

Revised Course of Study and Scheme of Examination

Bachelor of Computer Applications (BCA)

(Effective from session 2016-2017 and onwards)

First to Third Year (I to VI Semester)



Department of Computer Application

**Govt. Auto. Girl's P. G. College of Excellence
Near Bus Stand, Krishnaganj Ward, Sagar (M.P.) - 470002**

Phone No. : 07582-223573 (Office), 07582-404480 (Computer Dept.)

E-mail : heggpgesag@mp.gov.in

Website : www.mphighereducation.nic.in/gdesagar

Govt. Auto. Girl's P. G. College of Excellence, Sagar (M.P.)
Course of Study and Scheme of Examination
Bachelor of Computer Applications (BCA) w.e.f. 2016-2017 and onwards

SCHEME FOR BACHELOR OF COMPUTER APPLICATIONS (BCA)

First Year (Semester I)

Code	Subject	Max Marks			Total Marks	
		Theory		Practical	Max	Min
		Sessional	Semester			
BCA - 101	Computer Fundamentals	15	85	-	100	6 + 34 = 40
BCA - 102	Digital Principles	15	85	-	100	6 + 34 = 40
BCA - 103	Programming with 'C'	15	85	-	100	6 + 34 = 40
BCA - 104	PC Software	15	85	-	100	6 + 34 = 40
BCA - 105	Communication Skills	15	85	-	100	6 + 34 = 40
BCA - 106	Mathematical Foundation	15	85	-	100	6 + 34 = 40
BCA - 107	Software Laboratory - I	-	-	200	200	80
Total		90	510	200	800	320

First Year (Semester II)

Code	Subject	Max Marks			Total Marks	
		Theory		Practical	Max	Min
		Sessional	Semester			
BCA - 201	System Analysis and Design	15	85	-	100	6 + 34 = 40
BCA - 202	Financial Accounting	15	85	-	100	6 + 34 = 40
BCA - 203	Object Oriented Programming with 'C++'	15	85	-	100	6 + 34 = 40
BCA - 204	Operating System	15	85	-	100	6 + 34 = 40
BCA - 205	Computer Organization and Architecture	15	85	-	100	6 + 34 = 40
BCA - 206	Discrete Mathematics	15	85	-	100	6 + 34 = 40
BCA - 207	Software Laboratory - II	-	-	200	200	80
Total		90	510	200	800	320

Second Year (Semester III)

Code	Subject	Max Marks			Total Marks	
		Theory		Practical	Max	Min
		Sessional	Semester			
BCA - 301	Database Management System	15	85	-	100	6 + 34 = 40
BCA - 302	Internet and Web Technology	15	85	-	100	6 + 34 = 40
BCA - 303	Basics of Computer Hardware	15	85	-	100	6 + 34 = 40
BCA - 304	Data Structure using 'C'	15	85	-	100	6 + 34 = 40
BCA - 305	Computer Oriented Numerical Methods	15	85	-	100	6 + 34 = 40
BCA - 306	Software Laboratory - III	-	-	200	200	80
Total		75	425	200	700	280

Second Year (Semester IV)

Code	Subject	Max Marks			Total Marks	
		Theory		Practical	Max	Min
		Sessional	Semester			
BCA - 401	Data Communications and Computer Networks	15	85	-	100	6 + 34 = 40
BCA - 402	RDBMS with SQL	15	85	-	100	6 + 34 = 40
BCA - 403	Software Engineering	15	85	-	100	6 + 34 = 40
BCA - 404	Microprocessor and Interfacing	15	85	-	100	6 + 34 = 40
BCA - 405	Statistical Methods	15	85	-	100	6 + 34 = 40
BCA - 406	Software Laboratory - IV	-	-	200	200	80
Total		75	425	200	700	280

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Third Year (Semester V)

Code	Subject	Max Marks			Total Marks	
		Theory		Practical	Max	Min
		Sessional	Semester			
BCA - 501	Optimization Techniques	15	85	-	100	6 + 34 = 40
BCA - 502	Computer Graphics	15	85	-	100	6 + 34 = 40
BCA - 503	Programming with VB.NET	15	85	-	100	6 + 34 = 40
BCA - 504	Artificial Intelligence	15	85	-	100	6 + 34 = 40
BCA - 505	Elective	15	85	-	100	6 + 34 = 40
	(A) Data Warehousing and Mining					
	(B) Unix and Shell Programming (C) Theory of Computation					
BCA - 506	Software Laboratory - V	-	-	200	200	80
Total		75	425	200	700	280

Third Year (Semester VI)

Code	Subject	Max Marks			Total Marks	
		Theory		Practical	Max	Min
		Sessional	Semester			
BCA - 601	Major Industrial Project Dissertation Viva	-	-	200	200	120
BCA - 602	Colloquium/Seminar	-	-	200	200	80
Total		-	-	400	400	200

Grand Total

Semester	I	II	III	IV	V	VI	Total
Max Marks	800	800	700	700	700	500	4200

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Syllabus for BCA I Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-101 Computer Fundamentals	Max. Marks Sessional : 15	Min. Marks Sessional : 05
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Computers : About computer system, characteristics and limitation of computers, classification of computers. Organization of Computer System : Difference between computer hardware and software, block diagram of computer system (components of computer system i.e., input, output and memory units) Development of Computers : Evolution and generations of computers. Applications of Computers : E-business, remote sensing, weather forecasting, gaming and multimedia.

UNIT - II

Input Devices : Keyboard, point-and-draw devices (mouse, touch screen, trackball, touchpad, joystick, light pen), digitizer, data scanning devices (image scanners, optical scanners, magnetic ink character reader), electronic card reader, digital camera, voice input/recognition system. Output Devices : Soft Copy Output Devices : Monitors and its types (CRT and Non-CRT – LCD, LED), characteristics (resolution and refresh rate), video standards or display modes (CGA, EGA, VGA, SVGA and HD / 720P), screen image projectors, speaker. Hard Copy Output Devices : Printers and its types: character impact printers (DMP, daisy wheel printer), character non-impact printers (thermal printer, electrostatic printer, ink-jet printer, laser printer), line impact printers (drum printer, chain printer, band printer), plotters (drum plotters, flat-bed plotters, ink-jet plotters).

UNIT - III

Memory System : Computer memory and its characteristics, units of memory, data accessing/storing methods (sequential access, direct/random access). Classification of Memory : Internal/Primary Memory : Core memory, semiconductor memory: main memory - RAM and its types (SRAM and DRAM); ROM and its types (Masked Rom, PROM, EPROM, EEPROM, Flash), VRAM, Cache memory. External/Secondary Memory : Magnetic memory (sequential access memory - magnetic tape, direct access memory - floppy disk, hard disk; SSD; magnetic drums; zip drive), disk terminology (tracks, sectors, clusters, FAT), flash memory (USB flash drive, memory cards), Optical memory (CD-ROM, WORM, ERWOD, DVD, BD).

UNIT - IV

Software Concept : Introduction and importance of computer software, types of computer software (pre-written and custom made), software packages, public domain, freeware, shareware and open source software's, relationship between hardware and software. Computer Virus : About computer virus, its working, existence, virus infection, symptoms and their effects, different types of viruses and other malicious software, preventing virus infection, antivirus software's.

UNIT - V

Algorithm and Flowcharts : Algorithm : Introduction, characteristics of algorithm, method of developing an algorithm. Flowchart : Introduction, flowcharts symbols, general rules for flowcharting. Programming Concepts : Programming Languages and Classification: Introduction, characteristics of a good programming language, classification of programming language: low level (machine and assembly) and high level languages, types of higher level languages (procedural, structured, non-procedural or database, object-oriented, functional, logic, mark-up and scripting languages). Programming Techniques : Top down, bottom up and modular designing, its features. Language Processors : Translator (assembler, compiler and interpreter). Developments and Evaluation of Programming Languages : About some high level languages (FORTRAN, ALGOL, LISP, COBOL, Pascal, APL, Simula, P/I, SNOBOL, LOGO, PROLOG, SQL, C, C++, ADA, HTML, XML, Visual Basic, Java, PHP, ASP).

TEXT BOOKS

1. Rajeriyā, Sheelamhu, "Computer Fundamentals", Karnal Prakashan, Indore.
2. Sinha, P. K., "Computer Fundamentals", BPD Publications.
3. Rajaraman, V., "Fundamentals of Computers", PHI.

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Syllabus for BCA I Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-102 Digital Principles	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Number System and its Representation : Data types, number system: non-positional and positional number system, types of positional number system: decimal; binary; octal and hexadecimal, number system conversion, binary arithmetic, Integer (signed magnitude and signed 2's complement) and floating point representation, overflow and underflow.

Computer Codes : Introduction, BCD, EBCDIC, ASCII, Excess-3, Gray, error detection and error correction codes.

UNIT - II

Basic Building Blocks : Logic gates, universal gates, exclusive gates, bubbled gates, universality of NAND and NOR gates; implementation of NOT, AND & OR gates by using NAND and NOR gates.

Boolean Algebra : Boolean variables, Boolean algebra, Boolean functions and truth tables, logic diagrams, laws of Boolean algebra, rules for Boolean algebra, Demorgan's theorems, simplification of Boolean functions, implementation using basic gates, obtain expression from logic circuits.

UNIT - III

Karnaugh Map (K Map) : Introduction, sum of products (SOP), products of sum (POS), min and max terms, algebraic expression by K map: two and three variables K map, simplification of Boolean function using K map, simplification of Boolean expression using K map, don't care conditions, irredundant expression.

UNIT - IV

Combinational Logic Circuits : Introduction, Adders: Half and Full Adders; creating full adder using two half adder, subtractors: half and full subtractors; creating full subtractor using two half subtractors, multiplexers: 2 to 1, 4 to 1, 8 to 1 and 16 to 1 multiplexers; applications of multiplexers, demultiplexers: 1 to 4, 1 to 8 and 1 to 16 demultiplexers; applications of demultiplexers, decoders: 2 to 4, 3 to 8 decoders; applications of decoder, encoders: 8 to 3 encoder; application of encoder.

