

VERY IMPORTANT INSTRUCTIONS:
Kindly refer the official communication of the
University in the
B.A. R&S file .

UNIVERSITY OF MADRAS
DEGREE OF MASTER OF COMPUTER APPLICATIONS (M.C.A.)

Choice Based Credit System
REVISED REGULATIONS
(Effective from the academic year 2008-2009 onwards)

1. Eligibility for Admission

Candidate who has passed the under-mentioned degree examinations of this University or an examination of other institution recognized by this University as equivalent thereto provided they have undergone the course under 10+2+3 or 11+1+3 or 11+2+2 pattern or under the Open University System, shall be eligible for admission to the M.C.A. Degree Course.

(a) B.C.A/B.E.S/B.Sc. in Computer Science/Mathematics/Physics/ Statistics / Applied Sciences OR (b) B.Com / Bachelor of Bank Management/B.B.A/B.L.M/B.A Corporate Secretaryship / B.A. Economics/ any other Bachelor's Degree in any discipline with Business Mathematics and Statistics or Mathematics/Statistics in Main/Allied level OR (c) B.Sc. Chemistry with Mathematics and Physics as allied subjects OR (d) B.E/B.Tech./M.B.A OR (e) A Bachelor's Degree in any discipline with Mathematics as one of the subjects at the Higher Secondary level (i.e. in +2 level of the 10+2 pattern)

2. Duration of the Course

The Course duration shall be three years consisting of six semesters. In order to be eligible for the award of the degree the candidate shall successfully complete the course in a maximum period of five years reckoned from the date of enrolment for the first semester of the course.

3. Structure of the Course and Evaluation Pattern

The duration of University examination for theory and practical subjects shall be 3 hours. The maximum mark for each theory is 100 with 25 for Internal Assessment(IA) and 75 for University Examination. The distribution of internal marks for theory papers shall be: Two tests out of three - 15 marks, Attendance – 5 marks, and Assignment/Seminar - 5 marks. The maximum mark for each practical is 100 with 40 for Internal Assessment and 60 for University Examination. The distribution of internal marks for practical papers shall be: Practical tests Two out of three - 30 marks, Attendance – 5 marks, and Record - 5 marks. For project work the marks assigned shall be

Internal Two out of three presentations 20 marks

Project report
Viva-voce

60 marks
20 marks

For the conduct of University Examinations in Practical subjects the University will appoint one external examiner one internal examiner who shall normally be the concerned practical in-charge. The University will set the questions and distribute to the colleges. The examiners will conduct the examinations and award the marks on the same day and forward to the University. The College Principal/Head of the department will coordinate and provide the laboratory and other facilities for conducting the examination.

Project work shall be carried out individually in an R&D section of any Industry or University or in the Institute in which the candidate is studying. The Project Work/Dissertation report shall be submitted through the guides/supervisors to the Head of the Department and then to the University not later than 31st May/31st December. If he/she fails to submit the Project Work/Dissertation within the stipulated date for a particular semester, he/she may be permitted with the approval of the Head of the Department to submit the Project Work/Dissertation report during the succeeding semesters, within the maximum period of **FIVE** years from the date of admission to the first semester. Project/Dissertation evaluation and Viva-Voce shall be conducted by one external examiner and one internal examiner who shall normally be the project guide.

List of courses, Scheme of evaluation and their associated credits are given below:

First Semester

S.No.	Course components	Name of Course	Credits	Exam. Duration	Max. Marks	
					IA*	UE*
1	Core-1	Programming in C and Unix	4	3	25	75
2	Core-2	Digital Computer Fundamentals	4	3	25	75
3	Core-3	System Software	4	3	25	75
4	Core-4	Practical – I: Programming in C	2	3	40	60
5	Core-5	Practical –II: Unix and Shell Programming	2	3	40	60
6	Non-Major Elective-1	Mathematics for Computer Science	4	3	25	75
7	SoftSkill-1		2	3		

* IA = Internal Assessment, UE = University Examination

Second Semester

S.No.	Course components	Name of Course	Credits	Exam. Duration	Max. Marks	
					IA	UE
8	Core-6	Microprocessors and its Applications	4	3	25	75
9	Core-7	Object Oriented Programming with C++	4	3	25	75
10	Core-8	Data Structures	4	3	25	75

11	Core-9	Practical – III: Data Structures using C++ Lab	2	3	40	60
12	Core-10	Practical – IV: Microprocessor Lab	2	3	40	60
13	Non Major Elective- 1	Statistical Methods	4	3	25	75
	Soft Skill-2		2	3		

