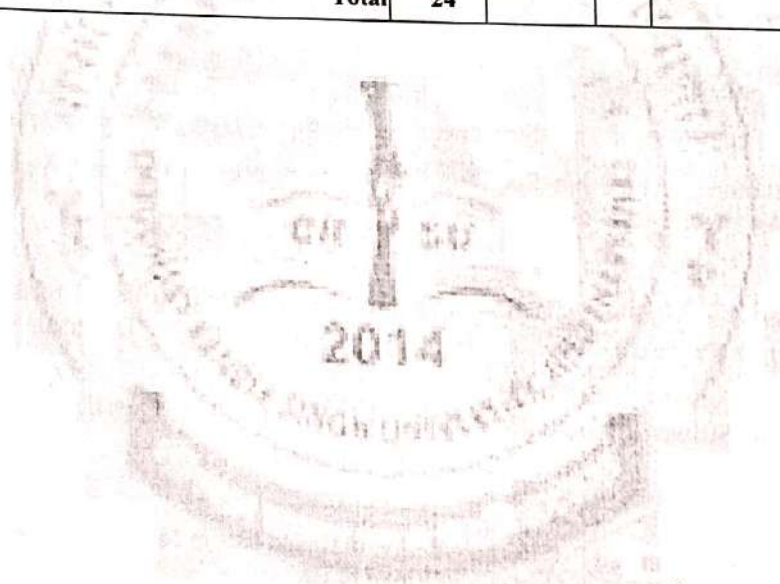


DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS
SCHEME AND SYLLABUS OF EXAMINATION FOR
Bachelor of Physical Science/B.A.
Duration 3 Years (6Semesters) w.e.f. Academic Session2023-24

Semester-III Scheme-A										
Course Code	Course Title	Credit	L:T:P:CH	Internal Marks		External Marks		Total Marks		
				Th	Pr	Th	Pr	Min	Max	
Major/Core Courses										
CC-A2		4	3:0:1:5	20	10	50	20	40	100	
CC-B2		4	3:0:1:5	20	10	50	20	40	100	
B23-CC-C3	Data Structures	4	3:0:1:5	20	10	50	20	40	100	
Minor/Vocational Courses										
B23-CC-M3	Presentation Tools	4	3:0:1:5	20	10	50	20	40	100	
Multidisciplinary Courses										
B23-MDC3	IT Tools	3	2:0:1:4	15	05	35	20	30	75	
Ability Enhancement Courses										
B23-AEC3	To be opted by student from the Central Pool	2	2:0:0:2	15	-	35	-	20	50	
Skill Enhancement Courses										
B23-SEC3	To be opted by student from the Central Pool	3	2:0:1:4	15	05	35	20	30	75	
Total		24							600	



B23-CC-C3 Data Structures

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70 [Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

- To learn basics of data structure and algorithm complexities.
- To acquire knowledge of arrays and strings.
- To understand the idea of implementation for linked lists and stacks.
- To learn various searching and sorting techniques along with implementation of queues.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Data Structure Definition, Data Type vs. Data Structure, Classification of Data Structures, Data Structure Operations, Applications of Data Structures; Algorithm Specifications: Performance Analysis and Measurement (Time and Space Analysis of Algorithms- Average, Best and Worst Case Analysis).

UNIT-II

Arrays: Introduction, Linear Arrays, Representation of Linear Array In Memory, Two Dimensional and Multidimensional Arrays, Sparse Matrix and its Representation, Operations on Array: Algorithm for Traversal, Selection, Insertion, Deletion and its implementation.

String Handling: Storage of Strings, Operations on Strings viz., Length, Concatenation, Substring, Insertion, Deletion, Replacement.

UNIT-III

Linked List: Introduction, Array vs. linked list, Representation of linked lists in Memory, Traversing a Linked List, Insertion, Deletion, Searching into a Linked list, Type of Linked List.

Stack: Array Representation of Stack, Linked List Representation of Stack, Algorithms for Push and Pop, Application of Stack: Polish Notation, Postfix Evaluation Algorithms, Infix to Postfix Conversion, Infix to Prefix Conversion, Recursion.

UNIT-IV

Introduction to Queues: Simple Queue, Double Queue, Circular Queue, Priority Queue, Representation of Queues as Linked List and Array, Applications of Queue. Algorithm on Insertion and Deletion in Simple Queue and Circular Queue.

UNIT-V (PRACTICUM)

Practicum:

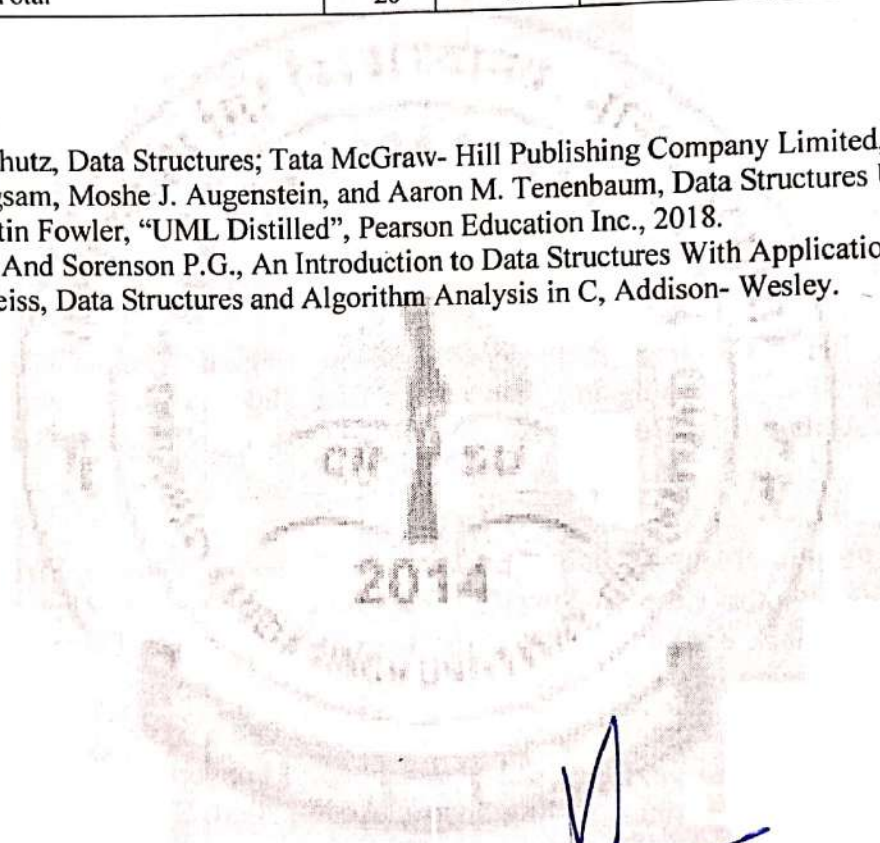
In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on C Language during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

1. Seymour Lipschutz, Data Structures; Tata McGraw- Hill Publishing Company Limited, Schaum's Outlines.
2. Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, Data Structures Using C, Pearson Education. Martin Fowler, "UML Distilled", Pearson Education Inc., 2018.
3. Trembley, J.P. And Sorenson P.G., An Introduction to Data Structures With Applications, McGraw- Hill.
4. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Addison- Wesley.



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- A signature that looks like "Soul" with "1117" below it.
- A signature that looks like "doh" with a horizontal line below it.
- A signature that looks like "Jus" with a horizontal line below it.

B23-CC-M3 Presentation Tools

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70 [Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

1. To learn the basics of MS Word.
2. To understand various formatting options.
3. To familiarize the student with report writing.
4. To get familiar with concepts like table, mails merge.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Creating New Presentations: Creating a Presentation, Choosing a Template/Theme, Changing the Template/Theme, Adding Slides, Typing in Slide, Choosing a Slide Layout, Changing the Slide Layout, Adding Text & Outline, Adding Text Bulleted, Numbered Lists, Adding & Editing Text with Outline, View Outline, View Keystrokes.

UNIT-II

Pictures & Graphics: Placing Pictures into Placeholders, Cropping Photos, Sizing Graphics, Fixing Stretched/Squished Photos, Photos Crop to Shape, Aspect Ratio Adjustment, Photos & Graphics Picture Adjustments (converting to Black & White), Picture Border, Layered Objects, Placeholder, Aligning Evenly, Distributing, Grouping, Reordering Layered Objects.

UNIT-III

SmartArt: Creating SmartArt, Adding Text Layouts, Styles, Shapes, Converting Text into SmartArt, SmartArt with Picture, Adding Shapes, Adding Lines, Styling Shapes, Adding Text, Shapes Resizing, Moving, Rotating Shapes, Connector Lines, Text Boxes.

UNIT-IV

Tables: Creating Tables in PowerPoint, Typing in Table, Data Designing, Table Layout, Sizing Tables, Columns/Rows Alignment, Spacing In a Table, Adding or Removing Rows/Columns, Merging Cells, Copying & Pasting Charts, Importing Excel data to a Chart, Updating the Chart Data when the Excel File Changes.

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- A signature in the middle with an arrow pointing right.
- A signature at the bottom with the text "Panderup" and "man...".
- A signature at the bottom left with "Soul" and "ATN".