UNIT - V

Sequential Logic Circuits : Introduction, flip flops: unlocked & clocked R-S; D, J-K, T and master-slave flip flops, registers: buffer registers (uncontrolled and controlled buffer registers); shift registers (right and left shift registers); other types of shift registers (SISO, SIPO, PISO, PIPO registers), counters: asynchronous and synchronous counters.

TEXT BOOKS

1. Rajaraja, Sreedansha, "Computer Architecture", Pragma Publications Pvt. Ltd., Mathura.
2. Mano, M., "Computer System Architecture", PHI
3. Tivari, Ashish, "Digital Computers", Kamal Prakashan, Indore.

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Syllabus for BCA I Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-103 Programming with 'C'	Max. Marks Seasonal : 15	Min. Marks Seasonal : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

C at a Glance : Introduction, historical development of C, rules for creating a C program, structure of C program, the main() function, compiling and running a program, statement terminator, comment lines, C header files.

Fundamentals of C : Character set, tokens, keywords, identifiers, constants, data types, variables, variable declaration, rules for naming variables, operators, arithmetic, relational, logical, increment and decrement, assignment, conditional, bitwise, additional operators (sizeof and comma operator), expressions.

Input/Output Functions : clrscr(), printf(), scanf(), getch(), putchar(), getche(), getch(), putch(), gets(), puts().

UNIT - II

Control Statements : Decision making or conditional statements: if statements (simple if statement, if ... else statements, nested if ... else, else-if ladder), switch statement, loop or iterative statements: for, nested for loop, while, do ... while loops, jump or breaking control statements: break; continue and goto statements.

Arrays : Introduction, features of Array, declaring an Array, initializing an Array, accessing an Array, classification of Arrays: one-dimensional and two-dimensional arrays.

Character Strings : Introduction, declaring and initializing string variables, string handling functions: strlen(), strcpy(), strcmp(), strcat(), strncpy(), strstr(), strtok(), strcmpi(), strcmp(), strcat(),

UNIT - III

Functions : Introduction, benefits of using functions, types of functions (library or inbuilt functions; user defined functions) User defined functions: function structure, invoking a function; function prototype/declaration; rules for declaring function, categories of functions (no arguments and no return values, arguments and no return values, arguments with return values), function calling (call by value, call by reference), functions with arrays, use of local and global variables, recursion and recursive function, void function.

UNIT - IV

Structures : Introduction, declaration of structure, structure variables, accessing and initialising structure members, copying and comparing structure variables, difference between Arrays and structures, structure within structure (nested structures), structures and arrays: array of structures, array within structure, accessing elements in array of structures, structures and functions: passing structure member to functions, passing structure to functions.

Unions : Introduction, declaring unions, accessing and initialising union members, use of array as a union member, difference between structure and union, similarities between structure and union.

UNIT - V

Pointers : Introduction, pointer operators: address operator (&), indirection operator (*), declaring and initialisation of pointer variables, accessing a variable through its pointer, pointers as function arguments, array of pointers, pointer arithmetic, pointer to pointer.

File Processing : Introduction, types of files (data and text files), declaration of file, file handling functions: fopen(), fclose(), getc(), putc(), fprintf(), fscanf(), fwrite(), fread(), remove(), rename(), getw(), putw(), fseek(), ftell(), rewind(), fflush(), feof(), file operations (creating or opening a file, closing a file, writing data into file, reading data from a file, renaming a file, deleting a file).

TEXT BOOKS

1. Balagurusamy, E., "Programming in Ansi C", McGraw Hill Education.
2. Pandey, Arun, "Programming in C", Kamal Prakashan, Indore.
3. Naik, N. K., "Programming with C", Kamal Prakashan, Indore.
4. Kanetkar, Y. P., "Let Us C", BPB Publications.

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Syllabus for BCA I Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-104 PC Software	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

MS Windows : Introduction and features of windows, versions of windows, starting and shutting down windows, components of windows: desktop; icons and its types (disk drive icons, application icons, shortcut icons, document icons, etc.); my computer, recycle bin; my documents; taskbar; start menu and windows accessories; basic controls in windows: title bar; minimize; maximize & close windows; scroll bar; menu; tool bars; dialog boxes; windows files and folders; working with files & folders; simple operations like copy, delete, moving of files and folders; creating shortcuts; windows explorer; control panel: display properties; adding and removing software and hardware; setting up date and time; screen saver and appearance.

UNIT - II

Office Packages or Office Suites : Office activates and their software requirements, typical office suite components: word processor; spreadsheet; presentation program; database program; graphics suite; etc., comparison of various office suites: Microsoft Office; Star Office; Open Office; Lotus Office.

MS Word Basics : Introduction, advantages of word processing, features of MS Word, chief elements of Word window: title bar; menu bar; tool bars (standard bar, formatting bar, drawing bar); status bar; ruler; scroll bar; buttons; task pane; keyboard shortcuts.

UNIT - III

Document Handling in MS Word : Creating; saving and retrieving word document, modify a word document (delete, insert, selecting text), cut; copy & paste, the clipboard, find text and replacing text, bold; underline; italic characters, spelling and grammar, thesaurus, bullets and numbering.

Formatting a Word Document : Setting up margin; tabs; line spacing and paragraph spacing, paragraph alignment (left, center, right, justify), adding page number; header and footer, paper size & layout, print preview, setting print orientation & print document.

Advanced Features of MS Word : Creating table in document, editing tables (merge and split cells, insert row and column, delete row and column, changing row height and column width, convert text to table and table to text), mail merge, inserting pictures in document, Macros, auto correct options, print envelopes and labels.

UNIT - IV

Introduction to MS Excel : Features of MS Excel, Related terms of MS Excel (spreadsheet, worksheet, cell, cell address, size of worksheet). Worksheet management: opening of spreadsheet, saving a file, moving between worksheets, adding; deleting; copying and moving worksheets, hiding and showing worksheet, naming; grouping and ungrouping worksheets. Types of data in MS Excel: date; numeric; alphabet; alphanumeric; OR; label; values; formulae. Enter & edit data, cut, copy and paste data. Formatting data: decimal point; commas; currency; column width; row height; inserting rows & columns; deleting rows & columns.

Advanced Features of MS Excel : Formatting Cells : Change font & size of a cell, change border of a cell, changing cell background, change alignment of data, change data type, hiding cell content. Formulas : Creating; copying & moving formulas. Functions : Logical functions, statistical functions, math & trigonometry functions, date & time functions, wizard function, automatic entry. Creating and editing charts, pivot table. Printing : previewing worksheet, setting up pages, adjusting margins, printing a worksheet, spell check.

UNIT - V

Introduction to MS PowerPoint : Features of MS PowerPoint, different presentation styles in PowerPoint (creating presentation using): blank presentation; from design template; from AutoContent wizard; from existing presentation, presentation using: blank presentation; from design template; from AutoContent wizard; from existing presentation, display views (normal view, slide sorter view, slide show), inserting; deleting and formatting slides, moving between slides, slide master & color schemes, formatting slides (tips for formatting text); bulleted lists; background, pictures); adding charts; drawing and sounds to a slide, animation: animation transition between slides; animating slides; customizing animation effects, creating PowerPoint handouts, starting a slide show, printing presentation.

TEXT BOOKS

1. Bindal, Rohit, "Microsoft Office XP", Kamal Prakashan, Indore.
2. Naik, N. K., "PC Software", Kamal Prakashan, Indore.
3. Kennell, J. A., Davis, G. H., and Simmons, C., "Microsoft Office 2000: The Complete Reference", McGraw Hill Education.

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Syllabus for BCA I Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-105 Communication Skills	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Communication : Meaning and process of communication, direction of communication, purpose of effective communication, organizational communication, barriers to communication, types of communication.

UNIT - II

Oral Communication Skills : Types of oral communication (face to face and with use of mechanical devices) and their merits & demerits, speaking skill, listening skill, presentation skills, body language, voice modulation, conflict and negotiating process, SWOT analysis.

UNIT - III

Written Communication Skills (Letter Writing) : Principles of letter writing, structure and layout of letters, quotations, orders and tenders, sales letters, claim and adjustment letters, job application letters, memorandum, notices, agenda and minutes.

UNIT - IV

Written Communication Skills (Report Writing) : Business reports, structure of reports, preparatory steps to writing reports, preparing bio-data, seminar reports, paper for publication, paper for reading, questionnaire for generating report opinion collection.

UNIT - V

Brainstorming : Introduction to brainstorming, definition and types of group, stages of group development (five-stage model), group decision making, group discussion, group think and group shift.

TEXT BOOKS

1. Chhabra, T. N., "Business Communication : Concepts and Skills", Sun India Publications, New Delhi.
2. Robbins, S. P., Judge, T. A., and Vohra, N., "Organizational Behavior", Pearson Education.
3. Murphy, H., "Effective Business Communication", Allied Publishers Pvt. Ltd.
4. Lullow, R., and Panten, F., "The Essence of Effective Communication", PHI.
5. Shrama, R. C., and Mohan, K., "Business Correspondence and Report Writing", McGraw Hill Education.
6. Menzal, D. H., Jones, H. M., and Boyd, L. G., "Writing a Technical Paper", McGraw Hill Education.

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Syllabus for BCA I Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-106 Mathematical Foundation	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Matrices and its Applications : Introduction, order of a matrix, types of matrices, equality of matrices, addition, subtraction and multiplication of matrices, related matrices: transpose of a matrix; adjoint of a square matrix; inverse of a matrix, solution of linear system of equations: method of determinants - Cramer's rule, elementary transformations, minors, rank and nullity of a matrix, eigen values and eigen vectors.

UNIT - II

Differentiation and its Applications : Successive differentiation, standard results, expansion of function by Maclaurin's and Taylor's theorem.

UNIT - III

Partial Differentiation and its Applications : Functions of two or more variables, partial derivatives, homogeneous functions : Euler's theorem, Jacobians.

