DETAILED SYLLABUS
BACHELOR OF COMPUTER APPLICATIONS
(BCA)

(EFFECTIVE FROM JULY 2011)

Department of Computer Applications

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SCHEME FOR
BACHELOR OF COMPUTER APPLICATIONS
(BCA)
(Effective From July 2011 Session)

SEMESTER -I

Subject Code	Subject Name	Scheme			Theory Paper	Internal Evaluation	Practical Exams	Total Marks
		L	T	P				
1BCA1	Fundamentals of Computers & Information Technology	4			80	20		100
1BCA2	Programming Methodology and C Programming	4	1	3	80	20	25	125
1BCA3	PC Packages (Word, Excel and PowerPoint)	4		3	80	20	25	125
1BCA4	Social Science-I	4	1		80	20		100
1BCA5	Communicative English-I	4			80	20		100
							Semester Total	550

(**L-Lecture, T-Tutorial, P-Practical)*

SEMESTER -II

Subject Code	Subject Name	Scheme			Theory Paper	Internal Evaluation	Practical Exams	Total Marks
		L	T	P				
2BCA1	Digital Electronics	4			80	20		100
2BCA2	Data Base Management System	4	1	3	80	20		100
2BCA3	Advanced Programming in C	4		3	80	20	25	125
2BCA4	Desk Top Publishing & Designing	4	1		80	20	25	125
2BCA5	Communicative Hindi	4			80	20		100
							Semester Total	550

SEMESTER -III

Subject Code	Subject Name	Scheme			Theory Paper	Internal Evaluation	Practical Exams	Total Marks
		L	T	P				
3BCA1	Data Structures	4			80	20		100
3BCA2	Advance DBMS with Oracle	4	1	3	80	20	25	125
3BCA3	Object Oriented Programming with C++	4		3	80	20	25	125
3BCA4	Elementary Mathematics	4	1		80	20		100
3BCA5	Communicative English-II	4			80	20		100
							Semester Total	550

SEMESTER –IV

Subject Code	Subject Name	Scheme			Theory Paper	Internal Evaluation	Practical Exams	Total Marks
		L	T	P				
4BCA1	Computer Networks	4			80	20		100
4BCA2	System Analysis And Design	4	1	3	80	20		100
4BCA3	Programming with Visual Basic.Net	4		3	80	20	25	125
4BCA4	Internet Programming	4	1		80	20	25	125
4BCA5(A) 4BCA5(B)	Elective- I Computerized A/C Multimedia	4			80	20		100
							Semester Total	550

SEMESTER -V

Subject Code	Subject Name	Scheme			Theory Paper	Internal Evaluation	Practical Exams	Total Marks
		L	T	P				
5BCA1	Operating System	4			80	20		100
5BCA2	Asp.Net & C#	4	1	3	80	20	25	125
5BCA3	Programming with Java	4		3	80	20	25	125
5BCA4	Science of Communication	4	1		80	20		100
5BCA5	Social Science-II	4			80	20		100
							Semester Total	550

SEMESTER -VI

Subject Code	Subject Name	Scheme			Theory Paper	Internal Evaluation	Practical Exams	Total Marks
		L	T	P				
6BCA1	Web Development	4		3	80	20	25	125
6BCA2	Linux & Shell Programming	4	1	3	80	20	25	125
6BCA3(A) 6BCA3(B) 6BCA3(C)	Elective II Principles of Management Advance Mathematics E-Commerce	4			80	20		100
6BCA 4	Project Work		4	4		40	160	200
							Semester Total	550

General Instructions:

1. **For passing the subject examination minimum 40% marks must be separately scored in Theory Paper, Practical Exams and Internal Evaluation in the subject.**
2. **For passing the semester, minimum aggregate marks must be 45% in the semester.**

Course: BCA **Semester: I**
Sub Code: 1BCA1 **Subject Name: Fundamentals of Computers and Information Technology**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT- I Brief History of Development of Computers, Computer System Concepts, Computer System Characteristics, Capabilities and Limitations, Types of Computers, Basic Components of a C omputer System - Control Unit, ALU, Input/output Functions and Characteristics, Memory RAM, ROM, EPROM, PROM and other types of Memory.	8					8	
UNIT- II Input/ Output & Storage Units - Keyboard, Mouse, Trackball, Joystick, Digitizing tablet, Scanners, Digital Camera, MICR, OCR, OMR, Barcode Reader, Voice Recognition, Light pen, Touch Screen, Monitors - Characteristics and types of monitor , Size, Resolution, Refresh, Dot Pitch, Video Standard - VGA, SVGA, XGA.	8					8	
UNIT - III Printers and its Types - Dot Matrix, Inkjet, Laser, Plotter, Sound Card and Speakers, Storage Fundamentals - Primary Vs Secondary data Storage, Various Storage Devices - Hard Disk Drives, Floppy Disks ,Optical Disks, Flash Drives.	8					8	
UNIT- IV Use of Communication and IT, Communication Process, Communication Types- Simplex, Half Duplex, Full Duplex, Serial and Parallel Communication, Types of Network - LAN, WAN, MAN , Internet, Topologies of LAN - Ring, Bus, Star, Mesh and Tree Topologies, World Wide Web and its Applications and Internet Services.	8					8	
UNIT - V Software and its Need, Types of Software - System Software, Application Software, System Software - Operating System, Utility Program, Programming Languages, Assemblers, Compilers and Interpreter, Programming Languages- Machine, Assembly, High Level, 4GL.	8					8	
TEXT & REFERENCE BOOKS: • *COMPUTERS TODAY, BY S.K BASANDRA, GALGOTIA PUBLICATIONS.* • *FUNDAMENTALS OF INFORMATION TECHNOLOGY ALEXIS LEON & MATHEWS LEON, , VIKAS PUBLISHING* • *DOS QUICK REFERENCE RAJEEV MATHUR, , GALGOTIA PUBLICATIONS*							

Course: BCA **Semester: I**
Sub Code: 1BCA2 **Subject Name: Programming Methodology and C Programming**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT - I Program Concept, Characteristics of Programming, Various Stages in Program Development, Algorithms, Flow Charts, Programming Techniques – Top Down, Bottom Up, Modular, Structured, Features, Merits, Demerits and Their Comparative Study. Programming Logic - Simple, Branching, Looping, Recursion, Programming Testing & Debugging.	8	6				14	
UNIT- II Introduction to C Language, C Language Standards, Features of C, Structure of C Program, Introduction to C Compilers, Creating and Compiling C Programs, IDE, Features of Turbo C Compiler. Keywords, Identifiers, Variables, Constants, Scope and Life of Variables, Local and Global Variable, Data Types, Expressions. Operators - Arithmetic, Logical, Relational, Conditional and Bit Wise Operators, Precedence and Associativity of Operators, Type Conversion. Basic Input/Output Library Functions ,Character Input/Output getch(), getchar(). getche(), putchar(). Formatted Input/Output - printf() and scanf(), Mathematical & Character Functions.	8	6				14	
UNIT- III Declaration Statement, Conditional Statement - if Statement, if else Statement, Nesting of if... .else Statement, else if Ladder, The ?: Operator, switch Statement. Iteration Statements - for Loop, while Loop, do-while Loop. Jump Statements: break, continue, goto, exit(). Arrays - Concept of Single and Multi Dimensional Arrays Strings : Declaration, Initialization, Functions	8	6				14	
UNIT – IV The Need of C Functions, User Defined and Library Function, Prototype of Functions, Prototype of main() Function, Calling of Functions, Function Arguments, Argument Passing: Call By Value and Call By Reference, Return Values. Nesting of Function, Recursion, Array as Function Argument, Command Line Arguments, Storage Class Specifier - Auto, Extern, Static, Register.	8	6				14	
UNIT - V Defining Structure, Declaration of Structure Variable, Type def, Accessing Structure Members, Nested Structures, Array of Structure, Structure Assignment, Structure as Function Argument, Function that Return Structure, Union.	8	6				14	
TEXT & REFERENCE BOOKS: • *BALAGURUSWAMY, "PROGRAMMINGIN C ", TMH PUBLICATIONS* • *GOTTFRIED SCHAUMS OUTLINE SERIES, "PROGRAMMING WITH C ", TMH PUBLICATIONS* • *MAHAPATRA, " THINKING IN C ", (PHI)PUBLICATIONS* • *ANURAG SEETHA, "INTRODUCTION TO COMPUTERS AND INFORMATION TECHNOLOGY", RAIN PRASAD & SONS, BHOPAL* • *S.K. BASANDRA, "COMPUTERS TODAY", GALGOTIA PUBLICATIONS.* • *PETER JULIFF "PROGRAM DESIGN" PHI PUBLICATIONS*							

