

**ACADEMIC REGULATIONS  
COURSE STRUCTURE AND  
DETAILED SYLLABUS**

**COMPUTER SCIENCE & ENGINEERING**

*For*

**MCA (Master of Computer Applications)**  
(Three Year Full Time Programme)



**JNTU COLLEGE OF ENGINEERING HYDERABAD  
(Autonomous)**

Kukatpally, Hyderabad – 500 085, Andhra Pradesh, India.

**2012**



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD  
COLLEGE OF ENGINEERING HYDERABAD  
(AUTONOMOUS)**

**ACADEMIC REGULATIONS FOR THE AWARD OF FULL TIME MCA DEGREE  
(WITH EFFECT FROM THE ACADEMIC YEAR 2012-2013)**

MCA Degree of the Jawaharlal Nehru Technological University Hyderabad shall be conferred on those who are admitted to the programme and fulfill all the requirements for the award of the Degree.

### 1. ELIGIBILITY FOR ADMISSIONS

Admission to the above programme shall be made subject to the eligibility and qualifications prescribed by the College/University from time to time.

Admission shall be made on the basis of the merit rank obtained by the qualifying candidate at ICET for MBA/MCA conducted by the APSCE subject to reservations as prescribed by the Government from time to time.

### 2. COURSE WORK

2.1 A candidate after securing admission must pursue the prescribed course of study for the duration of 3 years (Six Semesters).

2.2 Each semester shall be of **22 weeks duration including examinations.**

2.3 A candidate admitted to the programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

2.4 Each subject is assigned certain number of credits as specified below.

Theory Subjects	4 Periods/Week	3 Credits
Practical	4 Periods/Week	2 Credits
Project work		20 Credits

(Each period will be of 50 minutes duration)

2.5 A student shall be eligible to appear for the end semester examination of any subject if he acquires a minimum of 75% attendance in that subject.

Condonation of shortage of attendance in each subject is up to 10% (65% and above and below 75%) may be granted based on medical grounds with sufficient proof.

A student will not be permitted to write the end examination in that subject unless he satisfies the above attendance requirement in a particular subject. In such a case the candidate may seek re-admission for that subject when offered next.

- 2.6 In order to qualify for the award of the MCA Degree, the candidate shall earn all the prescribed credits, as per the course structure.

### 3. EVALUATION

- (i) Theory Subjects are evaluated for 100 marks, and Practicals/Lab Subjects are also evaluated for 100 marks.
- (ii) For theory subjects, the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End-Examination. For the award of the 40 Internal (sessional) marks for theory subjects, there shall be two internal examinations during the Semester, one at the middle of the Semester and the other immediately after the completion of instruction; each of which shall be evaluated for 25 marks, and the better one out of these two internals shall be considered for awarding the 25 sessional marks. Out of the remaining 15 sessional marks, 5 marks are allocated for teacher's assessment (allotment is based on the performance of the student in the class) and 10 marks will be awarded based on the student's performance in the Assignments. A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Semester Examination and a minimum aggregate to 50% of the total marks in the End Semester examination and Internal Evaluation taken together.
- (iii) For Practicals/Lab subjects, there shall be a continuous evaluation during the Semester for 40 sessional marks and 60 End Examination marks. Out of the 40 sessional marks, 15 marks shall be awarded for day-to-day work and 25 marks to be awarded by conducting an internal laboratory test. The End Examination shall be conducted by the teacher concerned and another faculty member of the same Department, as suggested by the Head of Department.
- (iv) Every candidate shall be required to execute his Project work and submit his Dissertation, after taking up a topic approved by the Project Review Committee (PRC). The PRC shall be constituted by the Head of the Department, and shall consist of the Head of the Department, the Project Supervisor, and a Senior faculty member of the Department. The Project work shall start the beginning of V<sup>th</sup> semester itself and it shall be of one year duration. The student has to decide his topic for Project Work within the first 6 weeks after the commencement of the V<sup>th</sup> semester class work and should submit his Project Work Proposal to the PRC, on whose approval he can register for the Project. The PRC will monitor the progress of the project work through PRC-I and PRC-II presentations during the beginning and ending of the VI<sup>th</sup> Semester. The PRC will review the fortnightly reports submitted by the student at the time of PRC-1 and PRC-II. The student shall submit a detailed Project Report at the end of the III year II Semester, and the same shall be evaluated by PRC as SATISFACTORY or UNSATISFACTORY. In case of Unsatisfactory declaration, the student shall resubmit the Project report after carrying out the necessary modifications/additions in the Project work, within the specified time as suggested by the PRC. The student can submit the Dissertation, only after

completion of 40 weeks from the Date of Registration, after obtaining the approval from PRC. If any student could not present for PRC-1 as scheduled in the Department due to some valid reasons, the Department can conduct PRC-1 to such candidates at a later date. However, the candidate is allowed to submit the Project Report only after completion of 40 weeks from the date of approval of the Project registration in PRC-I. Extension of time, within the total permissible limit for the completion of the Degree, may be considered by the PRC, on sufficient valid/genuine grounds.

- (v) The student shall be allowed to submit the Project Work and Report, only on the successful completion of all the prescribed subjects (Theory and Lab.), Project Stage-I, etc. Once the student's Project Work and Dissertation are approved by the PRC, the Dissertation will be sent to an External Examiner nominated by the Principal of the College on whose approval, the student can appear for the Project Viva-voce Examination.
- (vi) If the report of the External Examiner is favorable, then Viva-voce Examination shall be conducted by a Board, consisting of the Project Supervisor, Head of Dept, and the External Examiner who adjudicated the Project Work and Dissertation. The Board shall jointly report the student's performance in the Project Work as - (A) EXCELLENT, or (B) GOOD, or (C) SATISFACTORY, or (D) UNSATISFACTORY, as the case may be. In case, the student fails in the Viva-voce Exam or gets the UNSATISFACTORY grade, he has to reappear for the Viva-voce Exam as per the recommendations of the Board. If he fails at the second Viva-voce Exam also, he will not be eligible for the award of the Degree, unless he is asked to revise and resubmit by the Board within the double the duration of the course.
- (vii) If the report of the External Examiner is not favorable, the student shall revise and resubmit the Dissertation after one semester or as per the time specified by the External Examiner and/or the PRC. If the report of the Examiner is unfavorable again, then the Dissertation will be summarily rejected. In such a case, the dissertation shall be modified and resubmitted within the specified time, as per the suggestions and recommendations of the External Examiner/PRC.

#### 4. Re-Registration

- i) **Re-registration for detained students** : A student having shortage of attendance and detained in any subject (s) is eligible for re-registration only after completion of course work in that semester when offered next, by paying one-third of the tuition fee per subject to the college.
- ii) **Re-registration for Improvement of Sessional Marks for subjects failed in a Semester**: A candidate shall be given one chance for each subject to improve sessional marks provided the internal marks secured by a candidate are less than 50% and has failed in the end examination. This improvement of sessional marks is permitted on payment of one-third of Tuition fee per subject to the college when offered next. In the event of improvement of sessional marks, the marks obtained by the candidate in that subject in both internal and end semester examinations during the previous attempt are nullified. No candidate shall be permitted for appearing for internal examination without written permission from the College. The candidate has to

re-register within four weeks from the date of commencement of class work in that semester.

### 5. Grading Procedure

- (i) Marks will be awarded to indicate the performance of each student, in each Theory Subject or Practical, etc., and a proportional letter grade shall be given.
- (ii) As a measure of the student's performance, a Grading System using the following letter grades and corresponding percentage of marks shall be followed.

<i>% of Marks Secured</i>	<i>Letter Grade</i>
70% and above	A
Below 70% but not less than 60%	B
Below 60% but not less than 50%	C
Below 50%	F

### 6. Award of Degree or Class

After a student satisfies all the requirements prescribed for the completion of the Degree and becomes eligible for the award of the Degree, he shall be placed in one of the following four classes

Class Awarded	% of Marks Secured	<i>Program Credits</i>
FIRST CLASS with DISTINCTION	70% and above	From the Aggregate secured for all the 125 credits.
FIRST CLASS	Below 70% but not less than 60%	
SECOND CLASS	Below 60% but not less than 50%	
FAIL	Below 50%	

### 7. Withholding of Results

If the student has not paid dues to University/College, or if any case of indiscipline is pending against him, the result of the candidate may be withheld and he will not be allowed to go into the next higher Semester. The award or issue of the Degree may also be withheld in such cases.

## 8. General

- The Academic Regulations should be read as a whole for the purpose of any interpretation.
- The University/College reserves the right of altering the Academic Regulations and/or Syllabus/Course Structure, as and when necessary. The modifications or amendments may be applicable to all the candidates on rolls, as specified by the University/College.
- Wherever the words 'he' or 'him' or 'his' occur in the above regulations, they will also include 'she' or 'her' or 'hers'.
- Wherever the word 'Subject' occurs in the above regulations, it implies the 'Theory Subject' and 'Practical Subject' or 'Lab.'.
- In case of any ambiguity or doubt in the interpretations of the above regulations, the decision of the Vice-Chancellor will be final.