UNIT - IV

Integration and its Applications : Introduction to reduction formulae, reduction formulae for $\int \sin^n x dx$; $\int \cos^n x dx$; $\int \sin^n x \cos^n x dx$; $\int \tan^n x dx$; $\int \cot^n x dx$; $\int \sec^n x dx$; $\int \operatorname{cosec}^n x dx$, definite integrals.

UNIT - V

Multiple Integrals and their Applications : Double integrals, change of order of integration, double integrals in polar co-ordinates, triple integrals.

TEXT BOOKS

1. Grewal, Dr. B. S., "Higher Engineering Mathematics", Khanna Publishers, Delhi.
2. Agarwal, Dr. D. C., "Engineering Mathematics - I", Shree Sai Prakashan, Meerut.

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Syllabus for BCA I Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-107 Software Laboratory - I	Max. Marks Sessional : 000	Min. Marks Sessional : 00
	Max. Marks Semester : 200	Min. Marks Semester : 80
	Total : 200	Total : 80

Part I : DOS and Windows

(A) DOS

1. What is DOS? Explain its booting process.
2. Explain various versions of DOS.
3. Describe the concept of file in DOS. Explain directory and sub-directories.
4. What do you understand by internal and external commands?
5. Explain the following internal commands with suitable syntax and example: MD, CD, RD, COPY, COPY CON, DEL, REN, TYPE, DIR, PROMPT, VOL, VER, DATE, TIME, LABEL, CLS, ECHO, and PATH.
6. Explain the following external commands with suitable syntax and example: FORMAT, UNFORMAT, XCOPY, DISKCOPY, MORE, BACKUP, RECOVER, DEBUG, SORT, ATTRIB, DEBUT, MOVE, HELP, RESTORE, TREE and MORE.
7. Explain config.sys, autoexec.bat and command.com files.

(B) Windows

1. What is Windows operating system and its versions.
2. How to "Turn Off" computer in windows.
3. How to create a folder and how to cut, copy, paste, delete & rename a file / folder in Windows.
4. How to arrange icons and manage recycle bin operations.
5. How to set display properties.
6. Discuss the installation process of new hardware and software.
7. Explain the procedure of setting date & time, screen saver and appearance.
8. Discuss Windows accessories.
9. How to search a file or folder.

Part II : MS Office

(A) MS Word

1. Creating new word document.
2. Define page size and margins for a document.
3. Insert graphics (a picture for example) in a document.
4. Inserting bullets and numbers.
5. Use different fonts and font size.
6. Use special mathematical symbols like integration, sigma etc.
7. Include superscript and subscript.
8. Use of Auto-Text, AutoCorrect, Spelling & Grammar tool and Thesaurus.
9. Page formatting, page border and shading.
10. Creation of mail merge, macros and tables.
11. Practice of printing, page setup etc.

(B) MS Power Point

1. Creating, manipulating and enhancing slides.
2. Inserting Organizational and Excel Charts.
3. Using Word Art.
4. Inserting sounds and animated pictures.
5. Insert a slide in a slide show.
6. Change slide layout color and background.
7. Apply design templates.
8. Apply animation and slide transition.

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9. Set timing for the display of the presentation.

(C) MS Excel

1. Create & open a work sheet, name it and save it.
2. Change the width of a column / range of columns.
3. Enter text and change its size and font in a cell.
4. Delete / insert a row / column in a worksheet.
5. Erase a range / full worksheet.
6. Fill a range of columns from n to k in steps of s .
7. Create a table and use it to create and display graph / chart.
8. Use Formulas and Functions.

Part III : Programming Concepts with 'C' Language

Write the following programs in C language with suitable algorithm, flowchart and input/output :

1. Calculate simple interest when p , r and t are given.
2. Calculate addition, subtraction, multiplication and division of given two numbers.
3. Print table of given number.
4. Find average of given n numbers.
5. Print Fibonacci series upto n terms.
6. Convert Celsius temperature to Fahrenheit temperature and vice versa.
7. Find greatest, smallest, and middle element of the three given numbers.
8. Compute factorial of a given number.
9. Compute the sum of digits of given number of many digits.
10. Print reverse digits of given number.
11. Print a string in reverse order.
12. Generate random number between 0 to n .
13. Check the given number is even or odd.
14. Check the given number is positive negative or zero.
15. Swap two numbers without using third variable.
16. Check the given number is Armstrong or not. (An Armstrong number is one such that the sum of cubes of each of its digits is equal to the number itself, e.g. $153 = 1^3 + 5^3 + 3^3 = 1 + 125 + 27$).
17. Check for a string to be a palindrome or not. (e.g., Malayalam is a palindrome as it reads same forward and backward).
18. Check the given number is prime or not.
19. Convert decimal into its equivalent binary number.
20. print the following pyramid :

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(b)

*
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(c)

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Syllabus for BCA II Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-201 System Analysis and Design	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

System Concept : Concept of system, elements or components of a system, characteristics of system, type of systems: physical and abstract systems; open and closed systems; information systems.
SDLC : Overview of system analysis and design, system development life cycle: different phases of SDLC, considerations for candidate system, prototyping.
Role of system Analyst : Definition of system analyst, role & tasks of a system analyst, attributes of a system analyst, tools used by system analyst.

UNIT - II

System Planning & Initial Investigation : Introduction, system planning, phases of system planning, initial investigation: needs identification; determining user's information; activities in initial investigation.
Information Gathering or Fact Finding : Meaning of information gathering, kinds of information do we need, sources of information, information gathering (fact finding) tools & techniques.
Feasibility Study : Introduction, system performance, feasibility study, why feasibility studies, feasibility considerations or tests, steps in feasibility analysis.

UNIT - III

Cost-benefit Analysis : Introduction, data analysis, cost-benefit analysis, system proposal.
Structured Analysis : Introduction to structured analysis, why structured analysis, tools of structured analysis: DFD; data dictionary; form; Gantt charts; system model; structured English or pseudo-code; system flow chart; decision tree; decision table.
Process and Stages of System Design : Introduction to system design, process of design, design methodologies: structured design, information engineering, prototyping; JAD; RAD; structured walkthrough; object-oriented design.

UNIT - IV

Input/Output and Forms Design : Introduction to input design, output design and form design.
File Organization and Database Design : File structure, file organization, database design, role of database administrator.
System Testing and Quality Assurance : Why system testing, what do we test for, test plan, types of system tests, quality assurance, trends in testing, role of data processing auditors.

UNIT - V

Implementation and Software Maintenance : System implementation, system conversion, user training and documentation, post-implementation review, software maintenance.
System Security and Disaster/Recovery Planning : Introduction to system security and disaster/recovery planning.

TEXT BOOKS

1. Rajeriy, Sheetanshu, "System Analysis and Design", Kamal Prakashan, Indore.
2. Awad, E. M., "System Analysis and Design", Galgotia Publication.

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Syllabus for BCA II Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-202 Financial Accounting	Max. Marks Sessional : 15	Min. Marks Sessional : 05
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Accounting : Meaning; objectives and scope of accounting, accounting principles, accounting concepts and conventions, Generally Accepted Accounting Principles (GAAP), accounting standards in India.

UNIT - II

Introduction to Journal and Ledger : Concept and rules of debit & credit, posting, sub-division of journal, book-keeping, double-entry system, cash book, purchase book, sales book, ledger, trail balance.

UNIT - III

Final Accounts : Meaning, need, scope and objectives, trading account, profit and loss account, balance sheet.

UNIT - IV

Bills of Exchange and Depreciation : Introduction to bills of exchange, types of bills, introduction to depreciation, need and objectives of depreciation, straight line method and written down value method of depreciation.

UNIT - V

Introduction to Company Accounts : Introduction, kinds of companies, formation of companies, share capital, types of shares, subscription and over subscription.

TEXT BOOKS

1. Gupta, R. L., and Gupta, V. K., "Principles and practice of Accountancy", Sultan Chand & Sons, New Delhi.
2. Shukla, S. M., "Financial Accounting", Sahitya Bhawan Publication, Agra.

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Govt. Auto. Girl's P. G. College of Excellence, Sagar (M. P.)

Syllabus for BCA II Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-203 Object Oriented Programming with 'C++'	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Principles of OOP and C++ : Object oriented programming paradigm, basic concepts of OOP, advantages/benefits of OOP, applications of OOP.

Fundamentals of C++ : Introduction to C++, structure of C++ program, compiling and linking a C++ program, header files, Character set, tokens, keywords, identifiers, constants, data types, variables: variable declaration; rules for naming variables, operators: arithmetic, relational, logical, increment and decrement, assignment; conditional, bitwise; additional operators (sizeof and comma operator), expressions, input and output operators: cin >>, cout <<.

UNIT - II

Control Statements : Decision making or conditional statements, loop or iterative statements, jump or breaking control statements.

Arrays, Pointers and Functions : Introduction to Arrays, declaring an Array, initializing an Array, accessing an Array, classification of Arrays: one-dimensional and multi-dimensional arrays. Character string, string handling functions. Introduction to pointers, initialization of pointers, pointer manipulation. Introduction to functions, types of functions (library or inbuilt functions, user defined functions), user defined functions, function prototype/declaration, categories of functions (no arguments and no return values, arguments and no return values, arguments with return values), function calling (call by value, call by reference), recursive functions.

UNIT - III

Classes and Objects : Introduction to object and class, members of class, categories of classes, types of objects, declaration of classes, defining member functions, accessing class members (calling member functions), inline function, friend function, scope resolution operator.

Constructors and Destructors : Introduction, constructors, need for constructor, syntax rules for writing constructor functions, copy, default and parameterized constructors, destructors, need for destructors, syntax rules for writing destructors.

UNIT - IV

Inheritance : Introduction, need for inheritance, levels of inheritance, derived and base classes, single inheritance, making a private member inheritable, multilevel, multiple, hierarchical and hybrid inheritance.

Overloading : Introduction to function overloading, need for function overloading, advantages of function overloading, declaration and definition of function overloading, calling overloaded functions, rules for function overloading, operator overloading, rules for overloading operators.

