running pre- defined decision trees and explore results using MS OLAP Analytics.**
- 2. Using IBM OLAP Miner – Understand the use of data mining for evaluating the content of multidimensional cubes.**
- 3. Using Teradata Warehouse Miner – Create mining models that are executed in SQL.**

( BI Portal Lab: The objective of the lab exercises is to integrate pre-built reports into a portal application )

- 4. Publish cognos cubes to a business intelligence portal.**

Metadata & ETL Lab: The objective of the lab exercises is to implement metadata import agents to pull metadata from leading business intelligence tools and populate a metadata repository. To understand ETL processes

- 5. Import metadata from specific business intelligence tools and populate a meta data repository.**
- 6. Publish metadata stored in the repository.**
- 7. Load data from heterogenous sources including text files into a pre-defined warehouse schema.**

**Case study**

9. Design a data mart from scratch to store the credit history of customers of a bank. Use this credit profiling to process future loan applications.
10. Design and build a Data Warehouse using bottom up approach titled 'Citizen Information System'. This should be able to serve the analytical needs of the various government departments and also provide a global integrated view.

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**V Semester**

**E- COMMERCE**

**UNIT-I**

Electronic Commerce-Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

**UNIT-II**

Consumer Oriented Electronic commerce - Mercantile Process models

**UNIT-III**

Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems.

**UNIT-IV**

Inter Organizational Commerce - EDI, EDI Implementation, Value added networks.

**UNIT-V**

Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

**UNIT-VI**

Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing - Information based marketing, Advertising on Internet, on-line marketing process, market research.

**UNIT-VII**

Consumer Search and Resource Discovery - Information search and Retrieval, Commerce Catalogues, Information Filtering.

**UNIT VIII**

Multimedia - key multimedia concepts, Digital Video and electronic Commerce, Desktop video processings, Desktop video conferencing.

**TEXT BOOKS:**

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson.

**REFERENCE BOOKS:**

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
2. E-Commerce, S.Jaiswal – Galgotia.
3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.

4. Electronic Commerce – Gary P.Schneider – Thomson.
5. E-Commerce – Business, Technology, Society, Kenneth C.Taudon, Carol Guyerico Traver.

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**V Semester**

**MULTIMEDIA AND APPLICATION DEVELOPMENT**

**UNIT-I**

Fundamental concepts in Text and Image: Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

**UNIT-II**

Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

**UNIT-III**

**Action Script I:** ActionScript Features, Object-Oriented ActionScript, Datatypes and Type Checking, Classes, Authoring an ActionScript Class

**UNIT-IV**

**Action Script II:** Inheritance, Authoring an ActionScript 2.0 Subclass, Interfaces, Packages, Exceptions

**UNIT-V**

**Application Development:** An OOP Application Framework, Using Components with ActionScript MovieClip Subclasses.

**UNIT VI**

**Multimedia data compression:** Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

**UNIT VII**

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

## **UNIT-VIII**

Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications : Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand(MOD).

### **Text Books:**

- 1) Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI/Pearson Education
- 2) Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY.

### **Reference Books:**

- 1) Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
  - 2) Macromedia Flash MX Professional 2004 Unleashed, Pearson.
  - 3) Multimedia and communications Technology, Steve Heath, Elsevier(Focal Press)
  - 4) Multimedia Applications, Steinmetz, Nahrstedt, Springer.
  - 5) Multimedia Basics by Weixel Thomson
  - 6) Multimedia Technology and Applications, David Hilman , Galgotia
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**V Semester**

