ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR			
PART A: Introduction			
PROGRAM: Certificate	CLASS: BCA	SEMESTER: I	SESSION: 2022-23
Subject: Computer Science			

1.	Course Code	S I - BCAAIT
2.	Course Title	Computer Fundamental Organization and Architecture
3.	Course Type	Major – Paper-I
4.	Pre-Requisite (if any)	To study this course, a student must have basic knowledge of Computers.
5.	Course Learning Outcomes(CO)	On completion of this course, learners will be able to: CO1. Understand the basic structure, operation and characteristics of digital computer. CO2. Be able to design simple combinational digital circuits based on given parameters. CO3. Understand the working of arithmetic & logic unit CO4. Know about hierarchical memory system including cache memories and virtual memory. CO5. Understand concept and advantages of parallelism, multi-processors and multi-core processors.
6.	Credit Value	Theory 4 Credits Practical 2 Credits
7.	Total Marks	Max. Marks : 100 Min. Passing Marks: 35

PART B: Content of the Course

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.

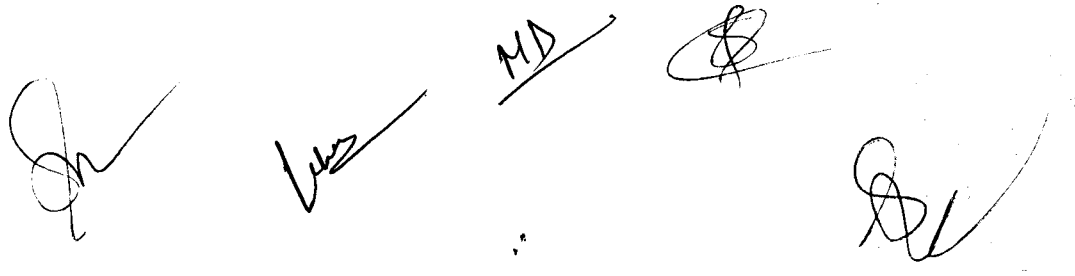
Module	Topics	No. of
I	Fundamentals of Computer – Definition, Characteristics, Block Diagram of a Computer, Input devices - Output Devices- Keyboard, Scanner, Mouse, light pen, Bar Code Reader, OMR, OCR. MICR, Printers- types of Printer, Monitors, Plotters-types of plotters, Computer Memory- Types of Memory.	10
II	Fundamentals of Digital Electronics: Number System-Binary, Decimal, Octal, Hexa-Decimal, Conversions, Binary Arithmetic-Addition, Subtraction, Multiplication, Division, Underflow, Overflow, Sign Magnitude, Complements-1's and 2's, Fixed-Point Representation, Floating-Point Representation.	10
III	Boolean Algebra, Reducing Boolean Expression, Logic Gates-AND, OR, NOT, Universal Gates-NAND, NOR. Analog and Digital Signals, Clock Waveform Timing, Map Simplification, K-Map- Two, Three and Four variables.	10

IV	Combinational Circuits- Adder, Subtractor, Multiplexer, De-multiplexer, Decoders, Encoders. Binary Codes – Gray Codes, ASCII code, BCD code, EBCDIC, Error Detection Code and Correction Code, Hamming Code.	10
V	Sequential Circuits - Flip - Flops, SR, D, T, JK, Master-Slave, Registers, Shift Registers- SISO, SIPO, PISO, PIPO, Counters, Instruction, Instruction Format, Instruction Codes, Handshaking, DMA Data Transfer, Auxiliary Memory, Cache Memory, Associative Memory, Flynn's classification - Introduction to SISD, SIMD, MISD, MIMD, Parallelism, Multicore processors.	10
Keywords/Tags: Digital Electronics, Logic Gates, Circuits, Instruction formats, Parallelism, Memory hierarchy, Multicore, Multi-threading, SISD, SIMD, MISD, MIMD.		

PART C: Content of the Course		
No. of Lab. Practical s (in hours per week): 2 Hrs. per week		
Total No. of Labs: 30 Hrs.		
	Suggestive list of Practical	No. of labs
	PART-I (Computer Fundamentals) 1. Various parts of a Computer 2. Identify various parts inside the CPU like motherboard, SMPS, Ports, Buses, IC chip, Processor, HDD, RAM. 3. Identify various I/O devices **PART-II (Digital Electronics)** 1. To study basic gates (AND, OR, NOT) and verify their truth tables. 2. To study and verify NAND as Universal gate using IC 7400. 3. To realize basic gate AND from Universal gate NAND. 4. To realize basic gate OR from Universal gate NAND. 5. To realize basic gate N OT from Universal gate NAND. 6. To study and verify NOR as Universal gate 7. To realize basic gate AND from Universal gate NOR. 8. To realize basic gate OR from Universal gate NOR. 9. To realize basic gate NOT from Universal gate NOR. 10. Verification and Interpretation of truth table for XOR gate. 11. To study Half Adder using basic gates and verify its truth table. 12. To study Full Adder using basic gates and verify its truth table. 13. To design and construct RS flip Flop using gates and verifies the truth table. 14. To design and construct JK Flip Flop using gates and verifies the truth table. 15. To verify De-Morgan's First Law Theorem. 16. To verify De-Morgan's Second Law Theorem.	15

	Keywords/Tags: Digital Electronics, Logic Gates, AN D, OR, NOT, IC7486, IC 7400, NAND, NOR, IC 7483, Circuits, Flip Flop, De-Morgan's Theorem.	

