Academic Council: Date 26 / 04 / 2010, R. No.: (2)
Executive Council: Date 07 / 05 / 2010, R. No.: (3)

BHAVNAGAR UNIVERSITY

BHAVNAGAR

(NACC Accreditation Grade "B")

CREDIT AND SEMESTER SYSTEM

SYLLABUS

Master of Computer Application

(M.C.A.)

(In Force From Academic Year: 2010-2011)

MASTER OF COMPUTER APPLICATION (M.C.A.)

Credit and semester system syllabus in force from June 2010

NAME OF THE SUBJECT: Computer Science

SEMESTER – 1st

SR. NO.	PAPER NO	NAME OF THE PAPER	TOTAL MARKS EXT + INT = TOTAL	PASSING STANDARD EXT + INT = TOTAL	TOTAL TEACHING HOURS	CREDITS
1	101	Operations Research	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
2	102	Computer Programming Using C	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
3	103	Internet: Concepts & Tools	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
4	104	Computer Organization	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
5	105	Practical	100	40	15 Weeks x 09 Hours = 135	09

* INTERNAL	MARKS
TEST	30

SEMESTER – 2nd

SR. NO.	PAPER NO	NAME OF THE PAPER	TOTAL MARKS EXT + INT = TOTAL	PASSING STANDARD EXT + INT = TOTAL	TOTAL TEACHING HOURS	CREDITS
1	201	System Analysis & Design	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
2	202	Object Oriented Programming Using C++	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
3	203	Data Structures & Algorithm	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
4	204	Computer Networks	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
5	205	Practical	100	40	15 Weeks x 09 Hours = 135	09

* INTERNAL	MARKS
TEST	30

MASTER OF COMPUTER APPLICATION (M.C.A.)

Credit and semester system syllabus in force from June 2010

NAME OF THE SUBJECT: Computer Science

SEMESTER – 3rd

SR. NO.	PAPER NO	NAME OF THE PAPER	TOTAL MARKS EXT + INT = TOTAL	PASSING STANDARD EXT + INT = TOTAL	TOTAL TEACHING HOURS	CREDITS
1	301	Operating System Principals	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
2	302	Core Java	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
3	303	Computer Graphics	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
4	304	Database: Concepts & Tools	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
5	305	Practical	100	40	15 Weeks x 09 Hours = 135	09

* INTERNAL	MARKS
TEST	30

SEMESTER – 4th

SR. NO.	PAPER NO	NAME OF THE PAPER	TOTAL MARKS EXT + INT = TOTAL	PASSING STANDARD EXT + INT = TOTAL	TOTAL TEACHING HOURS	CREDITS
1	401	Web Programming - I	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
2	402	Windows Programming	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
3	403	Advanced Java	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
4	404	Software Engineering	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
5	405	Practical	100	40	15 Weeks x 09 Hours = 135	09

* INTERNAL	MARKS
TEST	30

MASTER OF COMPUTER APPLICATION (M.C.A.)

Credit and semester system syllabus in force from June 2010

NAME OF THE SUBJECT: Computer Science

SEMESTER – 5th

SR. NO.	PAPER NO	NAME OF THE PAPER	TOTAL MARKS EXT + INT = TOTAL	PASSING STANDARD EXT + INT = TOTAL	TOTAL TEACHING HOURS	CREDITS
1	501	Artificial Intelligence	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
2	502	Advanced UNIX/LINUX	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
3	503	Web Programming - II	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
4	504	Project – I	70 + 30 = 100	28 + 12 = 40	15 Weeks x 04 Hours = 60	04
5	505	Practical	100	40	15 Weeks x 09 Hours = 135	09

* INTERNAL	MARKS	REMAKS
TEST	30	PAPER NO: 501, 502, 503, 505
PRESENTATION	30	PAPER NO: 504

SEMESTER – 6th

SR. NO.	PAPER NO	NAME OF THE PAPER	TOTAL MARKS EXT + INT = TOTAL	PASSING STANDARD EXT + INT = TOTAL	TOTAL TEACHING HOURS	CREDITS
1	601	Project - II	210 + 90 = 300	84 + 36 = 120	15 Weeks x 42 Hours = 630	21

* INTERNAL	MARKS
REPORTING	40
PRESENTATION	50

MASTER OF COMPUTER APPLICATION
M.C.A.
SEMESTER – I

Paper No: 101: Operations Research **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction & LPP**	**12**	**14**
	❖ Introduction to OR – Various Definitions of OR, OR Techniques ❖ Standard form of LPP, Formulation of LPP ❖ Simplex Method – Maximization & Minimization (Big – M Method)		
Unit-2	**Transportation Problem**	**12**	**14**
	❖ Problem Definition, LPP Formulation of TP ❖ Methods to find basic solution – North West Corner Method, Least Cost Method, Vogel's Method ❖ Test of Optimality – Stepping Stone Method, Modi Method ❖ Special Cases in TP		
Unit-3	**Assignment Problem**	**12**	**14**
	❖ Problem Definition, LPP Formulation of AP ❖ Methods to find solution – Hungarian Method ❖ Special Cases in AP		
Unit-4	**Inventory Management**	**12**	**14**
	❖ Basic Theory & Terminology of Inventory Management ❖ Model- 1: EOQ Model with Constant Demand & Instantaneous supply ❖ Model- 2: EOQ Model with Finite Replenishment Rate ❖ Model-3: EOQ Model with Shortage ❖ Inventory Control Practices – ABC Analysis, VED Analysis, FNS Analysis		
Unit-5	**Project Management**	**12**	**14**
	❖ Network Concepts – Network Components, Rules for Network Construction ❖ Critical Path Method (CPM) ❖ Project Evaluation & Review Technique (PERT)		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ V.K.Kapoor: Operations Research – Problems & Solutions, Sultan Chand & Sons, New Delhi
❖ J.K.Sharma: Operations Research – Theory & Applications, MacMillan India Ltd,
❖ H.A.Taha: Operations Research - An Introduction, PHI