UNIT-V(PRACTICUM)

Practicum:

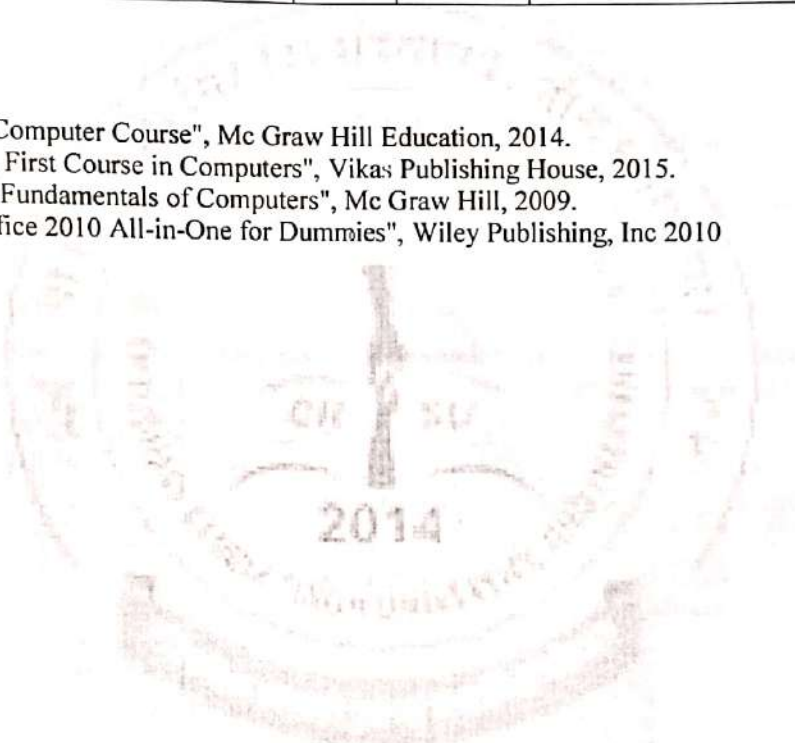
In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on MS Word during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	-	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	-	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	6	-	
Total	10	5	

Suggested Readings:

1. Taxali, Ravi Kant, "Computer Course", Mc Graw Hill Education, 2014.
2. Saxena, Sanjay, "A First Course in Computers", Vikas Publishing House, 2015.
3. Balagurusami, E., "Fundamentals of Computers", Mc Graw Hill, 2009.
4. Weverka, Peter, "Office 2010 All-in-One for Dummies", Wiley Publishing, Inc 2010



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B23-MDC23 IT Tools

Max.Marks:75
Min. Pass Marks: 30

Time: Theory(3Hours),Practical(3Hours)

Internal Assessment Marks :20[Theory(15) + Practical(05)]
External End Term Exam Marks: 55[Theory(35)+Practical(20)]

Credit:3

Course Objectives:

1. Understand the basic concepts of data, information and searching.
2. understand concept of TPS & MIS
3. learn about Ecommerce Models
4. learn Security threats

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introduction to Internet & Computer: Concept, application and uses of Internet, Internet services, search engines, concepts of data, information, information system, effects of IT on business, Characteristics of Computers, Input, Output, Storage units, Central Processing Unit, Processor Speed, Cache Memory, RAM, ROM, Secondary Storage Devices: Hard Disks, Optical Disks CD-ROM, DVD, Input Devices - Keyboard, Mouse, joystick, Scanner, web cam, Output Devices- Monitors, Printers - Dot matrix, inkjet, laser, Computer Software- Relationship between Hardware and Software; System Software, Application Software, Compiler

UNIT-II

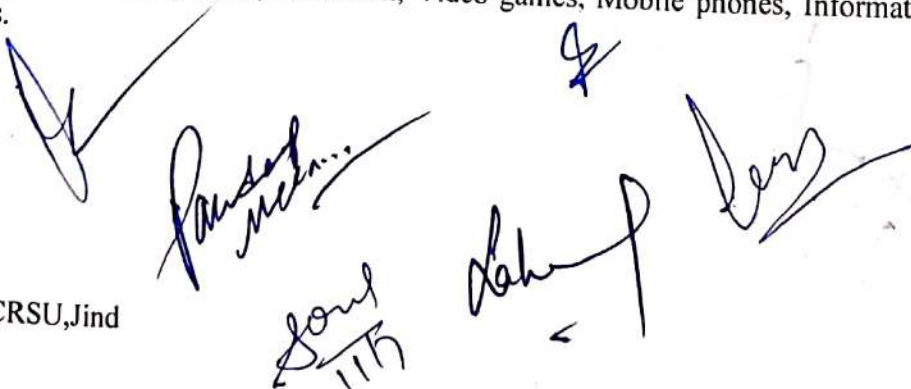
Operating System: An overview of different versions of Windows, Basic Windows elements, File management through Windows. Using essential accessories: System tools, Disk clean-up, Disk defragmenter, Calculator, Notepad, Paint, and WordPad, Application Management: Installing, uninstalling, running applications, Windows control panel- keyboard, mouse, file explorer, font, region, network settings

UNIT-III

Word processing concepts: saving, closing, Opening an existing document, Editing text, Finding and replacing text, printing documents, creating and Printing Merged Documents, Character and Paragraph Formatting, Page Design and Layout. Editing and Profiling Tools: Checking and correcting spellings. Handling Graphics, Creating tables.

UNIT - IV

Application of information Technology in Railways, Airlines, Banking, Insurance, Inventory Control, Financial systems, Hotel Management, Education, Video games, Mobile phones, Information kiosks, special effects in Movies.



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PageNo.6

UNIT-V (PRACTICUM)

Practicum:
In practical execution based on Digital tools during the laboratory work.

The students should be able to work on Internet – communication through Internet. Research using online sources – surveys, research on social networking sites. Vlogs, Bhim, banking UPIs, Ayushman app.

The students should be able to work on Internet – communication through Internet. Research using online sources – surveys, research on social networking sites. Vlogs, Bhim, banking UPIs, Ayushman app.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class tsest etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

- Miller M, "Absolute Beginners Guide to Computer Basics", Pearson Education, 2009
- V. Raja Raman, "Introduction to Information Technology", PHI Learning; 3rd edition (30 March 2018)
- Linda Foulkes, " Learn Microsoft Office 2019: A comprehensive guide to getting started with Word, PowerPoint, Excel, Access, and Outlook", Packt Publishing Limited; Illustrated edition (29 May 2020)


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DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS
SCHEME AND SYLLABUS OF EXAMINATION FOR
Bachelor of Science (Honours/ Honours with Research) in Computer Science
Duration 4 Years (8 Semesters) w.e.f. Academic Session 2023-24

Semester-III Scheme-C										
Course Code	Course Title	Credit	L: T:P: CH	Internal Marks		External Marks		Total Marks		
				Th	Pr	Th	Pr	Min	Max	
Major/Core Courses										
B23-CSE-301	Basics of Unix Operating Systems	4	3 :0:1:5	20	10	50	20	40	100	
B23-CSE-302	Quantitative Foundation of Computer Science	4	3 :0:1:5	20	10	50	20	40	100	
Minor/Vocational Courses										
B23-CSE-303	Advance Programming in C	4	3 :0:1:5	20	10	50	20	40	100	
Multidisciplinary Courses										
B23-CSE-304	Network and its Usages	3	2 :0:1:4	15	05	35	20	30	75	
Ability Enhancement Courses										
	Will be selected by the central pool	2	2 :0 :0:2	15	-	35	-	20	50	
Skill Enhancement Courses										
	Will be selected by the central pool	3	2 :0:1:4	15	05	35	20	30	75	
Value Added Courses										
	Will be selected by the central pool	2	2 :0 :0:2	15	-	35	-	20	50	
Total		22							550	


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B23-CSE-301 Basics of Unix Operating Systems

Internal Assessment Marks : 30[Theory(20)+Practical(10)]
External End Term Exam Marks: 70[Theory(50)+Practical(20)]

Max.Marks:100
Min.PassMarks:40

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

1. Learn the basics of Unix Operating System.
2. Understand different Commands.
3. Implement Combination of Commands.
4. Get familiar with file and directory structure.
5. To get familiar with file attributes.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

The UNIX Operating System: Knowing Your Machine, The System Administrator, Logging In and Out, Logging In, Logging Out, A Hands-On Session, System Information with date and who, Viewing Processes with ps, Handling Files, Handling Directories, How It All Clicked, Berkeley: The Second School, UNIX Gets Fragmented, The Internet, The Windows Threat, POSIX and the Single UNIX Specification, Linux and GNU, The UNIX Architecture, Division of Labor: Kernel and Shell

UNIT-II

Command Basics, The PATH: Locating Commands, Where Is the Command?, Command Structure, Flexibility of Command Usage, man: On-Line Help, 2.4.1 Navigation and Search, Further Help with man -k and man -f, The man Documentation, Understanding a man Page, Using man to Understand man, echo: Displaying Messages, Mail, mailx Internal Commands, passwd: Changing Your Password, uname: Your Machine's Name and Operating System, who: Know the Users, date: Displaying the System Date

UNIT-III

The File, Ordinary (Regular) File, Directory File, Device File, What's in a (File)name?, The File System Hierarchy, The UNIX File System, Using Absolute Pathnames with Commands, The HOME Variable and ~: The Home Directory, pwd and cd: Navigating the File System, Relative Pathnames (. and ..), mkdir: Making Directories, rmdir: Removing Directories, ls: Listing Files, ls Options, cp: Copying Files, cp Options, mv: Renaming Files, rm: Deleting Files, rm Options, cat: Displaying and Concatenating Files, more, pico: Rudimentary Text Editing, Navigation, Text Editing, wc: Counting Lines, Words and Characters, lp: Printing a File.

UNIT-IV

ls Revisited (-l): Listing File Attributes, Listing Directory Attributes (-ld), File Permissions, chmod: Changing File Permissions, Relative Permissions, Absolute Assignment, Recursive Operation (-R), The Directory, Read Permission, Write Permission, Execute Permission, umask: Default File and Directory Permissions, File Systems and Inodes, ln: Creating Hard Links, Where to Use Hard Links, ln Again: Creating Symbolic Links, File Ownership, chown: Changing File Ownership, chgrp: Changing Group Owner, How to Handle Intruders, Modification and Access Times, find: Locating Files, Selection Criteria.