Course: BCA **Semester: I**
Sub Code: 1BCA3 **Subject Name: PC PACKAGES (Word, Excel and PowerPoint)**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT- I **MS Windows: Introduction to MS Windows, Features of Windows, Various versions of Windows & its use, Working with Windows, My Computer & Recycle bin , Desktop, Icons and Windows Explorer, Screen description & working styles of Windows, Dialog Boxes & Toolbars, Working with Files & Folders, Operations on Files and Folders, Shortcuts & Auto starts, Accessories and Windows Settings, Using Control Panel- Setting common devices using control panel, creating users, internet settings, Start button & Program lists, Installing and Uninstalling new Hardware & Software programon your computer.**	**8**	**6**				**14**	
UNIT- II **Office Packages: Office activates and their software requirements, Word-processing, Spreadsheet, Presentation graphics, Database, introduction and comparison of various office suites like MS-Office, Lotus-Office, Star-Office, Open-Office, MS Word Basics- Features & area of use. Working with MS Word, Menus & Commands, Toolbars & Buttons, Shortcut Menus, Wizards & Templates, Creating a New Document, Different Page Views and layouts, Applying various Text Enhancements, Working with Styles, Text Attributes, Paragraph and Page Formatting, Text Editing using various features , Bullets, Numbering, Auto formatting, Printing & various print options**	**8**	**6**				**14**	
UNIT- III **Advanced Features of MS Word, Spell Check, Thesaurus, Find & Replace; Headers & Footers, Inserting PageNumbers, Pictures, Files,Auto texts, Symbols, Working with Columns, Tabs & Indents, Creation & Working with Tables including conversion to and from text, Margins & Space management in Document, Adding References and Graphics, Mail Merge, Envelops & Mailing Labels. Importing and exporting to and from various formats.**	**8**	**6**				**14**	
UNIT - IV **MS Excel - Introduction and areaof use, Working with MS Excel, concepts of Workbook & Worksheets, Using Wizards, Various Data Types, Using different features with Data, Cell and Texts, Inserting, Removing & Resizing of Columns & Rows, Working with Data& Ranges, Different Views of Worksheets, Column Freezing, Labels, Hiding, Splitting etc., Usig different features with Data and Text; Use of Formulas, Calculations & Functions, Cell Formatting including Borders & Shading, Working with Different Chart Types; Printing of Workbook & Worksheets with various options.**	**8**	**6**				**14**	
UNIT-V **MS PowerPoint - Introduction & area of use, Working with MS PowerPoint, Creating a New Presentation, Working with Presentation, Using Wizards, Slides & it's different views, Inserting, Deleting and Copying of Slides, Working with Notes, Handouts, Columns & Lists, Adding Graphics, Sounds and Movies to a Slide, Working with PowerPoint Objects, Designing & Presentation of a Slide Show, Printing Presentations, Notes, Handouts with print options. Outlook Express, Features and uses, Configuraton and using Outlook Express for accessing e-mails in office.**	**8**	**6**				**14**	
TEXT & REFERENCE BOOKS: • *WINDOWS XP COMPLETE REFERENCE. BPB PUBLICATIONS* • *MS OFFICE XP COMPLETE BPB PUBLICATION* • *MS WINDOWS XP HOME EDITION COMPLETE, BPB PUBLICATION.* • *JOE HABRAKEN, MICROSOFT OFFICE 2000, 8 IN 1, BY, PRENTICE HALL OF INDIA* • *I.T TOOLS AND APPLICATIONS, BY A. MANSOOR, PRAGYA PUBLICATIONS, MATURA*							

Course: BCA **Semester: I**
Sub Code: 1BCA4 **Subject Name: Social Science-I**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT- I Concept, Definitions and Importance Of Sociology, Relation of Sociology with Other Social Sciences, Group-Community-Institution-Organisation-Society-Humanity-Biosphere and Their Unity and Inter-Dependence, Meaning of Family, Kinship, Class, Caste, Clan, Tribe, Marriage.	8					8	
UNIT – II Concept of Socialization, Social Stratification, Concept, Definitions and Process of Social Change, Understanding of Contemporary Changes in India , Characteristics of Indian Culture.	8					8	
UNIT- III Concept, Definitions and Importance of Psychology, Relation of Psychology with Other Social Sciences, Psychology of Social Groups , Elements and Process of Human Behavior, Theory of Information Opinion and Attitude Formation.	8					8	
UNIT- IV Environmental Study, Renewable And Non-Renewable Resources Natural Resources And Associated Problems: (a) Forest Resources: Use and over-exploitation, Deforestation, Timber extraction, mining, Dams and their effects on forests and tribal people. (b) Water Resources: Use and over-utilization of surface and ground water, floods, Drought, dams-benefits and problems. (c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources. (d) Food Resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. (e) Energy Resources: Growing energy needs, Renewable and non-renewable energy sources, Use of alternate energy sources. (f) Land Resources: Land as a resource, land degradation, Man induced landslides, Soil erosion and Desertification.	8					8	
UNIT- V Environmental Study -Role of an Individual in Conservation of Natural Resources. Environmental Pollution Definition,Causes, Effects And Control Measures of : Air Pollution ,Water Pollution , Soil Pollution , Marine Pollution, Noise Pollution ,Thermal Pollution ,Nuclear Pollution,Role Of An Individual in Prevention of Pollution Public Awareness, Understanding Ecosystem Environment and Human Health.	8					8	
TEXT & REFERENCE BOOKS: • *A TEXT BOOK OF ENVIRONMENTAL SCIENCE BY ARVIND KUMAR, APH PUBLISHING CORPORATION* • *A TEXT BOOK OF ENVIRONMENTAL STUDIES BY DR B K SHARMA , HIMALAY* • *FUNDAMENTALS OF SOCIOLOGY BY RAJENDRA KUMAR SHARMA,* **ISBN***: 9788171566457*							

Course: BCA **Semester: I**
Sub Code: 1BCA 5 **Subject Name: Communicative English -1**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I Sentences : Simple, Compound, Complex, Assertive, Interrogative, Imperative, Exclamatory. Clauses : Co-ordinate, Sub-ordinate, Relative, Adverb, Comparative (Adverb + Adjective) Articles : usage of 'A', 'An', 'THE' Preposition : Position of Prepositions, Place Relations Time Relations and other relations.	8					8	
UNIT-II Functional Grammar Tenses : Simple Present, Progressive Perfect, Present Perfect Progressive along with Past Tense and indications of futurity. Reported speech Modals : Will, Shall Should, Would and others Voice - Active and Passive.	8					8	
UNIT-III Reading & Writing, Comprehension of Unseen Passage , Grasp Of General Language Skills, Issues with Reference Words & Usage Within Passages.	8					8	
UNIT-IV Paragraph Writing, Expansion of given ideas, Listening, Note taking/Note making.	8					8	
UNIT-V Vocabulary : making sentences with idioms & phrases, Words Commonly Misspelled/confused, Words formation by prefix suffix.	8					8	
TEXT & REFERENCE BOOKS: • *A PRACTICAL ENGLISH GRAMMAR BY THOMSON AND MARTINET* • *ENGLISH GRAMMAR BY W.S.ALLEN* • *INTERMEDIATE ENGLISH GRAMMAR BY RAYMOND WILLIAMS* • *VOCABULARY BY MICHAEL MC CARTHU AND FELICITY O'DELL* • *ENGLISH GRAMMER BY JAYANTHI DAKSHINA MURTH*							

Course: BCA **Semester: II**
Sub Code: 2BCA1 **Subject Name: Digital Electronics Design**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I Data representation Data Types and Number Systems, Binary Number System, Octal & Hexa-Decimal Number System, Fixed Point Representation, 1's & 2's Complement, Binary, Arithmetic Operation on Binary Numbers, Overflow & Underflow, Floating Point Representation, Codes, ASCII, EBCDIC Codes, Gray Code, Excess-3 & BCD, Error Detection & Correcting Codes Binary Storage and Registers.	8					8	
UNIT–II Boolean algebra and digital logic circuits -Logic Gates, AND, OR, NOT,, NOR, NAND & XOR Gates and their Truth Tables, Boolean Algebra, Basic Definition and Properties, Basic Boolean Law's, Demorgan's Theorem, Minimization Techniques, K Map – Two, Three and More Variables maps, Sum of Product & Product of Sums, Don't care conditions.	8					8	
UNIT–III Combination Circuits - Half adder & Full adder, Full Subtractor, Full Subtractor and decimal adder, Code Conversion, Multilevel NAND and NOR Circuits, Decimal adder, decoders, Multiplexers and Demultiplexers.	8					8	
UNIT–IV Sequential logic- Flip-Flops - RS, D, JK & T Flip-Flop, Triggering in flip flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, flip flop excitation tables, Design procedure and design of counters. Design with equations.	8					8	
UNIT–V Registers, Counters and the memory unit, Shift registers, Ripple counters and Synchronous counters, Inter-register Transfer, Arithmetic Logic and Shift Micro Operation, Conditional Control Statement, Instruction Codes, Processor organization, design of a simple computer.	8					8	
TEXT & REFERENCE BOOKS: • *DIGITAL LOGIC AND COMPUTER DESIGN BY MORRIS MANO* • *COMPUTER SYSTEM ARCHITECTURE BY MORRIS MANO*							