4. Passing Requirements

a) For all subjects the passing requirement is as follows: i) candidate secures not less than 50% of marks in University examination(U.E.) and not less than 50% in aggregate of the total maximum marks prescribed in each theory & practical, and in Project work minimum 50% each in dissertation and Viva-Voce examination and not less than 50% in aggregate of the total maximum marks prescribed, shall be declared to have passed in the respective subject.

b) A candidate who passes in all subjects and in the project work earning 135 credits(including soft Skills and Internship) within the maximum period of five years reckoned from the date of admission to the course shall be declared to have qualified for the degree.

c) The relative overall performance of the candidate shall be determined by the overall percentage of Marks obtained in all subjects evaluated as follows:

$$WAM = \frac{\text{Sum of all (marks obtained X Credit)}}{\text{Sum of all (maximum marks X Credit)}} = \frac{\sum M_i * C_i}{\sum C_i}$$

where M_i is the mark obtained in the i^{th} subject with credit C_i .

This score shall be entered in the transcript given to the candidate on successful completion of the course calculated to two decimal points.

5. Classification of successful candidates

(a) A Candidate who qualifies for the Degree and secures **WAM** of not less than 75% shall be declared to have passed the examination in **FIRST CLASS WITH DISTINCTION** provided he/she has passed the examination in every subject he/she has registered as well as in the project work in the first appearance.

(b) A candidate who qualifies for the degree as per the regulations for passing requirements and secures a weighted average of not less than 60% shall be declared to have passed the examination in **FIRST CLASS**.

(c) All other successful candidates shall be declared to have passed in **SECOND CLASS**.

(d) Only those candidates who have passed all the papers including practical and project work in the first appearance shall be considered for the purpose of **RANKING**.

6. Procedure in the event of failure

- (a) If a candidate fails in a particular subject (other than Project work) he/she may reappear for the University examination in the subject in subsequent semesters and obtain passing marks.
- (b) In the event of failure in Project Work, the candidate shall reregister for Project Work and redo the Project Work in a subsequent semester and resubmit the dissertation afresh for evaluation. The internal assessment marks shall be freshly allotted in this case.

7. Attendance

A candidate who has attendance of less than 75% overall in a semester shall not be permitted to take the University examination. However, it shall be open to the Academic Dean/Principal to grant exemption to a candidate if he/she possess 65% or more attendance but less than 75% after paying the required condonation fee to the University for valid reasons and such exemptions should not under any circumstances be granted for attendance below 65%. Candidates who have less than 65% and those who have less than 75% but have not got the exemption as above, has to repeat the semester from the next academic year.

8. Grading system

In addition to the above marking system, grading system is also adopted as detailed below:

- (a) The marks (sum of IA and UE marks) in each course is assigned with a letter grade on a five point scale using the following letter grade, grade points and ranges of marks.

Grade	Grade Points	Ranges of Marks
O	5	75% and above
A	4	60% and less than 75%
B	3	55% and less than 60%
C	2	50% and less than 55%

- (b) The letter grades are converted into grade points. The grade points of a particular course are multiplied by the credit points assigned to the course. The weighted grade points for all the courses prescribed in the Regulations are added and divided by the total credit points to arrive at overall grade point average (OGPA) rounded up to two decimal points.

$$\text{OGPA} = \frac{\sum c_i * g_i}{\sum c_i}$$

where c_i is the credit, g_i is the grade obtained in that paper, the sum is to be taken over all subjects.

9. Provision for Lateral Admission

Candidates with PGDCS of this University or any other University as equivalent thereto, provided he/she satisfies the eligibility condition as above, shall be admitted to the Second year of the M.C.A. Degree Course.

PATTERN OF QUESTION PAPER (THEORY)

Time 3 hours

Max Marks 75

Part - A: (50 words) 10 simple questions (10 x 1 = 10 Marks)

At least two questions from each unit.

Part – B: (200 words) 5 Out of 7 questions (5 x 5 = 25 Marks)

At least one question from each unit.

Part –C: (500 words) 4 Out of 6 questions (4 x 10 = 40 Marks)

At least one question from each unit.

PATTERN OF QUESTION PAPER (PRACTICAL)

Time: 3 Hours

Max: 60 Marks.

One compulsory problem (may contain subdivisions) to be solved within 3 hours.