PageNo.2

UNIT-V (PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on C++ Language during the laboratory work.

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

- Das Sumitabha, Your UNIX/Linux: The Ultimate Guide : Tata McGraw-Hill
- Das Sumitabha, Unix : Tata McGraw-Hill
- Blum Richard, Bresnahan Christine, Unix Command Line and Shell Scripting : Wiley Pub
- Kenneth Rosen, Douglas Host Unix –The Complete Reference , Tata McGraw-Hill.

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- *Paresh Mehta*
- *Dhanu*
- *Beur*
- *11/21/24*
- *Soni*
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B23-CSE-302 Quantitative Foundation of Computer Science

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

- Define mathematical structures (relations, functions, sets) and use them to model real life situations
- Solve puzzles based on counting principles.
- Organize, manage, present and Analyze Statistical data using measures of central tendency
- Analyze Statistical data using measures of dispersion and Study the relationship between variables using techniques of correlation
- To implement the programs based on various concepts of web development.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Sets, relations and functions: Operations on sets, relations and functions, binary relations, partial ordering relations, equivalence relations, principles of mathematical induction.

UNIT-II

Introduction to counting: Basic counting techniques - inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating function. Data Types and Data Presentation: Data types: Attribute, Variable, Discrete and Continuous variable, Univariate and Bivariate distribution. Types of Characteristics, Different types of scales: nominal, ordinal, interval and ratio.

UNIT-III

Data presentation: Frequency distribution, Histogram, Ogive curves. Measures of Central tendency: Concept of average/central tendency, characteristics of good measure of central tendency. Arithmetic Mean (A.M.), Median, Mode - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits and demerits. Combined arithmetic mean. Partition Values: Quartiles, Deciles and Percentiles - examples for ungrouped and grouped data

UNIT-IV

Measures of dispersion: Concept of dispersion, Absolute and Relative measure of dispersion, characteristics of good measure of dispersion. Range, Semi-interquartile range, Quartile deviation, Standard deviation - Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, merits and demerits. Combined standard deviation, Variance. Coefficient of range, Coefficient of quartile deviation and Coefficient of variation (C.V.) Correlation: Concept of correlation, Types and interpretation,

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Page No.4

UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on HTML/CSS/JavaScript Language during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	


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B23-CSE-303 Advance Programming in C

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70[Theory(50)+Practical(20)]

Credit:4

Time: Theory(3Hours),Practical(3Hours)

Course Objectives:

- To learn the advance concepts of C programming language
- To understand different types of operators, functions used for strings.
- To learn the usage of console I/O operators..
- To implement the programs using concept of Files.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Data Types Revisited, Integers, long and short, Integers, signed and unsigned, Chars, signed and unsigned, Floats and Doubles, A Few More Issues, Storage Classes in C, Automatic Storage Class, Register Storage Class, Static Storage Class, External Storage Class, Macro Expansion, Macros with Arguments, Macros versus Functions

UNIT-II

Puppeting On Strings, What are Strings, More about Strings, Pointers and Strings, Standard Library String Functions , strlen(), strcpy(), strcat(), strcmp(), Two-Dimensional Array of Characters, Array of Pointers to Strings, Limitation of Array of Pointers to Strings, Structures , Why Use Structures, Declaring a Structure, Accessing Structure Elements, How Structure Elements are Stored, Array of Structures, Additional Features of Structures, Uses of Structures.

UNIT-III

Console Input/Output: Types of I/O, Console I/O Functions , Formatted Console I/O Functions, sprintf() and sscanf() Functions, Unformatted Console I/O Functions, More Issues In Input/Output, Using argc and argv, Detecting Errors in Reading/Writing, Standard I/O Devices, I/O Redirection, Redirecting the Output, Redirecting the Input, Both Ways at Once

UNIT-IV

File Input/Output :Data Organization, File Operations, Opening a File, Reading from a File, Trouble in Opening a File, Closing the File, Counting Characters, Tabs, Spaces, A File-copy Program, Writing to a File, File Opening Modes, String (line) I/O in Files, The Awkward Newline Record I/O in Files, Text Files and Binary Files, Record I/O Revisited, Database Management, Low Level Disk I/O, A Low Level File-copy Program, I/O Under Windows

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PageNo.6

UNIT-V(PRACTICUM)

Practicum:

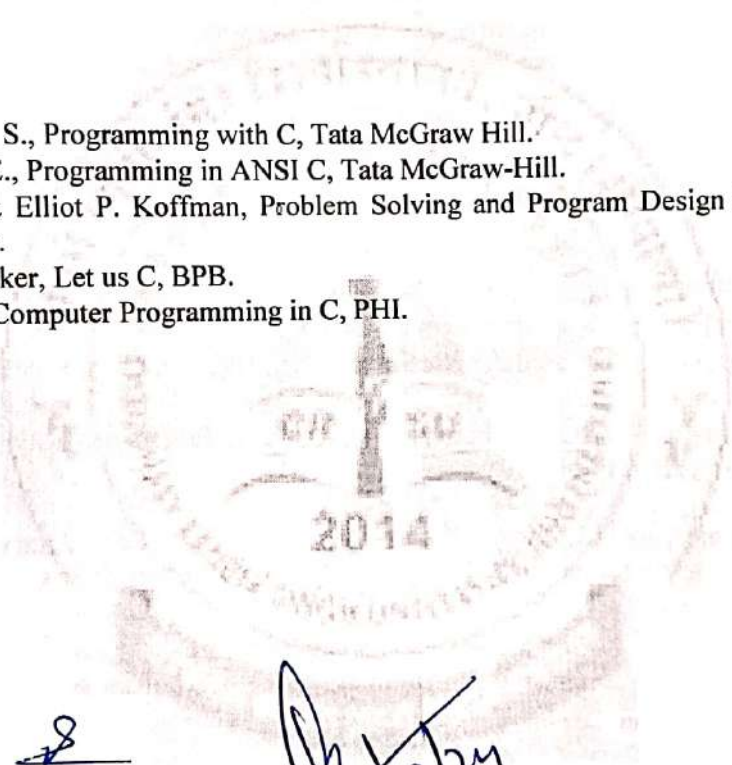
In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on Scheduling algorithms in C/C++ during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

- Gottfried, Byron S., Programming with C, Tata McGraw Hill.
- Balagurusamy, E., Programming in ANSI C, Tata McGraw-Hill.
- Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.
- Yashwant Kanetker, Let us C, BPB.
- Rajaraman, V., Computer Programming in C, PHI.



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B23-CSE-304 Network and its Usages

Max.Marks:75

Min. Pass Marks:

Internal Assessment Marks :20[Theory(15) + Practical(05)]

External End Term Exam Marks:55[Theory(35)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:3

Course Objectives:

- To recognize the principles of the big picture of computer networks.
- To understand the networking environment.
- To know the importance of VPNs.
- To convey the availability of tools and techniques for networking.
- To discuss about evolving technologies in networks.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Design Principles: Determining Requirements, Analyzing the Existing Network, Preparing the Preliminary Design, Completing the Final Design Development, Deploying the Network, Monitoring and Redesigning, Maintaining, Design Documentation, Modular Network Design, Hierarchical Network Design.

UNIT-II

LAN connectivity for small businesses, Integration, Token-Ring, Ethernet, ATM LAN emulation, InterLAN Switching, LAN to Mainframe, Building networks.

UNIT-III

Virtual Network management and planning, VPNs for small businesses, Secure remote access in VPNs, IPsec VPNs, Integrating data centers with Intranets, Implementing and supporting Extranets.

UNIT - IV

Trends in data communications: Merits of xDSL technology, Preparing for cable modems, Voice and video on the LAN, Internet voice applications, Building IP PBX telephony network, Fax over IP, Videoconferencing over IP networks.

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UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on Digital tools during the laboratory work.

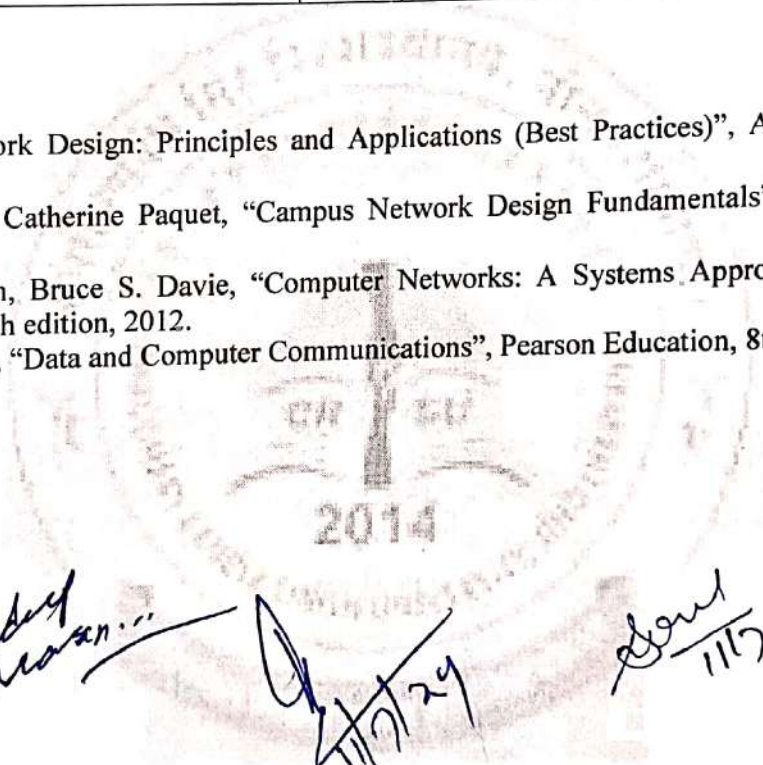
The students should be able to work on Internet – communication through Internet. Research using online sources – surveys, research on social networking sites. Vlogs, Bhim, banking UPIs, Ayushman app.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

- Gil Held, "Network Design: Principles and Applications (Best Practices)", Auerbach Publications, 1st edition, 2000.
- Diane Tiare and Catherine Paquet, "Campus Network Design Fundamentals", Pearson Education, 1st edition, 2006.
- Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Morgan Kaufmann Publishers Inc., 5th edition, 2012.
- William Stallings, "Data and Computer Communications", Pearson Education, 8th edition, 2016.