Paper No: 102: Computer Programming Using "C" **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction**	**12**	**14**
	❖ Introductory Concepts, computer characteristics, application areas, stored program concept, editors. ❖ Types of Programming Languages, High & Low level language, Compiler, Translator, Machine Language. ❖ Programming at a glance: variables, arithmetic operators & arithmetic expression, use of scanf() & printf() functions, if statement & for loop.		
Unit-2	**Logic Development**	**12**	**14**
	❖ Problem Analysis, Flow charts, algorithm. ❖ Data types, variables, constants, type conservations ❖ Operators – Relational operators, logical operators, increment & decrement operators, assignment operators, bitwise operators, conditional operator ❖ Formatted I/O in C		
Unit-3	**Structured Programming**	**12**	**14**
	❖ Simple one dimensional arrays, strings ❖ Control strategies, Condition & Loop Statements – if, while, do-while, for, break, continue, switch ❖ Method of Structured Programming ❖ Functions – User Defined Functions, Library Functions ❖ Scope rules, global & local variables, static variables, register variables, external variables, header file		
Unit-4	**Pointers & Arrays**	**12**	**14**
	❖ Pointers, passing pointer arguments in functions ❖ Two dimensional arrays, multidimensional arrays, initialization of arrays, ❖ Arrays & pointers, passing arrays to a function		
Unit-5	**Structures & Unions**	**12**	**14**
	❖ Basics of structures, array of structure, passing structure to function, pointer to structure ❖ Unions ❖ Typedef & bit fields		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Kernighan B. W. & Ritchie D. M: The C Programming Language, Prentice Hall, India
❖ E. Balagurusamy: Programming in ANSI C Tata McGraw-Hill Publishing Co. Ltd.
❖ Yashvant Kanetkar: ANSI C Programming, BPB Publication, New Delhi
❖ Gottfried: Programming with C, Tata McGraw-Hill Publishing Co. Ltd.

Paper No: 103: Internet: Concepts & Tools **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Internet Concepts**	**12**	**14**
	❖ History of Internet, Impact of Internet in various fields. ❖ Various services available on Internet - e-mail, News group, Chat, Audio and Video on demand etc. ❖ Internet Domain & Server Identifiers ❖ Client IP Address ❖ Internet Protocols – TCP/IP, FTP, Telnet		
Unit-2	**Web Page Development through HTML**	**12**	**14**
	❖ Introduction – HTML Tags, Paired Tags, Singular Tags ❖ Commands – Head, Body, Title & Footer ❖ Formatting – Text, Heading style, Paragraph Break, Line Break, Drawing Lines ❖ List – Unordered List, Ordered List, Definition List ❖ Tags – Image Tag, Table Tag, Hyper link Tag, Frames Tag		
Unit-3	**Web Page Development through DHTML**	**12**	**14**
	❖ Cascading Style Sheet (CSS) – Font Attributes, Color & Back ground Attributes, Text & Boarder Attributes, Margin Attributes, List Attributes ❖ Class, Span, DIV ❖ External Style Sheet		
Unit-4	**Introduction to Java Script**	**12**	**14**
	❖ Java Script in Web Pages – Database Connectivity, Client Side Java Script, Capturing User Input ❖ Advantages of Java Script ❖ Data Types – Number, Boolean, String, Null ❖ The Java Script Array ❖ Operators & Expressions ❖ Java Script Programming Constructs ❖ Conditional Statements & Looping ❖ Built in Functions – eval(), parseInt(), parseFloat(), User Defined Function		
Unit-5	**Java Script Forms**	**12**	**14**
	❖ Properties of Form Elements – Text, Password, Button, Check Box, Text Area ❖ Mathematical Built In Functions – abs(), ceil(), floor(), pow(), random(), sqrt() ❖ Date Built In Functions – getDate(), setDate(), getHours(), setHours(), getTime(), setTime() ❖ String Built In Functions – big(), blink(), bold(), charat(), italics(), tolowercase(), touppercase(), substring()		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Ivan Bayross: HTML, Java Script, DHTML and PHP, BPB Publication, New Delhi
❖ Douglas E Comer: The Internet, PHI, New Delhi