Course: BCA **Semester: II**
Sub Code: 2BCA2 **Subject Name: Data Base Management System**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT- I INTODUCTION TO DATAB ASE SYSTEM Introduction To Database Systems Purpose of Database System, Vi ew Of Data, Characteristics of Database Approach, Architecture for a Database System, Advantages and Disadvantages Of DBMS, Database Users and Administrator, Database Design and ER Model , Data Model Classification.	8					8	
UNIT-II RELATIONAL DATABASE Structure of Relational Database Database Schema, Key, Relational Operations Formal Relational Query Languages .	8					8	
UNIT-III RELATIONAL DAT ABASE DESIGN Features of Good Database Design, Universal Relation, Anomalies in A Database Atomic Domain and 1NF ,Functional Dependency Theory, Decomposition Using Functional Dependency Algotithm for Decomposition, Decomposition Using Multivalue Dependency More Normal Forms, Database Design Process.	8	6				14	
UNIT-IV DATABASE STORAGEAND QUERYING Basic Concepts Of Indexing and Hashing Query Processing , Measures Of Query Cost , Query Processing for Select, Sort Join Operations. Basics of Query Optimization, Transformation of Relational Expression Estimating Statistics of Expression, Choice of Evaluation Plan .	8	6				14	
UNIT-V TRANSACTION MANAGEMENT Transaction Concepts, Features of Database Transaction. Concurrency Control in Database - Lock Base, Time Stamp Base, Val idation Base Protocols Database Recovery System .	8	6				14	
TEXT & REFERENCE BOOKS: • *SILVERSCHATZ KORTH AND SUDARSHAN-DATABASE SYSTEM CONCEPTS, 6TH ED. TATA MC-GRAW HILL.* • *RAGHU RAMA KRISHNAN-DATABASE MANAGEMENT SYSTEMS, 2ND ED. TATA MC-GRAW HILL* • *RAJESH NARANG DATABASE MANAGEMENT SYSTEM,2ND ED.PHI* • *R. ELMASRI ET. AL FUNDAMENTALS OF DATABASE SYSTEMS . 3RD EDITION ADDISON WESLEY, (INDIAN REPRINT), NEW DELHI.* • *C.J.DATE, DATA BASE SYSTEMS*, Vol I & II							

Course: BCA **Semester: II**
Sub Code: 2BCA3 **Subject Name: Advanced Programming in C**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I Basics of Pointers, Pointers Operators, Pointer Arithmetic, Pointers and Function, Pointer and Strings, Pointer to Structure, Pointers within Structure, Introduction to Static and Dynamic Memory Allocation, The Process of Dynamic Memory Allocation, DMA Functions : malloc(), calloc(), free(), realloc(), sizeof() Operator.	8	6				14	
UNIT –II Introduction to File Handling, File Structure, File Types : Streams, Text, Binary; File System Basics, The File Pointer, Opening a File and Closing a File, Functions for File Handling : fopen(), fclose(), getc(),fgetc(), putc(), fputc(), feof(), gets(), puts(), fgets(), fputs(), getw(), putw(), fscanf(), fprintf(), fread(), fwrite(), Standard Streams in C, Flushing a Stream, Direct Access File and Random Access to File : fseek(), ftell(), rewind(); File Name as Command Line Argument.	8	6				14	
UNIT -III Preprocessor and its Advantages, Preprocessor Directives, Macros with and without Arguments, #Define, #Include; Creating Header Files, Include User Defined Header Files, Conditional Compilation Directives: #if, #else, #elif and #ifdef & undef; Using defined, #error, #line, #pragma, The # & ## Preprocessor Operator.	8	6				14	
UNIT -IV Display adapter, Graphics Mode and Resolution, Header File "Graphics. h". Various Functions of Graphics, Function initgraph() and its Arguments, Functions Used in Graphics - Drawing a Point on Screen, Drawing Lines, Rectangle, Circles, Arcs, Polygon. Functions to Fill Colors. Display Text in Graphics Mode, Justifying Text.	8	6				14	
UNIT -V Working with ROM BIOS Routines, IVT, Registers for Passing Arguments to BIOS Routine. Function int86(), Finding Installed Memory Size and Clearing Screen using int86(), Working with Mouse and Keyboard, Working with DOS Routines, Function intdos(), Renaming File, Deleting File, Create Directory, Delete Directory using intdos()	8	6				14	
TEXT & REFERENCE BOOKS: • *HERBERT SHIELD, "COMPLETE REFERENCE C"* • *Y KANETKAR, "POINTERS THROUGH C ".* • *Y KANETKAR, "TSR THROUGH C".* • *R.S SALARIA, "APPLICATION PROGRAMMING IN C"*							

Course: BCA **Semester: II**
Sub Code: 2BCA 4 **Subject Name : Desktop Publishing & Designing**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT - I D.T.P For Publications: Introductions to Printing, Types of Printing, Offset Printing, Working of offset Printing, Transparent Printout, Negative & Positives for Plate were making, Use of Desk Top Publishing in Publications, Importance of D.T.P in Publication, Advantage of D.T.P in Publication, Mixing of graphics & Image in a single page production, Laser printers - Use, Types, Advantage of lager printer in publication.	8	6				14	
UNIT - II Page Layout: Different page format / Layouts, News paper page format, Page orientations, Columns & Gutters, Printing in reduced sizes. Introductions To Page Maker:Page Maker Icon and help, Tool Box, Styles, Menus etc., Different screen Views, Importing text/Pictures, Auto Flow, Columns, Master Pages and Stories, Story Editor, Menu Commands and short-cut commands, Spell check, Find & Replace, Import Export etc., Fonts, Points Sizes, Spacing etc., Installing Printers, Scaling (Percentages), Printer setup.	8	6				14	
UNIT - III Use Of D.T.P, Use of D.T.P. in Advertisements, Books & Magazines, News Paper, Table Editor.	8	6				14	
UNIT - IV Introduction to Adobe Photoshop & Documents ,Various Graphic Files and Extensions Vector Image and Raster Images, Various Colour Modes and Models.	8	6				14	
UNIT - V Introduction to Screen and Work Area, Photoshop Tools & Palettes ,Use of Layers & Filters Working with Images.	8	6				14	
TEXT & REF ERENCE BOOKS : • *PAGE MAKER 4.0 & 5.0 BY B.P.O. PUBLICATIONS.* • *PRAKHAR COMPLETE COURSE FOR DTP (CORELDRAW, PAGEMAKER, PHOTOSHOP)*							

Course: BCA **Semester: II**
Sub Code: 2BCA5 **Subject Name:Communicative Hindi**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours
;wfuV&1 हिन्दी भाषा का संक्षिप्त विकास, हिन्दी की ,oa cksfy;ksa dk laf{kIr ifjp;] 'kCndks'k & mi;ksx ,oa egRo] fgUnh Okkdj.kCn jpuk] okD; jpuk] okD;ksa ds izdkj] miokD; laf/k lekl] milxZ] izR;;] I;kZ;okph foyksekFkhZ] ?kZd] lewgkFkZd 'kCn AA	8					8
;wfuV&2 छेवनागरी लिपि के मुख्य विशेषताऐं 'kq) ,oa orZuh; 'kqf) ds fu;e] izeq[k eqgkojks ,oa yksdksfDr;ksa dk iz;ksx] Nan ,oa vyadkj प्रयोग, विराम चिह्नों का प्रयोग A	8					8
;wfuV&3 गद्य को विभिन्न शैलियाँ, सांकेतिक ,oa वार्तिक पत्रों की भाषा शैली, वर्ण विभाग, स्वर व्यंजन , 'ाब्द विभाग :– संज्ञा, सर्वनाम, विशेषण, क्रिया, संबंध बोधक समुच्चय बोधक, विस्मययि बोधक । वाक्य विभाग :– उद्देश्य और विधेय, काल और काल अभेद, पुरुष, वचन, लिंग	8					8
; wfuV &4 vuqokn dk vFkZ vkSj ifjHkk"kk] vuqokn ds izdkj] vuqokn ds midj.k ,oa leL;k] Hkko rFkk izHkko ds vk/kkj ij vuqokn ,oa ys[kA	8					8
;wfuV&5 fuca/k ys[ku] fjiksVZ ys[ku] i= ys[ku] vuqokn] xksnku]xou - eqa'khizsepanA	8					8
TEXT & REFERENCE BOOKS: • *vuqokn fodkl ,oa lais"k.k %& MkW- gfjeksgu* • *vuqokn dyk fl)kar vkSj iz;ks• %& MkW dSyk'k HkkfV;k* • *O;ogkfjd fgUnh %& MkW- ks[kj.kUnd* • *Ifj"d`r fgUnh O;kdj.k %& cnjhukFk*						