**OBJECT ORIENTED ANALYSIS AND DESIGN (Using UML)**

**UNIT-I**

**Introduction to UML:** Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, Software Development Life Cycle.

**UNIT-II**

**Basic Structural Modeling:** Classes, Relationships, common Mechanisms, and diagrams.

**Advanced Structural Modeling:** Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages.

**UNIT-III**

**Class & Object Diagrams:** Terms, concepts, modeling techniques for Class & Object Diagrams.

**UNIT- IV**

**Basic Behavioral Modeling-I:** Interactions, Interaction diagrams.

**UNIT-V**

**Basic Behavioral Modeling-II:** Use cases, Use case Diagrams, Activity Diagrams.

**UNIT-VI**

**Advanced Behavioral Modeling:** Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

**UNIT-VII**

**Architectural Modeling:** Component, Deployment, Component diagrams and Deployment diagrams.

**UNIT-VIII**

**Case Study:** The Unified Library application

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

1. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Mark Priestley: Practical Object-Oriented Design with UML, TATA McGrawHill
5. Applying UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.

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V Semester

**SOFTWARE PROJECT MANAGEMENT)**  
**(Elective – III**

**UNIT-I**

**Conventional Software Management:** The waterfall model, conventional software Management performance.

**Evolution of Software Economics:** Software Economics, pragmatic software cost estimation.

**UNIT-II**

**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

**The old way and the new:** The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

**UNIT-III**

**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, transition phases.

**Artifacts of the process:** The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

**UNIT-IV**

**Model based software architectures:** A Management perspective and technical perspective.

**Work Flows of the process:** Software process workflows, Iteration workflows,

**UNIT-V**

**Checkpoints of the process:** Major mile stones, Minor Milestones, Periodic status assessments.

**Iterative Process Planning:** work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

**UNIT-VI**

**Project Organizations and Responsibilities:** Line-of-Business Organizations, Project Organizations, evolution of Organizations.

**Process Automation:** Automation Building blocks, The Project Environment.

## **UNIT-VII**

**Project Control and Process instrumentation:** The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

**Tailoring the Process:** Process discriminants.

## **UNIT-VIII**

**Future Software Project Management:** modern Project Profiles, Next generation Software economics, modern process transitions.

**Case Study:** The command Center Processing and Display system- Replacement (CCPDS-R)

## **TEXT BOOKS:**

Software Project Management, Walker Royce: Pearson Education, 2005.

## **REFERENCE BOOKS:**

Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.

Software Project Management, Joel Henry, Pearson Education.

Software Project Management in practice, Pankaj Jalote, Pearson Education.2005.

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III Year MCA

V Semester

**MIDDLE WARE TECHNOLOGIES**  
**(Elective-III)**

**UNIT-I:**

**Introduction to client server computing:** Evolution of corporate computing models from centralized to distributed computing, client server models. Benefits of client server computing, pitfalls of client server programming.

**UNIT-II:**

**CORBA with Java:** Review of Java concept like RMI, RMI API, JDBC. Client/Server CORBA-style, The object web: CORBA with Java.

**UNIT III:**

**Introducing C# and the .NET Platform;** Understanding .NET Assemblies; Object – Oriented Programming with C#; Callback Interfaces, Delegates, and Events.

**UNIT IV:**

**Building c# applications:** Type Reflection, Late Binding, and Attribute-Based Programming; Object Serialization and the .NET Remoting Layer; Data Access with ADO.NET; XML Web Services.

**UNIT-V:**

**Core CORBA / Java:** Two types of Client/ Server invocations-static, dynamic. The static CORBA, first CORBA program, ORBlets with Applets, Dynamic CORBA-The portable count, the dynamic count multi count.

**UNIT-VI:**

**Existential CORBA:** CORBA initialization protocol, CORBa activation services, CORBAIDL mapping CORBA java- to- IDL mapping, The introspective CORBA/Java object.

**UNIT-VII:**

**Java Bean Component Model:** Events, properties, persistency, Introspection of beans, CORBA Beans

**UNIT-VIII:**

**EJBs and CORBA:** Object transaction monitors CORBA OTM's, EJB and CORBA OTM's, EJB container frame work, Session and Entity Beans, The EJB client/server

development Process The EJB container protocol, support for transaction EJB packaging  
EJB design Guidelines.