Paper No: 104: Computer Organization **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction.**	**12**	**14**
	❖ Block Diagram of a Personal Computer ❖ Introduction to Processor, Memory, Bus, I/O controllers ❖ Storage devices: Magnetic disks, optical disks, memory sticks ❖ Input / output devices – Mouse & keyboard, CRT monitors, LCD monitors, dot matrix printers, laser printers		
Unit-2	**Processors, Memory and Input / Output.**	**12**	**14**
	❖ Instruction Execution ❖ CPU organization ❖ Overview of Microprocessor chips, memory chips & Buses ❖ Example of a typical Microprocessor chip and a memory chip ❖ ISA bus, PCI bus, Universal Serial Bus (USB), Architecture of PC with multiple type of buses ❖ I/O chips		
Unit-3	**Gates and Boolean Algebra**	**12**	**14**
	❖ Gates ❖ Boolean Algebra, Truth Tables ❖ Preparing truth table for given circuit ❖ Preparing circuit for given truth table (SOP & POS) ❖ De Morgan's Theorems, Gate Minimization		
Unit-4	**Basic Digital Logic Circuits.**	**12**	**14**
	❖ Integrated circuits. ❖ Combinational Circuits - Encoder, Decoder, Multiplexer, De-Multiplexer, comparator. ❖ Arithmetic Circuits - Half adder, full adder, binary adder, binary adder/ subtractor.		
Unit-5	**Memory Elements & Counters**	**12**	**14**
	❖ Flip flops – SR Flip Flop, D-Flip Flop, JK Flip Flop ❖ Registers – Storage Registers with Parallel Input & Serial Input, Shift Registers, Universal Register ❖ Counters – Synchronous & Asynchronous Counters, Ripple Counter, Counters with Increment & Decrement Facility		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Tanenbaum A. S.: Structured Computer Organization, Prentice-Hall of India Pvt. Ltd.
❖ Malvino A. P.: Digital Computer Electronics, Tata McGraw, Hill Pub. Co. Ltd.
❖ Thomas Bartee: Computer Architecture & Logic Design Tata McGraw, Hill Pub. Co. Ltd.
❖ Pal Chaudhuri: Computer Organization and Design, Prentice-Hall of India Pvt. Ltd.

Paper No: 105: Practical **Credits: 09**
Marks: **100 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	Practical Based on 102 (Computer Programming Using C)	**81**	**60**
Unit-2	Practical Based on 103 (Internet: Concepts & Tools)	**54**	**40**

MASTER OF COMPUTER APPLICATION
M.C.A.
SEMESTER – II

Paper No: 201: System Analysis & Design **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Structure of Business Information System**	**12**	**14**
	❖ Business systems concepts ❖ Categories of Information systems ❖ What is System Analysis & Design ❖ System Development Strategies – Classical Method(SDLC), Structured Analysis Development Method, System Prototype Method		
Unit-2	**Requirement Analysis & Determination**	**12**	**14**
	❖ Fact Finding Techniques ❖ Tools for Analysis – Decision Trees, Decision Tables, Structured English ❖ Data Flow Diagrams & Data Dictionary		
Unit-3	**Design of Input & Output**	**12**	**14**
	❖ Output objectives, types of output, Key output questions ❖ Output format - Detailed report & Summary report, Tabular output & Graphics output ❖ Input validation ❖ Error checking methods and Error messages ❖ Dialogue design - Data entry dialogues		
Unit-4	**Design of Database & Software**	**12**	**14**
	❖ System development in a database environment ❖ Design of Database – Normalization ❖ Top-Down structure of modules, Coupling & Cohesion, Span of control, Module size, Shared modules ❖ Software Design tools - Structured flowcharts, HIPO, Warnier/Orr diagrams		
Unit-5	**Testing & Implementation**	**12**	**14**
	❖ Level of testing - Unit testing, Systems testing, & special systems testing ❖ Methods of system conversion - parallel systems, direct conversation, pilot system, phase-in.		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ James A Senn: Analysis and Design of Information Systems McGraw Hill International Edition
❖ Yourdon E. and Constantine L. L:Structured Analysis and Design, Yourdon Press, New York.

Paper No: 202: Object Oriented Programming Using C++ **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction.**	**12**	**14**
	❖ Object oriented languages & tools. ❖ Brief introduction of object, class, encapsulation, inheritance, overloading, polymorphism, encapsulation. ❖ Relationship between C & C++ ❖ Writing simple programs using cin, cout and manipulators		
Unit-2	**Functions in C++**	**12**	**14**
	❖ Declaring, Defining and calling functions ❖ Passing arguments to function, Reference arguments, Default arguments ❖ Function Overloading ❖ Inline functions		
Unit-3	**Objects & Classes**	**12**	**14**
	❖ Class Definition, Constructors, Destructors ❖ Objects as function arguments ❖ Memory management of Classes, Objects and static data ❖ Array as class member data & Array of objects		
Unit-4	**Operator Overloading & Inheritance**	**12**	**14**
	❖ Overloading of unary & binary operators ❖ Concept of derived class & base class ❖ Constructor for derived & base class ❖ Public & private inheritance, Levels of inheritance Multiple inheritance		
Unit-5	**File Handling**	**12**	**14**
	❖ Streams – basic understanding, input stream, output stream, overloading stream operators ❖ Files as a stream – ifstream, ofstream, fstream, opening & closing a file ❖ File handling with character I/O and file pointers ❖ File handling with object I/O (using overloaded operators)		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Robert Lafore: Object Oriented Programming in Turbo C++ Guide, Galgotia Pub. (P) Ltd.
❖ E Balagurusamy: Object Oriented Programming in C++, Tata McGraw-Hill Publishing Co. Ltd.
❖ Barkakati N.: Object Oriented Programming in C++, PHI
❖ David Parsons: Object Oriented Programming with C++, BPB publication, New Delhi