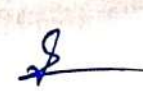




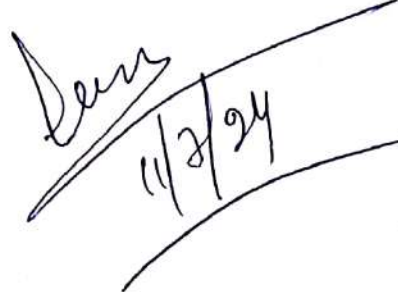

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**DEPARTMENT OF COMPUTER SCIENCE AND
APPLICATIONS SCHEME AND SYLLABUS OF
EXAMINATION FOR
Bachelor of (Honours/Honours with Research) in
Computer Science and Application
Duration 4Years(8Semesters) w.e.f. Academic
Session 2023-24**

Semester-III Scheme-D										
Course Code	Course Title	Credit	L: T:P: CH	Internal Marks		External Marks		Total Marks		
				Th	Pr	Th	Pr	Min	Max	
Major/Core Courses										
BCA23-CC301	Java OOP Foundations	4	3 :0:1:5	20	10	50	20	40	100	
BCA23-CC302	Linux and Shell Programming	4	3 :0:1:5	20	10	50	20	40	100	
BCA23-CC303	Data Base Technologies	4	3 :0:1:5	20	10	50	20	40	100	
Minor/Vocational Courses										
BCA23-M301	Basic Concepts of UML	2	1 :0:1:3	10	05	20	15	20	50	
Multidisciplinary Courses										
BCA23-MDC301	Basic Spreadsheet Tools	3	2 :0:1:4	15	05	35	20	30	75	
Ability Enhancement Courses										
	To be opted by students from the Central Pool	2	1 :0:1:3	15	-	35	-	20	50	
Skill Enhancement Courses										
	To be opted by students from the Central Pool	3	2 :0:1:4	15	05	35	20	30	75	
Total		22		29					550	



BCA23-CC301

Java OOP Foundations

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks : 30[Theory(20)+Practical(10)]
External End Term Exam Marks :70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives: After completing this course, the learner will be able to:

1. Implement simple java programs.
2. Implement multiple inheritance using Interfaces
3. Implement Exception Handling and File Handling.
4. Use AWT to design GUI applications.
5. Develop the projects using Java.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Object Oriented Programming and Java Fundamentals: Structure of Java programs, Classes and Objects, Data types, Type Casting, Looping Constructs

UNIT-II

Interfaces: Interface basics; Defining, implementing and extending interfaces; Implementing multiple inheritance using interfaces Packages: Basics of packages, Creating and accessing packages, System packages, Creating user defined packages

UNIT-III

Exception handling using the main keywords of exception handling: try, catch, throw, throws and finally; Nested try, multiple catch statements, creating user defined exceptions. File Handling Byte Stream, Character Stream, File I/O Basics, File Operations

UNIT-IV

AWT and Event Handling: The AWT class hierarchy, Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Creating GUI applications using AWT.

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PageNo.2

UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on Java Language during the laboratory work.

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

- Schildt, H. (2018). Java: The Complete Reference. 10th edition. McGraw-Hill Education.
- Balaguruswamy E. (2014). Programming with JAVA: A Primer. 5th edition. India: McGraw Hill Education.
- Horstmann, C. S. (2017). Core Java - Vol. I – Fundamentals (Vol. 10). Pearson Education
- Schildt, H., & Skrien, D. (2012). Java Fundamentals - A Comprehensive Introduction. India: McGraw Hill Education.

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BCA23-CC302

Linux and Shell Programming

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives: After completing this course, the learner will be able to:

1. Understand Linux architecture.
2. Use various Linux commands that are used to manipulate system operations.
3. Acquire knowledge of Linux File System.
4. Understand and make effective use of I/O and shell scripting language to solve problems.
5. To implement the programs based on various shell commands and programs in Linux.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introduction to Linux: Linux distributions, Overview of Linux operating system, Linux architecture, Features of Linux, Accessing Linux system, Starting and shutting down system, Logging in and Logging out, Comparison of Linux with other operating systems.

UNIT-II

Commands in Linux: General-Purpose commands, File oriented commands, directory oriented commands, Communication-oriented commands, process oriented commands, etc. Regular expressions & Filters in Linux: Simple filters viz. more, wc, diff, sort, uniq, grep; Introducing regular expressions.

UNIT-III

Linux file system: Linux files, inodes and structure and file system, file system components, standard file system, file system types. Processes in Linux: Starting and Stopping Processes, Initialization Processes, Mechanism of process creation, Job control in Linux using at, batch, cron & time.

UNIT-IV

Shell Programming: vi editor, shell variables, I/O in shell, control structures, loops, subprograms, creating & executing shell scripts in Linux.

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UNIT-V(PRACTICUM)

Practicum:

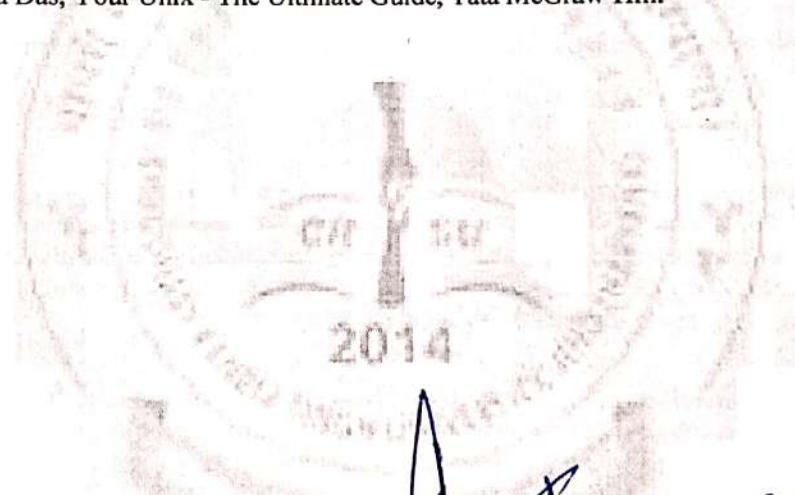
In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on Linux commands during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

- Yashwant Kanetkar, Unix & Shell programming – BPB Publications.
- Richard Petersen, The Complete Reference – Linux, McGraw-Hill.
- M.G.Venkateshmurthy, Introduction to Unix & Shell Programming, Pearson Education.
- Stephen Prata, Advanced UNIX-A Programmer's Guide, SAMS Publication.
- Sumitabha Das, Your Unix - The Ultimate Guide, Tata McGraw-Hill.



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BCA23-CC303 Data Base Technologies

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

1. Understand the basic concepts of data base and its usage.
2. Understand database languages and their purpose thereof.
3. Learn about importance of normalized database.
4. Learn to work with SQL Queries
5. To design and develop data base.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Basic Concepts – Data, Information, Records, Files, Schema and Instance etc. Limitations of File Based Approach, Characteristics of Database Approach, Database Management System (DBMS), DBMS Components & Functions, Database Interfaces, Advantages and Disadvantages of DBMS. Database Users: Data and Database Administrator, Role and Responsibilities of Database Administrator, Database Designers, Application Developers etc.

UNIT-II

Data Models: Hierarchical, Network and Relational Data Models. Entity-Relationship Model: Entity, Entity Sets, Entity Type, Attributes: Type of Attributes, Keys, Integrity Constraints, Designing of ER Diagram, Symbolic Notations for Designing ER Diagram,

UNIT-III

SQL: Meaning, Purpose and Need of SQL, Data Types, SQL Components: DDL, DML, DCL and DQL, Basic Queries, Join Operations and Sub-queries, Views, Specifying Indexes. Constraints and its Implementation in SQL. Relational Algebra: Basic Operations: Select, Project, Join, Union, Intersection, Difference, and Cartesian Product etc.

UNIT-IV

Relational Model: Functional Dependency, Characteristics, Inference Rules for Functional Dependency, Types of Functional Dependency, Normalization: Benefits and Need of Normalization, Normal Forms Based on Primary Keys-1NF,2NF,3NF .

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UNIT-V(PRACTICUM)

Practicum:

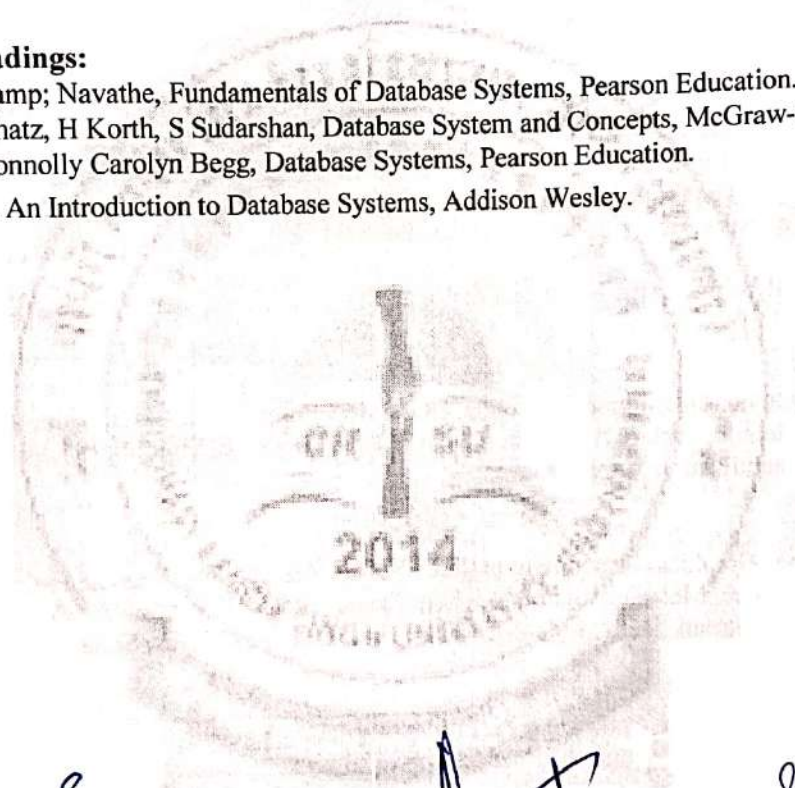
In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on SQL commands during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

- Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education.
- A Silberschatz, H Korth, S Sudarshan, Database System and Concepts, McGraw-Hill.
- Thomas Connolly Carolyn Begg, Database Systems, Pearson Education.
- C. J. Date, An Introduction to Database Systems, Addison Wesley.