Course: BCA **Semester: III**
Sub Code: 3BCA1 **Subject Name: Data Structure**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT - I The Concept of Data Structure, Abstract Data Type, Concept of List & Array, Introduction to Stack, Stack as an Abstract Data Type, Primitive Operation on Stack, Stack's Application - Infix, Postfix, Prefix and Recursion. Introduction to Queues, Primitive Operations on Queues, Queue as an Abstract Data type, Circular Queue, Dequeue, Priority Queue, Applications of Queue.	8	6				14	
UNIT - II Linked List - Introduction to Linked List, Memory Representation of Linked List, Operations on Linked List, Linked List Representation of Stack and Queue, Header Nodes. Types of Linked List - Doubly Linked List, Circular Linked List, Application of Linked List.	8	6				14	
UNIT –III Trees - Basic Terminology of Trees, Binary Trees, Tree Representations as Array & Linked List. Binary Tree Representation. Traversal of Binary Trees - Inorder, Preorder & Postorder, Application of Binary Tree, Threaded Binary tree, Height Balanced tree, B-tree.	8	6				14	
UNIT-IV Analysis of Algorithm, Complexity with Big'O' Notation. Searching - Sequential Search, Binary Search and their Comparison. Sorting - External & Internal Sorting, Insertion Sort, Selection Sort, Quick Sort, Bubble Sort, Heap Sort, Comparison of Sorting Methods.	8	6				14	
UNIT-V Graphs - Introduction to Graphs, Basic Terminology, Directed, Undirected & Weighted graph, Representation of Graphs, Graph Traversals - Depth First & Breadth First Search. Spanning Trees, Minimum Spanning Tree, Applications of Graphs : Shortest Path Problem using Dijkstra Method.	8	6				14	
TEXT & REFERENCE BOOKS: • *FUNDAMENTALS OF DATA STRUCTURE, BY S. SAWHNEV & E. HOROWITZ* • *DATA STRUCTURE: BY T REMBLEY & SORRENSON* • *DATA STRUCTURE: BY LIPSCHUISTS (SCHAUM 'S OUTLINE SERIES MCGRAW HILL PUBLICATION)* • *FUNDAMENTALS OF COMPUTER ALGORITHM: BY ELLIS HOROWITZ AND SARTAJ SAWHNEY*							

Course: BCA **Semester: III**
Sub Code: 3BCA2 **Subject Name: Advanced DBMS with Oracle**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT - I Oracle product details, Overview of oracle architecture Oracle files, System and User process, Oracle Memory, System data base object, Oracle Data types.	8					8	
UNIT-II Working with Tables. Data Constraints, Select Command, Oracle Operator, Range Searching, Pattern Matching, Oracle Built In Function Grouping data from Tables in SQL, Manipulation Data in SQL, Joining Multiple Tables ,Sub queries,	8	7				15	
UNIT –III Oracle Security –Privileges., Creating view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes. Creating and Managing, Working with Sequences.	8	7				15	
UNIT –IV PL/SQL Introduction, Data type support in PL/SQL, Conditional Statements, Using DML Within PL/SQL,Procedures & Functions, Cursors, Parameterized Cursor.	8	7				15	
UNIT-V Exception handling in PL/SQL, Triggers - Concept, use, how to apply database triggers, type of triggers, Syntax, deleting.	8	7				15	
TEXT & REFERENCE BOOKS: • *IVAN BAYP'OS.C, 'SQL. PL/SQL", BPB PUBLICATIONS"* • *LIEBSCHUTY. 'THE ORACLE COOKBOOK", BPB PUBLICATION* • *MICHAEL ABBEY, MICHAEL JCOREY, 'ORACLE A BEGINNERS* • *GUIDE". TMHPUBLICATION* • *ORACL DATA BASE 11 G SATISH ASNANI PHI LEARNING*							

Course: BCA **Semester: III**
Sub Code: 3BCA3 **Subject Name- Object Oriented Programming with C++**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I Object Oriented Programming, Concepts, Advantages, Usage. C++ Environment: Program Development Environment,C++ language standards. Introduction to Various C++Compilers, C++ Standard Libraries, Prototype of main() Function, Datatypes. Classes & Objects- Classes, Structure & classes, Union & Classes, Friend Function, Friend Classes, Inline Function,, Scope Resolution Operator, Static Class Members, Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment.	8	6				14	
UNIT-II Array, Pointers References & The Dynamic Allocation operators Array of objects, Pointers to Object, Type Checking C++ Pointers, The This pointer, Pointer to Derived Types, Pointer to Class Members, Reference parameter, Passing references to Objects, Returning Reference, Independent Reference, 'C++ 'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects.	8	6				14	
UNIT -III Constructor & Destructor - Introduction, Constructor, Parameterized constructor, Multiple Constructor in a class, Constructor with Default Argument, Copy Constructor, Default Argument, Destructor, Function & Operator Overloading Function Overloading, Overloading Constructor Function Finding the address of an Overloaded Function.	8	6				14	
UNIT -IV Operator Overloading: Creating a member, Operator Function, Creating Prefix & Postfix forms of the increment & decrement operation, Overloading the shorthand operation (i.e. +=,-=~., etc), Operator overloading restriction, Operator overloading using friend function, Overloading New & Delete, Overloading some special operators, Overloading [ ], ( ),-, comma operator, Overloading <<.	8	6				14	
UNIT -V Inheritance -Base Class Access Control, Protected Members, Protected Base Class Inheritance, Inheriting Multiple Base Classes, Constructors, Destructors & Inheritance, When Constructor & Destructor Function, Passing parameters to base class constructors, Granting access, Virtual base classes. Virtual functions & Polymorphism: Virtual function, Pure Virtual functions, Early vs. Late binding.	8	6				14	
TEXT & REFERENCE BOOKS: • *HERBERTZ SHIELD, "C++ THE COMPLETE REFERENCE "TMH PUBLICATION ISBN 0-07-463880-7* • *R. SUBBURAJ, 'OBJECT ORIENTED PROGRAMMING WITH C++ VIKAS PUBLISHING HOUSE, NEW DELHI.ISBN 81-259-1450-1* • *E. BALGUR USWAMY, "C++ " TMH PUBLICATION ISBN O-07-462038-X* • *M. KUMAR 'PROGRAMMING IN C++" TMH PUBLICATIONS* • *R. LAFORE, 'OBJECT ORIENTED PROGRAMMING C++"* • *ASHOK . N. KAMTHANE, "OBJECT ORIENTED PROGRAMMING WITH ANSI & TURBO C++ ", PEARSON EDUCATION PUBLICATION,ISBN8J-7808-772-3*							

Course: BCA **Semester: III**
Sub Code: 3BCA4 **Subject Name- Elementary Mathematics**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I Sets and Their Representations. Empty Set, Finite & Infinite Sets, Equal Sets. Subsets. Subsets of the Set of Real Numbers Especially Intervals (with notations). Power Set. Universal Set. Venn Diagrams. Union and Intersection of Sets. Difference of Sets. Complement of a Set. Ordered Pairs, Cartesian Product of Sets. Number of Elements in the Cartesian Product of two Finite Sets. Cartesian Product of the Reals with itself (upto R x R x R). Definition of Relation, Pictorial Diagrams, Domain. Co- domain and Range of a Relation.	8					8	
UNIT-II Function as a special kind of relation from one set to another. Pictorial representation of a function, domain, co-domain & range of a function. Real valued function of the real variable, domain and range of these functions, constant, identity, polynomial, rational, modulus, signum and greatest integer functions with their graphs. Sum, difference, product and quotients of functions. Types of relations: reflexive, symmetric, transitive and equivalence relations. One to one and onto functions, composite functions, inverse of a function. Binary operations.	8					8	
UNIT-III Complex numbers, Brief description of algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system. Fundamental principle of counting. Factorial n. (n!),Permutations and combinations,.	8					8	
UNIT-IV Sequence and Series. Arithmetic progression (A. P.). arithmetic mean (A.M.) Geometric progression (G.P.), general term of a G.P sum of n terms of a G.P., geometric mean (G.M.), relation between A.M. and G.M. Sum to n terms of the special series n, n2 and n3.	8					8	
UNIT-V Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, two point form, intercepts form and normal form. General equation of a line. Distance of a point from a line. Standard equation of a circle, Coordinate axes and coordinate planes in three dimensions. Coordinates of a point.	8					8	
TEXT & REFERENCE BOOKS: • *www.e-booksdirectory.com/mathematics* • *www.origoeducation.com/go-maths*. • *BASICS OF MATHEMATICS BY R D SHARMA.*							