UNIT - V

Polymorphism : Introduction, early and late binding, virtual functions, pure virtual functions.

File Handling : Introduction, classes for file stream operations, opening and closing of files, the concept of file modes, types of files, binary file operations, file pointer, random access file processing, declaring a random access file, member functions used to process a random access file, detecting EOF, error handling during file IO.

TEXT BOOKS

1. Balagurusamy, E., "Object Oriented Programming with C++", McGraw Hill Education.
2. Banerj, Shashi, "Object Oriented Programming in C++", Karnal Prakashan, Indore.
3. Kametkar, Y. P., "Let Us C++", BPB Publications.

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Syllabus for BCA II Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-204 Operating System	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to OS : Concept of operating system, relation of operating system with application software and hardware, objectives or goals of operating system, functions of operating system, classification of operating system: single user, multi-user and network operating system, evolution of operating system, various operating systems: OS/2, MS DOS, Novell NetWare, Mac OS, Unix, Linux, Solaris, Windows and its versions.

UNIT - II

Process Management : Introduction, process management, concept of process: process state model; swapped out processes; process control block (PCB), operations on processes: process creation and termination, inter process communication, introduction to scheduling: process scheduling and processor (CPU) scheduling: long-term, short-term and medium-term scheduler; various CPU scheduling policies.

UNIT - III

Concurrency and Process Synchronization : Process synchronization, principles of concurrency, various synchronization problems: critical-section problem, mutual exclusion problem, producer-consumer problem, dining-philosophers problem, semaphores and monitors.

UNIT - IV

Deadlocks : Principles of deadlock, deadlock prevention, deadlock detection, deadlock avoidance, Banker algorithm for deadlock avoidance, recovery from deadlock.

I/O Management : I/O devices, organization of the I/O functions, device drivers.

UNIT - V

Memory Management : Concept of memory management, memory management requirements, memory management techniques: swapping; paging and segmentation.

File Management : Introduction to file management, concept of file: file attributes; types of files, file management in OS : file access methods; file operations and naming; file sharing and protection.

TEXT BOOKS

1. Stallings, W., "Operating System", PHE.
2. Silberschatz, A., Galvin, P. B., and Gagne, G., "Operating System Concepts", John Wiley & Sons, INC.
3. Rajoria, Sheetalshu, "Computer Fundamentals", Kamal Prakashan, Indore.
4. Tiwari, Ashish, "Operating System", Kamal Prakashan, Indore.

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Syllabus for BCA II Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-205 Computer Organization and Architecture	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Overview : Digital computers, computer architecture, computer organization, difference between compute architecture and organization, structure and functions, basic organization of a computer system, microprocessor, working of microprocessor, microprocessor 8085 architecture, speed of microprocessors.

UNIT - II

Basic Computer Organization : Register transfer language and micro-operations, instruction codes, instruction set, operations operation-code and operands, computer registers, instruction format, instruction cycle, addressing modes, real and protected addressing modes, input-output and interrupt.

UNIT - III

Central Processing Unit Design : Central processing unit, BUS organization, PCI BUS, register organization, stack organization, data path and control signals, types of processors (CPU), micro programmed and hardwired control, pipelining, software-hardware interaction layers in computer architecture.

UNIT - IV

Input-Output Organization : Transfer of information between I/O devices, CPU & memory, data transfer format, types of data transfer, I/O interface, modes of data transfer: programmed I/O; Interrupt-driven I/O; DMA, I/O channels and processors, Input/Output identification (peripheral or memory mapped), conditions of data transfer.

UNIT - V

Memory Organization : Computer memory and their characteristics, memory hierarchy, classification of memory, main memory, RAM and ROM chips, cache memory principles, associative memory, virtual memory, memory management system.

TEXT BOOKS

1. Rajaraja, Sheelashu, "Computer Architecture", Pragsa Publications Pvt. Ltd., Mathura.
2. Mano, M. M., "Computer System Architecture", PHI.

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Govt. Auto. Girl's P. G. College of Excellence, Sagar (M. P.)

Syllabus for BCA II Semester
(w.e.f. 2020-2021 and onwards)

Paper Code : BCA-206 Discrete Mathematics	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Sets and Proposition : Introduction, different types of sets, operations on sets, algebraic properties of set operations, Venn Diagram, countable and uncountable sets, mathematical induction, ordered pair: Cartesian product of two sets; arbitrary Cartesian product of sets.

UNIT - II

Relations and Functions : Relation, binary relation, domain and range of a relation, inverse relation, composite relation; relation on a set, identity relation in a set, different types of binary relations or properties of binary relations, equivalence relation, equivalence classes, function or mapping, image and pre-image, domain and range of a mapping.

UNIT - III

Posets and Lattices : Partial order relation, total ordering relation, partially ordered set, Hasse diagram, chain and anti-chain, dual of a poset, isomorphic posets, maximal and minimal elements, least upper bound, greatest lower bound; lattice, dual lattice, dual statement, properties of lattices, sub-lattice, well-ordered set, complete order, distributive lattices, complement of an element in a lattice, complemented lattice, complemented complete lattice, bounded lattice, direct product of lattices, lattice homomorphism, modular lattices.

UNIT - IV

Graph Theory : Introduction to graph, parallel edges and self loop, directed graph, simple graph, finite; infinite and multigraph, incident and adjacent edges, degree of a vertex, isolated and pendant vertex, trivial and null graph, even and odd vertices, planar, complete, regular, bipartite graphs, subgraphs, union, intersection and ring sum of two graphs, walks; paths, circuits and cycles in a graph, connected and disconnected graphs, weighted graph, shortest path in weighted graphs.

UNIT - V

Trees : Introduction to tree, pendant vertex in a tree, rank and nullity of a graph, distance and centres in a tree, eccentricity of a vertex, radius and diameter of a tree, rooted tree, binary tree, level of vertices in a binary tree, binary decision tree, path length of a tree, spanning tree, minimum spanning tree in a weighted graph, cut sets.

TEXT BOOKS

1. Pothuk, Dr. H. K., "Discrete Mathematics", Shiksha Sahitya Prakashan, Meerut.
2. Agarwal, Dr. B. C., "Mathematical Foundations of Computer Science", Shree Sai Prakashan, Meerut.

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Syllabus for BCA II Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-207 Software Laboratory - II	Max. Marks Sessional : 000	Min. Marks Sessional : 00
	Max. Marks Semester : 200	Min. Marks Semester : 80
	Total : 200	Total : 80

Part I : Programming in C++

Write the following programs in C++ language with suitable algorithm, flowchart and input/output :

1. Print Fibonacci series upto n terms.
2. Convert Celsius temperature to Fahrenheit temperature and vice versa.
3. Find greatest, smallest and middle element of the three given numbers.
4. Compute factorial of a given number using recursion.
5. Compute the sum of digits of given number and print its reverse order.
6. Print a string in reverse order.
7. Generate random number between 0 to n .
8. Check for a string to be a palindrome or not.
9. Check the given number is prime or not.
10. Compute the addition of two matrices.
11. Compute the multiplication of two matrices.
12. Print the following pyramid :

```
*****
****
***
**
*
```

(a)

```
*****
****
***
**
*
```

(b)

```
*****
****
***
**
*
```

(c)

13. To check entered character is small, capital, digit or a special character.
14. Convert binary number to its equivalent decimal number.
15. Concatenate two strings without using strcat() function.
16. Count numbers of vowels in string.
17. Count the number of words and characters in a sentence.
18. Enter 10 integers in a single-dimension array and then print out the array in ascending order.
19. Check a given year is a leap year or not.
20. Find smallest element in array.

Part II : Minor Project in C/C++

Students will be working on a minor project in C/C++. The instructions for project are as follows :

1. The topic of the project should be chosen by the student.
2. The project should be complete in all respects with proper documentation in "C/C++" language.
3. In minor project, an input screen should be developed for inputting the data and a proper format of the screen should be designed for showing the output or results.
4. The screens should be very user friendly and all relevant data/information should be available for the data entry personal and for the end user.
5. All necessary/required data should be assumed by the student.

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Syllabus for BCA III Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-301 Database Management System	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to DBMS : Meaning of data and database, types of database, definition of DBMS, functions, characteristics and purpose of DBMS, file system Vs database system, drawbacks of file system, advantages, disadvantages and applications of DBMS.

Concepts of DBMS : Schema and instances, views of data & data abstraction, three level architecture of DBMS, data independence (logical and physical data independence), data dictionary, components of DBMS (hardware, software, data & database, application programs & queries, database users).

UNIT - II

Data Models and Database Languages : Introduction, object based data models (E-R, object-oriented, semantic and functional), record based data models (relational, hierarchical and network), physical data models. Introduction and types of database languages (DDL, DML, DCL, TCL).

Basics of Relational Data Model : Definition, objectives and basic terminologies (attributes, tuple, field, relation, domain, column, degree, etc.), relational model constraints (not null, unique, default, check and different keys: super, candidate, primary, alternate, foreign, composite key, etc.)

UNIT - III

Entity Relationship (E-R) Model : Introduction, components of an E-R model (entity, entity set and attributes), types of attributes (key, simple, composite, derived, stored, single & multi-valued, null attributes), types of entity sets (strong, weak and associative entity set), different key attributes (primary, partial and composite key, etc.), relationship, degree and mapping cardinalities of relationship, E-R diagram notations, steps to create an E-R diagram, special E-R features (specialization, generalization and aggregation).

UNIT - IV

Relational Algebra and Calculus : Introduction, various relational operations (select, project, rename, union, intersection, set-difference, Cartesian-product, division), join operations, introduction to relational calculus, types of relational calculus (tuple relational calculus and domain relational calculus).

Functional Dependencies & Normalization : Data redundancy and anomalies, meaning and types of functional dependencies, decomposition, meaning of normalization, different normal forms (1NF, 2NF, 3NF and BCNF).

UNIT - V

Database Security and Integrity : Meaning of database security & integrity, security & integrity violations, levels of security measures, protection from intentional access (authorization, authentication, encryption), avoidance of accidental loss (types of integrity rules).