PART D: Assessment and Evaluation			
Internal Assessment : Continuous Comprehensive Evaluation (CCE) : 40 **Marks**		**External Assessment**: University Exam (UE) : **60 Marks** Time : **02.00 Hours**	
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Lab Attendance	10 Marks	Practical record file	25 Marks
		Viva voce practical	10 Marks
Internal Viva	10 Marks	Execution	5 Marks
Practical File	20 Marks	Answer script	20 Marks
Total	**40 Marks**	**Total**	**60 Marks**



St. Aloysius College (Autonomous), Jabalpur, Madhya Pradesh

PART A			
Program: **Certificate**	Class: **B.C.A.**	Semester :**1st**	Session: **2022-23**

1.	Course Code	**BCA-102**
2.	Course Title	**Programming and Problem Solving through 'C'**
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	**Minor**
4.	Pre-Requisite (if any)	**10+2 Maths (opted as an elective by the students of Computer Application)**
5.	Course Learning Outcomes (CLO)	**After the completion of this course, a student shall be able to do the following:** CO1. Identify situations where computational methods and computers would be useful. CO2. Given a computational problem, identify and abstract the programming task involved. CO3. Approach the programming tasks using techniques learned and write pseudo code. CO4. Choose the right data representation formats based on the requirements of the problem. CO5. Use the comparisons and limitations of the various programming constructs and choose the right one for the task in hand. CO6. Write the program on a computer, edit, compile, debug, correct, recompile and run it. CO7. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task.
6.	Credit Value	**Theory - 4 Credits**
7.	Total Marks	Max. Marks : **40+60** / Min. Passing Marks: **35**

PART B: Content of the syllabus

No. of Lectures (in hours per week): **4 Lectures per week**

Total No. of Lectures: **60**

Unit	Topics	No. of Lectures
I	**Classification of programming language:** Structured programming concepts, modular programming, top-down programming approach. **Problem solving using computer**: coding, compilation, debugging and testing, documentation, implementation and maintenance. **Problem- Solving Techniques**: Steps for Problem-Solving, Design of Algorithms, Definition, Features of Algorithm. Flowcharts, Basic	12

	Symbols used in Flowchart Design. **Basics of C**: History of C, salient Features of C, C language IDE'S: What is IDE's Types of IDE's, Structure of a C Program, a Simple C Program, Compiling a C Program, Link and Run the C Program.	
II	**Variables and Constants**: Character Set, Identifiers and Keywords, Rules for Forming Identifiers, Qualifiers, **Variables**, Declaring Variables, Initializing Variables, **Constants**, Types of Constants, **Data Types, Operators**, expressions, operator precedence and associativity. **Managing input/output function**: formatted and unformatted. **Conditional Statements and Loops:** Decision Control Statements: if Statements, switch Statement, Loop Control Statements: while Loop, do-while Statement, for Loop, Nested Loop, goto Statement, Break Statement, Continue Statement.	12
III	**Array:** one dimensional array Declaration, Initialization, insertion, deletion of an element form an array, finding the largest/smallest element in an array, two dimensional arrays, addition / multiplication of matrices. **String:** Declaration and Initialization of Strings, String formatted specifiers, Array of Strings, Use of <string.h>, String library function (strlen, strcpy, strcmp,strcat, strlwr, strrev), **Storage Class:** Need & types of Storage class,	12
IV	**Functions:** Definition of a Function, types of function, Declaration of a Function, Function Prototypes, passing arguments to a function, call by value, call by reference, command line argument, recursion. **Pointers:** pointers and their characteristics, address and indirection operators, pointer type declaration and assignment, pointer arithmetic, passing pointers to functions, array of pointers, introduction to pointer to pointer.	12
V	**Structures**: declaration of structure, accessing the members of a structure, initializing structures, structures as function arguments, structures and arrays, **Preprosessor**: What is pre-processor, Types of Pre-processor, Macros, File Inclusion, Conditional Compilation. **Dynamic memory allocation** Memory management, Types of memory allocation, Allocation (malloc, calloc, realloc), Deallocation(free) **Command Line Arguments, Enumeration**, typedef.	12

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

- D. Ravichandran, programming New Age International, 1996.
- E. Balaguruswamy, Tata McGraw Hill Pub.

Reference Books:

- Y.Kanitkar, Let us C. BPB Publication, 4th Ed. 2002.
- Rajiv Dharaskar, Hidden Treasure of C, BPB Publication, 1995.

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• Shridhar B. Dandin, Programming – Pragya Publication (Hindi Medium)
Suggestive digital platform web links
https://www.cprogramming.com/ https://www.linuxtopia.org/online_books/programming_books/gnu_c_programming_tutorial/index.html https://www.codewithharry.com/videos/c-tutorial-in-hindi-with-notes
Suggested equivalent online courses
https://nptel.ac.in/courses/106/105/106105171/
PART D: Assessment and Evaluation
Internal Assessment: Continuous Comprehensive Evaluation (CCE): **40 Marks** Shall be based on allotted assignments and Class Tests based on the Course outcomes.

Attainment Expressions	PO Mapping	PSO mapping	Cognitive level
Identifying basic problem of real world with abstract requirement (CO1, CO2)	PO1, PO2	PSO4	R, U
Applying algorithm, flowchart and pseudocode on basic real-world problems (CO3)	PO3	PSO5	AP
Applying input output operations and basic programming constructs on basic real problems (CO4, CO5)	PO1, PO2	PSO4, PSO6	AP
Writing basic programs for enhancing programming skills (CO6, C07)	PO1, PO2, PO3	PSO9	AN, C

External Assessment: 60 Marks Time: **03.00 Hours**

Section	Mark x No. of Questions
A: Very Short Questions	1 x 5
B: Short Questions	4 x 5
C: Long Questions	7 x 5

PART A:			
Program: **Certificate**	Class: **BCA**	Semester Ist	Session: **2022-23**
Subject: **Computer**			

1.	Course Code		
2.	Course Title	**C Programming Lab**	
3.	Course Type (Core	**Lab**	
4.	Pre-Requisite (if any)	**10+2 Maths (opted as an elective by the students of Computer Application)**	
5.	Course Learning Outcomes (CLO)	**After the completion of this course, a student shall be able to:** • Basic Concepts of programming • Build Logic • Knowledge of problem solving skills	
	Credit Value	**2 Credits**	
	Total Marks	Max. Marks : **40+60**	Min. Passing Marks: **35**