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
JNTUH COLLEGE OF ENGINEERING; HYDERABAD  
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD  
Master of Computer Applications (MCA)**

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

<b>Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
MC 1.1	Computer Organization	4	-	-	3
MC 1.2	Object Oriented Programming	4	-	-	3
MC 1.3	Probability and Statistics	4	-	-	3
MC 1.4	Accountancy and Financial Management	4	-	-	3
MC 1.5	Communication Skills	4	-	-	3
MC 1.6	English Language Communication Skills Lab	-	-	4	2
MC 1.7	Computer Organization Lab	-	-	4	2
MC 1.8	Object Oriented Programming Lab	-	-	4	2
					<b>21</b>

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

<b>Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
MC 2.1	Data Structures	4	-	-	3
MC 2.2	Operating Systems	4	-	-	3
MC 2.3	Mathematical Foundations of Computer Science	4	-	-	3
MC 2.4	Operations Research	4	-	-	3
MC 2.5	Database Management Systems	4	-	-	3
MC 2.6	Data Structures & Operating Systems Lab	-	-	4	2
MC 2.7	Database Management Systems Lab	-	-	4	2
MC 2.8	IT Workshop	-	-	4	2
					<b>21</b>

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

<b>Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
MC 3.1	Software Engineering	4	-	-	3
MC 3.2	Computer Networks	4	-	-	3
MC 3.3	Linux Internals	4	-	-	3
MC 3.4	Management Information Systems	4	-	-	3
MC 3.5	Computer Graphics	4	-	-	3
MC 3.6	UML Lab	-	-	4	2
MC 3.7	Linux Internals Lab	-	-	4	2
MC 3.8	Computer Graphics Lab	-	-	4	2
					<b>21</b>

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

Code	Subject	L	T	P	Credits
MC 4.1	Mobile Application Development	4	-	-	3
MC 4.2	Advanced Java Programming	4	-	-	3
MC 4.3	Data Warehousing and Mining	4	-	-	3
MC 4.4	Open Elective	4	-	-	3
MC 4.5	Dept. Elective-I	4	-	-	3
MC 4.6	Advanced Java Programming Lab	-	-	4	2
MC 4.7	Data Warehousing and Mining Lab	-	-	4	2
MC 4.8	Mobile Application Development Lab	--	-	4	2
					<b>21</b>

**MC4.4 Open Elective**

MC4.4.1 Organizational Structure and Personnel Management

MC4.4.2 Intellectual Property Rights &amp; Cyber Laws

MC 4.4.3 Green IT

**MC4.5 Dept. Elective-I**

MC4.5.1 Distributed Systems

MC4.5.2 Mobile Computing

MC4.5.3 Systems Programming

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

Code	Subject	L	T	P	Credits
MC 5.1	Mobile-Commerce	4	-	-	3
MC 5.2	Multimedia Application Development	4	-	-	3
MC 5.3	Network Security & Cryptography	4	-	-	3
MC 5.4	Dept. Elective-II	4	-	-	3
MC 5.5	Dept. Elective-III	4	-	-	3
MC 5.6	Network Security & Cryptography Lab	-	-	4	2
MC 5.7	Multimedia Application Development Lab	-	-	4	2
MC 5.8	Project Stage I	--	-	4	2
					<b>21</b>

**MC5.4 Dept. Elective-II**

MC5.4.1 Software Project Management

MC5.4.2 Web Services

MC5.4.3 Information Retrieval Systems

**MC5.5 Dept. Elective-III**

MC5.5.1 Software Testing &amp; Quality Assurance

MC5.5.2 Web Mining

MC5.5.3 Ethical Hacking

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

Code	Subject	L	T	P	Credits
MC6.1	Project Stage II	--	--	--	20
		--	--	--	<b>20</b>



**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
JNTUH COLLEGE OF ENGINEERING HYDERABAD**

I Year MCA

I Semester

**MC 1.1 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.

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

**UNIT II**

**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 III**

**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.

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

**UNIT IV**

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

**MICROPROGRAMMED CONTROL:** Control memory, Address sequencing, micro program example, design of control unit hard wired control. Micro programmed control

**UNIT V**

**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:**

1. Computer Organization – Car Hamacher, Zvonks Vranesic, SafeaZaky, 5<sup>th</sup> Edition, McGraw Hill.
2. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.
3. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
4. David A. Paterson and john L.Hennessy-Computer- organization and design- Harcourt Asia Pte Ltd.-2<sup>nd</sup> Edition
5. Structured Computer Organization – Andrew S. Tanenbaum, 4<sup>th</sup> Edition PHI/Pearson

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
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I Year MCA

I Semester

**MC1.2 OBJECT ORIENTED PROGRAMMING**

**UNIT I**

**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 deallocation operators-new and delete, Preprocessor directives.

**UNIT-II**

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

**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-III**

**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.

**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-IV**

**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-V**

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

**TEXT BOOKS:**

1. Problem solving with C++: The Object of Programming, 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.

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
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I Year MCA

I Semester

**MC1.3 PROBABILITY AND STATISTICS**

**UNIT I**

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

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

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

**UNIT II**

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

**UNIT III**

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

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

**UNIT IV**

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

**UNIT V:**

**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

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
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I Year MCA

I Semester

**MC 1.4 ACCOUNTANCY AND FINANCIAL MANAGEMENT**

**UNIT I**

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

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

**UNIT II**

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

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

**UNIT III**

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

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

**UNIT IV**

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 V**

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

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
JNTUH COLLEGE OF ENGINEERING HYDERABAD**

**I Year MCA**

**I Semester**

**MC1.5 COMMUNICATION SKILLS**

**Objectives:**

- ☛ To teach students the four language skills - Listening, Speaking, Reading and Writing.
- ☛ To enable students comprehend the concept of Communication.
- ☛ To train students convert the conceptual understanding of Communication into every day practice.
- ☛ To help students cultivate the habit of Reading.
- ☛ To prepare students communicate their ideas relevantly and coherently in Professional Writing.

**UNIT I**

**INTRODUCTION**

Basics of Communication - Principles of Communication - Types of Communication – Stages of Communication – Verbal and Non-verbal Communication – Channels of Communication – Barriers to Effective Communication – Formal and Informal Expressions in Various Situations.

**UNIT II**

**READING & STUDY SKILLS**

Reading Comprehension – Reading Strategies - Skimming and Scanning- Intensive and Extensive Reading– Unknown Passage for Comprehension - Critical Reading of Short Stories – Study Skills – Note Making – Summarizing – Articles and Prepositions – Synonyms and Antonyms

**UNIT III**

**WRITING SKILLS**

Difference between Spoken and Written Communication- Features of Effective Writing– Writing Unambiguous Sentences – Presentation Skills – Tenses – Concord – Question Tags -Practice Exercises - One Word Substitutes – Words Often Confused and Misspelt.

**UNIT IV**

**PROFESSIONAL WRITING**

Letter writing – Types, Parts and Styles of Formal Letters – Language to be used in Formal Letters – Letters of Enquiry, Complaint, and Apology with Replies – Letter of Application -Resume – E-mail – Active and Passive Voice - Formation of a Sentence.

**UNIT V**

**REPORT WRITING**

Types of Reports – Formats of Reports – Memo Format – Letter Format and Manuscript Format- Parts of Technical Report – Informational, Analytical and Project Reports – Common Errors - Idioms and Phrases.

**REFERENCE BOOKS:**

1. Suresh Kumar, E. *et al.* 2011. *Essential English*. Hyderabad: Orient Blackswan
2. Yadava Raju, B. and Muralikrishna, C. 2009. *Advantage English*. Hyderabad: Orient Blackswan
3. Rizvi, M. A. 2005. *Effective Technical Communication*. New Delhi: Tata McGraw Hill
4. Farhathullah, T.M. 2009. *English for Business Communication*. Bangalore: Prism Publishers
5. Bikram K Das. 2011. *Functional Grammar and Spoken and Written Communication in English*. Kolkata: Orient Blackswan
6. Board of Editors. 2010. *Delight and Wisdom- An Anthology of Short Stories*. Mumbai : Orient Blackswan
7. Kiranmai Dutt, P *et al.* 2011. *A Course in Communication Skills*. New Delhi: CUP India
8. Krishnaswamy, N. 2000. *Modern English – A Book of Grammar, Vocabulary and Usage*. Macmillan India Pvt. Ltd
9. Mukherjee, Meenakshi. 2009. *Let's Go Home and Other Stories*. Mumbai : Orient Blackswan
10. Ramachandran, K K. *et al.* 2007. *Business Communication*. New Delhi: Macmillan
11. Raman, Meenakshi. 2006. *Business Communication*. New Delhi: OUP
12. Taylor, Ken. 2011. *50 ways to improve your Business English*. Hyderabad: Orient Blackswan



**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
JNTUH COLLEGE OF ENGINEERING HYDERABAD**

**I Year MCA**

**I Semester**

**MC 1.6 ENGLISH LANGUAGE COMMUNICATION SKILLS LAB**

**Objectives**

- ☛ To facilitate computer-aided multi-media instruction with individualized and independent language learning
- ☛ To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
- ☛ To bring about a consistent accent and intelligibility in their English by providing an opportunity for practice in speaking
- ☛ To improve the fluency in spoken English and neutralize mother tongue influence
- ☛ To train students to use language effectively to face interviews, group discussion and public speaking

**UNIT I**

Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.