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BCA23-M301

Basic Concepts of UML

Max.Marks:50
Min.PassMarks:20

Internal Assessment Marks :15[Theory(10)+Practical(05)]
External End Term Exam Marks:35[Theory(20) +Practical(15)]

Time: Theory(3Hours),Practical(3Hours)

Credit:2

Course Objectives:

1. Understand the basic concepts of UML.
2. Understand need of drawing models.
3. Understand interdependency of various models
4. Learn problem solving strategies
5. Learn UML tools.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introduction: Object-Orientation, Modeling, Class Modeling: Object, Class, Value & Attributes, Operation & Method, Link & Association, , Qualified association, Multiplicity, Association end name, Ordering, , Generalization & Inheritance,.

UNIT-II

Class Modeling: Graphical Structure of Object & Class, Association, Aggregation, Abstract Class, Multiple Inheritance, Metadata. State Modeling: Events, States, Transition & Conditions, State Diagram, State Diagram. State Modeling: Nested State Diagram, Nested States.

UNIT-III

System Design: Overview, Estimating Performance, Making a reuse plan, Breaking a system into subsystems, Identifying Concurrency, Allocation of subsystem, Management of data storage, Handling global resources.

UNIT-IV

Interaction Modeling: Use Case Models: Actors, Use case, Use case diagram, Guidelines for use case diagram. Sequence Model: Scenarios, Sequence Diagrams, Guidelines for Sequence model. Activity Model: Activities, Branches, Initiation & Termination, Concurrent Activities,

UNIT-V(PRACTICUM)

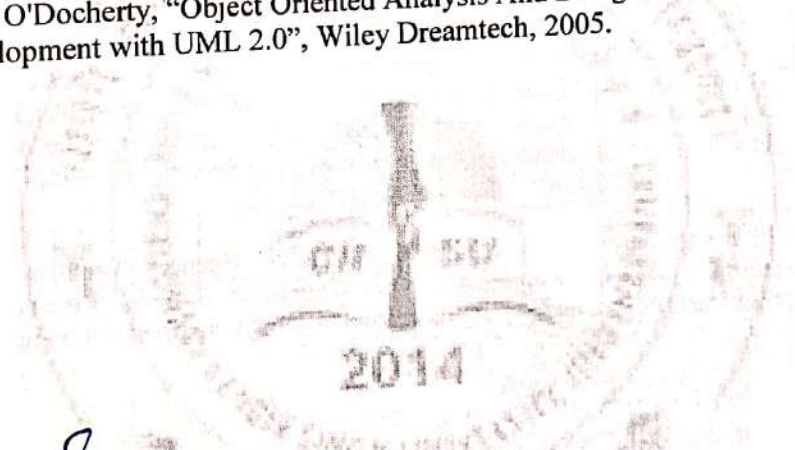
In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on elements of UML along with their graphical syntax during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	EndTermExamination:
Class Participation	4	-	Athree hour examfor bothTheoryandPracticum
Seminar/presentation/assignment/quiz/class test etc	-	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	6	-	
Total	10	5	

SuggestedReading

1. Michael Blaha, James Rumbaugh, "Object Oriented Modeling and Design with UML", Pearson Education, 2011.
2. Daminni Grover, "Object Oriented Analysis and Design with UML", I. K International Publishing House, 1st edition, 2012.
3. Martin Fowler, "UML Distilled", Pearson Education Inc., 2018.
4. Mike O'Docherty, "Object Oriented Analysis And Design Understanding System Development with UML 2.0", Wiley Dreamtech, 2005.



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BCA23-MDC301

Basic Spreadsheet Tools

Max. Marks: 75
Min. Pass Marks: 30

Internal Assessment Marks :20 [Theory(15) + Practical(05)]
External End Term Exam Marks :55 [Theory(35)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:3

Course Objectives:

1. To learn the basics of Spreadsheet.
2. To understand various formatting options.
3. To familiarize the student with applying various formulas.
4. To get familiar with basic inbuilt functions.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Data Processing : Basics of Data processing , Spelling Check, Removing Duplicate Rows, Finding and Replacing Text, Changing the case of text, Removing rows and columns from table, Fixing numbers and number signs, Fixing dates and times, Merging and Splitting Columns, Merging and Splitting Rows, Transforming and Rearranging Columns and Rows, Reconciling table data by joining or matching.

UNIT-II

Sort and Filter Operations : Formula & Functions, Solving generic problem through formula, Mathematical Functions, Statistical Functions, Text Functions, Logical Functions, Compatibility Functions, Information Functions, Cube Functions, Date and Time Functions, Web Functions.

UNIT-III

Functions: Mathematical Functions, Statistical Functions, Logical Functions, Applications of functions, Applying In-Built functions, Defining user functions, Modules, Add in and Automation Functions, Lookup Conditions, Lookup and Reference Functions Conditional Formatting

UNIT-IV

Pivot Chart and Pivot Table: Creating Data Aggregation through Pivot Tables, Representing Data visually through Pivot Chart, Calculating margins and other common ratios using calculations on pivot table, Filter data using slicers in pivot table.

Data Visualization through Pivot Chart

UNIT-V(PRACTICUM)

Practicum:

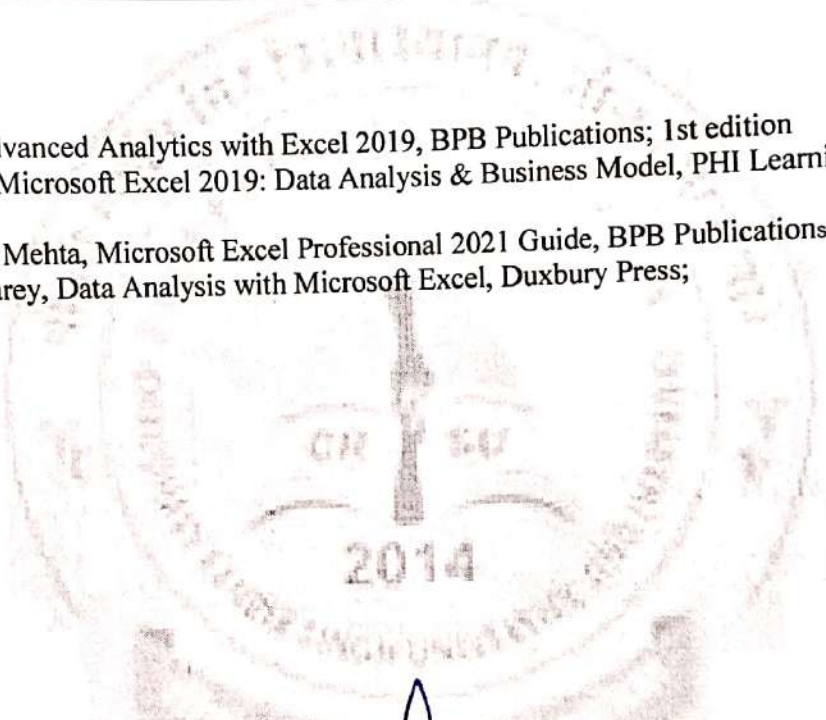
In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on Spreadsheet Tools during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

1. Manisha Nigam, Advanced Analytics with Excel 2019, BPB Publications; 1st edition
2. L. Winston Wayne, Microsoft Excel 2019: Data Analysis & Business Model, PHI Learning Pvt. Ltd.
3. CA Manmeet Singh Mehta, Microsoft Excel Professional 2021 Guide, BPB Publications
4. K. Berk, Partrick Carey, Data Analysis with Microsoft Excel, Duxbury Press;



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DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

Scheme and Syllabus of
Skill Enhancement Courses (SECs) for Central Pool for
3rd semester of NEP based Undergraduate Programmes
w.e.f. Academic Session 2023-24

Semester – III									
Course Code	Course Title	Credit	L : T : P : CH	Internal Marks		External Marks		Total Marks	
				Th	Pr	Th	Pr	Min	Max
B23-SEC-301	Advanced IT Skills	3	2 : 0 : 1 : 4	15	05	35	20	30	75
B23-SEC-302	Data Management	3	2 : 0 : 1 : 4	15	05	35	20	30	75

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B23-SEC-301 Advanced IT Skills

Max. Marks: 75
Min. Pass Marks: 30

Internal Assessment Marks : 20 [Theory (15) + Practical (05)]
External End Term Exam Marks : 55 [Theory (35) + Practical (20)]

Time : Theory (3 Hours), Practical (3 Hours)

Credit: 3

Course Objectives:

1. To understand the concept of IT.
2. To know about various tools used for IT.
3. To get familiar with working with O.S.
4. To know about E-Mail and its features.
5. To provide hands on training on IT tools.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introduction to Computer: AI based Computers, Evolution of Computers & its applications, Advanced Hardware and Software, importance of AI in Application Software, Systems Software, Utility Software. Graphics Processing Unit, Input devices, Output devices, Computer Memory & storage, Mobile Apps.