Course: BCA **Semester: III**
Sub Code: 3BCA5 **Subject Name: Communicative English -II**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT - I Nouns : Countable, Unconuntable,Pronoun : Personal, Relative and others,Verb and Verb structures (infinitives and gerundials),Linking Devices.	8					8	
UNIT - II Adverbs and adverb phrases, Comparisons and Intensification Modifiers and adverbs,Adjectives and Adjective Phrases.	8					8	
UNIT - III Synonyms Antonyms & Homonyms,Diminutives and Derivatives,Jargons or Registers.	8					8	
UNIT - IV Precis writing,Paragraph,Curriculum Vitae/Resume,Curriculum Vitae/Resume,Preparation of questionnaire for Interview skills.	8					8	
UNIT-V Effective Public Speaking : Features & aspects of EPS, genral mistakes & how to avoid them, structure of an ideal speech/technical presentation.	8					8	
TEXT & REFERENCE BOOKS: • *INTERMEDIATE ENGLISH GRAMMAR BY RAYMOND WILLIAMS* • *VOCABULARY BY MICHAEL MC CARTHU AND FELICITY O'DELL* • *ENGLISH GRAMMER BY JAYANTHI DAKSHINA MURTH* • *A PRACTICAL ENGLISH GRAMMAR BY THOMSON AND MARTINET* • *ENGLISH GRAMMAR BY W.S.ALLEN*							

Course: BCA **Seme** **ster: IV**
Sub Code: 4BCA1 **Subject Name: Computer Networks**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT -I Networking - Needs and Advantages, Network, Types- Client, Server and Peers, Introduction to various types of servers. Wired & Wireless transmission, Base band and Broadband transmission, Layered Technology, Overview of OSI Model.	8					8	
UNIT-II Transmission Media Types- Properties & Specialty of Various Media Types, Comparative Study. Network Topology-Bus, Star, Ring, Star Bus, Star Ring, Mesh Features, Advantages and Disadvantages of Each Type, Network Adapters Cards.	8					8	
UNIT –III The Theoretical Network Model – OSI, Introduction to IEEE 802 standards, Ethernet, Token Rings, FDDI, Network Scaling-No, of nodes, distance, software, speed, special requirements ,Connectivity Devices: Modem, Repeater, Hub, bridge Gateway.	8					8	
UNIT –IV Overview of TCP/IP reference model. Protocols- IP, TCP, UDP, ARP, SNMP, FTP, SMTP, TELNET Protocols, IP Addressing Class A, B & C. Domain Name Addressing, URL, E-mail address.	8					8	
UNIT-V Network Security : Network Security Issues, Security Barriers Needs Firewalls and Features of Firewalls, Types of Firewall Technology, Network Level and Application Level, IP Packets Filter Screening Routers, Limitations of Firewalls.	8					8	
TEXT & REFERENCE BOOKS: • *NETWORKING ESSENTIALS:STUDY GUIDE MCSE AMES CHEWS CHARLES PERKINS, MATTHEW STREBE BPB PUBLICATIONS.* • *LOCALAREA NETWORKS'S.K.BASANDRA & S. JAISWAL, , GAL GOTIA PUBLICATIONS* • *COMPUTER NETWORK ANDREW & T ANENBAUM,* • *DATA AND COMPUTER COMMUNICATION WILLIAM STERLING* • *DATA COMMUNICATION BY PRAKASH C GUPTA*							

Course: BCA **Semester: IV**
Sub Code: 4BCA2 **Subject Name: System Analysis and Design**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT - I System Concept: Definition, Characteristics, Elements of System, Physical and abstract system, Open and Closed system, ,System Development Life Cycle: Various phases of system development, Considerations for system planning and control for system success, System Planning.	8					8	
UNIT -II Initial Investigation: Determining Users Requirements and Analysis, Fact Finding Process and Techniques. Feasibility Study: Determination of Feasibility Study, Technical, Operational & Economic Feasibilities, Data Analysis, Cost and Benefit Analysis .	8					8	
UNIT -III Tools of Structured Analysis: Data Dictionary, Form, Gantt Charts, System Model, Pseudo Codes, Flow Chart System Flow Chart, Decision Tree, Decision Tables, Input/ Output and Form Design: Input and Output Form Design Methodologies, Menu, Screen Design, Layout Consideration.	8					8	
UNIT -IV User Manual, Programming Manual, Programming Specifications, Operator Manual. System Testing & Quality: System Testing and Quality Assurance, Software Maintenance. System Security: Data Security, Disaster/ Recovery Threat and Risk Analysis.	8					8	
UNIT -V Organization of EDP: Introduction. Job Responsibilities & duties of EDP Personnel's- EDP manager, System Analyst, Programmers, Operators etc. Essential features in EDP.	8					8	
TEXT & REFERENCE BOOKS: • *SYSTEM ANALYSIS & DESIGN BY V K JAM, DREAMTECH PRESS* • *MODERN SYSTEM ANALYSIS &DESIGN BY A HOFFER, F GEORGE, S VALACIAH LOW PRICED EDN. PEARSON EDUCATION.* • *INFORMATION T ECHNOLOGY & COMPUTER APPLICATIONS BY VK.KAPOOR SULTAN CHAND& SONS, NEW DELHI.*							

Course: BCA **Semester: IV**
Sub Code: 4BCA3 **Subject Name: Programming with VB.Net**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT -I Introduction to .NET, .NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser. The environment: Editor tab, format tab, general tab, docking tab. visual development & event drive Programming -Methods and events.	8	6				14	
UNIT –II The VB.NET Language- Variables -Declaring variables, Data Type of variables, Forcing variables declarations, Scope & lifetime of a variable, Constants, Arrays, types of array, control array, Collections, Subroutines, Functions, Passing variable Number of Argument Optional Argument, Returning value from function. Control flow statements: conditional statement, loop statement. Msgbox & Input box.	8	6				14	
UNIT-III Working with Forms: Loading, showing and hiding forms, controlling One form within another.GUI Programming with Windows Form: Textbox, Label, Button, Listbox,Combobox, Checkbox, PictureBox, RadioButton, Panel, scroll bar, Timer, ListView, TreeView, toolbar, StatusBar.There Properties, Methods and events. OpenFileDilog, SaveFileDialog, FontDialog, ColorDialog,PrintDialog. Link Label. Designing menues: ContextMenu, access & shorcut keys.	8	6				14	
UNIT-IV Object oriented Programming: Classes & objects, fields Properties,Methods & Events, constructor, inheritance. Access Specifiers: Public Private, Projected. Overloading, My Base & My class keywords. Overview of OLE, COM technology & .NET.	8	6				14	
UNIT -V Database programming with ADO.NET Overview of ADO, from ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB. Display Data on data bound controls, display data on data grid.	8	6				14	
TEXT & REFERENCE BOOKS: • *VB.NET PROGRAMMING BLACK BOOK BY ST EVEN HOLZNER DREAMTECH PUBLICATIONS* • *MASTERING VB.NET BY EVANGEL OS PET ROUTSOS- BPB PUBLICATIONS* • *INTRODUCTION TO .ZVET FRAMEWORK -WORX PUBLICATION MSDN. MICROSOFT.COM/ NET WWW.GOTDOTNET. COM*							

Course: BCA **Semester: IV**
Sub Code: 4BCA4 **Subject Name: Internet Programming**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I Internet Evolution, Concepts, Internet Vs Intranet, Internet Services USENET, GOPHER, WAIS, ARCHIE (WWW) - History, Working, Web Browsers, Its Functions, URLs, Web Sites, Domain Names, Concept of Search Engines, Search Engines types, Web Servers, E-Mail: Sending & Receiving Email, Free E-Mail Services.	8	6				14	
UNIT –II Concepts of Hypertext, HTML Introduction, Features, Uses & Versions Using Various HTML Tags, Elements of HTML Syntax, Head & Body Sections, , Inserting Texts, Text Alignment,	8	6				14	
UNIT-III Using Images In Pages, Hyperlinks Text and Images, Bookmarks, Backgrounds and Color Controls, Creating and Using Tables in HTML, Use of Font Size & Attributes, List Types and its Tags. Introduction to WYSIWYG Design tools for HTML, Overview of MS- FrontPage.	8	6				14	
UNIT - IV JavaScript Overview, JavaScript and the WWW, JavaScript vs. VBScript, JavaScript vs. Java, JavaScript versions, JavaScript Comments, Variables: Variables overview, declaring variables, Types of variables, Casting variables.	8	6				14	
UNIT-V JavaScript Alert box, Prompt & confirm. Expressions: Arithmetic operators, Assignment operators, Logical operators, Expressions and precedence, Statements: If statement, For statement, While statement, Break/Continue ,	8	6				14	
TEXT & REFERENCE BOOKS: • *LEARN HTML IN A WEEKEND BY STEVEN E. CALLIHAN, PHI* • *USING HTML BY LEE ANNE PHILLIPS,* • *PHI TEACH YOURSELF JAVASCRIPT IN 24 HRS. BY MICHAEL MONCUR, T ECHMEDIA*							