UNIVERSITY OF MADRAS
DEGREE OF MASTER OF
COMPUTER APPLICATIONS (M.C.A.)
 REVISED SYLLABUS
 (Effective from the academic year 2008-2009 onwards)

Title of the Course/ Paper	Programming in C and Unix		
Core - 1	I Year & First Semester	Credit: 4	
Objective of the course	This course introduces the basic programming concepts and fundamentals of Unix		
Course outline	Unit 1: Basic Elements of C – Data Types – Operator – Control Statements – Branching, Looping, Nested Control Structures – Prototypes and Functions – Parameter Passing Methods – Recursion – Storage Classes – Library Functions – Arrays – Passing Arrays to Functions – Multi-Dimensional Arrays – Strings Operations – Enumerated Data Types.		
	Unit-2: Structures – User Defined Data Types – Union - Nested Structure, Passing Structures to Functions – Pointer Concept – Declaration – Accessing Variable through Pointer – Initializing Pointer Variable – Pointers and Functions – Pointers and Arrays – Pointers and Structures – Example Programs using Pointers with Function, Arrays and Structures – Command Line Arguments – Self Referential Structures.		
	Unit 3: Dynamic Memory Allocation – Operations on Pointers – Singly Linked List – Creation, Insertion and Deletion of Elements – Stack and Queue implementation using Linked List – Concept of Streams – File Handling - File Pointer – High Level File Operations – Opening and Closing of File – Creating, Processing and Updation on Files – Simple File Handling Programs.		
	Unit-4: Introduction to Unix – Unix Components – Unix Files – File Attributes and Permission – Standard I/O – Redirection – Pipes and Filters – Grep and Stream Editor – Process and Signal Commands		
	Unit-5 : Shell Programming – Shell Variables – Export, Read, Exit Commands – Control Structures – Arithmetic in Shell Programming – Debugging Scripts – Structure of an AWK Script – AWK Control Structures – Functions in AWK – Executing AWK Scripts with the Shell.		

1. Recommended Texts

- (i) B. W. Kernighan and D. M. Ritchie, 1990, The C Programming Language, Second Edition, PHI, New Delhi.
- (ii) M.G. Venkateshmurthy, 2005, Introduction to Unix & Shell Programming, Pearson Education India, Delhi.

2. Reference Books

- (i) A. N. Kanthane, 2005, Programming with ANSI and Turbo C, Pearson Education,

- Delhi.
- (ii) J. R. Hanly and E. B. Koffman, 2005, Problem solving and program design in C, Fourth Edition, Pearson Education India.
 - (iii) B. A. Fozougar, R. Failberg, 2003, Unix and Shell Programming, Thomson

Title of the Course/ Paper	Digital Computer Fundamentals		
Core - 2	I Year & First Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of digital computer		
Course outline	Unit 1: Number System – Converting numbers from one base to another – Complements – Binary Codes – Integrated Circuits – Boolean algebra – Properties of Boolean algebra – Boolean functions – Canonical and Standard forms – Logical Operations – Logic gates – Karnaugh Map up to 6 variables – Don't Care Condition – Sum of Products and Products of Sum simplification – Tabulation Method.		
	Unit-2: Adder – Subtractor – Code Converter – Analyzing a combinational Circuit – Multilevel NAND and NOR circuits – Properties of XOR and equivalence functions – Binary Parallel Adder – Decimal Adder – Magnitude Comparator – Decoders – Multiplexers – ROM – PLA.		
	Unit 3: Flip Flops – Triggering of flip-flops – Analyzing a sequential circuit – State reduction – excitation tables – Design of sequential circuits – Counters – Design with state equation – Registers – Shift Registers – Ripple and synchronous Counters.		
	Unit-4: Memory Unit – Bus Organization – Scratch Pad memory – ALU – Design of ALU – Status Register – Effects of Output carry – Design of Shifter – Processor Unit – Microprogramming – Design of specific Arithmetic Circuits		
	Unit-5 : Accumulator – Design of Accumulator – Computer Configuration – Instruction and Data formats – Instruction sets – Timing and Control – Execution of Instruction – Design of Computer – Hardwired control – PLA Control and Microprogram control		

1. Recommended Texts

- (i) M. Morris Mano, 1994, Digital Logic and computer Design, PHI, New Delhi.

2. Reference Books

- (i) M. M. Mano and C.R.Kime, 2001, Logic and Computer Design Fundamentals, 2nd Edn, Pearson Education, Delhi.
- (ii) Givone, 2002, Digital Principles Design, Tata McGraw Hill, New Delhi.
- (iii) C. H. Roth , Jr, 2005, Fundamentals of Logic Design ,5th Edition, Thomson Learning, Singapore.