PART B: Content of the Course

No. of Lab. Practicals (in hours per week): 1 **Lab. per week (1 hr 25 mins)**

Total No. of Lab.: **30 Hrs.**

SNo	**Suggestive List of Practical**	**No. of Labs**
1	Basic C commands on computer	**30**
2	Write a program to check given year is leap or not	
3	Write a program to find maximum from given three number without using	
4	Write a program to find area of a circle, rectangle, and square using switch-	
5	Write a program whether a given number is prime or not.	
6	Write a program to input 10 numbers add it and find its average.	
7	Write a program to generate even/odd series from 1 to 100.	
8	Write a program to create a pyramid structure	
9	Write a program to reverse a string.	
10	Write a program to find whether a given string is PALINDROME or not.	
11	Write a program to change the case of string.	
12	WAP to print Fibonacci series	
13	Write a program to generate a series 1+1/1!+2/2!+3/3!+---------- +n/n!	
14	Write a program to generate series 1+1/2!+1/3!+---------- +1/n!	
15	WAP to find length of string without using built in function.	
16	Write a program for call by value and call by reference.	
17	Write a recursive program to calculate factorial of a given number.	
18	Write a program to print sum of two matrices.	
19	Write a program to demonstrate different storage	
20	Write a program to demonstrate concept of command line argument.	
21	Write a program to demonstrate concept of structure.	
22	Write a program to draw Line, Circle, Rectangle by using built in function.	
23	Write a program to check given year is leap or not	

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

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Textbooks: • D. Ravichandran. programming New Age International, 1996. • E. Balaguruswamy, Tata McGraw Hill Pvb. • Computer Fundamentals and Programming in C by R.Thareja.
Suggestive digital platform web links
https://codeforwin.org/ http://learn-c.org/
Suggested equivalent online courses
https://nptel.ac.in/courses/106/105/106105171/ https://www.youtube.com/watch?v=OHCMfsNpqCc

PART D: Assessment and Evaluation			
Internal Assessment : Continuous Comprehensive Evaluation (CCE) : 40 **Marks**		**External Assessment**: University Exam (UE) : **60 Marks** Time : **02.00 Hours**	
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Lab Attendance	10 Marks	Practical record file	25 Marks
		Viva voce practical	10 Marks
Internal Viva	10 Marks	Execution	5 Marks
Practical File	20 Marks	Answer script	20 Marks
Total	**40 Marks**	**Total**	**60 Marks**

ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR				
PART A: Introduction				
Program: Certificate	Class: B.C.A.	Year: I Semester	Session: 2022-23	
Subject: Computer Application				
1.	Course Code	S1-COSC1G		
2.	Course Title	**Data Analysis & Visualization through spreadsheet**		
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	**Elective**		
4.	Pre-Requisite (if any)	To study this course. a student must have prior basic Knowledge of using computer and internet, This course is open for all.		
5.	Course Learning Outcomes (CLO)	**On completion of this course, learners will be able to:** 1. Prepare a spreadsheet file and enter data into the sheet 2. Illustrate formatting and editing capabilities on the data 3. Demonstrate basic calculations and save data 4. Demonstrate basic visualizing, analyzing, organizing and sharing techniques		
6.	Credit Value	**Theory** — 2 **Credits**		
7.	Total Marks	Max. Marks: 40+60	Min. Passing Marks: 35	

PART B: Content of the Course

No. of Lectures (in hours per week): 1 **Lecture per week**

Total No. of Lectures: **30 Hrs.**

Module	Topic	No. of Lectures
i	**Introduction to Spreadsheet:** What is Spreadsheet, User interface, **Basics of Spreadsheet:** *Overview* of spreadsheet. opening new file and saving spreadsheet (through menu and keyboard shortcut). rows, columns, cells, workbooks and worksheets, merging cells; Selecting rows and columns. Non-contiguous cells: How to enter data (numeric. text. date). Working with multiple sheets, inserting and deleting sheets. Renaming sheets. **Number formatting** - Introduction. General and text. Number and fraction. Currency. Accounting. Percentage. Date. Time. Inserting and deleting rows, columns and cells. **Formatting cells** - Introduction. Bold. Italics and Underline. Border, Fill and Font. Alignment. Format painter and clear format. Editing the cell content. Entering multiple lines of text using ALT+Enter, auto fill, copy and paste, cut and paste, auto fill series, use of fill handle through mouse.	6
II	**Printing worksheet:** Select print area. see print preview, adjusting margin During print preview. **Page Formatting:** ***Page*** layout—Orientation. Size. Margins; watermark, page color, page borders; inserting headers and footer, inserting page numbers, date, path and filename. **Viewing:** split windows, layout view (normal. page break and Print). **Protecting/Securing using file properties:** Protect Workbook. Protect Sheet. Lock Cells. Read-only Workbook. **Saving a File and use of Template.**	6

	Calculations: Entering formula, editing formula, copying formula. Cell references (absolute, relative and mixed), paste formula (using keyboard shortcut and fill handle). **Data Validation:** Reject Invalid Dates. Budget Limit; Prevent Duplicate Entries, Product Codes. Drop-down List, Dependent Drop-down Lists.	
III	**Introduction to Functions:** What is function, entering functions, types of Functions. **Count and Sum**: Countif, Count, Count Characters. Not Equal To, Sum, Total, Sumif, Sumproduct. **Date & Time:** DateDif, Today's Date. Date and Time Formats, Calculate Age. Time Difference. Weekdays, Days until Birthday, Last Day of the Month, Add or Subtract Time, Quarter. Day of the Year **Text:** Separate Strings. Count Words. Text to Columns, Find. Search. Change Case. Remove Spaces. Compare Text. Substitute vs Replace. Text. Concatenate. Substring. **Statistical:** Average, Negative Numbers to Zero. Random Numbers. Rank, Percentiles and Quartiles, Box and Whisker Plot. Averageif, Forecast. MaxIfs and MinIfs, Weighted Average, mode, Standard Deviation, Frequency.	6
IV	**Data Visualization:** Introduction to charts. various type of charts (Column, Bar. Pie. Area, XY Scatter. Bubble. Net. Stock. Column & Line); 3-D Shape (Bar, Cylinder, Cone. Pyramid), Chart elements (Title. Subtitle. X-axis. Y-axis, Z-axis. Display grids, Legends, Display data series); Creating a Chart: Selecting data series, select chart components – labels, background, axis, format and design. **Conditional Formatting:** Manage Rules. Formula based. Data Bars. Colour Scales. Icon Sets, Find Duplicates. Shade Alternate Row s. Compare Two Lists. Conflicting Rules. Heat Map. **Data Analysis:** Sort and Filter **Pivot Tables:** Creating pivot table. Group pivot table items, pivot table summarization. Multi-level pivot table, Frequency distribution, pivot chart. Slicers, update pivot table, calculated field/item, GetPivotData, **If analysis**.	6