Paper No: 203: Data Structures & Algorithms **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction**	**12**	**14**
	❖ Types of Data Structures ❖ Implementation of Stacks, Queues, Linked Lists, Doubly Linked List ❖ Binary Trees - Representation of Binary Tree, Tree Traversal		
Unit-2	**Sorting &Searching**	**12**	**14**
	❖ Linear sort, Selection sort, Bubble sort, Insertion sort, Radix sort ❖ Sorting on two keys (primary key and secondary key) ❖ Searching in Array – Linear Search, Sequential Search in Sorted Array, Binary Search ❖ Tree Searching, Insertion & Deletion in Binary Tree		
Unit-3	**Divide & Conquer**	**12**	**14**
	❖ The general method. ❖ Binary search, Finding maximum, Minimum. ❖ Merge sort, Quick sort.		
Unit-4	**Greedy Methods**	**12**	**14**
	❖ General method. ❖ Knapsack Problem. ❖ Job sequencing with deadlines. ❖ Spanning trees.		
Unit-5	**Backtracking**	**12**	**14**
	❖ General method. ❖ 8 queens problems. ❖ Sum of subsets. ❖ Graph colouring.		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Data Structures Using C and C++- Y. Langsam, M.J.Augenstein, A.M. Tenenbaum
❖ Fundamentals of Computer Algorithms- Horowitz Ellis & Sahni Sartaj Galgotia Pub. Pvt. Ltd., New Delhi.
❖ Tremblay J. & Sorenson P. G.: An Introduction to Data Structures with Applications, McGraw-Hill Int. Edition.
❖ Goodman, S. E. & Hedetnieni,: Introduction to the Design and Analysis of Algorithms, McGraw-Hill Book Comp.

Paper No: 204: Computer Networks **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction.**	**12**	**14**
	❖ Uses of Computer Networks ❖ LAN, MAN, WAN, Wireless Network, Home Network, Internet ❖ Reference models - OSI and TCP/IP models		
Unit-2	**Physical Layer & Data Link Layer**	**12**	**14**
	❖ Transmission media – Twisted Pair, Coaxial Cable, Fiber Optic Cable ❖ Modems, Multiplexing and switching ❖ Basics of data link layer - framing, error control and flow control ❖ Error detecting codes ❖ Data link protocols - Unrestricted Simplex protocol, Simplex stop and wait protocol, Simplex protocol for noisy channel.		
Unit-3	**MAC Sublayer**	**12**	**14**
	❖ Multiple Access Protocol – ALOHA, Carrier sense Multiple Access Protocol ❖ Ethernet & Fast Ethernet ❖ Blue Tooth Overview ❖ Basics of Repeaters, Hubs, Bridges, Switches, Routers, Gate Ways		
Unit-4	**Network & Transport Layer**	**12**	**14**
	❖ Network layer design issues ❖ Routing algorithms - Shortest path routing, Flooding, Broadcast routing, Multicast routing ❖ Inter-Networking fundamentals - Tunneling, Routing ❖ IP protocol and IP address ❖ Elements of transport protocols ❖ UDP & TCP protocol		
Unit-5	**Application Layer & Network Security**	**12**	**14**
	❖ DNS – The Domain Name System ❖ Electronic Mail ❖ Network Security – Cryptography, Public Key Algorithm (RSA), Firewall, Virtual Private Network		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Tanenbaum A. S.: Computer Networks, Prentice-Hall of India Pvt. Ltd., New Delhi.
❖ Ahuja V.: Design and Analysis of Computer Communication Networks, McGraw-Hill Book Company.
❖ Douglas E. Comer: Computer Networks & Internets, Prentice Hall of India Pvt. Ltd., New Delhi.
❖ Forouzn: Data Communication & Networking, TMH

Paper No: 205: Practical **Credits: 09**
Marks: **100 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/Weight
Unit-1	Practical Based on 202 (Object Oriented Programming Using C++)	**70**	**50**
Unit-2	Practical Based on 203 (Data Structures & Algorithms)	**65**	**50**

MASTER OF COMPUTER APPLICATION
M.C.A.
SEMESTER – III

Paper No: 301: Operating System Principals **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction**	**12**	**14**
	❖ What is OS, General categories of OS – Desktop system, Multiprocessor systems, Distributed systems, clustered systems, Real time systems, Handheld systems, Computing environments ❖ Computer system structure - I/O structure, Hardware protection ❖ Operating system components, Services, System calls, System programs		
Unit-2	**Process Management**	**12**	**14**
	❖ Process concepts - States of process, Scheduling ❖ Threads – User & Kernel Threads, Single & Multi-Threaded Processes, Multi-Threading Models ❖ CPU scheduling - Scheduling Criteria, Scheduling Algorithms. ❖ System Deadlocks - Criteria for deadlock arise, Deadlock prevention, Avoidance – Banker's Algorithm, Detection and recovery.		
Unit-3	**Memory Management**	**12**	**14**
	❖ Logical and physical address, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging. ❖ Virtual memory – Demand Paging, Page replacement algorithms		
Unit-4	**File Management**	**12**	**14**
	❖ File Concept – Access Methods, Directory Structure ❖ File System Structure ❖ Allocation methods ❖ Free space management, Directory implementation		
Unit-5	**I/O Management**	**12**	**14**
	❖ Overview of I/O system – Application I/O Interface, I/O hardware, kernel I/O subsystem ❖ Disk scheduling algorithms		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Silberschetz A and Galvin: Operating Systems Concepts. Addision - Wesley.
❖ Tanenbaum: Operating Systems Prantice Hall of India Pvt. Ltd.
❖ Madnick S. & Donovan J. J.: Operating Systems.McGraw Hill Book Co.