Title of the Course/ Paper	System Software		
Core -3	I Year & First Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts language processors required for computing related applications.		
Course outline	Unit 1: Language processors – Language processing activities and fundamentals – Language specification – Development Tools – Data Structures for Language processing- Scanners and Parsers.		
	Unit 2: Assemblers: Elements of Assembly language programming - Overview of the Assembly process - Design of a Two-pass Assembler - A single pass Assembler for the IBM PC.		
	Unit 3: Macros and Macro processors – Macro definition, call , and expansion – Nested macro calls – Advanced macro facilities - Design of a macro preprocessor - Compilers: Aspects of compilation .		
	Unit 4: Compilers and Interpreters – Memory allocation - Compilation of Expressions and Control structures - Code optimization – Interpreters.		
	Unit 5 : Linkers: Linking and Relocation concepts – Design of a linker – Self relocating Programs – A linker for MS DOS - Linking for over-lays – loaders - Software tools: Software tools for program development - Editors - Debug monitors - Programming environments – User interfaces.		

1. Recommended Texts

- (i) D. M. Dhamdhere, 1999, Systems Programming and Operating Systems, Second Revised Edition, Tata McGraw-Hill, New Delhi.

2. Reference Books

- (i) L. L. Beck, 1996, System Software An Introduction to System Programming, 3rd edition, Addison-Wesley.

Title of the Course/ Paper	Practical – I: Programming in C		
Core -4	I Year & First Semester	Credit: 2	
Objective of the course	This course gives practical training on Programming in C.		
course outline	<ol style="list-style-type: none"> 1. Determining a given number is prime or not. 2. Pascal's triangle 3. String Manipulation 4. Matrix multiplication 5. Finding determinant of a Matrix 6. Checking for tautologies and Contradictions. 7. Euclidean's Algorithm for finding GCD (Towers of Honai). 8. Creating database for telephone numbers and related operations. Use file concepts. 		

	<p>9. Creating database for Mailing addresses and related operations. Use structures.</p> <p>10. Creating database for web page addresses and related operations. Use pointers.</p> <p>11. File Processing.</p> <p>12. Finding roots of equations: Bisection Method.</p> <p>13. Finding roots of Equations: Newton-Raphson Method.</p> <p>14. Finding roots of Equations: Secant Method.</p> <p>15. Solving algebraic equations: Gauss Elimination Method.</p>
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Title of the Course/ Paper	Practical –II: Unix and Shell Programming		
Core -5	I Year & First Semester	Credit: 2	
Objective of the course	This course gives practical training on Unix and Shell Programming.		
Course outline	<ol style="list-style-type: none"> 1. Write a script that asks for the user's age. If it is equal to or higher than 18, print a message saying that this user is allowed to drive any vehicle. If the user's age is below 16, print a message telling the user how many years he or she has to wait before legally being allowed to drive. 2. Use an if/then/else construct that prints information about the current month. The script should print the number of days in this month, and give information about leap year if the current month is February. 3. Check whether the given number is Armstrong / prime / perfect or not. 4. Accepts any number of arguments and prints them in the reverse order. 5. Write a script that does the following: <ol style="list-style-type: none"> a. display the name of the script being executed. b. Display the first, third and tenth argument given to the script. c. Display the total number of arguments passed to the script. d. If there were more than three positional parameters, use shift to move all the values 3 places to the left. e. Print all the values of the remaining arguments. f. Print the number of arguments . <p>Note: test with zero, one, three and over ten arguments.</p> 		

	<ol style="list-style-type: none"> 6. Design a menu driven program for rename, remove and copy commands. 7. Check whether the given user has logged in or not. 8. To check file permissions (read/write/execute/exit) and file types (file / directory /size zero) 9. Write a program to get the input from the user whether to read the unread system information or whether to read the already read system information and display all the system information page by page. (using news command-The news command allows a user to read news items published by the system administrator). 10. write a program to get two user inputs (filename and whether to download or upload the file. 11. write a program to get two user inputs – the file name and the column no(n). using cat command, list the nth column from mentioned file. 12. Simulate find command. 13. Remove duplicates words from list / file. 14. To process Electricity Billing system using awk command. 15. To prepare salary report for ABC company using awk command.
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Title of the Course/ Paper	Mathematics for Computer Science		
Non Major Elective - 1	I Year & First Semester	Credit: 4	
Objective of the course	This course introduces the basic mathematical concepts and Numerical methods for computing related applications.		
Course outline	Unit 1: Mathematical Logic: Statement Calculus – Connectives – normal forms – Predicate Calculus – Theory of inference for statement Calculus – Predicate Calculus including theory of inference.		
	Unit-2: Set Theory: Basic concepts of set theory – relations and ordering – functions –recursion.		
	Unit 3: Algebraic Structures: Semigroups – monoids- grammars and languages – groups and subgroups – Polish experiments and their compilation.		
	Unit-4: Roots of Equations: Graphical Method – Bisection Method – False-Position Method – Fixed-Point Iteration – Newton-Raphson Method – Secant Method – Roots of Polynomials: Conventional Methods – Muller’s Method – Bairstow’s Method. Algebraic Equations: Gauss Elimination –Gauss-Jordan – LU Decomposition – Matrix Inverse –Gauss-Seidel.		
	Unit-5 : Numerical Differentiation - Integration: Trapezoidal Rule – Simpson’s Rule – Romberg Integration – Differential equations: Taylor’s method – Euler’s method –Runge-Kutta 2 nd and 4 th order methods – Predictor – corrector methods.		