Transaction Processing and Concurrency Control : Database transaction, operations in transaction, transaction failure in between the operation, ACID properties, states of transaction, schedule and serializability. Meaning of concurrency, problems caused by concurrency, concurrency control techniques, locks and its types, lock-based protocols, timestamp based protocols, meaning of deadlock, deadlock handling (ignorance, avoidance, prevention, and detection & removal).

TEXT BOOKS

1. Rajaraja, Sreeramesh, "Database Management System", Karmal Prakashan, Indore.
2. Hansen, G. W., and Hansen, F. V., "Database Management System and Design", PHI.
3. Elmasri and Navaty, "Fundamentals of Database Systems", Pearson Education.
4. Nark, N. K., "Concepts of DBMS", Karmal Prakashan, Indore.
5. Laud, Ansel, "Database Management System", Karmal Prakashan, Indore.

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Syllabus for BCA III Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-302 Internet and Web Technology	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Basics of Internet : Concept and evaluation of internet, basic internet terms (hyperlink, gateway, address, surfing and browsing, download and upload, online and offline, bandwidth), intranet and extranet, ISP, types of internet connectivity (dial-up connection, ISDN, leased line, DSL, VSAT connection, broadband), internet addressing (IP address, URL, domain names, e-mail address), communication protocols, applications of internet, advantages and disadvantages of internet.

UNIT - II

Electronic Mail : Introduction, web based e-mails and e-mail clients, free and paid e-mail services, composing/sending and receiving e-mails.
World Wide Web : Introduction and history, HTTP, web server, features and applications of WWW, webpage and website, types of websites (according to building method, according to web page orientation, according to purpose: search engines, portals; etc.), web browsers.
Web Publishing : Introduction, steps of web publishing, web design tools.

UNIT - III

Basics of HTML : History, versions and features of HTML, HTML elements; tags and attributes, structure of an HTML document, basic and advanced text formatting, use of attributes (title, align, size, width, background and color attributes), inserting images, HTML colors, creating hyperlinks, HTML comments, HTML marquee.
Advanced HTML : HTML lists, tables (creating tables, table heading, different attributes related to tables, table backgrounds and border colors, table caption, header, body and footer), HTML frames and forms.

UNIT - IV

Introduction to JavaScript : Overview, Java versus JavaScript, versions, features, advantages and limitations of JavaScript, syntax and conventions, JavaScript coding conventions.
Elements of JavaScript : variables, data types, arrays, operators and expressions, branching and looping statements, dialog boxes, functions, events, objects.

UNIT - V

Cloud Computing : Introduction and concept of cloud computing, cloud components (clients, datacenter and distributed servers) and characteristics, types of cloud (private, public, community and hybrid), services provided by cloud computing (SaaS, PaaS and IaaS), benefits and challenges of cloud computing, related areas.

TEXT BOOKS

1. Rajoriya, Sheetanshu, "Web Technologies", Kamal Prakashan, Indore.
2. Bayross, Ivan, "HTML, JavaScript, DHTML and PHP", IPB Publications.
3. Rajoriya, Sheetanshu, "Web Designing", Kamal Prakashan, Indore.
4. Rajoriya, Sheetanshu, "Internet and E-commerce", Kamal Prakashan, Indore.

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Syllabus for BCA III Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-303 Basics of Computer Hardware	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction : Digital computer, computer hardware and software, basic organization of computer system, types of computer, microprocessor and its working, speed of microprocessor.

Different Parts of Computer System : Form factors, computer cabinet, SMPS, motherboards, processors, processor fan and heat sinks, RAM, hard disk, optical memory and drives, keyboard and mouse, monitors, scanners, printers, speakers, different types of cables, different types of cards, UPS.

UNIT - II

PC Assembling : Introduction, tools used for assembling, comparative study of various types motherboards, different types of processors and RAMs, steps for computer assembling, connecting I/O devices and power cables to the assembled system, final check.

Configuring the System : Booting up the first time, POST, BIOS setup, HDD formatting and partitioning.

UNIT - III

Software Concept : Introduction, types of software, concept of operating system, different types of operating system, booting process.

Operating System Installation : Introduction, system requirements for Windows 7; 8.1 and 10 operating systems, Windows 7; 8.1; 10 installation process.

UNIT - IV

Driver, Software and Peripheral Installation : Different types of device drivers and its installation, Plug and Play (PnP), different application software's and its installation (MS Office, Adobe Photoshop, Acrobat Reader, zippers, media players, browsers, etc.), installation of different peripherals (modems, printers, etc.).

UNIT - V

Troubleshooting and Fault Finding : Computer dead, hanging up/freezes the system, system reboots repeatedly, no display on monitor, boot disk failure error, blue screen error, send-don't send error message, power supply testing and troubleshooting, clear an unknown BIOS password, replacing the CMOS battery, different beeps codes for fault finding, different troubleshooting steps.

Diagnostic Tools : Various types of antivirus programs, backup and recovery software's, CMOS breaking utility, data recovery software's, disk management utilities, registry repair or checkers utilities, partition making and changing utilities, system configuration checkers/analyzer utilities.

TEXT BOOKS

1. Rajoriya, Shectanshu, "Basics of Computer Hardware", Pragma Publications Pvt. Ltd., Mathura.
2. Mueller, S., "Upgrading and Repairing PCs", Pearson Education.

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Syllabus for BCA III Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-304 Data Structure using 'C'	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Data Structures : Concept of data representation, primitive and non-primitive data types, ADT, meaning and classification of data structures, operations on data structure, data structures and 'C', types of algorithms: iterative and recursive algorithms

Stack : Meaning, properties of stack, operations on stack, implementation of stack using array, applications of stacks.

UNIT - II

Queues : Meaning, properties and drawbacks of queue, array representation of queue, types of queue: simple queue, circular queue, priority queue, operations on all types of queues.

Linked list : Meaning, advantage and disadvantages, representation of linked list, types of linked list: singly, doubly, circular and circular doubly linked list, operations on singly linked list.

UNIT - III

Searching, Sorting and Hashing : Meaning of searching, sequential and binary search. Meaning of sorting, different sorting methods: insertion, selection, shell, bubble, quick and merge sort. Big O/N notation. Meaning of hashing, hash table and functions.

UNIT - IV

Recursion : Meaning and types of recursion, writing recursive programs: Fibonacci series up to given terms, factorial of a given number, advantages and disadvantage of recursion, problem solving techniques: divide and conquer technique, the Tower of Hanoi problem (an application of divide and conquer), history and recursive solution of Tower of Hanoi problem, backtracking technique, 8 queen problem (an application of backtracking), history and recursive solution of 8 queen problem.

UNIT - V

Graphs : Meaning and basic terminology, types of graphs, operations of graphs, traversing a graph: breadth first and depth first traversal, shortest path, Dijkstra's and Greedy algorithms for finding shortest path.

Trees : Meaning and properties of tree, basic tree terminologies, binary tree, characteristics of a binary tree, traversal of binary tree: pre-order, in order and post-order, operations on binary tree, binary search tree, AVL tree.

TEXT BOOKS

1. Lipschutz, S., "Data Structures with C", McGraw Hill Education.
2. Hirdare, N., and Agarwal, S., "Data Structures using C & C++", Kamal Prakashan, Indore.
3. Kanetkar, V. P., "Data Structures Through C", BPB Publications.

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Syllabus for BCA III Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-305 Computer Oriented Numerical Methods	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 24
	Total : 100	Total : 40

UNIT - I

Numerical Errors and its Types : Introduction, types of numerical errors: roundoff errors (chopping, symmetric roundoff), truncation errors, measures of accuracy: absolute, relative and percentage errors.
Numerical Solution of Algebraic and Transcendental Equations : Bisection method, method of false position, Newton-Raphson method.

UNIT - II

Numerical Solution of Linear Simultaneous Equations : Direct methods: Gauss elimination method, Gauss - Jordan method, LU decomposition method, Iterative methods: Jacobi's iteration method, Gauss-Seidel iteration method, relaxation method.

UNIT - III

Numerical Solution of Differential Equations : Euler's method, modified Euler's method, Runge-Kutta (fourth order) method, Taylor's series method, Picard's method.

UNIT - IV

Finite Differences and Interpolation : Introduction, finite differences: forward differences, backward differences, central differences, divided differences, methods for interpolation: interpolation with equal intervals (Newton's forward and backward interpolation formula); interpolation with unequal intervals (Newton's divided difference interpolation formula, Lagrange's interpolation formula), inverse interpolation.

UNIT - V

Numerical Integration : Introduction, Newton's-Cotes's quadrature formula (a general quadrature formula), Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule.

TEXT BOOKS

1. Agarwal, Dr. D. C, "Computer Oriented Numerical and Statistical Methods", Shree Sai Prakashan, Meerut.
2. Grewal, Dr. B. S., "Higher Engineering Mathematics", Khanna Publishers, Delhi.
3. Bhargat, Valdehi, "Computer Oriented Numerical Methods", Kamal Prakashan, Indore.

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Syllabus for BCA III Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-306 Software Laboratory - III	Max. Marks Sessional : 00	Min. Marks Sessional : 00
	Max. Marks Semester : 700	Min. Marks Semester : 80
	Total : 200	Total : 80

Part I : Data Structure Programs using 'C'

Write the following data structure programs in 'C' language :

1. To search an element in the array using linear search.
2. To perform various operations over queue.
3. To perform insertion into linked list.
4. To perform deletion into linked list.
5. To perform traversal of linked list.
6. To implement bubble sort.
7. To implement insertion sort.
8. Print Fibonacci series upto n terms using recursion.
9. To simulate the working of Towers of Hanoi problem for n disks.
10. To implement binary tree traversal.