Course: BCA **Seme** **ster: IV**
Sub Code: 4BCA5 (A) **Subject** **Name: Computerized Accounting**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I TAL LY FUNDAMENTALS Basic Concepts of Accounting, Financial Statements, Financial Statement Analysis, Cost Centre, Basic concepts of Inventory.2.Tally Configuration & INI setup, Data Directory & Folders configuration, Single & Multiple User, Tally Screen Components, Mouse / Keyboard Conventions & Key, Combinations, Switching between screen areas, Quitting Tally. Maintaining Company Data, Basic Company Details, Create/Alter/Select/Load/Close a Company, Chart of Accounts, Company Features, and Configuration.	8	4				12	
UNIT-II BA SIC ACCOUNTING: Create, Alter & Display Groups and Ledgers,All accounting voucher types Accounting Voucher transactions, Account Invoice transactions, Excise Invoice, Export Invoice, Transactions using Bill-wise details,Bank Reconciliation, Interest calculations using simple & advance parameters, Interest calculations on outstanding balances & on invoices, Use of voucher class, adjustment of interest, Creation of voucher class, Invoice entry in a class situation, Create, Alter & Delete Budgets for groups, ledgers & cost centre, Defining credit limit & credit period, Display Budgets & variances, Create, Alter & Delete a scenario.Journal Transactions, payment voucher, Godown summary.	8	4				12	
UNIT - III ACCOUNTING REPORTS AND BOOKS OF AC COUNTS Reports like balance sheet, Profit & Loss account, Ratio analysis Trial Balance. Accounts books like cash / bank book, All Ledgers Group summary & vouchers, Sales, purchase & journal registers, Cost centre & category summary, Cost centre breakup ledger & group breakup, outstanding receivables & payables, interest receivable & payable, Statistics, Cash & Fund flow, Day book List of Accounts, Reversing journals, optional vouchers, post-dated vouchers.	8	4				12	
UNIT - IV INVENTORY ACCOUNTING AND INV ENTORY REPOR TS Create, Alter & Display Stock Groups and Stock Items, All inventory voucher types and transactions Inventory details in accounting vouchers, Reports like Stock summary, Inventory books like Stock item, Group summary, Stock transfers, Physical stock register, Movement analysis, Stock group & item analysis, stock category analysis Ageing analysis, Sales order & Purchase order book, Statement of inventory related to Godowns, categories, stock query, Reorder status, Purchase & Sales order summary, Purchase & Sales bill pending, Exception reports like negative stock & ledger, overdue receivables & payables, memorandum vouchers, optional vouchers, post-dated vouchers, reversing journals.	8	4				12	
UNIT – V PRIN TING, HOUSEKEEPING AND ADMINISTRA TION Cheque Printing, Common printing options, Different printing formats, Multi-Account printing, Dynamic- Report specific options, Creating Group Company, Use of Tally vault, Using Security control & defi ning different security levels, Use of Tally Audi,. Back-up & Restore, Splitting company data, Export & import of Data, ODBC compliance, use of E-mail, Internet publishing, Upload, web browser & online help, Re-write data.	8	4				12	
TEXT & REFERENCE BOOKS: • *IMPLEMENTING TALLY 6.3* BY NADHANI; ISBN: 81 7656494X BPB PUBLICATIONS, • *BPB TALLY 6.3* BY BPB EDITORIAL BOARD (HINDI) BPB PUBLICATIONS ISBN81 - 7656-594-6							

Course: BCA **Semester: IV**
Sub Code: 4BCA5 (B) **Subject Name: Multimedia**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT -I Introduction to Multimedia**:** Needs and areas of use, Development platforms for multimedia, Identifying Multimedia elements Text, Images, Sound, Animation and Video, Making simple Multimedia with PowerPoint. Concepts of plain & formatted text, RTF & HTML texts, Object Linking and Embedding concept.	8	4				12	
UNIT -II Sound and it Attributes, Mono V/S Stereo Sound, Sound Channels, Sound and Its Effect In Multimedia, Analog V/S Digital Sound, Overview Of Various Sound File Formats On PC WAV, M P3.	8	4				12	
UNIT –III Importance of Graphics in Multimedia, Vector and Raster Graphics, Image Capturing Methods Scanner, Digital Camera Etc. Various Attributes of Images Size, Color, Depth , Resolution etc, Various Image File Format BMP, DIB, EPS, PIC, and TIF Form at Their Features and imitations, Basics of animation, , Software Tools for animation.	8	4				12	
UNIT –IV Basics of Video Analog and Digital Video, How to use video on PC. Introduction to graphics accelerator cards, Brief note on various video standards NTSC, HDTV, Introduction to video capturing Media & instrument Videodisk.	8	4				12	
UNIT –V Virtual Reality Terminology Head Mounts Display (HMD), Boom, Cave, Input Devices and Sensual Technology, Characteristic If Immersive VR Shared Virtual Environments.	8	4				12	
TEXT & REFERENCE BOOKS: • *MULTIMEDIA: MAKING IT WORK (4TH EDITION) BY THYVAUGHAN, TATA MCGRA W HILLS.* • *MULTIMEDIA IN ACTION JAMES E SHUMAN VIKAS PUBLISHING HOUSE.* • *MULTIMEDIA BASICS VOLUME / TECHNOLOGY, ANDREAS HOI ZINGER, FIREWALL MEDIA (LAXMI PUBLICATIONS PVT. LID) NEW DELHI.*							

Course: BCA **Semester: V**
Sub Code: 5BCA1 **Subject Name: Operating System**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I Definitions, functions and types of operating system, components, Operating system Services, System Calls, programs, System structure.	8					8	
UNIT –II Process Concepts, process state & process control block, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, MultipleProcessor Scheduling Real-Time Scheduling, Threads,	8					8	
UNIT –III Critical Section Problem , Semaphores, Classical Problem Of Synchronization, , Deadlock Characterizations, Method for Handling,Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock .	8					8	
UNIT –IV Logical versus physical address space, Swapping, Contiguous Allocation, Paging, Segmentation, Virtual Memory, Demand Paging, Page Replacement, Page Replacement Algorithms,	8					8	
UNIT –V Disk Scheduling, Disk Management, Swap Space Management, Disk. reliability, Stable Storage Implementation. File Concepts Directory structure, Protection, File system in Linux.	8					8	
TEXT & REFERENCE BOOKS: • OPERATING SYSTEM CONCEPTS BY SILBERSCHATZ & GALVIN, ADDISON EDITION. • OPERATING SYSTEMCONCEPTS & DESIGN BYMILAN MILENKOVIC, WESLEY PUBLICATION 6 • OPERATING SYSTEM CONCEPTS & DESIGN BY MILAN MILEN KOVIC,TMH PUBILCATION							

Course: BCA **Semester: V**
Sub Code: 5BCA2 **Subject Name : ASP .Net and C#**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT –I Overview of ASP.NET framework, Understanding ASP.NET Controls, Applications Web servers, installation of WS. Web forms, web form controls -server controls, client controls, web forms & HTML, Adding controls to a web form ,Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box, etc. Running a web Application, creating a multiform web project.	8	6				14	
UNIT-II Form Validation: Client side validation, server Side validation, Validation Controls: Required Field Comparison Range. Calendar control, Ad rotator Control, Internet Explorer Control. State management- View state, Session state, Application state.	8	6				14	
UNIT –III Architecture of ADO.NET, Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class, Data Adapter Class, Dataset Class. Display data on data bound Controls and Data Grid. Database Accessing on web applications: Data Binding concept with web, creating data grid, Binding standard web server controls. Display data on web form using Data bound controls.	8	6				14	
UNIT-IV Writing datasets to XML, Reading datasets with XML. Web services: Introduction, Remote method call using XML, SOAP, web service description language, building & consuming a web service, Web Application deployment.	8	6				14	
UNIT –V Overview of C#, C# and .NET, similarities & differences from JAVA, Structure of C# program. Language features: Type system, boxing and unboxing, flow controls, Classes, interfaces, Serialization, Delegates, Reflection.	8	6				14	
TEXT & REFERENCE BOOKS: • *VB.NET BLACK BOOK BY STEVEN HOLZNER DREAMIECH* • *ASP.NET UNLEASHED* • *C# PROGRAMMING WROX PUBLICATION* • *C# PROGRAMMING BLACK BOOK BY MAN TELLES*							