1. Recommended Texts

- (i) J.P. Tremblay and R. Manohar, 1975, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill, New Delhi
- (ii) S.S. Sastri, 1977, Introductory Methods of Numerical Analysis, Prentice Hall India, New Delhi

2. Reference Books

- (i) J. Truss, 1999, Discrete Mathematics for Computer Scientists, 2nd Edn., Addison Wesley, Boston.
- (ii) S. C. Chapra and R. P. Canale, 2002, Numerical Methods for Engineers, Fourth Edition, McGraw Hill International Edition.
- (iii) Kolman, Busby and Ross, 2005, Discrete mathematical structures, 5th edition, PHI, New Delhi.
- (iv) P. Niyogi, 2003, Numerical Analysis and Algorithms, Tata McGraw Hill, New Delhi.

Title of the Course/ Paper	Microprocessors and its Applications		
Core -6	I Year & Second Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of Microprocessors and its applications.		
Course outline	Unit 1: Introduction to 8086 assembly language programming - Development steps – Construction - Writing Programs and Development Tools – Standard program structures – simple Programs – Jumps – While-do – repeat-until- Delay loops.		
	Unit 2: Strings – Procedures – Macros – Instruction Descriptions – Assembler Directives.		
	Unit 3: 8086 Microcomputer – Observing Bus signals – Minimum mode System – Troubleshooting – 8086 interrupts – Interrupt Applications – Programmable timer/Counter – Interrupt Controller.		
	Unit 4: Parallel Ports – Handshaking – Interfacing Digital Devices – Analog Interfacing – Industrial Control.		
	Unit 5 : DMA – DRAMS – Cache Memories – Co-Processors – EDA Tools – 80286 80386 and 80486 microprocessors.		

1. Recommended Texts

- (i) D. V. Hall, 1992, Microprocessors and Interfacing, Programming and Hardware, 2nd Edition, Tata McGraw-Hill, New Delhi.

2. Reference Books

- (i) K. Udaya Kumar and B.S. Uma Shankar, 1998, Advanced Microprocessors and IBM, PC Assembly Language Programming, Tata McGraw-Hill, New Delhi.

- (ii) A. P. Mathur, 1989, Introduction to Microprocessors, 3rd Edn., Tata McGraw-Hill, New Delhi.
- (iii) Yu Cheng Liu & Glenn A Gibson – 2005-Microcomputer Systems 8086/8088 Family- 2nd Edition –PHI- New Delhi

Title of the Course/ Paper	Object Oriented Programming with C++		
Core -7	I Year & Second Semester	Credit: 4	
Objective of the course	This course introduces the basic concepts of Programming in C++ for computing related applications		
Course outline	Unit 1: Introduction to OOP – Overview of C++ - Classes – Structures – Union – Friend Functions – Friend Classes – Inline functions – Constructors – Destructors – Static Members – Scope Resolution Operator – Passing objects to functions – Function returning objects.		
	Unit 2: Arrays – Pointers – this pointer – References – Dynamic memory Allocation – functions Overloading – Default arguments – Overloading Constructors – Pointers to Functions – Ambiguity in function overloading.		
	Unit 3: Operator Overloading – Members Operator Function – Friend Operator Function – Overloading some special operators like [] , () , a and comma operator – Inheritance – Types of Inheritance – Protected members – Virtual base Class – Polymorphism – Virtual functions – Pure virtual functions.		
	Unit 4: Class templates and generic classes – Function templates and generic functions – Overloading function templates – power of templates – Exception Handling – Derived class Exception – overhandling generic functions – Exception handling Functions – terminate () unexpected () – Uncaught – exception ()		
	Unit 5 : Streams – Formatted I/O with ios class functions and manipulators – creating own manipulator – overloading << and >> - File I/O – Name spaces – conversion functions – Array based I/O – Standard Template Library (STL).		

1. Recommended Texts

- (i) H. Schildt, 2003, C++ The Complete Reference, 4th Edition, Tata McGraw-Hill, New Delhi.

2. Reference Books

- (i) J.P. Cohoon and J.W. Davidson, 1999, C++ Program Design – An Introduction to Programming and Object-oriented Design, 2nd Edition, Tata McGraw-Hill, New Delhi.
- (ii) Johnston, 2002, C++ programming today, PHI, New Delhi.
- (iii) A. N Kanthane, 2005, Object Oriented Programming with ANSI & Turbo C++ , Pearson Education, New Delhi.
- (iv) Farrel , 2001, Object Oriented Programming using C++ , 2nd Edition, Thomson Learning, Singa[pore].