Part II : Computer Hardware Lab

List of experiments :

1. Identify different beep codes and error codes.
2. Understanding of motherboard and its interfacing components.
3. Identify different CPU's and RAM's.
4. Install and configure computer drivers and system components.
5. Disk formatting, partitioning and disk operating system commands.
6. Install, upgrade and configure windows operating systems.
7. Installation and configuration of antivirus.
8. Installation of printer and scanner software.
9. Disassembly and reassembly of hardware.
10. Troubleshooting and Managing Systems.

Part III : Mini Project in HTML

Students will be working on a mini project in HTML. The instructions for project are as follows :

1. The topic of the project should be chosen by the student.
2. The project should be complete in all respects with proper documentation in "HTML" language.
3. In mini project, an input screen should be developed for input of data and a proper format of the screen should be designed for showing the output or results.
4. The screens should be very user friendly and all relevant data/information should be available for the data entry personal and for the end user.
5. All necessary/required data should be assumed by the student.

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Syllabus for BCA IV Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-401 Data Communications and Computer Networks	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Data Communication : Meaning, difference between data transmission and data communication, elements of a communication system, types of data transmission: analog & digital; parallel & serial (asynchronous, synchronous, isochronous), data transmission modes (simplex, half duplex, full duplex), data communication measurement (bit rate, baud rate, baud, bandwidth, baseband, narrowband, wideband, broadband), multiplexing (FDM, TDM), ATM, transmission media (bounded and unbounded), switching techniques (circuit, packet and message), data transmission services (dial-up line, leased line, ISDN, VAN)

UNIT - II

Introduction to Computer Networks : Meaning, categories of networks (LAN, MAN, WAN), other types of computer networks (WLAN, SAN, CAN, PAN, DAN), structure of computer network, different network architectures (point-to-point, multi-point, client/server), network topologies (physical and logical): bus, ring, star, hybrid (tree and mesh), advantages and applications of computer networks.

UNIT - III

Communication Protocols and IEEE 802 Standards : Introduction, OSI reference model and its layers, TCP/IP model and its layers, comparison between OSI and TCP/IP model, TCP/IP protocols. Introduction to IEEE 802 standards, categories of IEEE 802 standards.

UNIT - IV

Network Connectivity Devices : Connectivity devices (modem, NIC, HUB, switch, repeater, bridge, router, brouter, gateway, WAP).
LAN Standards : Introduction, ALOHA, CSMA/CD, CDMA, traditional Ethernet, fast Ethernet, Gigabit Ethernet, FDDI, token bus, token ring.

UNIT - V

Error Detection and Correcting : Introduction, types of errors, error detection methods (parity check, checksum, CRC), error correction methods (block parity, hamming code).
Network Routing : Introduction, static Vs dynamic routing, routing table, routing algorithms: shortest path algorithm; link state; distance vector; flooding.

TEXT BOOKS

1. Gupta, P. C., "Data Communications and Computer Networks", PHI.
2. Rajwaja, Shreemsha, "Computer Fundamentals", Kamal Prakashan, Indore.
3. Tanenbaum, A. S., "Computer Networks", Pearson Education.

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Syllabus for BCA IV Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-402 RDBMS with SQL	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Relational Data Model : Concept and objectives of relational data model, database and relational database, relational model concepts (attributes, tuple, field, relation, domain, column, degree, etc.), properties of relations, integrity constraints, operations in relational model, extension and intension, advantages and disadvantages of relational model.

UNIT - II

Introduction to RDBMS : Definition of RDBMS, difference between DBMS and RDBMS, CODD'S rule for RDBMS, tasks of RDBMS.

Introduction to SQL : Introduction and history, role of SQL in a database architecture, characteristics and advantages of SQL. SQL syntax and queries, data types, operators and expressions, types of SQL statements (DDL; DML; DCL; Transaction Control Statements; etc.).

UNIT - III

Basic Database Operations (SQL Queries) : Create; drop and select a database, create and drop a table, insert; select; update; delete; alter; truncate; use; commit and rollback queries, different SQL clauses (where, and, or, in between, like, top, order by, group by, having, distinct).

UNIT - IV

SQL Comments, Wildcards, Aliases and Joins : Single-line and multi-line comments, wildcard characters, creating aliases, use of join clause, different types of joins.

SQL Constraints, Variables and Flow Controls : Defining different types of constraints (primary key, not null, unique, check, default and foreign), defining SQL variables, SQL flow control statements: if-else; case; while; break; continue; goto.

UNIT - V

SQL Views, Procedures, Functions : Creating, updating and dropping a view, inserting and deleting rows into a view. Creating stored procedures in SQL. Different SQL functions: aggregate functions (avg, count, first, last, max, min, sum), scalar functions (upper, lower, substr, len, round, getdate, format, str).

SQL Triggers : Meaning and benefits of triggers, creating triggers, triggering a trigger.

TEXT BOOKS/REFERENCES

1. Rajaraja, Sheelamshu, "Database Management System", Kamal Prakashan, Indore.
2. Halvorsen, H. P., "Structured Query Language", University College of Southeast Norway.
3. <https://www.tutorialspoint.com/sql>
4. <http://www.w3schools.com/sql>
5. https://www.tutorialspoint.com/plsql/plsql_triggers.htm

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Syllabus for BCA IV Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-403 Software Engineering	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Software Engineering : Meaning of software engineering, software process models: waterfall model, incremental process models (incremental and RAD model), evolutionary process models (prototyping, spiral and concurrent development model), component-based development, software development life cycle.

UNIT - II

Requirements Engineering, Analysis Modeling and Design : Meaning of requirements engineering, recognizing multiple viewpoints, requirements analysis, data modeling concepts (data objects, attributes and relationships), design concepts (abstraction, architecture, modularity, refinement and refactoring), object-oriented design concepts.

UNIT - III

Component-Level and User Interface Design : Meaning of component-level design, basic design principles, cohesion, coupling. Meaning of user interface design, interface design issues.

Project Scheduling : Basic principles, time-line charts.

Quality Concepts : Meaning of Quality, software quality (Garvin's quality dimensions, McCall's quality factors, ISO 9126 quality factors), cost of quality, quality and security, quality control.

UNIT - IV

Review Techniques : Cost Impact of software defects, review metrics and their use, review reporting and record keeping.

Software Quality Assurance : Elements of software quality assurance, six sigma for software engineering, software reliability and its measures, the ISO 9000 quality standards.

Evaluation for Software Projects : Observations on estimation, software sizing, empirical estimation models.

UNIT - V

Software Testing Strategies : Meaning of software testing, verification and validation, test strategies for conventional software (unit and integration testing), system testing (recovery, security and stress testing), debugging process and strategies, white-box and black-box testing.

Software Reengineering : Meaning of reengineering, reverse and forward engineering.

TEXT BOOKS

1. Pressman, R. S., "Software Engineering - A Practitioner's Approach", Seventh Edition, McGraw Hill Education.
2. Sommerville, I., "Software Engineering", Pearson Education.
3. Triwari, Ashish, "Software Engineering", Kamal Prakashan, Indore.

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Syllabus for BCA IV Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-404 Microprocessor and Interfacing	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Microprocessor : CPU as microprocessor, meaning and evolution of microprocessor, microprocessor architecture and its functional block diagram, terminologies used in microprocessor (instruction set, bandwidth, clock speed, word length, data types), basic microprocessor operations, features; types and applications of microprocessors.

UNIT - II

8085 Microprocessor : Functional units of 8085 microprocessor, 8085 architecture, 8085 pin configuration, addressing modes and interrupts in 8085, instruction sets of 8085.

UNIT - III

8086 Microprocessor : Features of 8086, comparison between 8085 & 8086, architecture of 8086, 8086 functional units, 8086 pin configuration, 8086 addressing modes and interrupts, instruction sets of 8086.

UNIT - IV

Multiprocessor Configuration : Introduction, different multiprocessor configurations (coprocessor, closely coupled and loosely coupled configuration), 8087 numeric data processor, 8087 architecture, 8087 pin description.

Memory and I/O Interfacing : Introduction, memory interfacing, I/O interfacing, block diagram of memory & I/O interfacing, 8085 interfacing pins, ways of communication: microprocessor with the outside world.

UNIT - V

Microcontrollers : Introduction, difference between microprocessor & microcontroller, types of microcontrollers, applications of microcontroller, microcontroller 8051 architecture, 8051 pin description, I/O ports and interrupts.

Peripheral Devices : 8255A programmable peripheral interface, ports, operating modes, features and architecture of 8255A, 8255A pin description, 8253/54 programmable interval timer, difference between 8253 & 8254, features of 8253/54, 8245 architecture and pin description, 8253/54 operational modes.

TEXT BOOKS/REFERENCES

1. Godse, A. P., and Godse, D. A., "Microprocessor and Interfacing", Technical Publications, Pune.
2. Ganeskar, Ramesh, "Microprocessor Architecture, Programming and Applications with the 8085", Penram International Publishing.
3. Tiwari, Ashish, "Microprocessors & its Interfacing", Kamal Prakashan, Indore.
4. <https://www.tutorialspoint.com/microprocessor>

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Syllabus for BCA IV Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-405 Statistical Methods	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Measures of Central Tendency and Moments : Kinds of measure of central tendency, arithmetic mean, methods of calculating arithmetic mean, median, computation of median, mode, methods for computing mode, relationship between mean, median and mode. Moment about any point and about the arithmetic mean (central moment), Karl Pearson's coefficients.

UNIT - II

Probability : Random experiment, sample space, events and its types, probability of an event, probability axioms, complementary event, additive law and multiplicative law of probability, independent and dependent events, Baye's theorem.

UNIT - III

Theoretical Frequency Distribution : Introduction, types of theoretical distribution, Binomial distribution, constants of Binomial distribution, Bernoulli formula, Poisson's distribution, constants of Poisson's distribution, Normal distribution, constants of Normal distribution.

UNIT - IV

Random Variables and its Expected Value : Random variable, types of random variables (discrete and continuous random variables) and its probability distributions, mathematical expectation or the expected value for discrete and continuous random variable, expectation of a sum, independent variates, product of expectations.

Curve Fitting : Meaning of curve fitting, method of least squares used in curve fitting, fitting of straight line and second degree parabola.