**Text Books:**

- 1 Client/Server programming with Java and CORBA Robert Orfali and Dan Harkey,  
John Wiley & Sons ,SPD 2<sup>nd</sup> Edition
- 2 Java programming with CORBA 3<sup>rd</sup> Edition, G.Brose, A Vogel and K.Duddy,  
Wiley-dreamtech, India John wiley and sons
- 3 C# and the .NET Platform Andrew Troelsen, Apress Wiley-dreamtech, India Pvt Ltd

**Reference: Books:**

Distributed Computing, Principles and applications, M.L.Liu, Pearson Education  
Client/Server Survival Guide 3<sup>rd</sup> edition Robert Orfali Dan Harkey and Jeri Edwards,  
John Wiley & Sons  
Client/Server Computing D T Dewire, TMH.  
IBM Webspere Starter Kit Ron Ben Natan Ori Sasson, TMh, New Delhi  
Programming C#, Jesse Liberty, SPD-O'Reilly.  
C# Preciesely Peter Sestoft and Henrik I. Hansen, Prentice Hall of India  
Intoduction to C# Using .NET Pearson Education  
C# How to program, Pearson Education

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V Semester

**INFORMATION RETRIEVAL SYSTEMS**  
(Elective-III)

**UNIT-I**

**Introduction:** Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

**UNIT-II**

**Information Retrieval System Capabilities:** Search, Browse, Miscellaneous

**UNIT-III**

**Cataloging and Indexing:** Objectives, Indexing Process, Automatic Indexing, Information Extraction.

**UNIT-IV**

**Data Structures:** Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

**UNIT-V**

**Automatic Indexing:** Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages

**UNIT-VI**

**Document and Term Clustering:** Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

**UNIT-VII**

**User Search Techniques:** Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext.

**Information Visualization:** Introduction, Cognition and perception, Information visualization technologies.

**UNIT-VIII**

**Text Search Algorithms:** Introduction, Software text search algorithms, Hardware text search systems.

**Information System Evaluation:** Introduction, Measures used in system evaluation, Measurement example – TREC results.

**TEXTBOOKS:**

Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.

**REFERENCE BOOKS:**

Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.

Modern Information Retrieval By Yates Pearson Education.

Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.

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V Semester

**SOFTWARE TESTING METHODOLOGIES**  
(ELECTIVE – IV)

**UNIT-I:**

**Introduction:-** Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs

**UNIT-II:**

**Flow graphs and Path testing:-** Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

**UNIT-III:**

**Transaction Flow Testing:-** transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

**UNIT-IV:**

**Domain Testing:-** domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

**UNIT-V:**

**Paths, Path products and Regular expressions:-** path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

**UNIT-VI:**

**Logic Based Testing:-** overview, decision tables, path expressions, kv charts, specifications.

**UNIT-VII:**

**State, State Graphs and Transition testing:-** state graphs, good & bad state graphs, state testing, Testability tips.

## **UNIT-VIII:**

**Graph Matrices and Application:**-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. ( Student should be given an exposure to a tool like JMeter or Win-runner).

### **TEXT BOOKS:**

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

### **REFERENCE BOOKS:**

1. The craft of software testing - Brian Marick, Pearson Education.
  2. Software Testing Techniques – SPD(Oreille)
  3. Software Testing in the Real World – Edward Kit, Pearson.
  4. Effective methods of Software Testing, Perry, John Wiley.
  5. Art of Software Testing – Meyers, John Wiley.
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V Semester

**ADVANCED DATABASES  
(ELECTIVE- IV)**

**UNIT-1**

**Introduction;** Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.

**Overview of Relational DBMS:** Relational Database Concepts, Normalization, Integrity rules, Relational data languages.

**UNIT-II**

**Distributed DBMS Architecture:** Architectural Models for Distributed DBMS, DDMBS Architecture.

**Distributed Database Design:** Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

**UNIT-III**

**Query Processing and decomposition:** Query Processing Objectives, Characterization of query processors, layers of query processing, query decomposition, Localization of distributed data.