Paper No: 302: Core Java **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction.**	**12**	**14**
	❖ Platform Independent Language – Byte Code, JVM ❖ Data types, Literals, Type Conversion & Casting ❖ Introduction of Array ❖ Operators – Arithmetic, Bitwise, Relational, Boolean, Assignment, ? Operator ❖ Control Statements		
Unit-2	**Introduction to Class & Inheritance**	**12**	**14**
	❖ Class Fundamentals, Simple Class, Nested and Inner Class, Declaring & Assigning Objects, Methods, Constructors, Garbage Collection, this Keyword, finalize(), ❖ Overloading Methods & Constructors, Introducing Access Control, Understanding static & final ❖ Inheritance Basic, Super, Method Overriding, Dynamic Data Dispatch, Abstract Class		
Unit-3	**String Handling, Packages & Interfaces**	**12**	**14**
	❖ String Conversion & Character Extraction methods, String Comparison methods, String buffer methods ❖ Defining Package, CLASSPATH, Importing Package ❖ Define & Implementing Interface, Nested Interface, Variables in Interface		
Unit-4	**Exception Handling & Multithreaded Programming**	**12**	**14**
	❖ Exception fundamentals & types ❖ Working with try, catch, throw, throws, finally ❖ Understanding Threads, Creating main thread & multiple threads, ❖ Methods of Runnable Interface, Thread Priorities, ❖ Inter-Thread Communication & synchronization		
Unit-5	**I/O, Applets & AWT**	**12**	**14**
	❖ I/O basics - Stream I/O, Consol I/O & File Handling ❖ Applet Fundamentals ❖ AWT – Classes, Working with Frame Windows, Graphics, Colors, Fonts, FontMetrics ❖ AWT Controls – Labels, Buttons, Checkboxes, CheckboxGroup, Choice, List, TextField, TextArea ❖ Layout Managers – FlowLayout, BorderLayout, GridLayout, CardLayout ❖ Event Handling		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Herbert Schildt: The Complete Reference Java, TMH, New Delhi
❖ Black Book: Java Programming, DreamTech Publication, New Delhi

Paper No: 303: Computer Graphics **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction.**	**12**	**14**
	❖ Advantage, Application and Classification of Computer Graphics ❖ Video display devices - CRT, Raster-scan displays, Random-scan displays, Color CRT Monitor, DVST, Flat panels. ❖ Input devices - Keyboard, Mouse, Trackball, Space-ball, Joysticks, Image scanners, Touch panel ❖ Graphics software - Coordinate systems, Graphics functions, Software standards, PHIGS workstations.		
Unit-2	**Basic Graphics Algorithms.**	**12**	**14**
	❖ DDA algorithm, Bresenham's line drawing algorithm, Parallel line drawing algorithm, Mid-point Circle drawing algorithm, Ellipse-Generating algorithm. ❖ Attributes - Line attributes, Curve attributes, Area-fill attributes, Character attributes		
Unit-3	**Two Dimensional Transformations.**	**12**	**14**
	❖ Basic Transformation - Translation, Rotation, Scaling. ❖ Composite transformations - Translations, Rotations, Scaling. ❖ Other transformation - Reflection, Shear.		
Unit-4	**Two Dimensional Viewing**	**12**	**14**
	❖ Windowing basics – Window & View port, viewing transformation. ❖ Clipping operations - point clipping, Cohen-Sutherland line clipping and Polygon Clipping, Curve Clipping Text Clipping.		
Unit-5	**Three Dimensional Transformation**	**12**	**14**
	❖ Introduction ❖ 3D Display Method ❖ 3D Viewing		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Donald Hearn & M. Pauline Baker: Computer Graphics, PHI.
❖ A.P.Godse, D.A.Godse: Computer Graphics, Technical Publication Pune
❖ F. S. Hill, J. R.: Computer Graphics. MacMillan Publishing Company.