Course: BCA **Semester: V**
Sub Code: 5BCA3 **Subject Name : Java Programming**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I C++ Vs JAVA, JAVA a nd Internet and WWW, JAVA s upport systems, JAVA environment, JAV A pr ogram structure, Tokens, Statements, JAV A virtual machine, Constants & Variab les, Data Types, Type Casting, Operators , Expressions & its Evaluation, Decision making and branching, Loops, Jumps in Loops, Labeled Loops.	8	6				14	
UNIT-II Defining a class, Adding variables and methods, Creating objects, Accessing class members, Constructors, Method overloading , Static members, Nesting of methods, Inheritance: Extending a class, Overriding methods, Final variables and method~, Final classes, Finalizes methods, Abstract methods and classes, Visibility control.	8	6				14	
UNIT-III Arrays, One dimensional & two dimensional, Strings, Ve ctors, Wrapper classes, Defining interfaces, Extending interfaces, Implementing interfaces, Accessing interface Variables, System packag es, Using system packages, Naming conventions, Creating packages, Accessing a package, Using package, Adding a class to a package, Hiding classes.	8	6				14	
UNIT-IV Threads, Creating threads, Extending the threads class, Stopping and blocking a thread, Life cycle of a thread, Using thread methods, Thread exceptions, Thread priority, Synchronization, Implementing the runnable Interface.	8	6				14	
UNIT-V Applets, Local and remote applets, Applets Vs applications, Writing applets, Applets life cycle, Creating an executable applet, Designing a web page, Applet tag, Adding applet to HTML file, Running the applet, Passing parameters to applets, Aligning the display, HTML tags & applets, Getting input from the user interface.	8	6				14	
TEXT & REFERENCE BOOKS: • *PROGRAMMING* JAVA *2ND EDITION BY E. BALAGUR USVAMY, TMH PUBLICATIONS.* • *PETER NORTON QUID E T O JAVA PROGRAMMING BY PETER NORTON, T ECHMEDIA* PUBLICAT IONS.							

Course: BCA **Semester: V**
Sub Code: 5BCA4 **Subject Name: Science of Communication**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT- 1 Introduction to communication theory, The fact of communication, Communication -Definition, Nature, Scope, Purpose. Process of Communication. Functions of Communication, Use s of Communication, The needs of communication, Communication and information, Communication and Languages.	8					8	
UNIT- II Definition and elements of human communication, S ocialization and r ole of communication in Socialization Types of communication, Intrapersonal communication, Interpersonal communication, Focused and unfocused interactions, group communication, mass communication, Interactive communication ,Public Communication ,Corporate communication.	8					8	
UNIT- III Ver bal communication, Non verbal communication, Importance of body language, Appropriate Body Postures ,Oral communication, Written communication, Visual communication, Signs ,Symbols and code system, communication skills , Dress code .	8					8	
UNIT- IV Barriers of communication, Physical barriers of communication, Psychological barriers of communication, Linguistic and cultural barriers of communication, Mechanical barriers of communication, Removal of barriers.	8					8	
UNIT- V Group communication: Types of Group discussion, Theories and Models, Decision making process, Leadership, Team work communication, Leadership skill Development, Group Discussion, Written Communication skills.	8					8	
TEXT & REFERENCE BOOKS: • *MASS COMMUNICATION IN INDIA BY KEVAL J. KUMAR - A J AICO BOOK* • *COMMUNICATION MOSAICS: AN INTRODUCTIONTO THE FIELD OF COMMUNICATION, 2001. BY WOOD, JULIA T, WADSWORTH*							

Course: BCA **Semester: V**

Sub Code: 5BCA5 **Subject** **Name- Social Science-II**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT- I Concept, definitions and importance of Political Science, Relations of Political Science with other social sciences, Concepts of power and authority, Basic elements of Indian constitution.	8					8	
UNIT- II Indian Constitution - Historical Background , Constituent Assembly of India – Philosophical foundations of the Indian Constitution ,Preamble , Introduction to Fundamental Rights and Duties ,Citizenship	8					8	
UNIT- III Constitutional Remedies for citizens. Union Government , Structures of the Union Government and Functions , President , Vice President ,Prime Minister ,Cabinet , Parliament , Supreme Court of India , Governor ,Chief Minister , Cabinet – State Legislature , Judicial System in States , High Courts and other Subordinate Courts.	8					8	
UNIT- IV Concept, Definitions and importance of Economics, Relations of Economics with other social sciences, Introduction to Indian Economy, *Market, Principles of demand and supply, Consumer behavior, Concept of Globalization, Liberalization, Swadeshi.*	8					8	
UNIT- V Human Rights - the Basic concept: Individual, group, State, Civil Society. Liberty,. Freedom, Equality Justice, Violence, Counter Violence, Human Values: Humanity, Compassion, Virtues, Impact of social structure on human behavior, Role of socialization in human values, Modernization.	8					8	
TEXT & REFERENCE BOOKS: • *DURGA DAS BASU, INTRODUCTION TO THE CONSTITUTION OF INDIA , PRENTICE HALL OF INDIA, NEWDELHI* • *2. R.C.AGA RWAL, (1997) INDIAN POLITICAL SYSTEM , S.CHAND AND COMPANY, NEW DELHI.*							

Course: BCA **Semester: VI**

Sub Code: BCA1 Subject Name: Web Development

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
Unit-I Introduction to PHP, History of PHP, Versions of PHP, Features of PHP, Advantages of PHP over Other Scripting Languages, Installation and Configuration of PHP, Data Types in PHP, PHP Syntax, Comments, PHP Variables and Constants, Scope of Variables, PHP String, String Manipulation, PHP Operators, Precedence of Operators, Expressions, Creating a PHP Script, Running a PHP Script.	8	6				14	
Unit-II Basic HTML, Embedding PHP in HTML, Passing Information between Pages, PHP $_GET, PHP $_POST, PHP Conditional Statements, PHP Looping Statements, Break, Continue, Exit, PHP Functions: Built-in and User Defined Function, Regular Expression Functions, Mathematical, Date and Time Functions, PHP Arrays: Creating Array and Accessing Array Elements,	8	6				14	
Unit-III PHP File Permissions, Working with Files: Opening, Closing, Reading, Writing a File; Working with Directory: Creating, Deleting, Changing a Directory; Working with Forms: Introduction to a Web Form, Processing a Web Form, Validating a Web Form, Input Validation, PHP with Client Side Scripting Language, Exception and Error Handling in PHP, Introduction to Cookies and Session Handling,	8	6				14	
Unit-IV **Working with Database:** PHP-Supported Databases; Using PHP & My SQL: Installation and Configuration of My SQL on Windows, Checking Configuration, Connecting to Database, Selecting a Database, Adding Table and Altering Table in a Database, Inserting, Deleting and Modifying Data in a Table, Retrieving Data, Performing Queries, Processing Result Sets,	8	6				14	
Unit-V Code Re-use, require(), include(), and the include_path, File System Functions and File Input and Output, File Uploads, Use of CSS, Introduction to Object Oriented Programming with PHP, Installing and Configuring Apache to use PHP on Windows, php.ini File,	8	6				14	
TEXT & REFERENCE BOOKS: • PHP & MY SQL, BY VIKRAM VASWANI, TMH PUBLICATIONS • PHP ESSENTIALS, BY JULIE C. MELONI, BPB PUBLICATIONS • PHP 5 AND MY SQL BIBLE, BY TIM CONVERSE AND JOYCE PARK, WILEY-DREAMTECH INDIA PUBLICATIONS • WEB TECHNOLOGIES, BLACK BOOK, DREAMTECH PRESS • ATKINSON, LEON. CORE PHP PROGRAMMING, NEW YORK: PRENTICE HALL • LEARNING PHP 5, BY DAVID SKLAR PUBLISHER O'REILLY MEDIA • MASTERING PHP, BY CHARLES, PUBLISHER: BPB • EXPERT PHP AND MYSQL, WROX PROGRAMMER TO PROGRAMMER, WROX PRESS, 2010 • PHP FOR ABSOLUTE BEGINNERS, APRESS, 2009 • SAMS TEACH YOURSELF CSS IN 24 HOURS (2ND EDITION), SAMS PUBLISHING, 2006 • HTTP:// WWW.PHPBUILDER.COM • HTTP://PHP.FAQTS.COM							