UNIT - V

Correlation and Regression : Meaning of correlation, Karl Pearson's coefficient of correlation and its property (i.e., coefficient of correlation lies between - 1 and + 1), meaning of regression, line of regression, equation to the line of regression, regression coefficients, properties of regression coefficients, angle between two regression lines.

TEXT BOOKS

1. Agarwal, Dr. D. C., and Pashak, Dr., H. K., "Statistical Methods", Shiksha Sahitya Prakashan, Meerut.
2. Ray, M., and Sharma, H. S., "Mathematical Statistics", Ram Prasad and Sons, Agra.

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Syllabus for BCA IV Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-406 Software Laboratory - IV	Max. Marks Sessional : 000	Min. Marks Sessional : 00
	Max. Marks Semester : 200	Min. Marks Semester : 80
	Total : 200	Total : 80

Part I : SQL Programs

Write the following SQL queries :

- To study Basic SQL commands (create database, create table, use, drop, insert) and execute the following queries using these commands:
 - Create a database named 'Employee'.
 - Use the database 'Employee' and create a table 'Emp' with attributes 'ename', 'ecity', 'salary', 'enumber', 'address', 'deptname'.
 - Create another table 'Company' with attributes 'cname', 'ccity', 'empnumber' in the database 'Employee'.
- To study the viewing commands (select, update using where clause) and execute the following queries using these commands:
 - Find the names of all employees who live in Delhi.
 - Increase the salary of all employees by Rs. 5,000.
 - Find the company names where the number of employees is greater than 10,000.
 - Change the company city to Gurgaon where the company name is 'TCS'.
- To study the commands to modify the structure of table (alter, delete) and execute the following queries using these commands:
 - Add an attribute named 'Designation' to the table 'Emp'.
 - Modify the table 'Emp', Change the datatype of 'salary' attribute to float.
 - Drop the attribute 'deptname' from the table 'Emp'.
 - Delete the entries from the table 'Company' where the number of employees are less than 500.
- To study the commands that involve compound conditions (and, or, in, not in, between, not between, like, not like) and execute the following queries using these commands:
 - Find the names of all employees who live in 'Gurgaon' and whose salary is between Rs. 20,000 and Rs. 30,000.
 - Find the names of all employees whose names begin with either letter 'A' or 'B'.
 - Find the company names where the company city is 'Delhi' and the number of employees is not between 5000 and 10,000.
 - Find the names of all companies that do not end with letter 'A'.
- To study the aggregate functions (sum, count, max, min, average) and execute the following queries using these commands:
 - Find the sum and average of salaries of all employees in computer science department.
 - Find the number of all employees who live in Delhi.
 - Find the maximum and the minimum salary in the HR department.
- To study the grouping commands (group by, order by) and execute the following queries using these commands:
 - List all employee names in descending order.
 - Find number of employees in each department where number of employees is greater than 5.
 - List all the department names where average salary of a department is Rs. 10,000.
- To study the commands involving data constraints and execute the following queries using these commands:
 - Alter table 'Emp' and make 'enumber' as the primary key.

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- Alter table 'Company' and add the foreign key constraint
 - Add a check constraint in the table 'Emp' such that salary has the value between 0 and Rs 1,00,000.
 - Alter table 'Company' and add unique constraint to column 'cname'.
 - Add a default constraint to column 'city' of table 'Company' with the value 'Delhi'.
8. To study the commands for aliasing and renaming and execute the following queries using these commands:
- Rename the name of database to 'Employee1'.
 - Rename the name of table 'Emp' to 'Emp1'.
 - Change the name of the attribute 'cname' to 'empname'.
9. To study the various set operations and execute the following queries using these commands:
- List the 'emumber' of all employees who live in Delhi and whose company is in Gurgaon or if both conditions are true.
 - List the 'emumber' of all employees who live in Delhi but whose company is not in Gurgaon.
10. To study the commands to delete the entire records and structure of table (delete, truncate, drop) and execute the following queries using these commands:
- Delete the entire record from the table 'Emp'.
 - Delete the structure of the table 'Company'.

Part II : Mini Project in C/C++

Students will be working on a mini project in C/C++. The instructions for project are as follows :

1. The topic of the project should be chosen by the student.
2. The project should be complete in all respects with proper documentation in "C/C++" language.
3. In mini project, an input screen should be developed for inputting the data and a proper format of the screen should be designed for showing the output or results.
4. The screens should be very user friendly and all relevant data/information should be available for the data entry personal and for the end user.
5. All necessary required data should be assumed by the student.

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**Syllabus for BCA V Semester
(w.e.f. 2016-2017 and onwards)**

Paper Code : BCA-501 Optimization Techniques	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Operations Research : Definition, characteristics and scope of operation research.
Linear Programming Problem : General mathematical model of LPP, methods for solving LPPs: graphical method, special cases in graphical method (multiple, infeasible, unbounded solution and redundancy), simplex method, two phase method, special cases in simplex method (unrestricted variables, unbounded, infeasible, multiple solution, tie for entering and leaving basic variable)

UNIT - II

Duality Theory : Introduction, primal to dual LPP conversion.
Transportation Problem : Introduction, mathematical formulation, solution of a transportation problem, methods for finding an initial basic feasible solution (north west corner rule, least cost method, vogel's approximation method), optimality test (modification distribution method), variations of the transportation method (Degeneracy, unbalanced problem, maximization case, prohibited transportation routes).

UNIT - III

Assignment Problem : Introduction, mathematical formulation, difference between transportation and assignment problem, solution methods of assignment problem, Hungarian method for solving assignment problem, variations of assignment problem (unbalanced problem, maximization case, multiple solution, restrictions on assignments), travelling salesman problem.

UNIT - IV

Integer Programming : Introduction, classifications of IPPs, mathematical model of IPP, Branch & Bound method for solving IPPs.
Sequencing Models : Introduction, assumptions of sequencing problems, processing n jobs through 2 machines, processing 2 jobs through n machines.

UNIT - V

Replacement Models : Introduction, types of replacement problems, replacement of items that deteriorates with time, replacement of items that fails completely.
Simulations Models : Introduction, types of simulation, steps of simulation process, Monte Carlo simulation, advantages, limitations and applications of simulation.

TEXT BOOKS

1. Rajaraja, Shectanshu, "Operations Research", Kamal Prakashan, Indore.
2. Gupta, Dr. P. K., and Hira, Dr. D. S., "Problems in Operations Research", Sultan Chand & Sons, New Delhi.

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Syllabus for BCA V Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-502 Computer Graphics	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Computer Graphics : Meaning of computer graphics, classification and advantages of computer graphics, applications of computer graphics, graphics standards, graphical user interface, elements of graphics (line segments, vectors, pixels, frame buffer).

UNIT - II

Graphical I/O Devices : Input Devices: keyboard, point-and-draw devices (mouse, touch screen, trackball, touch pad, joystick, light pen), data glove, digitizer, image scanners. Output (Graphical Display) Device: monitor, raster scan and random scan displays, display technologies (CRT displays, flat panel displays), characteristics of a monitor (resolution, refresh rate, dot pitch, aspect ratio), display modes (CGA, EGA, VGA, SVGA, XGA, 720p or HD, SXGA, UXGA).

UNIT - III

Points and Line Drawing : Points and lines, line drawing algorithms: DDA and Bresenham's algorithm, circle drawing algorithm: midpoint circle algorithm.

Polygon Representation and Filling : Introduction, types of polygons, representation of polygons, polygon filling (seed fill and scan line algorithms).

UNIT - IV

2D and 3D Clipping : Introduction, 2D clipping: point clipping; line clipping; line clipping algorithms (Cohen-Sutherland, midpoint subdivision, Cyrus-Beck algorithm); polygon clipping (Sutherland-Hodgman algorithm); curve clipping; text clipping; exterior clipping. 3D clipping: introduction, midpoint subdivision algorithm for 3D clipping.

UNIT - V

Hidden Lines and Surfaces : Meaning of visible/hidden lines and surfaces detection/elimination, hidden line/surface algorithms: back face removal; Z-buffer; scan-line; floating horizon algorithm.

Color Models : Introduction, types of color models: RGB, CMY and HSV color models.

TEXT BOOKS

1. Rajurija, Shekhar, "Computer Graphics", Pragya Publications Pvt. Ltd., Mathura.
2. Bajaj, G. S., "Computer Graphics & Multimedia", Dhanpat Rai & Co., Delhi.
3. Heam, D., and Baker, M. P., "Computer Graphics", PHI.

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Syllabus for BCA V Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-503 Programming with VB.NET	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Visual Basic.NET and the .NET Framework : Introduction to .NET framework: features and architecture, Common Language Runtime (CLR), Framework Class Library (FCL). Introduction to Visual Studio.NET: IDE, languages supported, components. Introduction to VB.NET: features, IDE of VB.NET - menu bar, toolbars, form and code designer, solution explorer, object browser, toolbox, properties window, output window.

UNIT - II

Elements of VB.NET : Working with forms: loading: showing and hiding forms, properties, events and methods of form. GUI programming with windows form: Label, TextBox, Listbox, ComboBox, RadioButton, Button, CheckBox, ProgressBar, DateTimePicker, Calendar, PictureBox, ScrollBar, GroupBox, Panel, ToolTip, Timer.

UNIT - III

Programming in VB.NET : Data types, keywords, declaring variables and constants, operators, understanding scope and accessibility of variables. Conditional Statements: If-Then, If-Then-Else, Nested If, Select Case. Looping Statement: Do loop, For loop, For Each-Next loop, While loop, Arrays: static and dynamic.

UNIT - IV

Functions, Built-in Dialog Boxes, Menus and Toolbar : Menus and toolbar: Menu Strip, Tool Strip, Status Strip, creating shortcut keys. Built-in Dialog Boxes: OpenFileDialog, SaveFileDialog, FontDialog, ColorDialog, PrintDialog, InputBox, MsgBox. Interfacing With End User: Creating MDI Parent and Child. Functions and procedures: Built-in functions (mathematical and string functions), user defined functions, procedures (subroutines).