Title of the Course/ Paper	Data Structures		
Core -8	I Year & Second Semester	Credit: 4	
Objective of the course	This course introduces the basic data structures for computing related applications.		
Course outline	Unit 1: Abstract data types - asymptotic notations – complexity analysis – Arrays- representation of arrays – operations on arrays – ordered lists – polynomials.		
	Unit-2: Linked lists: Singly linked list- circular linked lists - doubly linked lists – general lists – stacks -queues - circular queues – Evaluation of expressions.		
	Unit 3: Trees – Binary Trees – Binary Tree Traversals – Binary Tree Representations – Binary Search Trees – Threaded Binary Trees – Application of Trees (Sets) – Representation of Graphs – Graph Implementation – Graph Traversals- Application of Graph Traversals- Minimum Cost Spanning Trees – Shortest Path Problem		
	Unit-4: Internal Sorting – Optimal Sorting Time – Sorting Large Objects – Sorting with Tapes- Sorting with Disks.		
	Unit-5 : Hashing – AVL Trees - Red-Black Trees – Splay Trees – B-Trees.		

1. Recommended Texts

- (i) E.Horowitz, S. Sahni and Mehta, 1999, Fundamentals of Data Structures in C++, Galgotia, New Delhi

2. Reference Books

- (i) G. L. Heileman, 1996, Data Structures, Algorithms and Object Oriented Programming, Tata McGraw-Hill, New Delhi.
- (ii) A.V.Aho, J.D. Ullman, J.E. Hopcraft, 1983, Data Structures and Algorithms, Addison Wesley, Boston.
- (iii) S. Sahni , 2001, Data structures , Algorithms & Applications, Tata McGraw-Hill, New Delhi.
- (iv) Yedidyah Langsam Augensteil, Tanenbaum, Data Structures using C and C++ , PHI, New Delhi
- (v) Gilberg , Forouzan, 2002, Data Structures,Thomson Asia, Singapore.

Title of the Course/ Paper	Practical –III: Data Structures using C++ Lab.		
Core -9	I Year & Second Semester	Credit: 2	
Objective of the course	This course helps to implement data structures using C++		

Course outline	<p>For the implementation of the following problems, the students are advised to use all possible object oriented features. The implementation shall not be based on structured concepts</p> <ol style="list-style-type: none"> 1. Implementation of Arrays (Single and Multi-Dimensional) 2. Polynomial Object and necessary overloaded operators. 3. Singly Linked Lists. 4. Circular Linked Lists. 5. Doubly Linked Lists. 6. General Lists. 7. Implementation of Stack (using Arrays) 8. Implementation of Queue (Using Pointers) 9. Implementation of Circular Queue (using Arrays and Pointers) 10. Evaluation of Expressions- ITP (Infix to Prefix). 11. Binary Tree implementations and Traversals using recursion. 12. Binary Search Trees. 13. Shortest path (Dijkstra's) 14. Search methods in graphs (DFS & BFS) using recursion.
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Title of the Course/ Paper	Practical –IV: Microprocessor Lab		
Core -10	I Year & Second Semester	Credit: 2	
Objective of the course	This course gives practical training using assembly language		
Course outline	<p>Using 8086 Microprocessor kit/ MASM Software.</p> <ol style="list-style-type: none"> 1. Multi byte Addition/Subtraction of signed Numbers. 2. Computing LCM. 3. Computing GCD of n Numbers. 4. Insertion Sort. 5. Selection Sort. 6. Linear Search. 7. Matrix Multiplication. 8. Computing Factorial. 9. Computing nC_r. 10. Computing Fibonacci Number. 11. Finding Memory Size. 12. Clearing Screen. 13. Moving string of characters on the CRT. 14. Checking password. 15. Displaying Command Line Parameter. 		