Keywords/Tags: Excel, Calc. Formatting. Protecting range, sheet, Functions. Sort, Filter. Freeze. Pivot. Analysis, Visualization. Charts.

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings :

- Jacek Artymiak. Beginning OpenOffice Cale: Prom Setting Up Simple Spreadsheets to Business Forecasting, 2011, Apress. ISBN: 9781430231592
- Jacek Artymiak. OpenOffice.org Cale Functions and Formulas Tips. Essential OpenOffice.org Cale Skills. 1st ed., 2011
- Michael Alexander. Richard Kusleika. John Walkenbach.: Microsoft Excel 2019 Bible: The Comprehensive Tutorial Resource; John Wiley & Sons Inc.
- Walkenbach J.: Microsoft Excel 2016 Bible: The Comprehensive Tutorial Resource; Wiley.
- Fischer W., Excel: Quick Start Guide from Beginner to Expert (Excel, Microsoft Office); CreateSpace Independent Publishing Platform.
- Harvey G., Excel 2016 for Dummies (Excel for Dummies): John Wiley & Sons.
- Kalmstrom P.: Excel 2016 from Scratch: Excel course with demos and exercises; CreateSpace Independent Publishing Platform.
- Walkenbach J.: Excel Charts; John Wiley & Sons

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Suggestive digital platform web links

https://wiki.documentfoundation.org/images/c/c2/CG62-CalcGuide.pdf
http://www.ogenoffice.org/documentation/manuals/userguide3/0309CG3-DataAnalysis.pdf
https://wiki.documentfoundation.org/images/c/c2/CG62-CalcGuide.pdf
https://documentation.libreoffice.org/assets/Uploads/Documentation/en/CG4.1/PDF/CG4109-DataAnalysis.pdf
https://help.libreoffice.org/6.1/en-US/text/scalc/01/statistics.html?DbPAR=CALC
https://www.vfu.bg/en/e-Learning/MS-Office--excel.pdf
https://guides.library.duke.edu/excel/visualization

Suggested equivalent online courses

https://www.classcentral.com/course/edx-analyzing-and-visualizing-data-with-excel-4480\

PART A: Introduction				
Program: **Certificate**	Class: B.C.A.	Year: I Semester	Session: 2022-23	
Subject: **Computer Application**				
1.	Course Code	SI-COSC IR		
2.	Course Title	**Data Analysis & Visualization Lab**		
	Course Type (Core Course/Elective/Generic Elective/ Vocational	Elective		
4.	Pre-Requisite (if any)	To study this course. a student must have prior basic knowledge of Using computer and internet. This course is open for all.		
5.	Course Learning Outcomes (CLO)	**On completion of this course, learners will be able to:** 1. Prepare a spreadsheet file and enter data into the sheet 2. Illustrate formatting and editing capabilities on the data 3. Demonstrate basic calculations and save data 4. Demonstrate basic visualizing, analyzing, organizingand sharing techniques		
6	Credit Value	**Practical** - 2 **Credits**		
7.	Total Marks	Max. Marks: **40+60**	Min. Passing Marks: 35	

PART B: Content of the Course		
No. of Lab. Practical's (in hours per week): 2 Hrs. per week		
Total No. of Lab. 16 hrs.		
	Suggestive List of Practicals	No. of Labs.
	Note: In the first day of the lab instructor must make the students get familiar with the interface of the Calc/Excel along with the movement of cursor, rows, columns, cells, cell number identification, formula bar, use of fill handle (drag as well double click), setting width of columns and height of rows. Selecting rows and columns. Students must entry some data and practice above. **1. Simple data entry in a workbook and Perform the following operations as given below.** i. Inserting column and rows and deleting columns and rows. ii. Selecting range of columns and rows. iii. Change the width of column and height of rows by usingmenu. iv. Hiding and unhide the rows and columns. v. Entering multiple lines of text. vi. Rename the worksheet as BCA 1st semester" and Save the workbook as "Practical 1". **2. Cell formatting , Auto Fill Series and Advance Fill** i. Enter random data and perform a cell formatting operation. ii. Filling a series with formatting (rollno as 1 to 20). iii. Filling a series without formatting (rollno as 21 to 40). iv. Fill days. v. Filling a weekdays. vi. Perform an advance fill operation.	8

3. Create your mark sheet (as format given) and perform the following operations.

i. Merge and center operation.
ii. Cell formatting
iii. Use Sum, percentage and nested if function for calculations.