Paper No: 304: Database: Concepts & Tools **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction to SQL**	**12**	**14**
	❖ Basic Data Types of ORACLE ❖ Data Definition Language (DDL) ❖ Data Manipulation Language (DML) ❖ Transaction Processing Language (TPL) ❖ Data Constraints ❖ Inbuilt Functions ❖ Subqueries, Join, Indexes, Views, Sequences, Synonyms		
Unit-2	**Introduction to PL/SQL**	**12**	**14**
	❖ Advantages of PL/SQL and Generic PL/SQL Block ❖ Cursor – Implicit & Explicit Cursor, Cursor For Loop, Parameterized Cursor ❖ Locking Strategy – Implicit & Explicit Locking, Lock Table ❖ Exception Handling		
Unit-3	**ORACLE Database Object**	**12**	**14**
	❖ Stored Procedures & Functions ❖ Packages ❖ Triggers		
Unit-4	**Users, Privileges & Roles**	**12**	**14**
	❖ Users – Create & Delete User, Grant & Revoke Command ❖ Privileges – System & Object Privileges, Assigning, Viewing, Revoking System & Object Privileges ❖ Roles – Create, Grant, View & Delete the Roles		
Unit-5	**Introduction to ORACLE Server**	**12**	**14**
	❖ ORACLE Server & Instances ❖ Database Structure & Space Management ❖ Memory & Process Structure ❖ Schemas & Schema Objects ❖ Client Server Architecture – Distributed Database Processing ❖ Database Backup & Recovery ❖ ORACLE Utility – Import, Export		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Ivan Bayross: SQL/PLSQL, The Programming Language of ORACLE, BPB Publication
❖ J.A.Ramalho: Learn ORACLE 8i, BPB Publication
❖ Nilesh shah: Database Systems using ORACLE, PHI Publication

Paper No: 305: Practical **Credits: 09**
Marks: **100 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	Practical Based on 302 (Core Java)	**45**	**30**
Unit-2	Practical Based on 303 (Computer Graphics)	**45**	**30**
Unit-3	Practical Based on 304 (Database: Concepts & Tools)	**45**	**40**

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Paper No: 401: Web Programming – I **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction**	**12**	**14**
	❖ Fundamental Of ApacheServer ❖ Fundamental Features of PHP ❖ Versions of PHP ❖ Introduction of PHP Programming		
Unit-2	**Basic Of PHP**	**12**	**14**
	❖ Data Types, Constants, Operators, Arrays ❖ Conditional Statements & Iterations ❖ Functions – Built – in Functions, User Define Functions ❖ PHP Server Variable ❖ Working with Date, Time & String Functions ❖ Mathematical Functions		
Unit-3	**Working with Forms**	**12**	**14**
	❖ Form Elements – Text Box, Text Area, Password, Radio Buttons, Checkbox, Combo Box, Image ❖ Submit – Reset Button ❖ Uploading File to Web Server ❖ Logging Form		
Unit-4	**Regular Expression & Error Handling**	**12**	**14**
	❖ Regular Expressions – Types, Functions & Symbols ❖ Error Handling – Displaying Error, Logging Error, Ignoring Errors, Acting on Error		
Unit-5	**Interaction Between PHP & MYSQL**	**12**	**14**
	❖ PHP – MYSQL Architecture & PHP API ❖ Creating & Connecting DB Table ❖ Executing Commands – Selecting, Inserting, Extracting, Updating, Deleting		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Ivan Bayross, Sharanam Shah: PHP 5.1 For Beginners, Shroff Publishers & Distributors (SPD)
❖ Janet Valade: PHP5 & MYSQL Projects, Wiley Dreamtech
❖ Dave W. Mercer: Beginning PHP5, Wiley India Edition
❖ Steven Holzner: The Complete Reference PHP, Tata McGRAW – HiLL, New Delhi

Paper No: 402: Windows Programming **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction.**	**12**	**14**
	❖ Architecture of .NET, CLR, CTS ❖ Class Library Overview ❖ Visual Basic Language – DataTypes, Operators, Arrays, Conditional Statements & Loops, Procedures & Functions		
Unit-2	**Windows Forms – Controls**	**12**	**14**
	❖ Introduction to Solutions, Projects & Forms ❖ Creating forms in application ❖ Adding the controls to form – Text box, Rich text box, Labels, Buttons ❖ Additional Controls – Checkbox, Radio Button, List box, Combo box, Panel, Treeview, Tab, Timer		
Unit-3	**Windows Forms – Menu, Toolbar, Dialog**	**12**	**14**
	❖ Using Menustrip ❖ Using Toolstrip ❖ Common Dialog boxes – OpenFiledialog, Savefiledialog, Fontdialog, ColorDialog		
Unit-4	**Database Access**	**12**	**14**
	❖ Fundamental Ideas – Connection, Data Adapters, Datasets, Datareader ❖ Working with ADO.NET ❖ Data Binding – Simple Binding, Complex Binding ❖ Creating data entry forms for a single tables using Gridview Control		
Unit-5	**Developing Mobile Application**	**12**	**14**
	❖ Introduction to .NET Compact Framework ❖ Creating Smart Device Application ❖ Using Compact Database in Mobile Application		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Black Book: .NET Programming - Dreamtech Press
❖ Evangelos Petroutsos & Mark Ridgeway: Mastering Microsoft Visual Basic 2008 – Wiley India Pvt. Ltd.
❖ Pelland: Microsoft Visual Basic 2008 Express Edition – Build a Program Now.