UNIT - V

Advanced Concepts in VB.NET : Object Oriented Programming: creating classes, objects, fields, properties, methods, events, constructors and destructors, inheritance, overloading. Exception handling: models, statements. Data Access with ADO.NET: Introduction, data access with Server Explorer, creating connection, DataAdapter and DataSets, display data on data bound controls and data grid.

TEXT BOOKS

1. Holzner, S., "Visual Basic.NET Programming", Black Book, Dreamtech Press.
2. Shapiro, J. R., "The Complete Reference Visual Basic .NET", McGraw Hill Education.
3. Bairagee, Hemant, "VB.NET", Kamal Prakashan, Indore.

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Syllabus for BCA V Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-504 Artificial Intelligence	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Overview of AI : Introduction, concept of intelligence, definition and components of AI, history of AI, Turing test, techniques of AI, AI problems, characteristics and limitations of AI, applications of AI.

Problem Solving Techniques : Problem solving in AI, types of AI Problems, production systems, state space approach for problem solving (water jug problem, eight puzzle problem, Tower of Hanoi problem).

UNIT - II

Searching Techniques : Introduction, blind search or uninformed search (depth first, breadth first search), heuristic search or informed search (hill climbing, best first search), search techniques for game playing: the minimax procedure, alpha-beta cutoffs procedure.

UNIT - III

Knowledge Representation and Reasoning : Meaning of knowledge, knowledge representation, approaches to knowledge representation (logical and procedural representation scheme, network representation scheme, structured representation scheme), reasoning: how can we reason?, forward and backward chaining.

UNIT - IV

Reasoning with Uncertainty : Uncertain reasoning, symbolic reasoning, statistical and probabilistic reasoning, Fuzzy logic.

Knowledge Acquisition and Learning : Meaning of knowledge acquisition, meaning of learning, general learning model, learning techniques (memorization, direct instruction, analogy, induction, deduction), learning algorithms (supervised and unsupervised learning, active learning), genetic algorithms.

UNIT - V

Expert System : Meaning of expert system, structure of expert system, expert system tools, features of expert system, types of expert system (rule-based, frame-based, hybrid, model-based, ready-made and real-time expert systems), working areas for expert system, limitations of expert system, applications of expert system.

TEXT BOOKS

1. Rajurija, Sheelanshu, "Artificial Intelligence", Kamal Prakashan, Indore.
2. Aberkar, R., "Introduction to Artificial Intelligence", PHI.
3. Knight, K., Rich, E., and Nair, B., "Artificial Intelligence", McGraw Hill Education.

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Syllabus for BCA V Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-505 (A) Data Warehousing and Mining	Max. Marks Sessional : 15	Min. Marks Sessional : 06
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Data Warehouse : Meaning of data warehouse, characteristics; benefits; purpose; applications and challenges of data warehouse, basic terminology (metadata, metadata repository, data mart, virtual warehouse), components of data warehouse, difference between data warehouse and database, planning, creating and maintaining a data warehouse.

UNIT - II

Multidimensional Data Model : Introduction, data cube, star schema, difference between fact data and dimensional data, snowflake schema, difference between snowflake and star schema.

Data Warehouse Architecture : Basic and three-tier data warehouse architecture, problems in three-tier architecture, data warehouse back-end tools and utilities.

UNIT - III

On-line Analytical Processing : Introduction, OLAP server, MOLAP, ROLAP, HOLAP, web-based OLAP, comparison between OLTP and OLAP.

Aggregation : Introduction, aggregates or summaries, why aggregate?, meaning of aggregation, query management process.

UNIT - IV

Backup and Recovery of Data : Types of backup, data warehouse recovery models, define backup and recovery strategy, security impact on design of data warehouse.

Introduction to Data Mining : Meaning, evolution, elements and architecture of data mining, data mining metrics; issues and operations, relationship between data mining and data warehouse.

UNIT - V

Concepts of Data Mining : Meaning, tasks, uses, advantages, disadvantages and applications of data mining. Introduction to data pre-processing, data cleaning, inconsistent data, data integration, transformation and reduction. The knowledge discovery process. Data mining techniques: decision tree, neural networks, nearest-neighbor and clustering, genetic algorithm, rule induction. Web mining.

TEXT BOOKS

1. Agrawal, R. B., and Tayal S. P., "Data Mining and Data Warehousing", University Science Press, New Delhi.
2. Han, J., and Kamber, M., "Data Mining Concepts and Techniques", Elsevier.
3. Pujari, A. K., "Data mining Techniques", Universities Press, Hyderabad.

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Govt. Auto. Girl's P. G. College of Excellence, Sagar (M. P.)

**Syllabus for BCA V Semester
(w.e.f. 2016-2017 and onwards)**

Paper Code : BCA-505 (B) Unix and Shell Programming	Max. Marks Sessional : 15	Min. Marks Sessional : 05
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to UNIX : The UNIX operating system, history, architecture; features and flavors of UNIX, meaning of internal and external commands, general features of UNIX commands/command structure.

General Purpose Utilities : cat, date, echo, printf, bc, script, passwd, uname, path, who, tty, stty, ps, cd, mkdir, rmdir, cp.

Handling Files : Introduction to UNIX file system, cat, cp, rm, mv, more, file, ls, wc, pg, cmp, comm, diff, gzip, tar, zip, df, du, mount, umount, chmod, security by file permissions, introduction to index; directory hierarchy and devices.

UNIT - II

Introduction to Shells : Unix session, command line structure, metacharacters, creating new commands, command arguments and parameters, shell variables. Filters: the grep family, the stream editor sed.

UNIT - III

Shell Programming : Customizing the cat command, while and until loops, Traps, replacing a file, xop, pick, news, get and put commands.

UNIT - IV

Programming with I/O : Standard input and output: vis, program arguments, file access, debugging.

UNIX System Calls : Low-level I/O, File system: directories and inodes.

UNIT - V

Document Preparation : The ms macro package, the troff level, the tbl and eqn pre-processors, the manual page, document preparation tools.

TEXT BOOKS

1. Das, Samitabha, "Unix Concepts and Applications", McGraw Hill Education.
2. Kerrighan, B. W., and Pike, R., "The UNIX Programming Environment", P111.
3. Ferozcan, B. A., and Gilberg, R. F., "Unix and Shell Programming", Cengage Learning India.
4. Kanitkar, Y., "Unix Shell Programming", BPB Publications.

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Syllabus for BCA V Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-505 (C) Theory of Computation	Max. Marks Sessional : 15	Min. Marks Sessional : 05
	Max. Marks Semester : 85	Min. Marks Semester : 34
	Total : 100	Total : 40

UNIT - I

Introduction to Theory of Computation : Alphabets, strings and representations, introduction to language, grammars and automata, language generated by grammars, Chomsky Grammar classification, regular expressions and sets, building regular expression laws for regular expression, applications of regular expression.

UNIT - II

Finite Automata : Deterministic Finite Automaton (DFA), Non-deterministic Finite Automaton (NFA), finite automata with epsilon-moves, equivalence of DFA and NFA, minimizing the number of states of a DFA.

UNIT - III

Context-Free Grammars : Introduction, derivation, derivation trees, ambiguity, Chomsky Normal Form (CNF) and Greibach Normal Form (GNF).

UNIT - IV

Pushdown Automata : Pushdown Automaton (PDA), Deterministic Pushdown Automaton (DPDA), Non-equivalence of PDA and DPDA, PDA and context free grammar.

UNIT - V

Turing Machines : Introduction, representation of Turing machines, language acceptability by Turing machines, construction of Turing machine for simple problems, multi-tape, multi-track and non-deterministic Turing machines.

TEXT BOOKS

1. Lina, P., "An Introduction to Formal Languages and Automata", Narosa Publishing House, Delhi.
2. Mishra, K. L. P., and Chandrasekaran, N., "Theory of Computer Science", PHI.
3. Sivaramdam, S. N., and Meena, M. J., "Theory of Computation", International Publishing House Pvt. Ltd, Delhi.

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Syllabus for BCA V Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-506 Software Laboratory -V	Max. Marks Sessional : 00	Min. Marks Sessional : 00
	Max. Marks Semester : 200	Min. Marks Semester : 80
	Total : 200	Total : 80

Mini Project in VB.NET using SQL Server Database

Students will be working on a mini project. The instructions for project are as follows :

1. The topic of the project should be chosen by the student.
2. The project should be complete in all respects with proper documentation.
3. In mini project, an input screen should be developed for input of data and a proper format of the screen should be designed for showing the output or results.
4. The screens should be very user friendly and all relevant data/information should be available for the data entry personal and for the end user.
5. All necessary/ required data should be assumed by the student.

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Syllabus for BCA VI Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-601 Major Industrial Project Dissertation Viva	Max. Marks Sessional : 000	Min. Marks Sessional : 00
	Max. Marks Semester : 300	Min. Marks Semester : 120
	Total : 300	Total : 120

Every student shall be spending 4 months to 6 months for industrial training on a live project. A project viva/presentation to defend the work done is to be delivered. The report in hard bound form should contain the system design, analysis, feasibility etc. The report should contain the original certificate from the company about the originality of the work and the certificate to that effect that the work has actually been done by the candidate concerned in the industrial environment.

There should be three/four reports submitted by the student through the project manager of the company where the student is working. Every report should be signed by the project leader, on the letterhead and should be dated 1st of every month of the period, she is working.

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Syllabus for BCA VI Semester
(w.e.f. 2016-2017 and onwards)

Paper Code : BCA-602 Colloquium/Seminar	Max. Marks Sessional : 00	Min. Marks Sessional : 00
	Max. Marks Semester : 200	Min. Marks Semester : 80
	Total : 200	Total : 80

A seminar by every individual student is to be delivered on the topic released by the Head of the Department/Teacher In-charge. The HOD/Teacher In-charge not later than one month and not earlier than two months, will release the list of the topics. The computer output (in A4 size) on white paper properly ready for binding write-up in about 10 pages has also to be presented.

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