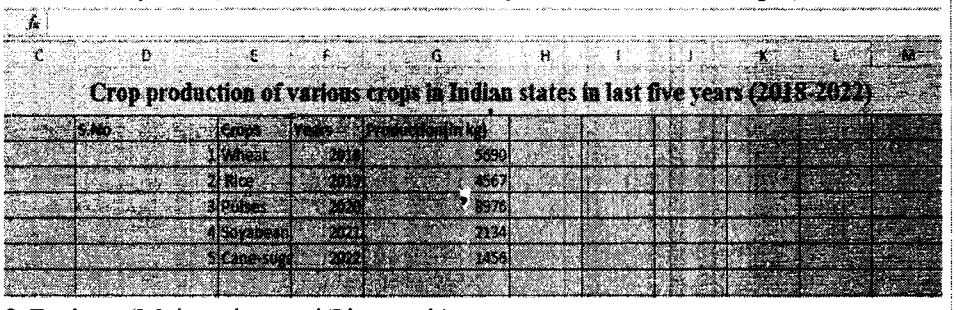
4. Working with formulas.

i. Find the number of students having percentage more than 60%. Max
ii. Find the number of students having percentage less than 45% Min
iii. Text
iv. Date and Time

5. Experiment related to the data validation (Use of drop-down list).

6. Experiment related to the data visualization.

Create worksheet related to crop production of various crops in Indian states in last five years (Wheat, Rice, Pulses, Soyabean, and Cane-sugar).



Crop production of various crops in Indian states in last five years (2018-2022)

S.No	Crops	Years	Production (in kg)
1	Wheat	2018	5690
2	Rice	2019	4567
3	Pulses	2020	8976
4	Soyabean	2021	2134
5	Cane-sugar	2022	1456

i. 2-D chart (Make a bar and Pie graph)
ii. 3-D chart (Make a cone and pyramid graph)

7. Use of conditional formatting.

8. Data analysis using Sort and Filters.

Create a random 5 students mark sheet and perform the following operations.

i. Find the name of the student got highest marks.
ii. Find the name of the student who got highest marks in both Theory and practical in subject.
iii. Sort the data on percentage and show only the top 3 highest rank students.

9. Data analysis using Pivot tables.

10. Data analysis and forecasting using what-if-analysis.

PART D: Assessment and Evaluation			
Internal Assessment : Continuous Comprehensive Evaluation (CCE) : 40 **Marks**		**External Assessment**: University Exam (UE) : **60 Marks** Time : **02.00 Hours**	
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Lab Attendance	10 Marks	Practical record file	25 Marks
		Viva voce practical	10 Marks
Internal Viva	10 Marks	Execution	5 Marks
Practical File	20 Marks	Answer script	20 Marks
Total	**40 Marks**	**Total**	**60 Marks**

St. Aloysius College (Autonomous), Jabalpur, Madhya Pradesh

PART A: Introduction				
Program: **Certificate**		Class: **BCA**	Semester: I	Session: **2022-23**
1.	Course Code	**S1-BCA1G**		
2.	Course Title	**Computational Mathematics**		
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	**Elective**		
4.	Pre-Requisite (if any)	Students must have basic analytical aptitude.		
5.	Course Outcomes (CO)	**On successful completion of the course the students shall be able to:** 1. Implement trigonometric solutions for measurements in real world scenarios. 2. Implement simultaneous & quadratic equations to solve complex problems 3. Use Mathematical Logic and Predicate calculus for solving problems 4. Apply the concepts of set theory for finding solutions to set related problems		
6.	Credit Value	**Theory - 4 Credits**		
7.	Total Marks	Max. Marks: **40+60**	**Min. Passing Marks: 35**	

PART B: Content of the Course

No. of Lectures (in hours per week): **4 lectures Per week**

Total No. of Lectures: **60 Hrs.**

Unit	Topics	No. of Lectures
I	**Trigonometry:** Values of Trigonometric Ratios, Height and Distances. **Elementary Matrices:** Definition of types of matrices.	20
II	**Equations:** Simultaneous Linear equations, Methods of solving Simultaneous Equations, Quadratic equations.	10
III	**Mathematical Logic:** Statements, Connectives: Negation, Conjunction, Disjunction, Truth Tables, Tautologies, Tautological implications, contradiction.	15
IV	**Set Theory:** Definition of a set, notations, subset, equal set, types of sets, and operations on set- Venn Diagrams.	15

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Text Books:

1. Plane Trigonometry Part I S. L. Loney, Arihant Prakashan
2. Textbook of Matrix Algebra S. Biswas, Prentice Hall India Learning Private Limited

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3. Business Mathematics S.M. Shukla, Sahitya Bhawan Publications.
4. Business Mathematics D C Agrawal, Sree Sai Prakashan.
3. S. K. Sarkar: A Text Book of Discrete Mathematics, S Chand, 2005.
4. A text book of Discrete Mathematics,9/E, Sarkar S. K. Chand New Delhi,2016
5. मध्य प्रदेश हिन्दी ग्रंथ अकादमी से प्रकाशित विषय से संबंधित पुस्तकें।

Reference Books:

1. Business Mathematics, J. K. Singh, Himalaya Publishing House, 2017
2. Business Mathematics, 9/E, Sancheti and Kapoor, Sultan Chand & Sons ,2014
3. Discrete Mathematical, 2/E, J.K. Sharma, Macmillan Publication, 2005

Suggestive digital platform web links

https://freevideolectures.com/university/iit-roorkee/
https://www.highereducation.mp.gov.in/?page=xhzIQmpZwkylQo2b%2Fy5G7w%3D%3D
https://epathshala.ncert.org.in/

Suggested equivalent online courses

S. No.	Course Title	Duration	Provider
1	Algebra and Trigonometry	15 weeks	Swayam
2	Mathematics	8 weeks	Mitopen Courseware

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.

PART D: Assessment and Evaluation

Internal Assessment: Continuous Comprehensive Evaluation (CCE): **40 Marks**
Shall be based on allotted assignments and Class Tests based on the Course outcomes.