Paper No: 403: Advanced Java **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introducing Swing**	**12**	**14**
	❖ Fundamental of Swing & Key features of Swing ❖ Components & Containers ❖ Swing Packages & Applications ❖ Painting Fundamentals ❖ Event Handling		
Unit-2	**Exploring Swing**	**12**	**14**
	❖ JLabel, JTextField, ❖ Button – Jbutton, JToggleBotton, Check Boxes, Radio Buttons ❖ JTabbedPane, JSrollPane, JList, JComboBox, ❖ Tree & JTable		
Unit-3	**Servlet Programming**	**12**	**14**
	❖ Life cycle of Servlet ❖ Create Simple Servlet & Servlet API ❖ Servlet Interfaces & Classes ❖ HTTP Servlet		
Unit-4	**Database Programming**	**12**	**14**
	❖ JDBC Architecture ❖ Data types in JDBC ❖ Processing Queries ❖ Database Exception Handling		
Unit-5	**Java Network Programming**	**12**	**14**
	❖ Networking Basis – TCP/IP models, Network Addressing, Domain Name Services(DNS), Ports, Sockets ❖ Simple Client Server Program using TCP ❖ Simple Client Server Program using UDP ❖ Introduction to RMI Architecture ❖ Object Serialization ❖ Implementing Remote class & Interfaces ❖ Client Server Program using RMI		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Herbert Schildt: The Complete Reference Java, TMH, New Delhi
❖ P. Radha Krishna: Object Oriented Programming Through Java, Universities press
❖ Black Book: Java Programming, DreamTech Publication, New Delhi

Paper No: 404: Software Engineering **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction.**	**12**	**14**
	❖ Software & Software Engineering Problems ❖ Software Engineering Approach – Phase Development Process, Project Management ❖ Software Process & It's Characteristics ❖ Software Development Process Models – Water Fall Model, Prototyping, Iterative Enhancement, Spiral Model		
Unit-2	**Software Requirements Analysis & Specifications**	**12**	**14**
	❖ Software Requirements – Need For SRS, Requirement Process ❖ Problem Analysis – Analysis Issues, Informal Approach, Structured Analysis, Object Oriented Modeling & Other Modeling Approach, Prototyping ❖ Requirement Specifications ❖ Validation		
Unit-3	**Planning & Design of Software**	**12**	**14**
	❖ Team Structure – Egoless team, Chief Programmer Team, Controlled Decentralized Team ❖ Quality Assurance Plan – Verification & Validation, Inspection & Review ❖ Unit Development Folder ❖ Risk Management – Concepts, Assessment, Control ❖ System Design principles. ❖ Module level concepts - Coupling & Cohesion ❖ Design Methodology - Structure Chart ❖ Functional approach vs. Object Oriented Approach		
Unit-4	**Coding & Testing**	**12**	**14**
	❖ Top Down & Bottom Up Approach for Coding & Testing ❖ Structured Programming ❖ Testing Fundamentals – Error, Fault, Failure ❖ Levels of Testing ❖ Test cases & Test criteria		
Unit-5	**Object Oriented Analysis & Design Tool – UML**	**12**	**14**
	❖ Fundamental of UML – Associations, Multiplicity, Qualified Association, Reflexive Association, Inheritance & Generalization, Dependencies ❖ Component of UML – Class Diagram, Object Diagram, Use Case Diagram, Activity Diagram		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Pankaj Jalote: An Integrated Approach to Software Engineering, Narosa Publication
❖ Joseph Schmuller: Teach Your Self UML in 24 Hours, Techmedia Publication
❖ Roger Pressman: Software Engineering, McGraw-Hill Publication

Paper No: 405: Practical **Credits: 09**
Marks: **100 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	Practical Based on 401 (Web Programming - I)	**45**	**30**
Unit-2	Practical Based on 402 (windows Programming)	**45**	**30**
Unit-3	Practical Based on 403 (Advanced Java)	**45**	**40**

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Paper No: 501: Artificial Intelligence **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Overview of AI**	**12**	**14**
	❖ Introduction to AI, Different areas of AI ❖ Various types of problems ❖ Problem space and search ❖ Production system. ❖ Problem characteristics		
Unit-2	**Heuristic Search**	**12**	**14**
	❖ Blind search methods – depth first search & breadth first search ❖ Intelligent search methods - Hill climbing, Best first, Back tracking ❖ Problem reduction and constraint satisfaction		
Unit-3	**Logic in AI**	**12**	**14**
	❖ Propositional Logic- Logical expressions, Clause form, Resolution in propositional logic ❖ Predicate Logic- Logical expressions, Clause form, Resolution in propositional logic, Unification in predicate logic. ❖ Logic programming ❖ Fuzzy sets & fuzzy logic		
Unit-4	**Expert Systems**	**12**	**14**
	❖ Introduction to Expert system, Its various categories. ❖ Various expert system cases. ❖ Representing and using Domain Knowledge. ❖ Expert System Shells. ❖ Explanation. ❖ Knowledge Acquisition		
Unit-5	**Introduction to different areas of AI**	**12**	**14**
	❖ Planning ❖ Understanding ❖ Natural language processing ❖ Learning ❖ Neural Networks		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Elaine Rich, Kevin Knight & Shivashankar Nair: Artificial Intelligence
❖ David W Rolston: Principles of AI & ES Development, McGraw Hill,1988.
❖ Robort J Sctialkaff: Artificial Intelligence, An Engineering Approach, McGraw Hill.
❖ Waterman: Guide to Expert Systems, Addison-Wesley Pub. Compnay