**Unit II**

Common Errors in Pronunciation – Neutralizing Mother Tongue Influence –Introduction to Word Accent – Pauses and Intonation.

**UNIT III**

Situational Dialogues – Expressions in Various Situations – Self-introduction and Introducing Others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette.

**UNIT IV**

Presentation Skills – Planning Outline and Preparing the Presentation – Individual and Group Presentations – Information Transfer – Tools and Multimedia Visuals – PPT on Project Work – Body Language - Closing and Handling Questions – Rubrics for Individual Evaluation.

**UNIT V**

Effective Listening - Practice – Group Discussions – ‘Just A Minute’ (JAM) Sessions – Pictionary – Giving Directions – Writing an Effective E-Mail.

**SUGGESTED READING**

1. Rama Krishna Rao, A. et al. *English Language Communication Skills – A Reader cum Lab Manual Course Content and Practice*. Chennai: Anuradha Publishers
2. Suresh Kumar, E. & Sreehari, P. 2009. *A Handbook for English Language Laboratories*. New Delhi: Foundation
3. Sasi Kumar, V & Dhamija, P.V. *How to Prepare for Group Discussion and Interviews*. Tata McGraw Hill
4. Hancock, M. 2009. *English Pronunciation in Use. Intermediate*. Cambridge: CUP
5. Hewings, M. 2009. *English Pronunciation in Use. Advanced*. Cambridge: CUP
6. Marks, J. 2009. *English Pronunciation in Use. Elementary*. Cambridge: CUP
7. Nambiar, K.C. 2011. *Speaking Accurately. A Course in International Communication*. New Delhi : Foundation
8. Soundararaj, Francis. 2012. *Basics of Communication in English*. New Delhi: Macmillan

#### **Suggested Software**

- Cambridge Advanced Learner's Dictionary, 3<sup>rd</sup> Edition
- Grammar Made Easy by Darling Kindersley
- Punctuation Made Easy by Darling Kindersley
- Clarity Pronunciation Power – part II
- Oxford Advanced Learner's Compass, 7<sup>th</sup> Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from 'train2success.com'
  - Preparing for being Interviewed,
  - Positive Thinking,
  - Interviewing Skills,
  - Telephone Skills,
  - Time Management
  - Team Building,
  - Decision making
- English in Mind, (I, II, III, IV Series) Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
JNTUH COLLEGE OF ENGINEERING HYDERABAD**

I Year MCA

I Semester

**MC1.7 COMPUTER ORGANIZATION LAB**

Write assembly language programs for the following using MASAM.

1. 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.
2. 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.
3. Write an ALP of 8086 to take N numbers as input. And do the following operations on them.
  - a. Arrange in ascending and descending order.
  - b. Find max and minimum
  - c. Find averageConsidering 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 stingDisplay 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 capacities.
  - 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 capacities.
- 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

**JNTUH COLLEGE OF ENGINEERING HYDERABAD****I Year MCA****I Semester****MC 1.8 OBJECT ORIENTED PROGRAMMING 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
  - a) To find the factorial of a given integer.
  - b) To find the GCD of two given integers.
  - c) 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) Addition of complex numbers.
  - c) Multiplication of complex numbers.
  - d) Subtraction of complex numbers.

- b) Writing a complex number.                      e) Multiplication of complex numbers.  
c) Addition 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.                      d) Subtraction of complex numbers.  
b) Writing a complex number.                      e) Multiplication of complex numbers.  
c) Addition of Complex numbers.                  f) Division of complex numbers.
- Note: 1. overload << and >> 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 Desgn**, 2<sup>nd</sup> Edition, D.S.Malik, Thomson.
2. **Object-Oriented Programming with C++**, M.P.Bhave, S.A.Patekar, Pearson Education.



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I Year MCA

II Semester

**MC 2.1 DATA STRUCTURES**

**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.

**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 IV**

**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.

**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 V**

**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.

**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. tanenbaum, 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.

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II Semester

**MC 2.2 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.

**Process:** Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication.

**UNIT II**

CPU Scheduling Criteria, Scheduling Algorithm, Multiple-Processor Scheduling, Real-Time Scheduling.

**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 III**

**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.

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

**UNIT IV**

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

**UNIT V**

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

**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 Silberschatz, 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

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II Semester

**MC 2.3 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

**UNIT I**

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

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

**UNIT II**

**Set Theory:** Introduction, Properties of binary Relations, Closure, Warshall's Algorithm, Equivalence and Partitions, Compatibility and partial ordering relations, Hasse diagram.

**Functions:** Invertible Function, Composition of functions, recursive Functions, Hashing, Lattice and its Properties, Sequences and Summations.

**UNIT III**

**Algebraic structures:** Algebraic systems Examples and general properties, Groups, Semi groups, Subgroups and monoids, groups sub groups' homomorphism, Isomorphism, Rings, Integral domains and Fields, Ring Homomorphism's and Polynomial Rings.

**UNIT IV**

**Combinatorics:** Counting, Combinations and Permutations, Enumerating of Combinations and Permutations, with repetitions, with constrained repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion-Exclusion.

**Recurrence Relations:** Concepts of Generating Functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, the Method of Characteristics Roots, Solutions of Inhomogeneous Recurrence Relations.

**UNIT V**

**Graphs:** Graph Terminology and Special Types of Graphs , Representing Graphs and Graph Isomorphism , Connectivity , Euler and Hamilton Paths , Shortest-Path Problems , Planar Graphs , Graph Coloring

**Trees and Cut-Sets:** Trees, Rooted Trees, Path Lengths in Rooted Trees, Prefix Codes, Binary Search Trees, Spanning Trees and Cut-Sets, Tie-Sets, Minimum Spanning Trees, Transport Networks.

**TEXT BOOKS:**

1. L LIU and DP Mohapatra - Elements of Discrete Mathematics – Tata McGraw Hill Publishing Co.
2. Kenneth H Rosen - Discrete Mathematics and Its Applications – Tata McGraw Hill Publishing Co.
3. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker Prentice Hall.

**REFERENCE BOOKS:**

1. Discrete and Combinational Mathematics- An Applied Introduction-5th Edition – Ralph. P. Grimaldi - Pearson Education.
2. Discrete Mathematical Structures – Thomas Koshy - Tata McGraw Hill Publishing Co.
3. Tremblay JP & Manohar P - Discrete Mathematical Structures with applications to computer science - Tata McGraw Hill Publishing Co.

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II Semester

**MC 2.4 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.

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

**UNIT II**

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

**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 III**

**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 IV**

**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 V**

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

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

**TEXT BOOKS:**

- |                                 |  |
|---------------------------------|--|
| 1. S.D.SHARMA                   | : Operations Research<br>kedar Nath Ramnath,1972 |
| 2. P.K.GUPTA & D.S.HIRA         | : Operations Research                            |
| 3. R.D.ASRHEDKAR & R.V.KULKARNI | : Operations Research.                           |

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II Semester

**MC 2.5 DATABASE 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**

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. 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 NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases, Oracle, SQL Server, DB2.

**UNIT III**

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.  
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, FIFTH Normal Form.

**UNIT IV**

Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity.  
Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of nonvolatile storage-Advance Recovery systems- Remote Backup systems.



**UNIT V**

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

**TEXT BOOKS:**

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

**REFERENCE BOOKS:**

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V.Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M.L.Gillenson, Wiley Student Edition.