Title of the Course/ Paper	Statistical Methods		
Non-Major Elective –2	I Year & Second Semester	Credit: 4	
Objective of the course	This course introduces the basic Statistical Methods for computing related applications		
Course outline	Unit 1: Sample spaces - events - Axiomatic approach to probability - conditional probability - Independent events - Baye's formula - Random Variables - Continuous and Discrete random variables - distribution function of a random variables - Characteristic of distributions - Expectation, variance - coefficient of variation, moment generation function - Chebyshev's inequality		
	Unit 2: Bivariate distribution - conditional and marginal distributions - Discrete distributions - discrete uniform, Binomial poisson and geometric Distributions - Continuous distributions - Uniform, Normal, Exponential and Gamma distributions.		
	Unit 3: Correlation coefficient - Rank correlation coefficient of determination - Linear Regression - Method of Least squares - Fitting of the curve of the form $ax + b$, $ax^2 + bx + c$, ab^x and ax^b - multiple and partial correlation (3 - variables only).		
	Unit 4: Concept of sampling – Methods of sampling - simple random sampling - Systematic sampling and stratified random sampling (descriptions only) - concepts of sampling distributions and standard error - point estimation (concepts only) - Interval Estimation of mean and proportion. Tests of Hypotheses - Critical Region - two types of Errors - Level of significance - power of the test - Large sample tests for mean and proportion - Exact tests based on Normal, t, F and Chi-square distributions.		
	Unit 5 : Basic principles of experimentation - Analysis of variance - one way and two way classifications - computing randomized design - Randomized Block design - Time series Analysis - Measurement of Trend and Seasonal variations.		

1. Recommended Texts

- (i) Mood, A.M., Graybill, F. and Boes, 1974, Introduction to Mathematical Statistics, McGraw-Hill.
- (ii) Trivedi, K.S, 1994, Probability and Statistics with Reliability, Queuing and Computer Science Applications. Prentice Hall India, New Delhi.

2. Reference Books

- (i) Arnold O. Allen, 1978, Probability, Statistics and Queuing Theory with Computer Science Application.
- (ii) Bajpai, A.C. Calus, I.M. Fairley, J.A., 1979, Statistical Methods for Engineers and Scientists. John Wiley & Sons.
- (iii) Douglas, C.,Montgomery, Lynwood,A. & Johnson, 1976, Forecasting and Time Series Analysis, Tata McGraw-Hill, New Delhi.

- (iv) Baisnab, A.P. and Manoranjan Jas, 1993, Elements of Probability and Statistics, Tata McGraw-Hill, New Delhi.
- (v) Kossack, C.F. and Henschke, C.I., Introduction to Statistics and Computer Programming, Tata McGraw-Hill, New Delhi.

List of Courses on Soft-Skills for PG Course

S. No.	Course Code	Course Title	Credits
1	UOM S 002	LANGUAGE AND COMMUNICATION	2
2	UOM S 004	SPOKEN AND PRESENTATION SKILLS	2
3	UOM S 006	MANAGERIAL SKILLS	2
4	UOM S 008	COMPUTING SKILLS	2

UOM S 002 LANGUAGE AND COMMUNICATION

Objectives

- *enable* students to convert the conceptual understanding of communication in to everyday practice.
- *train* students to ground concepts/ideas in their own experience.
- *create* a learner-language interface enabling students to exercise control over language use.
- *sensitise* students to the nuances of the four basic communication skills - Listening, Speaking, Reading and Writing.

UNIT I: Twinning Functions of Listening and Speaking.

UNIT II: Twinning Functions of Reading and Writing.

UNIT III: Individual Communication.

UNIT IV: Intermediary Communication.

UNIT V: Social Communication.

Recommended Texts

- Windshuttle, Keith and Elizabeth Elliot. 1999. *Writing, Researching and Communicating: Communication Skills for the Information Age*. 3rd Reprint. Tata McGraw-Hill. Australia.
- Dignen, Flinders and Sweeney. *English 365*. Cambridge University Press.
- Goleman, Daniel. 1998. *Working with Emotional intelligence*. Bantam Books. New York.
- Jones, Leo and Richard Alexander. 2003. *New International Business English*. Cambridge University Press.

Websites

- www.tatamcgrawhill.com/sites/0070600988

UOM S 004 SPOKEN AND PRESENTATION SKILLS

Objectives

- *coach* students to identify, classify and apply relevant skill sets.
- *illustrate* role of skills in real-life situations with case studies, role play, etc.
- *translate* performance of skills into efficient habits.
- *enable* students to perceive cultural codes involved in presentation and design language performance accordingly.

UNIT I: General Language Knowledge and Presentation.

UNIT II: Special Language Knowledge and Presentation.

UNIT III: General Communication Skills for Presentation.

UNIT IV: Professional Communication Skills for Presentation.

UNIT V: Social Communication Skills for Presentation.

Recommended Texts

- Cathcart, Robert. S. and Larry A. Samovar. 1970. *Small Group Communication: A Reader*. 5th Edition. Wm. C. Brown Publishers. Iowa.
- Tamblyn, Doni and Sharyn Weiss. 2000. *The Big Book of Humours Training Games*. 2004 Edition. Tata McGraw-Hill. New Delhi.
- Andrews, Sudhor. 1988. *How to succeed at Interviews*. 21st Reprint. Tata McGraw-Hill. New Delhi.
- Monippally, Matthukutty. M. 2001. *Business Communication Strategies*. 11th Reprint. Tata McGraw-Hill. New Delhi.