UNIT-II

Introduction to Operating System: Definition, User oriented functions of the Operating system, Different types of Operating Systems, Advanced features of Operating Systems for Mobile Phone and Tablets, Components of User Interface, Status Bar, Tool bar, Icons and their movement, Using Shortcuts, Control Panel in Operating System, Adding and removing apps on system.

UNIT-III

Introduction to Internet: Computer Networks, Network Topologies, Intranet, Features of Internet and Intranet, URL and its components, Web Browsers and their useful tools, A.I based searching tools.

UNIT-IV

E-mail: Definition of E-mails, Advantages and Disadvantages, Various features in Email account, Trash, Spam, Draft, Scheduled e-mails, replying options, Differentiate between sending and forwarding an E-mail, Searching criteria for emails, Limits of size of attaching files with email and their alternatives, Digital Signature.

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UNIT-V (PRACTICUM)

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

1. Sinha, P.K. & Sinha, Priti, Computer Fundamentals, BPB
2. Dromey, R.G., How to Solve it By Computer, PHI
3. Norton, Peter, Introduction to Computer, McGraw-Hill
4. Leon, Alexis & Leon, Mathews, Introduction to Computers, Leon Tech World
5. Rajaraman, V., Fundamentals of Computers, PHI

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B23-SEC-302 Data Management

Max. Marks: 75
Min. Pass Marks: 30

Internal Assessment Marks : 20 [Theory (15) + Practical (05)]
External End Term Exam Marks : 55 [Theory (35) + Practical (20)]

Time : Theory (3 Hours), Practical (3 Hours) Credit: 3

Course Objectives:

1. Learn the Basics of data.
2. Understand importance of data in current era.
3. Learn to implement various tools for data management.
4. Get familiar with features of tools
5. Learn to implement the practical work for data management.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introduction to Data: Definition, features of data, feature of good data management, usage of data, types of data, applications of data, difference between various data, data management in context • cost and value benefits • traceability and audit • ease of access and use • real world applications.

UNIT-II

Data Life Cycle: Creating data, Sources of data, Ingestion & Storage of data, Structure, attribution and relationships, Versioning, Sharing, Exchange & Re-Use, Archiving of data, Standards of data management, Approaches to achieve the standards.

UNIT-III

Meta data and Vocabularies: Definition of metadata, Discovery of metadata, Profiles of Metadata, Master Data Register (MDR) and its usage, Creating metadata, MEDIN, Controlled vocabulary, Indexing Content, Retrieving Content.

UNIT-IV

Data Quality and Publishing : Definition, Features of data quality, Importance of data quality, Methods of assessing the data quality, Process of publishing data, Delivery of products and services, Cartography, Styling, Licensing, Sharing and Re-use

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UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on C++ Language during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

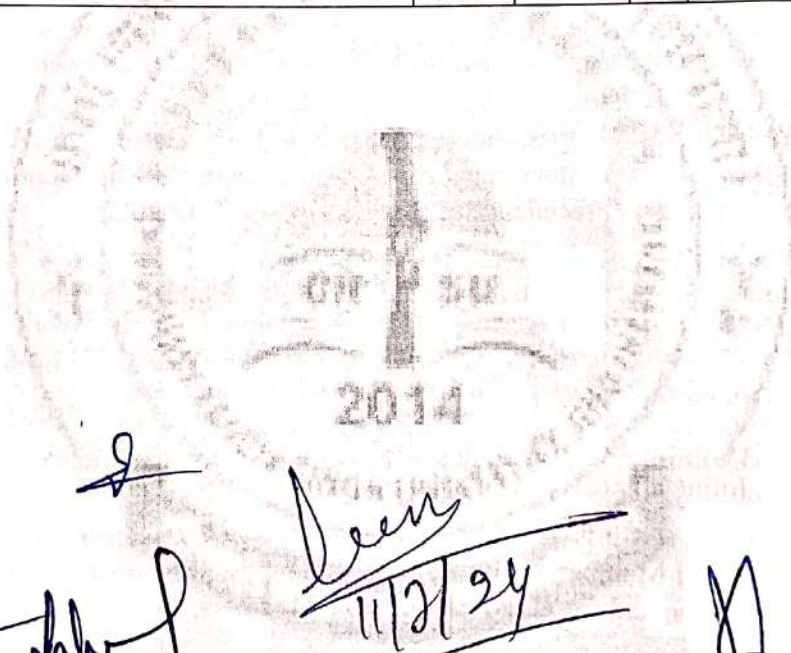
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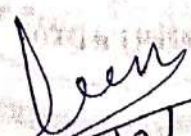


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DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS
SCHEME AND SYLLABUS OF EXAMINATION FOR
Bachelor of Physical Science/B.A.
Duration 3 Years (6 Semesters) w.e.f. Academic Session 2023-24

Semester-IV Scheme A									
Course Code	Course Title	Credit	L:T:P:CH	Internal Marks		External Marks		Total Marks	
				Th	Pr	Th	Pr	Min	Max
Major/Core Courses									
CC-A2		4	3:0:1:5	20	10	50	20	40	100
CC-B2		4	3:0:1:5	20	10	50	20	40	100
B23-CC-C4	OOP using C++	4	3:0:1:5	20	10	50	20	40	100
Minor/Vocational Courses									
B23-CC-M4	Spreadsheet Tools	4	3:0:1:5	20	10	50	20	40	100
Ability Enhancement Courses									
	To be opted by student from the Central Pool	2	2:0:0:2	15	-	35	-	20	50
Value Added Course									
	To be opted by student from the Central Pool	2	2:0:0:2	15	-	35	-	20	50
Total		20		26					500





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B23-CC-C4 OOP using C++

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70 [Theory(50)+Practical(20)]

Credit:4

Time: Theory(3Hours),Practical(3Hours)

Course Objectives:

1. To learn the basics of C program, data types and input/output statements.
2. To understand different types of operators, their hierarchies and also control statements of C.
3. To implement programs using arrays and strings.
4. To get familiar with advanced concepts like structures, union etc. in C language.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introduction to C++: About C++, Character Set, Keywords, Identifiers, Constants, Punctuators, Date Types: User-Defined, Built-in, Derived Data Types, Access Modifiers. Unformatted and Formatted I/O Operations. I/O using extraction and extraction operators, Type Conversion, Type Casting Operators in C++: Arithmetic, Relational, Logical, Bitwise, Ternary, Precedence & associativity of Operators.

UNIT-II

Control Structures: if statement, if-else statement, nested if, if-else-if ladder, switch...case statement, break and continue, goto statement, nested switch...case statement, Loops: while loop, do...while loop, for loop. Arrays and strings: Array definition, initialization multidimensional arrays, Manipulation of array elements, String declaration and initialization, Manipulations, String handling functions.

UNIT-III

Functions: Declaration and Definition, return values, arguments, passing parameters by value, call by reference, call by pointer, Recursions, Inline and external linkage Functions, storage classes.

Object-Oriented Features of C++: Class and Objects, Data hiding & encapsulation, abstraction, constructors & destructors. Data Members and Member Functions, accessing class members, empty class, local class, global class, Scope Resolution Operator and its Uses, Static Data Members, Static Member Functions, Structure vs Class.

UNIT-IV

Object Initialization and Cleanup: Constructors, types of constructors, destructors, constant objects and constructors. Friend Function & Class: defining friend function and friend class, defining memberfunction of a class as friend function.

Exception Handling in C++: exception handling model, exception handling constructs - try, throw, catch, Order of catchblocks, Catching all exceptions, Nested try blocks, handling uncaught exceptions, unexpected(), terminate() and standard exceptions.

UNIT-V (PRACTICUM)

Practicum:

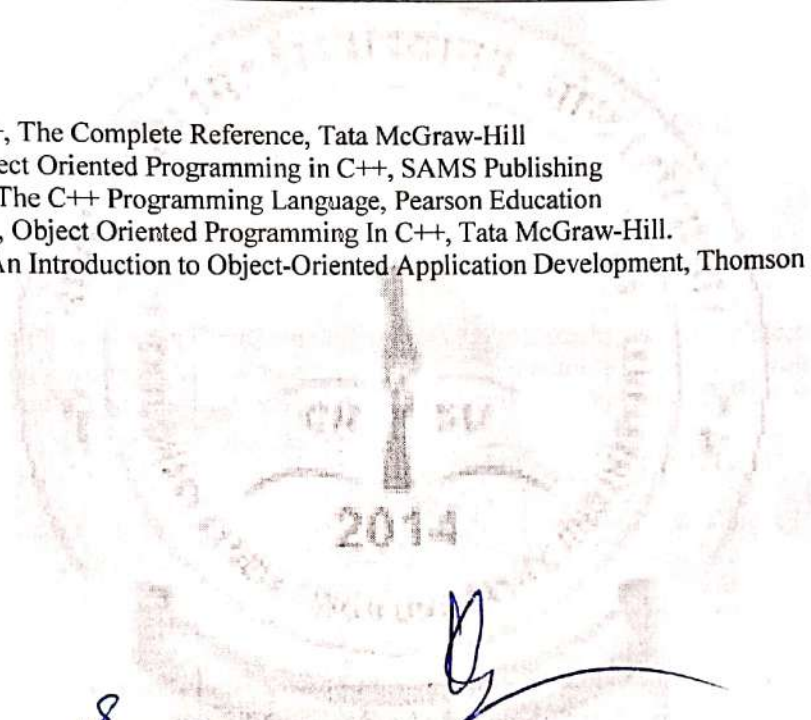
In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on C Language during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

1. Herbert Schildt, C++, The Complete Reference, Tata McGraw-Hill
2. Robert Lafore, Object Oriented Programming in C++, SAMS Publishing
3. Bjarne Stroustrup, The C++ Programming Language, Pearson Education
4. Balaguruswami, E., Object Oriented Programming In C++, Tata McGraw-Hill.
5. Richard Johnson, An Introduction to Object-Oriented Application Development, Thomson Learning.