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II Semester

**MC 2.6 DATASTRUCTURES AND OPERATING SYSTEMS LAB**

1. 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.
2. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that. Integer.
3. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
4. Write a Java program for sorting a given list of names in ascending order.
5. Write a Java program to multiply two given matrices.
6. 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)
7. 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.
8. 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.
9. Write a Java program that displays the number of characters, lines and words in a text file.
10. Write a Java program for creating multiple threads
  - a) Using Thread class
  - b) Using Runnable interface
11. Write a Java program that illustrates how run time polymorphism is achieved.
12. Write a java program that illustrates the following
  - a) Creation of simple package.
  - b) Accessing a package.
  - c) Implementing interfaces.
13. Write a java program that illustrates the following

- a) Handling predefined exceptions
- b) Handling user defined exceptions

14. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods:
- a) Linear search
  - b) Binary search

EXPNO		NAME OF THE EXPERIMENT	Page number
1	a)	RR( Round Robin) Scheduling	1-4
	b)	SJF(Shortest Job First)	5-8
	c)	FCFS(First Come First Served)	9-11
	d)	Priority Scheduling	12-15
2	a)	Sequential File Allocation	16-18
	b)	Indexed File Allocation	19-21
	c)	Linked File Allocation	22-24
3	a)	Simulate MVT and MFT MVT (Multiprogramming Variable Task)	25-27
	b)	MFT (Multiprogramming Fixed Task)	28-30
4		Banker's Algorithm for Dead Lock Avoidance And Dead Lock Prevention	31-37
5	a)	FIFO (First In First Out) Page Replacement	38-40
	b)	LRU (Least Recent Used) Page Replacement	41-44
	c)	Optimal Page Replacement (LFU)	45-48
6		Paging Memory Allocation Technique	49-52
7		Segmentation Memory Allocation Technique	53-57

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**II Semester**

**MC 2.7 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.

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I Year MCA

II Semester

**MC 2.8 IT Workshop**

**Objectives:**

The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

**PC Hardware** introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

**Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced.

**Productivity tools** module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX. **(Recommended to use Microsoft office 2007 in place of MS Office 2003)**

**PC Hardware**

**Task 1:** Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

**Task 2:** Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

**Task 3:** Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

**Task 4:** Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

**Task 5: Hardware Troubleshooting:** Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva

**Task 6: Software Troubleshooting:** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

### Internet & World Wide Web

**Task: Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

**Task 2: Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task 3: Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

**Task 4: Cyber Hygiene:** Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

### LaTeX and Word

**Task 1 – Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

**Task 2: Using LaTeX and Word** to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

**Task 3: Creating project abstract** Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

**Task 4 : Creating a Newsletter :** Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

### Excel

**Excel Orientation:** The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

**Task 1: Creating a Scheduler** - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

**Task 2 : Calculating GPA** - .Features to be covered:- Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

**Task 3: Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

**LaTeX and MS/equivalent (FOSS) tool Power Point**

**Task1:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

**Task 2:** Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

**Task 3:** Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

**Publisher**

Help students in preparing their personal website using Microsoft/ equivalent (FOSS) tool publisher. Topic covered during this week includes - Publisher Orientation, Using Templates, Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, Hosting website.

**REFERENCE BOOKS:**

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
  2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech
  3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
  4. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)
  5. LaTeX Companion – Leslie Lamport, PHI/Pearson.
  6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
- IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press , Pearson Education.
- Microsoft Office 2007: The Missing Manual - Chris Grover, Mathew MacDonald, E.A.Vander Veer O'reilly Media

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**MC 3.1 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.

**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 II**

**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.

**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 III**

**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.

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

**UNIT IV**

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

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

**UNIT V**

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

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

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

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

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**MC 3.2 COMPUTER NETWORKS**

**UNIT I**

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

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

**UNIT II**

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

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

**UNIT III**

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

**UNIT IV**

**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 V**

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

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

**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.

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## MC3.3 LINUX INTERNALS

**UNIT I**

Introduction to linux kernel, getting started with kernel

**Process Management:** process descriptor and the task structure, process creation, Linux implementation of threads, process termination

**Process scheduling:** Multitasking, process scheduler, policy, scheduling algorithm, scheduling implementation, process selection, preemption and context switching, real-time scheduling policies, scheduler related system calls.

**UNIT II**

**System calls:** sys calls, system call handler, system call implementation, system call context

**Interrupts and Interrupt handlers:** Interrupts, interrupt handlers, Registering an interrupt handler, writing interrupt handler, interrupt context, implementing interrupt handlers, interrupt control.

**UNIT III**

**Kernel Synchronization:** Critical regions and race conditions, locking, deadlocks, contention and scalability, atomic operations, spin locks, reader writer spin locks, semaphores, reader writer semaphores, mutexes, sequential locks, preemption disabling, ordering and barriers

**Timers and time management:** kernel notion of time, tick rate, jiffies, hardware clocks and timers, timer interrupt handler, timers, delaying execution.

**UNIT IV**

**Memory Management:** Pages, Pages, getting pages, Kmalloc (), vmalloc (), Slab layer, statically allocating on the stack, high memory mappings, per-CPU allocations, per-CPU interface,

**Virtual File System:** common file system interface, file system abstraction layer, Unix file systems, VFS objects and their data structures, the super block object and operations, inode object and operations.

**UNIT V**

**Block I/O layer:** anatomy of a block device, buffers and buffer heads, the bio-structure, request queues, I/O schedulers

**Process Address Space:** Address spaces, memory descriptor, virtual memory areas, manipulating memory areas

**Page cache and page write back:** approaches to caching, linux page cache the buffer cache, flusher threads.

**TEXT BOOKS:**

1. Linux Kernel Development by Robert Love, Third Edition, Pearson Education.

**REFERENCE BOOKS:**

1. Linux Kernel programming by Michael Beck, Harald Bohme et al., Third Ed., Pearson Education

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**MC 3.4 MANAGEMENT INFORMATION SYSTEM****UNIT I**

Introduction to IS Models – Nolan Stage Hypothesis, IS Strategic Grid, Wards Model, Earl's Multiple Methodology, Critical Success Factors, Soft Systems Methodology, Socio-Technical Systems Approach (Mumford), System Develop Life Cycle, Prototype and End User Computing, Application Packages, Outsourcing, Deciding Combination of Methods.

**UNIT II**

Types of Information Systems– Transactions Processing System, Knowledge Work Systems, Office Automation System, Management Information System, Decision Support System, Expert System, Strategic Information System. IS Security, Control and Audit - System Vulnerability and Abuse, business value of security and control, Need for Security, Methods of minimizing risks, IS Audit, ensuring system quality.

**UNIT III**

Induction to ERP: Overview of ERP, MRP, MRPII and Evolution of ERP, Integrated Management Systems, Reasons for the growth of ERP, Business Modeling, Integrated Data Model, Foundations of IS in Business, Obstacles of applying IT. Advantages and limitations of ERP.

**UNIT IV**

ERP Modules: Finance, Accounting Systems, Manufacturing and Production Systems, Sales and Distribution Systems, , Human Resource Systems, Plant Maintenance System, Materials Management System, Quality Management System, ERP System Options and Selection, ERP proposal Evaluation.

**UNIT V**

ERP Implementation and Maintenance: Implementation Strategy Options, Features of Successful ERP Implementation, Strategies to Attain Success, User Training, Maintaining ERP & IS. Case Studies.

**TEXT BOOKS:**

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 BOOKS:**

- C Laudon and Jane P.Laudon, et al: Management Information Systems, Pearson Education, 2009.
1. Alexis Leon, ERP (Demystified), 5/E, Tata McGraw-Hill, 2009.
  2. David L Olson, Managerial Issues of Enterprise Resource Planning Systems, McGraw Hill, International Edition-2009.
  3. Vaman, ERP in Practice, Tata McGraw-Hill , 2009
  4. Gordon B. Davis & Margrethe H.Olson: Management Information Systems, Tata McGraw-Hill , 2009.

5. W S Jawadekar: Management Information Systems, Tata McGraw-Hill , New Delhi, 2009
6. James A. Obrein: Management Information Systems, Tata McGraw-Hill , 2008
7. Gerald V.Post, David L Anderson: Management Information Systems, Irvin McGraw Hill, 2009.
8. C.S.V.Murthy: Management Information System, Himalaya publishing House ,2009
9. Rainer, Turban, Potter, Introduction to Information Systems, WILEY-India, 2009.
10. Dharminder and Sangeetha, Management Information Systems, Excel books, 2009
11. Monk, Concepts in ERP, Cengage, 2009.
12. Ashim Raj Singla, Enterprise Resource Planning, Cengage, 2008.
13. Vinod Kumar Garg, et al., Enterprise Resource Planning, PHI, 2007.

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**MC 3.5 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).

**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 II**

**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).

**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 III**

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). **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 IV**

**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 V**

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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**MC 3.6 UML LAB**

**Table of Contents**

**1. Software Requirement Specifications (Study and Possible implementations)**

- 1.1 Introduction
- 1.2 Purpose of the Document
- 1.3 Scope of System

**2. General Description**

- 2.1 Product Perspective
- 2.2 Product Functions
- 2.3 User Characteristics

**3. Visual Modeling in UML through Rational Rose Tool**

- 3.1 Visual Modeling
- 3.2 The Rational Rose Tool

**4. Development of**

- Actor
- Use case
- Use case Requirements
- Use case Diagram
- Activity Diagram
- Packages and Class Diagrams
- Sequence Diagram
- Collaboration Diagram
- State Chart Diagram
- Component Diagram
- Deployment Diagram

For the Case Study given by the lab Instructor/Faculty.