Attainment Expressions	PO Mapping	PSO Mapping	Cognitive level
Understanding mathematical concepts and deriving solutions (CO1, CO2, CO3, CO4)	PO1, PO2	PSO1	U, AN, AP
Identifying and analyzing real world problems and applying necessary mathematical concepts for providing a solution. (CO1, CO2, CO4)	PO3, PO4	PSO1, PSO2	AP, C

External Assessment: 60 Marks	**Time:** 03.00 Hours
Section	**Marks x No. of Questions**
A: Very Short Questions	1 x 5 = 05
B: Short Questions	4 x 5 = 20
C: Long Questions	7 x 5 = 35

ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR				
PART A: Introduction				
Program: Diploma	Session: **2023-24**	Class: BCA	Year: III SEM	SESSION: 2023-24
Subject: **Computer Application (BCA)**				
1. Course Code		S2-BCAA1T		
2. Course Title		**Data Communication and Computer Networks**		
3. Course Type		**Major**		
4. Pre-Requisite (if any)		To study this course, a student must have the basic knowledge of Computers.		
5. Course learning outcome(CLO)	• Demonstrate the Basic Concepts of Networking, Networking Principles, Routing Algorithms, IP Addressing and working of Networking Devices. • Demonstrate the significance, purpose and application of Networking protocols and Standards. • Describe, compare and contrast LAN, WAN, MAN, Intranet, Internet, AM, FM, PM and Various Switching Techniques. • Explain the working of Layers and apply the various protocols of OSI & TCP/IP model. • Analyze the Requirement for a given Organizational structure and select the most appropriate Networking Architecture and Technologies. • Design the Network Diagram and solve the Networking problems of the Organization with consideration of Human and Environment install and configure the networking device.			
6. Credit Value	Theory—6 Credits			
7. Total Marks	Max. Marks: **40+60**	Min. Passing Marks: 35		

PART B: Content of the Course

Lectures (in hours per week): 3 Hrs. per week

Total No. of Lectures (in hours): 90 Hrs.

Unit	Topics	No. of Lectures
I	Network goals and application, Network structure, Network services, Example of network and Network Standardization, Networking models: centralized, distributed and collaborative. Network Topologies: Bus, Star, Ring, Tree, Hybrid: Selection and Evaluation factors.	15
II	Theoretical basis for Data communication, Transmission media, Twisted pair, Coaxial Cable, Fiber optics: Selection and Evaluation factors Line of Sight Transmission, Communication Satellites. Analog and Digital transmission. Transmission and switching, frequency division and time division multiplexing, Circuit switching, packet. Switching and message switching.	20
III	Brief overview of LAN (local area network) Classification, Brief overview of Wide Area Network (WAN). Salient features and difference of LAN with emphasis on Media, Speed of Transmission,	20

	Terminal Handling, Polling, Token passing, Contention IEEE Standards their need and developments.	
IV	Open System: What is an Open System? Network Architectures is OSI Reference Model, Layers: Application, Presentation, Session, Transport, Network, Data Link & Physical Layer - Transmission, Bandwidth, Signaling devices used, media type. Data Link Layer - : Addressing, Media Access Methods, Logical link Control.	20
V	Routing: Fewest-Hops routing, Type of Service routing, Bridges and Routers, Gateway protocols, routing daemons. OSI and TCP/IP model. TCP/IP and Ethernet. The Internet: The structure of the Internet, the internet layers, Internetwork problems. Internet Standards.	15

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

1. Tannanbaum, A.S.: Computer Networks, Prentice Hall, 1 985.processing, Prentice Hall,1983.
2. Black : Computer Networks : Protocols, standards and Interfaces, Prentice Hall International I. Tannanbaum, A.S.: Computer Networks, Prentice Hall, 1985.processing, Prentice Hall, 1983.
3. Fourauzan B., "Data Communications and Networking", 3rd edition, TataMcGraw- Hill Publications,

Reference Books:

1. Comer· D., "Computer Networks and Internet", 2ND Edition, PearsonEducation
2. S.K.Basandra& S. Jaiswal, "Local Area Networks", Galgotia Publications
3. William Stallings, "Data and Computer Communication"
4: Book published by M.P. Granth Academy, Bhopal

Suggested Web Links:

https://www.nptel.ac. in/courses/106/105/106105082/
https://www. iitkg . ac
https://www.nptel.ac.in/course. html
https://www.harvard.edu/subject/computer-networking
http://www.m12hindigranthacademy.org/
http://www.mphindigranthacademy.org/

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods: Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 40 marks University Exam (UE) 60 marks		
Internal Assessment Continuous Comprehensive Evaluation (CCE): 40	Class Test Assignment/Presentation	Total 40
External Assessment University Exam Section: 60	Section (A) : Objective Questions Section (B): Short Questions Section (C): Long Questions	Total 60

St. Aloysius‘ College (Autonomous), Jabalpur		
Part A – Introduction		
Session:	2023-24	
Subject	Computer Application	
Programme	Diploma	
Class	BCA III Semester	
Course Code	S2-BCAA2T	
Course Type	Minor	
Course Title	**Database Management Systems**	
Pre–requisite	To study this course, a student must have the basic knowledge of Computers.	
Course Learning Outcome	After completion of this course, it is expected that the student shall be able CO1. Explain the features of database management systems and relational database. CO2. Design conceptual models of a database using ER modeling for real life applications and construct queries in relational algebra. CO3. Create and populate a RDBMS for a real-life application, with constraints and keys, using SQL. CO4. Retrieve any type of information from a database by formulating complex queries in SQL. CO5. Analyse the existing design of a database schema and apply concepts of normalization to design an optimal database.	
Credit Value	**4 credits (4-TH)**	
Total Marks	Max. Marks: 40+60	Min. Passing Marks:35
Part B – Course Content Total No. of Lectures-Tutorials-Practical (in hours per week): L-4		
Unit I	**Introduction to DBMS:** Why database? Characteristics of datain database, DBMS. What are advantages of DBMS? **Database Architecture and Modeling:** Conceptual, physical and logical database models, Role of DBA, Database design. **Entity Relationship (ER) Model:** Components of ER-model, ER modeling symbols, Relationships, Specialization, Generalization, Aggregation.	
Unit II	**Relational database implementation** **Relational Implementation with SQL:** Schema and Table Definition: Schema definition (CREATE), Data types & domains, Defining Tables, Column Definition. Data Manipulation: Simple Queries (SELECT, FROM, WHERE), Built-ln Functions (SUM, AVG, COUNT, MAX, and MIN).GROUP BY, ORDER BY and HAVING clause. Database Change Operations: INSERT, UPDATE, DELETE.	