UOM S 006 MANAGERIAL SKILLS

Objectives

- To help students to understand the mechanism of stress particularly negative emotions such as anxiety, anger and depression for effective management.
- To introduce the basic concepts of body language for conflict management.
- To give inputs on some of the important interpersonal skills such as group decision-making, negotiation and leadership skills.
- To make students learn and practice the steps involved in time management.
- To impart training for empowerment thereby encouraging the students to become successful entrepreneurs.

Unit I- Stress management

- Definitions and Manifestations of stress.
- Stress coping ability and stress inoculation training.
- Management of various forms of fear (examination fear, stage fear or public speaking anxiety), depression and anger.

Unit II- Conflict Management skills

- Types of conflict (intrapersonal, Intra group and inter group conflicts).
- Basic concepts, cues, signals, symbols and secrets of body language.
- Significance of body language in communication and assertiveness training.
- Conflict stimulation and conflict resolution techniques for effective management.

Unit III- Interpersonal Skills

- Group decision making (strengths and weaknesses).
- Developing characteristics of charismatic and transformational leadership.
- Emotional intelligence and leadership effectiveness- self awareness, self management, self motivation, empathy and social skills.
- Negotiation skills- preparation and planning, definition of ground rules, clarification and justification, bargaining and problem solving, closure and implementation.

Unit IV- Time Management

- Time wasters- Procrastination.
- Time management personality profile.

- Time management tips and strategies.
- Advantages of time management.

Unit V- Towards Empowerment

- Stimulating innovation and change- coping with "temporariness".
- Network culture.
- Power tactics and power in groups (coalitions).
- Managerial empowerment and entrepreneurship.
- Prevention of moral dwarfism especially terrorism.
- Altruism (prosocial behaviour/helping behaviour).
- Spirituality (clarifications with regard to spirituality)- strong sense of purpose- trust and respect- humanistic practices- toleration of fellow human beings expressions.

PRACTICAL TRAINING

Relaxation exercises- Western (Autogenic Relaxation) and Indian techniques (Shavasana).

Role-play.

Transactional Analysis.

REFERENCES

1. Swaminathan. V.D & Kaliappan. K.V. (2001). Psychology for Effective Living. Chennai. The Madras Psychology Society.
2. Robbins, S.B. (2005). Organizational Behaviour. New Delhi: Prentice Hall of India.
3. Smith, B. (2004). Body Language. Delhi: Rohan Book Company.
4. Hurlock, E.B. (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.

UOM S 008 COMPUTING SKILLS

Objective: The major objective in introducing the Computer Skills course is to impart training for students in Microsoft Office which has different components like MS Word, MS Excel, MS Access, Power point etc., at two levels based on their knowledge and exposure. It provides essential skills for the user to get adapted to any work environment, as most of the systems in any work place have MS Office installed for their day to day activities. The course is highly practice oriented rather than regular class room teaching.

Pre-requisite: Pass in Level B are an equivalent course.

Unit I: *Word Processing* - Formatting - Paragraph and character styles, templates and wizards, table and contents and indexes, cross referencing; Tables and Columns - creating manipulating and formatting; Mail Merge, Labels and Envelopes.

Unit II: *Spreadsheets* - Workbook, Building, Modifying, navigating; worksheet- Autofiull, copying and moving cells, inserting and deleting rows, printing; Formulas and functions- Troubleshooting formulas, Functions and its forms like database, financial, logical, reference , mathematical and statistical - Databases - Creating, sorting, filtering and linking.

Unit III: *Presentations* - Power point - exploring, creating and editing slides, inserting tables and charts- special effects- Clip Art, creating and drawing shapes, inserting multimedia content - presentations - planning, animation, handouts, slideshow..

Unit IV: *Databases* - Access - Components, creating a database and project, import and exporting, customizing; Tables- creating and setting fields; Queries -Types, creating, wizard- Reports- creating and layout.

Unit V: *Information Management* - Outlook - Starting, closing, contacts, tool bars, file management; email-reading, composing, responding, attachments, signature, junk mail; tasks- screen, sorting, creating, deleting, assigning, updating; scheduling- calendar.

Note: All units needs an approach through practical exposure.

References:

1. Working in Microsoft Office; Ron Mansfield, Tata McGraw Hill
2. Microsoft Excel 2007; Guy Hart Davis, Tata McGraw Hill.

Examination:

1. Internal assessment could be based on Theory and/or practicals.
2. End semester is based on practicals.