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**MC 3.7 LINUX INTERNALS LAB**

1. Write a program to create a hole in a file
2. Write a program to count the number of blank spaces and special characters in a file
3. Write a program to Convert file contents to sentence case and store it on other file
4. Write a program to list directories present in a current working directory
5. Write a program to list all ordinary files from current directory whose size exceeds 200 bytes and remove all files whose size is 0
6. Write a program to accept directory name as an argument and check whether it is present or not. if it is not a directory remove that file and create the directory with the same name. if it is a directory go to the directory and print directory information.
7. Write a program to read two values at the child, add them, pass the result to the parent and print it.
8. Implement client-server concept using pipes
9. Implement client-server concept using sing FIFO's
10. Implement client-server concept using Message Queues
11. Program such that client sends a filename to server and server has to open the file and send contents to the client. Client prints contents on screen. (Note: If server can't open a file then it has to send an error message)
12. Write a program to execute given command within 5 sec at child, otherwise kill the process.
13. Write a program to read block of data within the given time
14. Write a program which accepts one or more file/directory names as command line arguments and report the following information about each command line argument
  - (a) File type
  - (b) Number of links
  - (c) Time of last access
  - (d) Permissions

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**MC 3.8 COMPUTER GRAPHICS LAB**

1. a. Program to Draw a Line Using Bresenham's Algorithm.  
b. Program to Draw a Line Using DDA Algorithm.
2. Write a Program to Show Line Clipping.
3. Write a Program to Scale The Triangle.
4. Write a Program to Reflect Triangle
5. Write a Program to Rotate a Triangle About Origin.
6. Write a Program to Translate a Triangle
7. Write a Program to Rotate a Point about Point.
8. Write a Program to Rotate a Point about Origin
9. Write a Program to Draw a Hut Using Simple Graphic Function.
10. Write a Program to Draw Circle Using Bresenham's Algorithm.
11. Write a Program to Draw an Ellipse Using Midpoint Algorithm.
12. Write a Program to Fill a Polygon.

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**MC 4.1 MOBILE APPLICATION DEVELOPMENT**

**UNIT I**

J2ME Overview: Inside J2ME, J2ME and Wireless Devices.  
Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants.

**UNIT II**

J2ME Architecture and Development Environment: J2ME Architecture, Small Computing Device requirement, Run Time Environment, Midlet Programming, Java Language for J2ME, J2ME Software Development Kits, examples, multiple MIDlets in a MIDlet suite, J2ME Wireless Toolkit.

**UNIT III**

Commands Items and Event Processing: J2ME User Interfaces, Display Class, the Palm OS Emulator, Command Class, Item Class, Exception Handling.

**UNIT IV**

High- Level Display: Screens: Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class.

Low Level Display: Canvas: The Canvas, User Interactions, Graphics, Clipping Regions, Animation.

**UNIT V****Android**

Introduction: Background, Android, An Open Platform for Mobile Development, Native Android applications, Android SDK features, Development Framework.

Developing for Android: Developing for Mobile and Embedded device Android Development Tools

Creating Applications and Activities: Application Manifest File, Android Application Lifecycle, Android Application Class, Android Activities.

**Text Books:**

1. J2ME: The Complete Reference, James Keogh, Tata McGrawHill.
2. Professional Android™ 4 Application Development, Reto Meier, John Wiley.

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**MC 4.2ADVANCED 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  
**XML:** Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX.

**UNIT II**

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 III**

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 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 IV**

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

**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 V**

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:**

1. Internet and World Wide Web – How to program by Dietel and Nieto Pearson Education Asia. (Chapters: 3, 4, 8, 9, 10, 11, 12 – 18)
2. The complete Reference Java 2 Third Edition by Patrick Naughton and Herbert Schildt. (Chapters: 19, 20, 21, 22, 25, 27)
3. 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, and 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.

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**MC 4.3 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 Preprocessing:** Need for Preprocessing the data, Descriptive data summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT II**

**Data Warehouse and OLAP Technology:** Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining.

**Data cube computation:** Efficient methods for data cube computation, further development of data cube and OLAP technology. Data Generalization, Attribute oriented induction.

**UNIT III**

**Association analysis:** Basic concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining Various kinds of association rules, From association mining to correlation analysis, Constraint based mining.

**Classification:** Introduction, Issues, Decision tree induction, Bayesian classification, Rule-based classification, back propagation, Support vector machines. Associative Classification, Lazy learners, genetic algorithms, roughest approach, fuzzy set approach.

**UNIT IV****Prediction:**

Linear, Nonlinear and other regression methods. **Classifier/Predictor Accuracy:** Accuracy and error measures, evaluation, Ensemble methods. **Cluster Analysis:** Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering high dimensional data, Constraint-based cluster analysis, Outlier Analysis

.

**UNIT V**

**Mining Stream, Time-series and sequence data:** Mining data streams, Mining Time-series data, Mining sequence patterns in Transactional databases. **Mining Object, Spatial, Multimedia, Text and Web data:** Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial DataMining, Multimedia DataMining, Text Mining, Mining the World Wide Web.

**TEXT BOOKS:**

1. DataMining – Concepts and Techniques - Jiawei han & Micheline Kamber, Elsevier.

**REFERENCE BOOKS:**

1. DataMining Techniques – Arun K Pujari, University Press
2. Building the DataWarehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd...
3. Data Warehousing Fundamentals –Paulraj Ponnaiah Wiley Student Edition
4. The Data Warehouse Life cycle Tool kit – Ralph Kimball Willy Student Edition.
5. DataMining Introductory and advanced topics –Margaret H Dunham, PEA.
6. data mining – tan, vipin kumar, pea

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II Year MCA

IV Semester

**MC 4.4.1 ORGANIZATION 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, type's models, mathematical planning models, deterministic and probabilistic models.

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 IV**

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.

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 V**

Strategic management: Objectives, importance policies, concept of core competence capability of organizational learning. Communication: Importance of communication, interpersonal communication barriers of communication, communication in organizations, using communication skills to manage conflicts.

**TEXT BOOKS:**

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



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IV Semester

**MC 4.4.2 - INTELLECTUAL PROPERTY RIGHTS & CYBER LAWS**

**UNIT I**

Introduction to intellectual property, Law of Trademarks, trademark Selection & Searching, IP Law- Types of IP- Agencies for IP Registration- International Treaties. Purpose and Function of Trademarks Rights- Categories of marks- Trade names and Business names- protectable matter. Selection and Evaluation of a mark- Trademark search.

**UNIT II**

Trademark Registration Process, Post-registration Procedures, Trademarks Maintenance, Transfer of Rights to Marks, Preparing and filling the applications- Docketing Critical Dates- Examination Process- Post-examination procedure- Registration. Affidavit of Continued use- Affidavit of incontestability- Renewal of Registrations- Docketing Requirements- Loss of Trademarks Rights- Trademark use and Compliance Policies- Trademark Policing and Maintenance – Use of Marks Owned by Third Parties- Transfer of Ownership or Rights in Trademarks.

**UNIT III**

Inter Partes Proceedings, Infringement, Dilution, New developments in Trademark Law  
Inter parts proceedings – Infringement of Trademarks – Dilution of Trademarks- Related Trademarks claims. Protecting a Domain Name - Other Cyberspace Trademark issues.  
Law of Copyright, Subject Matter Of Copyright, Rights Afforded By Copyright Law  
Foundations of Copyrights Law- Originality of Material-Fixation of Material– Exclusions from Copyright Protection- Compilations, Collections and Derivative Works. Rights of Reproduction- Rights to Prepare Derivative works- Rights of Distribution- Rights to perform the work publicly- Rights to display the work publicly - Limitations on exclusive rights

**UNIT IV**

Copyright Ownership, Transfers, Duration, Registration and Searching Copyright Ownership issues- joint works – ownership in derivative works – works made for hire- transfers of copyright- termination of Transfers of copyright- duration of copyright. Copyright registration. Application-Deposit Materials-Application Process and Registration of Copyright-Searching Copyright Office Records- Obtaining Copyright Office Records and Deposit Materials- Copyright Notice.

Copyright Infringement, New Developments in Copyright Law, semi conductor chip protection act: Elements of Infringement – Contributory Infringement and Vicarious Infringement – Defenses to Infringement – Infringement Actions – Remedies for Infringement. Copyright Protection for Computer Programs – Copyright Protection for Automated Databases – Copyright in the Electronic age – The Digital Millennium Copyright Act – Recent Developments in Copyright Law – Terms of the Trade – Vessel Hull Protection – Semiconductor Chip Protection.

**UNIT V**

Law of Patents, Patent Searches, Ownership, Transfer: Patentability – Design Patents – Double Patenting – Patent Searching – Patent Application Process – Prosecuting the Application, Post-issuance Actions, Term and Maintenance of Patents. Ownership Rights – Sole and Joint Inventors – Disputes over Inventorship – Inventions Made by Employees and Independent Contractors – Assignment of Patent Rights – Licensing of Patent Rights – Invention Developers and Promoters.