Unit III	**Relational database implementation:** Multiple Table Queries-Subqueries, EXISTS and NOT EXISTS operators. **Relational Algebra and Calculus** Relational Algebra: Union, Intersection, Difference, Product, Select, Project, Join - Natural, Theta & Outer Join, Divide, Assignment. Relational Algebra Operations with SQL: UNION, INTERSECT, EXCEPT.
Unit IV	**The Relational Data Model:** ***Fundamental Concepts:*** Relations, Null Values, Keys, Foreign Keys, Integrity Constraints - Entity Integrity & Relational Integrity. ***Normalization Process:*** First Normal Form, Functional Dependencies, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form (BCNF), Fourth Normal Form; Other Normal Forms - Fifth Normal Form & Domain/Key Normal Form.
Unit V	**Physical Database Systems** Overview of Physical Storage Media, Magnetic Disk and Flash Storage, RAID, RAID Levels, Choice of RAID level. *Physical Storage Media.* Secondary Storage, Physical Storage Blocks. *Data Storage Formats on Disk:* Track Format, Record Format—Fixed-Length Records & Variable-Length Records, Input/output Management. *File Organizing and Addressing Methods:* Sequential File Organization, Indexed- Sequential File Organization, Direct File Organization, Data Dictionary Storage.

Part C – Suggested Readings

S. N.	Author	Name of the Book	Publication
1	Gary W. Hansen & James V. Hansen	Database Management and Design	Prentice Hall of India Pvt Ltd.
2	Ramez Elmasri, Shamkant Navathe	Fundamentals of Database Systems	Pearson
3	Raghu Ramakrishnan & Johannes Gehrke	Database Management Systems	McGraw Hill Education
4	C.J. Date	An Introduction to Database System	Pearson
5	Abraham Silberschatz, Henry F. Korth, S. Sudharshan	Database System Concepts	Tata McGraw Hill

Attainment Expressions	**PO Mapping**	**PSO mapping**	**Cognitive level**
Identifying basic problem of real world with abstract requirement (CO1, CO2)	PO2	PSO4	R, U
Applying advanced and basic queries on real databases (CO3, CO4,CO5)	PO2, PO3	PSO4, PSO7	AP

PART A: **INTRODUCTION**				
Program: Diploma		Class: BCA	Year. III Semester	Session: **2023-24**
Subject: **Computer Applications**				
1.	Course Code	**S2-BCAA2P**		
2.	Course Title	**DBMS**		
3.	Course Type	Minor		
4.	Pre-Requisite (if any)	To study this course, a student must have the basic knowledge of Computers.		
5.	Course Learning Outcomes (CLO)	This lab is based on the theory course of DBMS. This lab course Involves the development of the practical skills in DBMS using MS-Access/Visual-FoxPro/SQL-Server/etc. This course is an attempt to upgrade and enhance student's theoretical skills and provide the hands-on experience. After completing this lab course sessions, student will be able: • to create Databases & Views, • execute simple advance SQL queries, • use DBMS tools in the areas of database applications. Topics to be covered in the lab syllabus- • Introduction to MS-Access/Visual-FoxPro/SQL-Server/etc • Hands on practice on the application package used in the lab(i.e. on MS-Access/Visual-FoxPro/SQL-Server/etc) • Database creation using MS-Access/Visual-FoxPro/SQL-Server/etc • Simple SQL queries (Single table) • Use of Advanced SQL queries		
6.	Credit Value	2 credits (2-PR)		
7.	Total Marks	Max. Marks: 40 Int + 60 Ext	Min. Passing Marks: 35	
PART B: **CONTENT OF THE COURSE**				
Total No. of Lectures-Tutorials-Practical (in hours per week): P – 2				
Total timber of Practical: **02 Hours per Week**				

List of Practical's

1. To draw ER Model and Relational Model for a given database. Show ER to Relational Model reduction.

2. Implementation of Database

- Creation of Database with proper constraints
- Insert into database using different types of insert statements
- Display

3. Data Definition (schema) Modification

4. Simple SQL queries (Single table retrieval)

- Make use of different operators (relational, logical etc.)
- Selection of rows and columns, renaming columns, use of distinct keyword
- String handling (%, etc.)
- Update statement
- Delete

5. Advanced SQL Queries-1

- Group by, having clause, aggregate functions
- Set operations like union, union all and use of order by clause
- Nested queries: in, not in, exists, not exists and any, all

6. Advanced SQL Queries -2

- Join (Inner & Outer)
- Exists & Union

PART C: LEARNING RESOURCES
Textbooks, Reference Books, Other Resources
Suggested Readings:
1. SQL, PL/SQL-The programming language of ORACLE, Ivan Bayross, BPB publication. 2. Dr Rajeev Chopra, ―Database Management System (DBMS) A Practical Approach‖, 2010, S Chand 3. Jitendra Patel, ―DBMS Lab Manual‖ Kindle Edition, 2012.
Suggestive digital platform web finds
https:// •fec.kai.nic.in/i'aibag/FileHandler/270-101d6l 6b-255a-4add-8d9bdd e22fec7c1.pdf https://nesitsoiith.pes.edu/pdf/2019/3u1v/CS/LM DBMS%20LAB.ndf http://www.mphindigranthacademy.org/
Suggested *equivalent online courses*