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B23-CC-M4 Spreadsheet Tools

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70 [Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

1. To learn the basics of Spreadsheet.
2. To understand various formatting options.
3. To familiarize the student with applying various formulas.
4. To get familiar with basic inbuilt functions.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Data Processing : Basics of Data processing , Spelling Check, Removing Duplicate Rows, Finding and Replacing Text, Changing the case of text, Removing rows and columns from table, Fixing numbers and number signs, Fixing dates and times, Merging and Splitting Columns, Merging and Splitting Rows, Transforming and Rearranging Columns and Rows, Reconciling table data by joining or matching.

UNIT-II

Sort and Filter Operations : Formula & Functions, Solving generic problem through formula, Mathematical Functions, Statistical Functions, Text Functions, Logical Functions, Compatibility Functions, Information Functions, Cube Functions, Date and Time Functions, Web Functions.

UNIT-III

Functions: Mathematical Functions, Statistical Functions, Logical Functions, Applications of functions, Applying In-Built functions, Defining user functions, Modules, Add in and Automation Functions, Lookup Conditions, Lookup and Reference Functions Conditional Formatting

UNIT-IV

Pivot Chart and Pivot Table: Creating Data Aggregation through Pivot Tables, Representing Data visually through Pivot Chart, Calculating margins and other common ratios using calculations on pivot table, Filter data using slicers in pivot table.

Data Visualization through Pivot Chart

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UNIT-V(PRACTICUM)

Practicum:

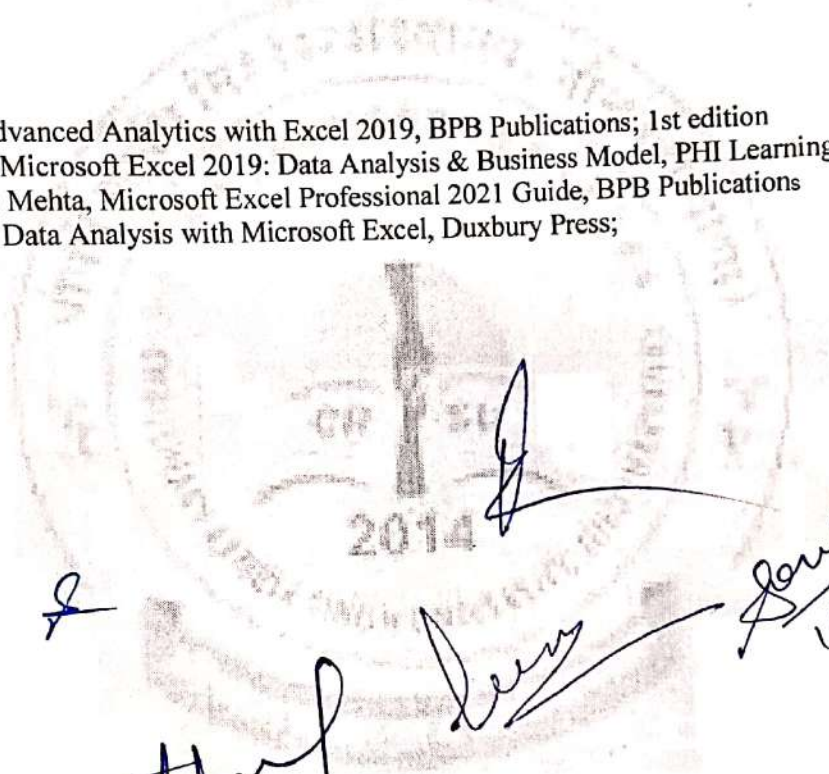
In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on MS Word during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	-	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	-	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	6	-	
Total	10	5	

Suggested Readings:

1. Manisha Nigam, Advanced Analytics with Excel 2019, BPB Publications; 1st edition
2. L. Winston Wayne, Microsoft Excel 2019: Data Analysis & Business Model, PHI Learning Pvt. Ltd.
3. CA Manmeet Singh Mehta, Microsoft Excel Professional 2021 Guide, BPB Publications
4. K. Berk, Partrick Carey, Data Analysis with Microsoft Excel, Duxbury Press;



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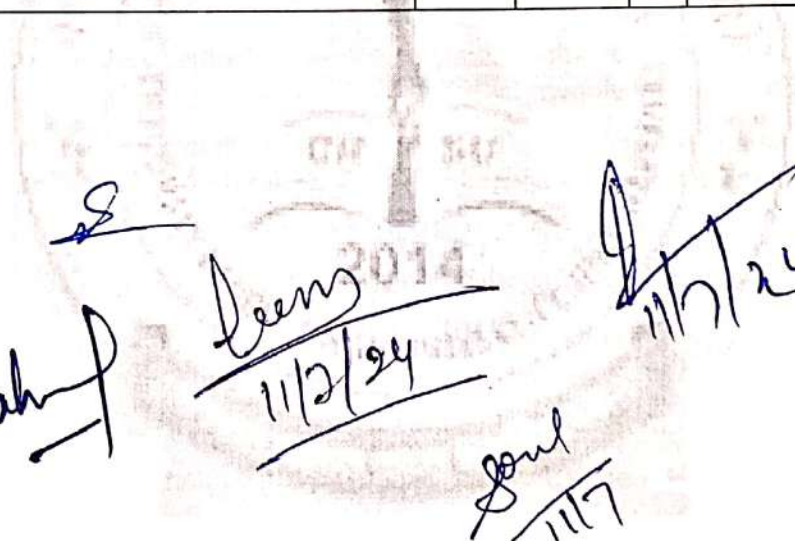
Rahul

Deep

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DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS
SCHEME AND SYLLABUS OF EXAMINATION FOR
Bachelor of Science (Honours/ Honours with Research) in Computer Science
Duration 4 Years (8 Semesters) w.e.f. Academic Session 2023-24

Semester-IV Scheme -C										
Course Code	Course Title	Credit	L: T:P: CH	Internal Marks		External Marks		Total Marks		
				Th	Pr	Th	Pr	Min	Max	
Major/Core Courses										
B23-CSE-401	Data Management with DBMS	4	3 :0:1:5	20	10	50	20	40	100	
B23-CSE-402	Introduction to Computer System Design and Organization	4	3 :0:1:5	20	10	50	20	40	100	
B23-CSE-403	Object-Oriented Programming with Java	4	3 :0:1:5	20	10	50	20	40	100	
B23-DSE-404	Front-End Development	4	3 :0:1:5	20	10	50	20	40	100	
Minor/Vocational Courses										
B23-CSE-405	Linux and Shell Programming	4	3 :0:1:5	20	10	50	20	40	100	
Ability Enhancement Courses										
	Will be selected by the central pool	2	2 :0 :0:2	15	-	35	-	20	50	
Value Added Courses										
	Will be selected by the central pool	2	2 :0 :0:2	15	-	35	-	20	50	
Total		24		29					600	



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B23-CSE-401 Data Management with DBMS

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks : 30[Theory(20)+Practical(10)]
External End Term Exam Marks: 70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

1. learn basic concepts of database along with its functions and components
2. understand data models.
3. understand SQL as a query language and Learn the concept of relational algebra and calculus.
4. acquire knowledge of advanced concepts of DBMS.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Basic Concepts: Data, Information, Records, Files, Schema and Instance etc. Limitations of File-Based Approach, Characteristics of Database Approach, Database Management System (DBMS), DBMS Functions and Components, Database Interfaces, Advantages and Disadvantages of DBMS.

Database Users: Data and Database Administrator, Role and Responsibilities of Database Administrator, Database Designers, Application Developers etc.

Database System Architecture: 1-Tier, 2-Tier & Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances, Data Independence – Logical and Physical Data Independence

UNIT-II

Data Models: Hierarchical, Network, and Relational Data Models.

Entity-Relationship Model: Entity, Entity Sets, Entity Type, Attributes: Type of Attributes, Keys, Integrity Constraints, Designing of ER Diagram, Symbolic Notations for Designing, ER Diagram

UNIT-III

SQL: Meaning, Purpose, and Need of SQL, Data Types, SQL Components: DDL, DML, DCL and DQL, Basic Queries, Join Operations and Sub-queries, Views, Specifying Indexes. Constraints and its Implementation in SQL.

Relational Algebra: Basic Operations: Select, Project, Join, Union, Intersection, Difference, and Cartesian Product, etc.

Relational Calculus: Tuple Relational and Domain Relational Calculus. Relational Algebra Vs. Relational Calculus.

UNIT-IV

Relational Model: Functional Dependency, Characteristics, Inference Rules for Functional Dependency, Types of Functional Dependency,

Normalization: Benefits and Need of Normalization, Normal Forms Based on Primary Keys- (1NF, 2NF, 3NF, BCNF), Multi-valued Dependencies, 4 NF, Join dependencies, 5 NF, Domain Key Normal Form.

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UNIT-V (PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on C++ Language during the laboratory work.

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

- Elmasri&Navathe: Fundamentals of Database Systems, Pearson Education.
- Thomas Connolly Carolyn Begg: Database Systems, Pearson Education.
- Korth&Silberschatz: Database System Concept, McGraw Hill International Edition.
- Raghu Ramakrishnan& Johannes Gehrke: Database Management Systems, McGraw Hill.
- Ivan Bayross: SQL, PL/SQL- The Program Language of ORACLE, BPB Publication.