Patent Infringement, New Development and International Patent Law Direct infringement- Inducement to Infringe- Contributory Infringement- First Sale Doctrine- Claims Interpretation- Defenses to Infringement- Remedies for Infringement- Resolving an Infringement Dispute- Patent Infringement Litigation. New Development in Patent Law- International Patent Protection- Paris Convention- Patent Cooperation Treaty- Agreement on Trade Related Aspects of Intellectual Property Rights- Patent Law Treaty.

**TEXT BOOKS:**

1. Intellectual Property Rights by Deborah E. Bouchoux, Cengage Learning.

**REFERENCE BOOKS:**

1. Managing Intellectual Property- The Strategic Imperative, Second Edition by Vinod v. Sople, PHI Learning Private Limited.
2. Intellectual Property- Copyrights, Trademarks, and Patents by Richard Stim, Cengage Learning.

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II Year MCA

IV Semester

MC 4.4.3 GREEN IT

**UNIT I**

**Trends and Reasons to Go Green:** Overview and Issues, Current Initiatives and Standards.

**UNIT II**

**Consumption Issues:** Minimizing power usage, cooling.

**UNIT III**

**What Can One Do:** Changing the Way one Works, Going Paperless, Recycling, Hardware Considerations.

**UNIT IV**

**Case Studies:** Technology Businesses, Other Organizations.

**UNIT V**

**The Greening Process:** Datacenter Design and Redesign, Virtualization, Greening one's Information Systems, Staying Green.

**TEXTBOOKS:**

**GREEN IT:** Reduce Your Information System's Environmental Impact While Adding to the Bottom Line-Toby VelteAnthony VelteRobertC Eisenpeter.

Title: Green IT.

Publisher: McGraw-Hill Osborne

ISBN 10: 0071599231.

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II Year MCA

IV Semester

**MC 4.5.1 - DISTRIBUTED SYSTEMS (Elective – I)**

**UNIT I**

Characterization of Distributed Systems. Design Issues, User Requirement, Network Technologies and Protocols, IPC, Client-Server Communication, Group Communication, IPC in UNIX. Remote Procedure Calling, Design issues, Implementation, Asynchronous RPC

**UNIT II**

Distributed OS, Its kernel, Processes and Threads, Naming and Protection, Communication and Invocation, Virtual Memory, File Service components, Design issues, Interfaces, implementation techniques, SUN network file systems.

**UNIT III**

SNS – a name service model, its design issues, Synchronizing physical clocks, Logical time and logical clocks, Distributed coordination. Replication and its architectural model, Consistency and request ordering, Conversation between a client and a server, Transactions, Nested Transactions.

**UNIT IV**

**Concurrency control**, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

**Distributed Transactions** and Nested Transactions, Atomic commit protocols, Concurrency control in distributed transactions, distributed Deadlocks, Transactions with replicated data, Transaction recovery, Fault tolerance, Hierarchical and group masking of faults.

**UNIT V**

**Cryptography**, Authentication and key distribution, Logics of Authentication, Digital signatures. **Distributed shared memory**, Design and Implementation issues, Sequential consistency and ivy, Release consistency and Munin, Overview of Distributed Operating systems Mach, Chorus.

**TEXT BOOKS:**

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Third Edition, Pearson Education.

**REFERENCE BOOKS:**

1. Advanced Concepts in Operating Systems, M Singhal, N G Shivarathri, Tata McGraw-Hill Edition.
2. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.

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II Year MCA

IV Semester

**MC 4.5.2 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. **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 III**

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

**Data Dissemination:** Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques. **Mobile Ad hoc Networks (MANETs):** Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

**UNIT V****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,

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II Year MCA

IV Semester

**MC 4.5.3 SYSTEMS PROGRAMMING (Dept Elective -I)**

**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.

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 III**

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

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

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

**UNIT IV**

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

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, and using I/O memory.

**UNIT V**

Data types in Kernel: Uses of structured C types, assigning an explicit size to data items, interface specific types, other portability issues, and 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 BOOKS:**

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

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**IV Semester**

**MC 4.6 ADVANCED JAVA PROGRAMMING LAB**

1. Program for Ordered and Unordered List
2. Program to Create Time Table
3. Program to Create Application Form
4. Program to Create a Calculator
5. Program for Creating Inline, Embedded & External Style Sheets
6. Program to Generate Fibonacci Series
7. Program to Find Factorial Of a Number
8. Program to Illustrate Date(), String(), Math() Objects
9. Program to Illustrate Filters
10. Program to Create Button Using AWT
11. Program to Create Checkbox Group Using AWT
12. Program to Create Choice List Using AWT
13. Program to Create Text Field Using AWT
14. Program to Create Grid Layout Using AWT
15. .Program to Create Tabbed Panes Using Swing





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IV Semester

**MC 4.7 DATA WAREHOUSING AND MINING 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  
InSQL.  
(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 heterogeneous sources including text files into a pre-defined  
Warehouse schema.
8. 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.
9. 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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**IV Semester**

**MC 4.8 MOBILE APPLICATION DEVELOPMENT LAB**

1. Write A J2ME Program To Insert An Image In A Canvas.
2. Write A J2ME To Create A Midlet Suite Using Two Midlets.
3. Write A J2ME Program To Create SMS Using Forms
4. Write A J2ME Program To Respond To Command Events
5. Write A J2ME Program To Validate Mobile Number.
6. Write A J2ME Program To Draw An Immutable Image On Canvas.
7. Write Programs For Developing All The Above Using Android.

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V Semester

**5.1 MOBILE COMMERCE**

**UNIT I****ELECTRONIC COMMERCE**

Traditional commerce and E-commerce – Internet and WWW – Role of WWW – Value Chains – Strategic Business And Industry Value Chains – Role of E-commerce. Packet Switched Networks – TCP/IP Protocol Script – Internet Utility Programmes – SGML, HTML And XML – Web Client And Servers – Web Client/Server Architecture – Intranet And Extranets – Web Based Tools For E-commerce – Security.

**UNIT II****MOBILE COMMERCE**

Introduction – Infrastructure of M-Commerce – Types Of Mobile Commerce Services – Technologies Of Wireless Business – Benefits And Limitations, Support, Mobile Marketing & Advertisement, Non- Internet Applications In M-Commerce – Wireless/Wired Commerce Comparisons.

**UNIT III****MOBILE COMMERCE: TECHNOLOGY**

A Framework For The Study Of Mobile Commerce – NTT Docomo's I-Mode – Wireless Devices For Mobile Commerce – Towards A Classification Framework For Mobile Location Based Services – Wireless Personal And Local Area Networks –The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks.

**UNIT IV****MOBILE COMMERCE: THEORY AND APPLICATIONS**

The Ecology Of Mobile Commerce – The Wireless Application Protocol – Mobile Business Services – Mobile Portal – Factors Influencing The Adoption of Mobile Gaming Services – Mobile Data Technologies And Small Business Adoption And Diffusion – E-commerce in The Automotive Industry – Location- Based Services: Criteria For Adoption And Solution Deployment – The Role of Mobile Advertising In Building A Brand – M-commerce Business Models.

**UNIT V****BUSINESS- TO- BUSINESS MOBILE E- COMMERCE**

Enterprise Enablement – Email and Messaging – Field Force Automation (Insurance, Real Estate, Maintenance, Healthcare) – Field Sales Support (Content Access, Inventory) – Asset Tracking and Maintenance/Management – Remote IT Support – Customer Retention (B2C Services, Financial, Special Deals) – Warehouse Automation – Security.

**TEXT BOOKS:**

1. E.Brian Mennecke, J.Troy Strader, "Mobile Commerce: Technology, Theory and Applications", Idea Group Inc., IIR press, 2003.
2. Ravi Kalakota, B.Andrew Whinston, "Frontiers of Electronic Commerce", Pearson Education, 2003.

**REFERENCE BOOKS :**

1. P. J. Louis, "M-Commerce Crash Course", McGraw- Hill Companies February 2001.
2. Paul May, "Mobile Commerce: Opportunities, Applications, and Technologies Of Wireless Business" Cambridge University Press March 2001.

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III Year MCA

V Semester

**MC 5.2 MULTIMEDIA 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.

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

**UNIT III**

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

**Application Development:** An OOP Application Frame work, Using Components with Action Script Movie Clip Subclasses.

**UNIT IV**

**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, and Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

**UNIT V**

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

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 Mook, 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.

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III Year MCA

V Semester

**MC 5.3 NETWORK SECURITY AND CRYPTOGRAPHY**

**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  
Classical Encryption Techniques, DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operation, Symmetric Ciphers Triple DES, Blowfish, AES, and RC4 Conventional Encryption Placement of Encryption Function, Traffic Confidentiality, key Distribution, Random Number Generation.