Paper No: 502: Advanced UNIX / LINUX **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Introduction to UNIX**	**12**	**14**
	❖ Log in, log out, basic shell commands ❖ Files and directories, users and groups, Permissions, File related commands ❖ Introduction to process, Redirection, Piping, process related commands		
Unit-2	**UNIX Shell script**	**12**	**14**
	❖ Basics of shell script ❖ Command line arguments ❖ String handling ❖ File manipulation using shell script ❖ awk programming		
Unit-3	**UNIX / LINUX Architecture**	**12**	**14**
	❖ File system - I-nodes, structure of a regular file, directories, super-block ❖ Algorithm - I-node assignment to new file, Allocation of Disk Block ❖ File system related system calls: create, open, read, write, lseek, close, link, unlink ❖ Types of kernels – micro, monolithic, hybrid		
Unit-4	**Linux: Environment & Tools**	**12**	**14**
	❖ Introduction of Linux, Installation of Linux, dual OS concept ❖ Linux environments – Gnome & KDE ❖ Overview of software tools – OpenOffice, KDE C/C++ IDE, gimp, QTDesigner ❖ Introduction to in-built services		
Unit-5	**Linux: Networking**	**12**	**14**
	❖ Configuring network interfaces – ifconfig, ping ❖ Configuring servers – DNS, DHCP ❖ Sharing information – NFS, Samba		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Yashwant Kanetkar: Shell script
❖ Bach M J: The design of Unic operating system, PHI
❖ Sumitabha Das: Unix concepts & applications, McGraw Hill
❖ Nemeth, Snyder, Hein: Linux administration handbook

Paper No: 503: Web Programming - II **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	**Core Concept**	**12**	**14**
	❖ Introduction of ASP.NET ❖ Web Forms – User Interface, Processing Stages, Initialization, Validation, Event Handling, Automatic Data Binding ❖ Page Class		
Unit-2	**.NET Application & State Management**	**12**	**14**
	❖ Anatomy of an .NET Application ❖ Global .aspx Application File ❖ .NET Components ❖ State – View State, Session State, Application State ❖ Transferring Information between Pages ❖ Client Side Programming – Cookies, JavaScript		
Unit-3	**Rich Data Controls & User Controls**	**12**	**14**
	❖ Grid View Controls – Formatting, Raw Selection, Sorting, Paging, Template ❖ List View Controls – Grouping, Paging, Detail View & Form View ❖ User Controls – Creating, Adding code to user control, Dynamically Loading		
Unit-4	**Themes and Master Pages**	**12**	**14**
	❖ Cascading Style Sheet – Creating, Applying ❖ Theme – Creating, Applying, Skins, Using CSS in a Theme ❖ MasterPage – Basic and Advance		
Unit-5	**Navigation and Deployment**	**12**	**14**
	❖ Treeview Control ❖ Menu Control – Menu Style, Menu Template ❖ IIS at a glance ❖ Deploying .NET Application		

Break up of Continuous Internal Evaluation
1) Test: 30 Marks

Reference Books

❖ Matthew MacDonald & Mario Szpuszta – ASP.NET 3.5 in c# 2008, Apress
❖ Black Book – ASP.NET 3.5, Dreamtech
❖ Bill Evjen, Scott Hanselman, Devin Rader – Professional ASP.NET 3.5 in C# and VB, Wiley India Edition

Paper No: 504: Project – I **Credits: 04**

Marks: **100 Marks**
Marks: Semester End Examination: **70 Marks**
Continuous Internal Evaluation: **30 Marks**

Detailed Guidelines	Teaching Hours	Marks/ Weight
❖ Objective of this paper is to familiarize the student with development of application software using the tools they studied and gain the experience before going for the larger projects in the final semester. ❖ A group of maximum two students is allowed to work on the same project. ❖ Students will be allowed to go for field work in industry / NGO / Govt. organizations to study the business process. Based on business requirement, they have to finalize the project definition. ❖ Faculty will provide the guidance. ❖ A group of maximum two students is allowed to work on the same project.	**120***	**70**

Break up of Continuous Internal Evaluation
1) Presentation: 30 Marks

[* Teaching hours = hours spent for field work + guidance provided by the faculty + practical hours]

Paper No: 505: Practical **Credits: 09**

Marks: **100 Marks**

Unit	Detailed Syllabus	Teaching Hours	Marks/ Weight
Unit-1	Practical Based on 502 (Advanced UNIX / LINUX)	**70**	**50**
Unit-2	Practical Based on 503 (Web Programming - II)	**65**	**50**

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Paper No: 601: Project – II **Credits: 21**

Marks: **300 Marks**
Marks: Semester End Examination: **210 Marks**
Continuous Internal Evaluation: **90 Marks**

Detailed Guidelines	**Working Hours**	**Marks/ Weight**
❖ Objective of this paper is to train the student in Industrial software development using standard norms and tools (may be of advanced nature). ❖ Faculty will provide the guidance as an internal guide. ❖ There will an external guide from the industry. ❖ A group of maximum three students is allowed to work on the same project ❖ Evaluation scheme: Preparation of study report (50%), Presentation (50%)	**630***	**210**

Break up of Continuous Internal Evaluation
1) Reporting: 40 Marks
2) Presentation: 50 Marks

[* 7 Hours per day X 6 days per week X 15 weeks = 630 hours]