Course: BCA **Semester: VI**
Sub Code: 6BCA2 **Subject Name: Linu• & Shell Programming**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT – I Linux introduction and file system - Basic Features, Different flavors of Linux. Advantages, Installing requirement, Basic Architecture of Unix/Linux system, Kernel, Shell. Linux File system-Boot block, super block, Inode table, data blocks, How Linux access files, storage files, Linux standard directories. Commands for files and directories cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more, less, creating and viewing files using cat, file comparisons – cmp & comm, View files, disk related commands, checking disk free spaces. Partitioning the Hard drive for Linux, Installing the Linux system, System startup and shut-down process.	8	6				14	
UNIT–II Essential linux commands Understanding shells, Processes in linux - process fundamentals, connecting processes with pipes, Redirecting input output, manual help, Background processing, managing multiple processes, changing process priority with nice, scheduling of processes at command, cron commands, kill, ps, who, sleep, Printing commands, touch, file related commands - wc, cut, dd, etc. Mathematical commands- bc, expr. Creating and editing files with vi & vim editor.	8	6				14	
UNIT–III System administration: Common administrative tasks, configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disable user's accounts, creating and mounting file system, file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel. Backup and restore files, installing and removing packages with rpm command. KDE & Gnome graphical interfaces.	8	6				14	
UNIT–IV Shell programming- Basic of shell programming, Various types of shell available in Linux, comparisons between various shells, shell programming in bash, read command, conditional and looping statements, case statements, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automate system tasks. Simple filter commands – pr, head, tail, cut, paste, sort, uniq, tr. Filter using regular expressions – grep, egrep, and sed.	8	6				14	
UNIT-V Basic networking administration: Setting up a LAN using Linux, choosing peer to peer vs client/server model, setting up an Ethernet Lan, configuring host computers, checking Ethernet connecting, connecting to Internet, common networking administrative tasks, configuring Ethernet, initializing Ethernet Interface, ifconfig, netstat and netconfig commands, TCP/IP network, DNS services, routing using Linux Installation & Administration of mail server, ftp server and Apache web server.	8	6				14	
TEXT & REFERENCE BOOKS: • *UNIX - CONCEPTS & APPLICATIONS (THIRD ED.) - SUMITABHA DAS, TATA MCGRAW HILL PUBLICATIONS.* • *UNIX FOR PROGRAMMERS AND USERS (THIRD ED.) - GRAHAM GLASS & KING ABLES, PEARSON EDUCATION INDIA.(LOW PRICES EDITION).* • *FEDORA CORE 6 BIBLE* • *RED HAT LINUX 9 BIBLE CRISTOPHER NEGUS, IDG BOOKS INDIA LTD.* • *USING LINUX BY JACK TACKETT, DAVID GUNTER, PHI, EEE EDITION* • *LINUX INSTALLATION AND ADMINISTRATION, NICHOLAS WELLS, COURSE TECHNOLOGY (VIKAS PUBLISHING, NEW DELHI).* • *UNIX SHELL PROGRAMMING - YASHWANT KANETKAR, BPB PUBLICATIONS,* • *RED HAT LINUX UNLEASHED TECHMEDIA (BPB PUBLICATIONS)* • *LINUX NETWORKING AND SECURITY - WELLS, COURSE TECHNOLOGY (VIKAS PUBLISHING, NEW DEIHI*							

Course: BCA **Semester: VI**
Sub Code: 6BCA3(A) **Subject Name: Principles of Management**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I Management basics What is management, the history of management, Types of manager, manager qualities. Management responsibilities, management tasks and functions. The business environment defining the organization, organization structure, the quality organization, organizational changes, Centralization and Decentralization, managing changes. Management obligations, social and professional responsibilities, government regulations.	8					8	
UNIT –II Strategy formulation the elements of strategy, the strategy formulation process, alliances and acquisitions, strategy formulation tools and Techniques, plan implementation. Decision making the nature of management decision, the decision making Process, decision making techniques.	8					8	
UNIT –III Information presentation and reporting - Principle, Type of Reports, Presentation on Modes, Function reporting system, Information and its uses, Characteristics of information, flow of information. Brief introduction to project planning and management and its tools/ techniques-Gantt chart, PERT/CPM. Human Resources management: Concepts & functions, Job analysis and role description.	8					8	
UNIT –IV Management skills: Leadership and motivation The nature of leadership, leadership theories, Delegation, motivation and motivation theories, need of motivation, motivation techniques. Team building Defining and effective team, selecting team members, building teams, training and development. Effective communication The communication process, presentation skills Tools and techniques.	8					8	
UNIT-V Time management The importance of time, characteristics of management Tasks, determining time elements, time management techniques. Entrepreneurship Entrepreneur and its role, how to become an Entrepreneur, essentials steps to become an entrepreneur, EDP training.	8					8	
TEXT & REFERENCE BOOKS: • *S.K. BASANDRA, "COMPUTERS TODAY", GALGOTIA PUBLICATIONS* • *MAZDA, ENGINEERING MANAGEMENT, ADDISEN WESLEY* • *KOONTZ H, "ESSENTIALS OF MANAGEMENT", TMH PUBLICATIONS*							

Course: BCA **Semester: VI**
Sub Code: 6BCA3(B) **Subject Name: Advanced Mathematics**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT - I Matrices - concept, notation, order, equality, types. Transpose of a Matrix, Symmetric and Skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices, simple properties of addition, multiplication and scalar multiplication. Concept of elementary row and column operations. Invertible matrices. Determinant of a square matrix (up to 3 x 3 matrices), properties of determinants, inverse of a square matrix.	10					10	
UNIT-II Vectors and scalars, magnitude and direction of a vector. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Scalar (dot) product of vectors, projection of a vector on a line. Vector (cross) product of vectors. Mathematically acceptable statements. Connecting words/ phrases – consolidating the understanding of "if and only if (necessary and sufficient) condition", "implies", "and/or", "implied by", "and", "or", "there exists" and their use through variety of examples related to real life and Mathematics.	10					10	
UNIT-III Differential coefficient from first principle, Differential coefficient of trigonometric function, Differential coefficient of product and quotient of two functions, Differential coefficient of function of a function, Successive Differentiation, Standard Integrals, Method of substitution and Integration by parts.	10					10	
UNIT-IV Definition of Statistics, Raw data, Classification of data, Average, Scater range, , Relationship between Mean ,Median, Mode , Dispersion ,Mean Deviation, Standard Deviation, Variance, Coefficient of Variance.	10					10	
UNIT-V Meaning of Probability, Random Experiment an outcome, Sample Space, Sample Point, Types of Sample Space, Types of Events, Probability of an Event, Total and Conditional Probability, Probability distribution of a random Variable, Repeated independent (Bernoulli) trials and Binomial distribution.	10					10	
TEXT & REFERENCE BOOKS: • *www.e-booksdirectory.com/mathematics* • *www.origoeducation.com/go-maths*. • *BASICS OF MATHEMATICS BY R D SHARMA.*							

Course: BCA **Semester: VI**
Sub Code: 6BCA3(C) **Subject Name: E-Commerce**

Unit	Lectures	Practical's	Workshops	Demo	Field Visits	Total Hours	Remarks
UNIT-I E-Commerce an Introductions, Concepts, Advantages and Disadvantages, Technology in E-Commerce, Benefits and impact of E-commerce on travel industry, Goals of E-Commerce, Difference between E-Commerce and E-Business, Models of E-Commerce,Limitations and Advantages of E-Commerce.	8					8	
UNI-II Electronic Payment Systems- Introduction, Types of Electronic Payment Systems, Electronic Payment Systems, Smart Cards and Electronic Payment Systems, Credit Card-Based Electronic Payment Systems, Risk and Electronic Payment Systems.	8					8	
UNIT-III E-Security Network and Web Site Risk for E-Business, Information Technology Act 2000 and its Highlights Related to E-commerce, E-Security,Firewalls, Electronic Market / E- Shop, Introduction to Security, Types of Securities, Security Tools, Network Security.	8					8	
UNIT-IV E-Governance, E-democracy, Government Efforts to Encourage Citizen Participation, Privacy and Security Issues, Information Security Management Digital Divide. Applications in Governance, E-government, Government –to-business, Business-to-Government and Citizen-to-Government,E-Governance Models.	8					8	
UNIT-V Introduction of Cyber Crime, Categorizing Cyber Crime, Information Warfare-Concept, information as an Intelligence Weapon, Attacks and Retaliation, Attack and Defense. Cyber Law.	8					8	
TEXT & REFERENCE BOOKS: • *FRONTIERS OF ELECTRONIC COMMERCE, BY- KALAKOTA, RAVI; STONE, TOM; WHINSTON, ANDREW B, ADDISON WESLEY PUBLISHING CO, ISBN 8178080575* • *E-COMMERCE AN INDIAN PERSPECTIVE BY P. TJOSEPH, S.J. PRENTICE-HALL OF INDIA*							

INTERNAL EVALUATION

For internal evaluation wherever required as per scheme, the concerned faculty members must keep a detailed record of activities performed. At least 2 tests must be conducted evenly distributed in the semester and syllabus, each having a weightage of 25% (in case more than 2 tests conducted, best 2 performance may be considered). Further the entire semester attendance be evaluated for 25% weightage and fully a comprehensive subject viva on the assignments (at least two) shall have a weightage of 25%.

The record for every students must be maintained at least for 6 months after the end of examination, foil/counter foil must be submitted to the Examination Section before the start of theory examination. The format (for 20 marks weightage) is attached herewith.

1. Subject code
2. Subject name
3. Year
4. Study Institute code
5. Name & address of Study Institute
6. Name of Class Coordinator

Roll No.	Enrollment No.	Test-1 Marks MM-5	Test-2 Marks MM-5	Attendance MM-5	Viva MM-5	Total MM-20

Signature of Class Coordinator

Signature of Head of Institute