**UNIT II**

Public key Cryptography Principles, RSA algorithm, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography  
Message authentication and Hash Functions Authentication Requirements and Functions, Message Authentication, Hash Functions and MACs Hash and MAC Algorithms SHA-512, Whirlpool, HMAC, CMAC

**UNIT III**

Digital Signatures and Authentication Protocols Digital Signatures, Authentication Protocols, Digital signature Standards Authentication Applications Kerberos, X.509 Directory Authentication Service Email Security Pretty Good Privacy (PGP) and S/MIME.

**UNIT IV**

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management  
Web Security Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

**UNIT V**

Intruders, Viruses and Worms Intruders, Viruses and related threats Firewalls: Firewall Design Principles, Trusted Systems, Intrusion Detection Systems

**TEXT BOOKS:**

1. Cryptography and Network Security (principles and approaches) by William Stallings Pearson Education.

**REFERENCE BOOKS:**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Cryptography and Security by C K Shyamala, N. Harini, Dr T R Padmanabhan, Wiley India
3. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
4. Principles of Information Security, Whitman, Thomson.
5. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
6. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
7. Introduction to Cryptography, Buchmann, Springer.

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III Year MCA

V Semester

**MC 5.4.1 SOFTWARE PROJECTMANAGEMENT (Elective–II)**

**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. **Model based software architectures:** A Management perspective and technical perspective. **Work Flows of the process:** Software process workflows, Iteration workflows.

**UNIT IV**

**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.

**Project Organizations and Responsibilities:** Line-of-Business Organizations, Project Organizations, evolution of Organizations. **Process Automation:** Automation Building blocks, The Project Environment.

**UNIT V**

**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 discriminates.

**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:**

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

**REFERENCE BOOKS:**

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005.

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III Year MCA

V Semester

**MC 5.4.2 WEB SERVICES (Elective – II)****UNIT I**

**Evolution and Emergence of Web Services** - Evolution of distributed computing, Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA).

**UNIT II**

**Introduction to Web Services** – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services - **Web Services Architecture** – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services, developing web services enabled applications.

**UNIT III**

**Core fundamentals of SOAP** – SOAP Message Structure, SOAP encoding , SOAP message exchange models, SOAP communication and messaging, SOAP security - **Developing Web Services using SOAP** – Building SOAP Web Services, developing SOAP Web Services using Java, limitations of SOAP.

**UNIT IV**

**Describing Web Services** – WSDL – WSDL in the world of Web Services, Web Services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL Tools, limitations of WSDL - **Discovering Web Services** – Service discovery, role of service discovery in a SOA, service discovery mechanisms, UDDI – UDDI Registries, uses of UDDI Registry, Programming with UDDI, UDDI data structures, support for categorization in UDDI Registries, Publishing API, Publishing information to a UDDI Registry, searching information in a UDDI Registry, deleting information in a UDDI Registry, limitations of UDDI.

**UNIT V**

**Web Services Interoperability** – Means of ensuring Interoperability, Overview of .NET and J2EE. **Web Services Security** XML security frame work, XML encryption, XML digital signature, XKMS structure, guidelines for signing XML documents.

**TEXT BOOKS:**

1. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India, 2008.
2. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education, 2008.
3. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.

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## III Year MCA

## V Semester

**MC 5.4.3 INFORMATION RETRIEVAL SYSTEMS (Elective – II)****UNIT I**

Definition, objectives, functional overview, Relationship to DBMS, Digital libraries, DataWarehouse. Information Retrieval System Capabilities: Search , browse, Miscellaneous.

**UNIT II**

Retrieval strategies: vector space model, probabilistic retrieval strategies, extended Boolean retrieval, LSI, fuzzy set Retrieval,[2]Cross language information retrieval: Introduction, cross language barrier, Cross –language Retrieval strategies, Cross language utilities.

**UNIT III**

Efficiency: Inverted Index, Query processing, Signature files, Duplicate document Detection Integrated structured data and text: IR as a relational application, semi structured search using a relational scheme, multi-dimensional data model, mediators.

**Unit IV**

Text Search Algorithms: Introduction, software Text search algorithms, Hardware Text search algorithms.

**UNIT V**

Multi-media information retrieval: Spoken language audio retrieval, Non-speech audio retrieval, graph retrieval, image retrieval, video retrieval Parallel information retrieval: Text Scanning, indexing, clustering and classification, Distributed information retrieval: A theoretical model of Distributed retrieval, Result fusion.

**TEXT BOOKS:**

1. Information storage and retrieval systems: Theory and implementation IInd edition: springer publishers,Gerald J.Kowalski mark T.Maybury
2. Information Retrieval: algorithms and heuristics IInd edition, springer publishers.David A .Grossman ,Ophir frieder.

**REFERENCE BOOKS:**

1. Information Retrieval systems: Yates pearsoned education.
2. Modern information retrieval ; frakes pearsoned education.
3. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
4. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
5. Modern Information Retrival By Yates Pearson Education.
6. Information Storage & Retieval By Robert Korfhage – John Wiley & Sons.

III Year MCA

V Semester

**MC 5.5.1 SOFTWARE TESTING AND QUALITY ASSURANCE  
(ELECTIVE – III)****UNIT I**

Software Testing Strategy and Environment: Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing. Software Testing Methodology Defects hard to find, verification and validation, functional and structural testing, workbench concept, eight considerations in developing testing methodologies, testing tactics checklist.

**UNIT II**

Software Testing Techniques :Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing. Software Testing Tools :Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, JMetra, JUNIT and Cactus.

**UNIT III**

Testing Process :Eleven Step Testing Process: Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes, Evaluate Test Effectiveness. Testing Specialized Systems and Applications Testing Client/Server – Web applications, testing off the Shelf Components, Testing Security, Testing a Data Warehouse

**UNIT IV**

Software Quality Assurance Framework and Standards SQA Framework: What is Quality? Software Quality Assurance, Components of Software Quality Assurance – Software Quality Assurance Plan: Steps to develop and implement a Software Quality Assurance Plan – Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma.

**UNIT V**

Software Quality Assurance Metrics and Measurement Software Quality Metrics: Product Quality metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metric Programs – Software Quality metrics methodology: Establish quality requirements, Identify Software quality metrics, implement the software quality metrics, analyze software metrics results, validate the software quality metrics – Software quality indicators – Fundamentals in Measurement theory.

**TEXT BOOKS:**

1. Effective Methods for Software Testing, 2nd Edition, William E. Perry , Second Edition, Wiley India, 2006.

2. Software Quality, Mordechai Ben-Menachem/Garry S. Marliss, Thomson Learning publication, 1997.

**REFERENCE BOOKS:**

1. Software Testing Tools, K.V.K.K. Prasad, Dream tech press, 2008.
2. Practical Software Testing, Ilene Burnstein, Springer, 2003.
3. Software Testing, Srinivasan Desikan & Gopaldaswamy Ramesh, Pearson Education, 2006.
4. Software testing techniques, Scott Loveland & Geoffrey Miller, Shroff Publishers, 2005.
5. Software testing, Ron Patton, second edition, Pearson Education, 2004.
6. Software Quality, Martin Wieczorek & Dirk Meyerhoff, Springer, 2001.
7. Software Testing: A Craftsman's approach, Paul C. Jorgensen, Second edition, CRC press, 2002.

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**MC 5.5.2 WEB MINING (ELECTIVE – III)**

**UNIT I**

Introduction to Web Data Mining and Data Mining Foundations Introduction – World Wide Web (WWW), A Brief History of the Web and the Internet, Web Data Mining-Data Mining, Web Mining.

Data Mining Foundations – Association Rules and Sequential Patterns – Basic Concepts of Association Rules, Apriori Algorithm- Frequent Itemset Generation, Association Rule Generation, Data Formats for Association Rule Mining, Mining with multiple minimum supports – Extended Model, Mining Algorithm, Rule Generation, Mining Class Association Rules, Basic Concepts of Sequential Patterns, Mining Sequential Patterns on GSP, Mining Sequential Patterns on PrefixSpan, Generating Rules from Sequential Patterns.

**UNIT II**

Supervised and Unsupervised Learning Supervised Learning - Basic Concepts, Decision Tree Induction – Learning Algorithm, Impurity Function, Handling of Continuous Attributes, Classifier Evaluation, Rule Induction – Sequential Covering, Rule Learning, Classification Based on Associations, Naïve Bayesian Classification, Naïve Bayesian Text Classification - Probabilistic Framework, Naïve Bayesian Model.

Unsupervised Learning – Basic Concepts, K-means Clustering – K-means Algorithm, Representation of Clusters, Hierarchical Clustering – Single link method, Complete link Method, Average link method, Strength and Weakness. Web Mining

**UNIT III**

Information Retrieval and Web Search Basic Concepts of Information Retrieval, Information Retrieval Methods - Boolean Model, Vector Space Model and Statistical Language Model, Relevance Feedback, Evaluation Measures, Text and Web Page Preprocessing – Stopword Removal, Stemming, Web Page Preprocessing, Duplicate Detection, Inverted Index and Its Compression – Inverted Index, Search using Inverted Index, Index Construction, Index Compression, Latent Semantic Indexing – Singular Value Decomposition, Query and Retrieval, Web Search, Meta Search, Web Spamming.