**UNIT-IV**

**Distributed query Optimization:** Query optimization, centralized query optimization, Distributed query optimization algorithms.

**UNIT-V**

**Transaction Management:** Definition, properties of transaction, types of transactions. Distributed concurrency control: Serializability, concurrency control Mechanisms & Algorithms, Time stamped & Optimistic concurrency control Algorithms, Deadlock Management.

**UNIT –VI**

**Distributed DBMS Reliability:** Reliability concepts and Measures, fault-tolerance in Distributed systems, failures in Distributed DBMS, local & Distributed Reliability Protocols, site failures and Network partitioning.

**Parallel Database Systems:** Database Series, Parallel Architecture, Parallel DBMS Techniques, Parallel exception problems, Parallel Execution for Hierarchical architecture.

**UNIT-VII**

**Distributed object Database Management Systems:** Fundamental object concepts and Models, Object Distributed Design, Architectural Issues, Object Management, Distributed Object storage, Object query Processing.

**UNIT VIII**

**Object Oriented Data Model :** Inheritance, Object identity, persistent programming languages, persistence of objects, comparing OODBMS and ORDBMS

**Text Books:**

1. M.Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Willipse Pelagatti: Distributed Databases, McGraw Hill.
3. Henry F Korth, A Silberchatz and Sudershan : Database System Concepts, MGH
4. Raghuramakrishnan and Johhanes Gehrke: Database Management Systems, MGH

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**V Semester**

**INFORMATION SECURITY  
(ELECTIVE-IV)**

**UNIT-I**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

**UNIT-II**

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC,

**UNIT-III**

Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

**UNIT-IV**

Email privacy: Pretty Good Privacy (PGP) and S/MIME.

**UNIT-V**

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management

**UNIT-VI**

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

**UNIT-VII**

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats

**UNIT-VIII**

Firewall Design principles, Trusted Systems, Intrusion Detection Systems

**TEXT BOOKS:**

1. Network Security Essentials (Applications and Standards) by William Stallings  
Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy,  
Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan  
Permech, wiley Dreamtech,

**REFERENCE BOOKS:**

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie  
Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Principles of Information Security, Whitman, Thomson.
4. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.

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**V Semester**

**UML LAB**

1. The student should take up the case study of Unified Library application which is mentioned in the theory, and Model it in different views i.e. Use case view, logical view, component view, Deployment view, Database design, forward and Reverse Engineering, and Generation of documentation of the project.
2. Student has to take up another case study of his/her own interest and do the same what ever mentioned in first problem. Some of the ideas regarding case studies are given in reference books, which were mentioned in theory syllabus, can be referred for some idea.

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**V Semester**

**Multimedia Application Development Lab**

1. Assigning Actions to an Object, and a Button
2. Creating Loops
3. Generation Random Numbers
4. Creating a Function, Calling a Function
5. Detecting the Player Version
6. Detecting the Operating System
7. Checking the System language
8. Detecting Display Settings
9. Tinting a Movie Clip's Color
10. Controlling a Movie Clip's Color with Sliders
11. Drawing a Circle
12. Drawing a Rectangle
13. Filling a Shape with a Gradient
14. Scripting Masks
15. Converting Angle Measurements
16. Calculating the Distance Between the Two Points
17. Formatting Currency Amount
18. Converting Between Units of Measurement
19. Determining Points Along a Circle
20. Sorting or Reversing an Array
21. Implementing a Custom Sort
22. Creating a Text Field
23. Making a Password Input field

All the above programs are to be done in Flash MX 2004.

**Reference:**

1. Action Script Cookbook, Joey Lott, SPD-Oreilly.
2. Flash MX Action Script for designers, Doug Sahlin, Dreamtech Wiley.
3. Flash MX Professional 2004 Unleashed, David Vogeleer and Matthew Pizzi , Pearson Education.