ST. ALOYSIUS' COLLEGE(AUTONOMOUS) JABALPUR				
PART A: Introduction				
Program: Diploma	Session: **2023-24**	Class: BCA	Year: III Semester	SESSION: 2023-24
Subject: **Computer Application (BCA)**				
8. Course Code		S2-BCAC 1 G		
9. Course Title		**Internet of Things (IOTs)**		
10. Course Type		Elective		
11. Pre-Requisite (if any)		Students must have basic Computer Knowledge		
12. Course learning outcome	• CO1. To understand the basics of the Internet of Things • CO2. To get an idea of some of the application areas where the Internet of Things can be applied. • CO3. To understand the middleware for the Internet of Things and the concepts of the Web of Things. • CO4. To understand the concepts of the Cloud of Things with an emphasis on Mobile cloud computing. • CO5. To understand the IOT protocols.			
13. Credit Value	Theory—3Credits	Practical— 1 Credits		
14. Total Marks	Max. Marks: 4**0+60**	Min. Passing Marks: 35		
PART B: Content of the Course				
Lectures (in hours per week): 2 Hrs. per week				
Total No. of Lectures (in hours): 60 Hrs.				
Module	**Topics**			**No. of Lectures**
I	Introduction: Introduction: Definition, characteristics of IoT, IoT Conceptual framework, IoT Architectural view, Physical design of IoT, Logical design of IoT, Application of IoT, Arduino IDE, Setup(), loop(), delay, bound, serial monitor.			14
II	Machine-to-machine (M2M). SDN (software-defined networking) and NFV (network function virtualization) for IoT, data storage in IoT. IoT Cloud-Based Services.			14
III	Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, and REST. HTTP Restful Web Sockets. Internet. Connectivity Principles: Internet Connectivity, Internet-based communication, IP addressing in IoT, and Media Access control.			14
IV	Sensor Technology, Participatory Sensing, Industrial IOT and Automotive IOT, Actuator. Sensor data Communication Protocols, Radio Frequency Identification Technology, Wireless-Sensor Network Technology. IoT Design methodology: Specification Requirement, process, model, service, functional & operational view. IoT Privacy and security solutions, Raspberry Pi & Arduino devices. IoT Case studies: smart city streetlights control & monitoring.			14

Suggested Readings

Textbooks:

- Rajkamal, Internet of Things—, Tata McGraw Hill publication.
- Hakima Chaouchi —The Internet of Things: Connecting Objects, Wiley publication.
- Francis Dacosta -Rethinking the Internet of things: A scalable Approach to connecting everything, 1st edition, Apress publications20l3.
- Donald Norris—The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi, and BeagleBone Black—, McGraw Hill publication.

Reference books:

- I . Philip Levis, -TinyOS Programming.
- D. Norris, —The Internet of Things: Do-it-Yourself Projects with Arduino, Raspberry Pi, and Beagle Bone Black, McGraw-Hill Education, New Delhi.
- Raj Karnal, —Internet of Things: Architecture and Desist, Tata McGraw Hill publication.
- Pajankarand A. Kakkar, —Raspberry Piby Example J, Pack Publishing Ltd, Birmingham, UK.
- S. Dooks published by II.P. Hindi Granth Academy, Bhopal

- Suggestive digital platform web links.
- https://www.iotforall.com/introduction-rot-applications-in-education
- https://onlinecourses.swayam2.ac.in/arpl9_ap52/preview
- http://www.mphindigranthacademy.org.

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods: Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE): 40 marks University Exam (UE) 60 marks

Internal Assessment Continuous Comprehensive Evaluation (CCE):40	Class Test Assignment/Presentation	Total 40
External Assessment University Exam Section: 60 Time : 03.00	Section (A) : Objective Questions Section (B): Short Questions Section (C): Long Questions	Total 60

PART' A: 1ntroduction			
Program: Diploma	Class: BCA	**Year: III SEM**	**Session: 2023-24**
	Subject: Internet of Things(IOTs) Practical /Lab		
1.	Course Code	S2-BCAC 1 R	
2.	Course Title	Internet of Things (lOTs) tab	
3.	Course Type(Core Course/ Elective/ Generic Elective/ Vocational	Elective	
4.	Pre-Requisite (if any)	Open for all	
5.	Connie 1.earning Outcomes (CLO)	After completing this lab course, students will be able to: 1. Arduino/Raspberry Concept. 2. Knowledge of Digital Sensor. 3. Uses of DHT11 Sensors. 4. Knowledge of Bluetooth interface.	
6.	Credit Value ,	Practical — 2 Credits	
7.	Total Marks ,	Max. Marks: 40+60	Min. Passing Marks: 35

PART B: Content of the Course	
No. of Lab. Practical (in hours per week): 1 Hr. per week	
Total No. of Labs: 15 Hrs.	
Suggestive List of Practical	No. of Labs.
1. To interface LLD/Buzzer with Arduino /Raspberry Pi and write a program to turn on LED after every 2 seconds. 2. To interface Push button/Digital sensor (IR/PDR) with Arduino/Raspberry Pi and write a program to turn on LED when push button is pressed or at sensor detection. 3. To interface DHT 11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings. 4. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn on motor when push button is pressed. 5. To interface OLED with Arduino/Raspberry Pi and write a program to temperature and humidity reading on it. 6. To interface blue tooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth. 7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED 'OFF when 1 "0'is received from smartphone using Bluetooth. 8. Write a program Arduino/Raspberry Pi to upload temperature and humidity data to thing speak cloud. 9. Write a program Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud. **10.** To install MySQL database on Raspberry Pi and perform basic SQL queries.	

Suggested Readings

Textbooks:

- Rajkamal, Internet of Things—, Tata McGraw Hill publication.
- Hakima Chaouchi —The Internet of Things: Connecting Objects, Wiley publication.
- Francis Dacosta -Rethinking the Internet of things: A scalable Approach toconnectingeveiythingi,1st edition, Apress publications20l3.
- Donald Norris—The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi, and BeagleBone Black—, McGraw Hill publication.

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- Raj Karnal, —Internet of Things: Architecture and Desist, Tata McGraw Hill publication.
- Pajankarand A. Kakkar, —Raspberry PibyExampleJ, Packt Publishing Ltd, Birmingham, UK.
- S. Dooks published by II.P. Hindi Granth Academy, Bhopal

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Internal Assessment Continuous Comprehensive Evaluation (CCE):40	Class Test Assignment/Presentation	Total 40
External Assessment University Exam Section: 60 Time : 03.00	Section (A) : Objective Questions Section (B): Short Questions Section (C): Long Questions	Total 60