**UNIT IV**

Link Analysis and Web Crawling Link Analysis - Social Network Analysis, Co-Citation and Bibliographic Coupling, Page Rank Algorithm, HITS Algorithm, Community Discovery-Problem Definition, Bipartite Core Communities, Maximum Flow Communities, Email Communities.

Web Crawling – A Basic Crawler Algorithm- Breadth First Crawlers, Preferential Crawlers, Implementation Issues – Fetching, Parsing, Stopword Removal, Link Extraction, Spider Traps, Page Repository, Universal Crawlers, Focused Crawlers, Topical Crawlers, Crawler Ethics and Conflicts.

**UNIT V**

Opinion Mining and Web Usage Mining, Opinion Mining - Sentiment Classification – Classification based on Sentiment Phrases, Classification Using Text Classification Methods, Feature based Opinion Mining and Summarization – Problem Definition, Object feature extraction, Feature Extraction from Pros and Cons of Format1, Feature Extraction from Reviews of Format 2 and 3, Comparative Sentence and Relation Mining, Opinion Search and Opinion Spam.

Web Usage Mining - Data Collection and Preprocessing- Sources and Types of Data, Key Elements of Web usage Data Preprocessing, Data Modeling for Web Usage Mining, Discovery and Analysis of Web usage Patterns -Session and Visitor Analysis, Cluster Analysis and Visitor Segmentation, Association and Correlation Analysis, Analysis of Sequential and Navigation Patterns.

**TEXT BOOKS :**

1. Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data by Bing Liu (Springer Publications).

**REFERENCE BOOKS:**

1. Data Mining: Concepts and Techniques, Second Edition Jiawei Han, Micheline Kamber (Elsevier Publications)
2. Web Mining: Applications and Techniques by Anthony Scime
3. Mining the Web: Discovering Knowledge from Hypertext Data by **Soumen Chakrabarti**

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**MC 5.5.3 ETHICAL HACKING (ELECTIVE – III)**

**UNIT I****Introduction to Ethical Hacking, Ethics, and Legality:**

Ethical Hacking Terminology, Different Types of Hacking Technologies, Different Phases Involved in Ethical Hacking and Stages of Ethical Hacking: Passive and Active Reconnaissance, Scanning, Gaining Access, Maintaining Access, Covering Tracks, Hacktivism, Types of Hacker Classes, Skills Required to Become an Ethical Hacker, Vulnerability Research, Ways to Conduct Ethical Hacking, Creating a Security Evaluation Plan, Types of Ethical Hacks, Testing Types, Ethical Hacking Report

**Foot printing and Social Engineering:**

Foot printing , Information Gathering Methodology, Competitive Intelligence ,DNS Enumeration Who is and ARIN Lookups, Types of DNS Records, Trace route, E-Mail Tracking , Web Spiders, Social Engineering, Common Types Of Attacks, Insider Attacks, Identity Theft, Phishing Attacks, Online Scams, URL Obfuscation, Social-Engineering Countermeasures.

**UNIT II****Scanning and Enumeration:**

Scanning, types of Scanning , CEH Scanning Methodology ,Ping Sweep Techniques, Nmap Command Switches, SYN, Stealth, XMAS, NULL, IDLE, and FIN Scans, TCP Communication Flag Types, War-Dialing Techniques, Banner Grabbing and OS Fingerprinting Techniques, Proxy Servers, Anonymizers , HTTP Tunneling Techniques, IP Spoofing Techniques, Enumeration, Null Sessions, SNMP Enumeration, Windows 2000 DNSZone Transfer, Steps Involved in Performing Enumeration.

**UNIT III****System Hacking:**

Understanding Password-Cracking Techniques, Understanding the LanManager Hash Cracking Windows 2000 Passwords, Redirecting the SMB Logon to the Attacker SMB Redirection, SMB Relay MITM Attacks and Countermeasures NetBIOS DoS Attacks, Password-Cracking Countermeasures, Understanding Different Types of Passwords Passive Online Attacks, Active Online Attacks, Offline Attacks Nonelectronic Attacks, Understanding Key loggers and Other Spyware Technologies Understand Escalating Privileges, Executing Applications, Buffer Overflows, Understanding Root kits Planting Root kits on Windows 2000 and XP Machines, Root kit Embedded TCP/IP Stack Root kit Countermeasures, Understanding How to Hide Files, NTFS File Streaming NTFS Stream Countermeasures, Understanding Steganography Technologies, Understanding How to Cover Your Tracks and Erase Evidence, Disabling Auditing, Clearing the Event Log.

**UNIT IV****Trojans, Backdoors, Viruses, and Worms:**

Trojans and Backdoors, Overt and Covert Channels, Types of Trojans, Reverse-Connecting Trojans, Netcat Trojan, Indications of a Trojan Attack, Wrapping, Trojan Construction Kit and Trojan Makers, Countermeasure Techniques in reverting Trojans, Trojan-Evading

Techniques, System File Verification Sub objective to Trojan Countermeasures Viruses and Worms, Difference between a Virus and a Worm, Types of Viruses, Understand Antivirus Evasion Techniques, Understand Virus Detection Methods

### **Sniffers**

Protocols Susceptible to Sniffing, Active and Passive Sniffing, ARP Poisoning, Ethereal Capture and Display Filters, MAC Flooding, DNS Spoofing Techniques, Sniffing Countermeasures

### **Denial of Service and Session Hijacking**

Denial of Service, Types of DoS Attacks, DDoS Attacks, BOTs/BOTNETs, "Smurf" Attack, "SYN" Flooding, DoS/DDoS Countermeasures, Session Hijacking, Spoofing vs. Hijacking, Types of Session Hijacking, Sequence Prediction, Steps in Performing Session Hijacking, Prevention of Session Hijacking.

## **UNIT V**

**Hacking Web Servers, Web Application Vulnerabilities, and Web-Based Password Cracking Technique** shacking Web Servers, Types of Web Server Vulnerabilities, Attacks against Web Servers, IIS Unicode Exploits, Patch Management Techniques, Web Server Hardening Methods Web Application Vulnerabilities, Objectives of Web Application Hacking, Anatomy of an Attack, Web Application Threats, Google Hacking, Web Application Countermeasures Web-Based Password Cracking Techniques, Authentication Types, Password Cracker, Password Attacks: Classification, Password-Cracking Countermeasures

### **SQL Injection and Buffer Overflows**

SQL Injection, Steps to Conduct SQL Injection, SQL Server Vulnerabilities, SQL Injection Countermeasures Buffer Overflows, Types of Buffer Overflows and Methods of Detection, Stack-Based Buffer Overflows, Buffer Overflow Mutation Techniques

### **Linux Hacking**

Linux Basics, Compile a Linux Kernel, GCC Compilation Commands, Install Linux Kernel Modules, Linux Hardening Methods.

### **TEXT BOOKS:**

1. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition.

### **REFERENCE BOOKS:**

1. Hacking Exposed Web 2.0, by Rich Annings, Himanshu Dwivedi, Zane Lackey, Tata Mcgraw hill Edition.
2. Ethical Hacking & Network Defense, Michael T. Simpson edition
3. Hacking Exposed Windows, Joel Scambray, cissp, Stuart McClure, Cissp, Third Edition, Tata Mcgraw hill edition
4. Hacking Exposed Window server 2003, Joel Scambray Stuart McClure, Tata Mcgraw hill edition.

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**MC 5.6 NETWORK SECURITY AND CRYPTOGRAPHY LAB**

1. Write a program that can encrypt and decrypt using Ceaser Cipher.  
Assume the key value  $K = 5$ .
2. Write a program to encrypt and decrypt using a 2 X 2 Hill Cipher.
3. Write a program that can encrypt and decrypt using a transposition technique, key value  $k = 4312567$ .
4. Write a program that can encrypt and decrypt using simple DES.
5. Using any one of the key management technique, write a program so that the sender and the receiver have the same secret key (Symmetric key encryption).
6. Write an RSA program for generating the public and private key, and for encrypting and decrypting the given plain text.
7. Write a Diffie-Hellman key exchange program for generating the public and private key.



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**MC 5.7.MULTIMEDIA APPLICATION DEVELOPMENT LAB**

1. Assigning Actions to an object
2. Assigning actions to a button
3. Mouse Events
4. Detecting the player version
5. Detecting the Operating System
6. Checking the System Language
7. Detecting Display Settings
8. Tinting a Movie Clip's Color
9. Controlling a Movie Clip's Color with Sliders
10. Drawing a Rectangle
11. Filling a Shape with a Gradient
12. Scripting Masks
13. Converting Angle Measurements
14. Calculating the Distance Between Two Points
15. Formatting Currency Amounts
16. Converting Between Units of Measurement
17. Sorting or Reversing an Array
18. Creating a Text Field
19. Making a Password Input Field