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B23-CSE-402 Introduction to Computer System Design and Organization

Max.Marks:100

Min.PassMarks:40

Internal Assessment Marks

:30[Theory(20) + Practical(10)]

External End Term Exam Marks:70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

1. understand number systems, error detecting and correcting code, and representations of numbers in a computer system.
2. understand computer arithmetic and Boolean algebra and simplification of Boolean expressions.
3. understand the working of logic gates and design various combinational circuits using these logic gates.
4. understand the working of different types of flip-flops and design different types of registers.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Number Systems: Binary, Octal, Hexadecimal, etc. Conversions from one number system to another, BCD Number System. BCD Codes: Natural Binary Code, Weighted Code, Self-Complimenting Code, Cyclic Code. Error Detecting and Correcting Codes.

Character representations: ASCII, EBCDIC, and Unicode. Number Representations: Integer numbers - sign-magnitude, 1's & 2's complement representation. Real Numbers normalized floating point representations.

UNIT-II

Binary Arithmetic: Binary Addition, Binary Subtraction, Binary Multiplication, Binary Division using 1's and 2's Complement representations, Addition and subtraction with BCD representations.

Boolean Algebra: Boolean Algebra Postulates, basic Boolean Theorems, Boolean Expressions, Boolean Functions, Truth Tables, Canonical Representation of Boolean Expressions: SOP and POS, Simplification of Boolean Expressions using Boolean Postulates & Theorems, Karnaugh-Maps (up to four variables), Handling Don't Care conditions.

UNIT-III

Logic Gates: Basic Logic Gates – AND, OR, NOT, Universal Gates -NAND, NOR, Other Gates – XOR, XNOR, etc. Their symbols, truth tables, and Boolean expressions.

Combinational Circuits: Design Procedures, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexers, Demultiplexers, Decoder, Encoder, Comparators, Code Converters.

UNIT-IV

Sequential Circuits: Basic Flip-Flops and their working. Synchronous and Asynchronous Flip –Flops, Triggering of Flip-Flops, Clocked RS, D Type, JK, T type, and Master-Slave Flip-Flops. State Table, State Diagram, and State Equations. Flip-flops characteristics & Excitation Tables.

Sequential Circuits: Designing registers –Serial-In Serial-Out (SISO), Serial-In Parallel-Out (SIPO), Parallel-In Serial-Out (PISO) Parallel-In Parallel-Out (PIPO), and shift registers.

DCSA, CRSU, Jind

PageNo.4

UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on HTML/CSS/JavaScript Language during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

- M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
- V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall.
- Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
- Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill.

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B23-CSE-403 Object-Oriented Programming with Java

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

1. understand the basic concept of JAVA;
2. learn and develop various controls and branching of logic under various cases using language control structures
3. exemplify the usage to implement polymorphism and Inheritance in Java programs.
4. acquire knowledge of Packages; Interfaces, Exceptions, and Multithreading in building efficient applications.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Key Attributes of Object-Oriented Programming, Introduction to Java, History and Features of Java, Java Virtual Machine (JVM), JDK, Java Runtime Environment;

Basic Elements: Lexical Tokens, Identifiers, Keywords, Literals, Comments, Primitive Data types, Operators, Assignments; Input/output in Java: Basics, I/O Classes, Reading Console Input.
Control Structures in Java: Decision and Loop Control Statements.

UNIT-II

Class and Object in Java: Class Fundamentals, creation of Objects, Defining Methods, Argument Passing Mechanism, Constructors, Abstract Class, Static Members.

Array in Java: Defining an Array, Initializing & Accessing Array, Multi-Dimensional Array.

String: String Fundamentals, Operations on Array and String, String Constructors, Creating Strings using String Class and StringBuffer Class.

UNIT-III

Polymorphism in Java: Basic Concept, Types, Overriding vs Overloading, Run-time and Compile-time polymorphism. Inheritance: Benefits of Inheritance, Types of Inheritance. Interface: Implementing Interface, extending Interface.

UNIT-IV

Package: creating a package, importing and using a package. Exception handling: try/catch, handling multiple exceptions, throw/throws keyword, finally keyword, user-defined exception. Concepts of Multithreading and Synchronization in Java.



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UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on Scheduling algorithms in C/C++ during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

- Ivor Horton, Beginning JAVA 2, WROX Publications, New Delhi
- Patrick Naughton and Herbert Schlitz, JAVA-2 Complete Reference, TMH, New Delhi
- Paul Deital & Harvey Deital, Java: How to Program, Pearson Education.
- Balaguruswamy, Programming with Java, TMH, New Delhi.
- Java6 Programming, BlackBook, KoGenT, Dreamtech Press.

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B23-CSE-404 Front-End Development

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

1. understand the basic concept of objects and regular expressions in JavaScript;
2. acquire knowledge of JavaScript events and DOM
3. learn to use forms and BOM in JavaScript;
4. get familiar with jQuery

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Objects in JavaScript: Introduction to objects, Type of objects in JavaScript, Creating objects, Object methods, Constructor function, Prototype in JavaScript, Inheritance using prototype chain.

Regular Expressions: Introduction to RegExp, Regular expression usage, Modifiers, RegExp patterns, RegExp methods, String methods for RegExp, Type conversion in JavaScript.

UNIT-II

Event handling: JavaScript events, Event handler, Event flow, Event bubbling and capturing, Event listeners, Event types. Document Object Model (DOM): Introduction to DOM, Types of DOM, DOM standards and methods, Manipulating documents using DOM, Handling images, Table manipulation, Animation, Node and Node-list handling.

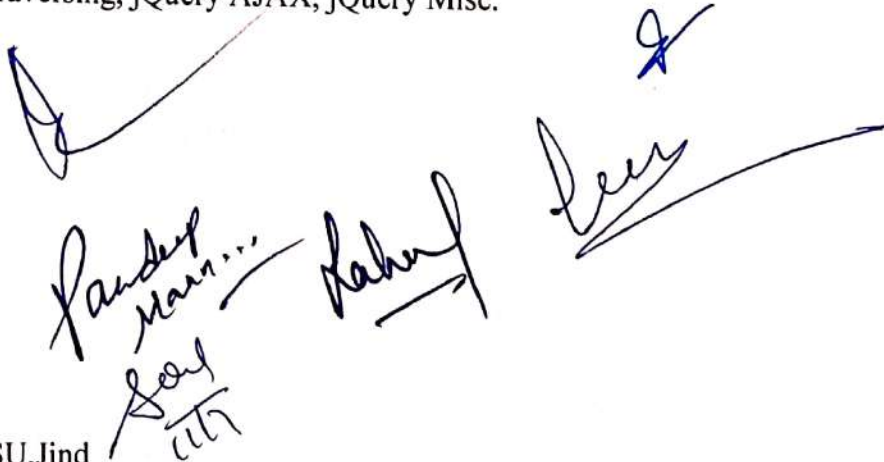
UNIT-III

Browser Object Model (BOM): Introduction to BOM, DOM vs BOM differences, Window object and methods, BOM navigator, BOM history, BOM location, BOM timer, Introduction to Cookies, Session and persistent cookies.

Form Handling: Introduction to forms, Form processing, Forms object, Accessing data from forms, Form validation, Additional features in forms, Validation APIs

UNIT - IV

Introduction to jQuery: jQuery Syntax, jQuery Selectors, jQuery Events, jQuery Effects, jQuery HTML, jQuery Traversing, jQuery AJAX, jQuery Misc.



UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on Digital tools during the laboratory work.

The students should be able to work on Internet – communication through Internet. Research using online sources – surveys, research on social networking sites. Vlogs, Bhim, banking UPIs, Ayushman app.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

- David Flanagan, JavaScript: The Definitive Guide: The Definitive Guide.
- Kogent Learning, Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML, AJAX – Black Book, Wiley India Pvt. Ltd.
- JavaScript and jQuery: Interactive Front-End Web Development by Jon Ducket
- Head First JavaScript Programming: A Brain-Friendly Guide by Elisabeth Robson and Eric Freeman

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B23-CSE-405 Linux and Shell Programming

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

1. understand Linux architecture;
2. ability to use various Linux commands that are used to manipulate system operations.
3. acquire knowledge of Linux File System;
4. understand and make effective use of I/O and shell scripting language to solve problems

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introduction to Linux: Linux distributions, Overview of Linux operating system, Linux architecture, Features of Linux, Accessing Linux system, Starting and shutting down system, Logging in and Logging out, Comparison of Linux with other operating systems

UNIT-II

Commands in Linux: General-purpose commands, File oriented commands, directory-oriented commands, Communication-oriented commands, process-oriented commands, etc.

Regular expressions & Filters in Linux: Simple filters viz. more, wc, diff, sort, uniq, grep; Introducing regular expressions

UNIT-III

Linux file system: Linux files, inodes and structure and file system, file system components, standard file system, file system types.

Processes in Linux: starting and stopping processes, initialization processes, mechanism of process creation, Job control in Linux using at, batch, cron& time

UNIT - IV

Shell Programming: vi editor, shell variables, I/O in shell, control structures, loops, subprograms, creating & executing shell scripts in Linux



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UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on Digital tools during the laboratory work.

The students should be able to work on Internet – communication through Internet. Research using online sources – surveys, research on social networking sites. Vlogs, Bhim, banking UPIs, Ayushman app.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	2	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	4	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	3	
Mid-Term Exam	7	-	
Total	15	5	

Suggested Readings:

- Kanetkar, UNIX & Shell programming – BPB.
- M.G.Venkateshmurthy, Introduction to UNIX & Shell Programming, Pearson Education.
- Richard Petersen, The Complete Reference – Linux, McGraw-Hill.
- Stephen Prata, Advanced UNIX – A programmer's Guide, SAMS.
- Sumitabha Das, Your UNIX - The Ultimate Guide, Tata McGraw-Hill

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[Handwritten signatures and initials are present below the stamp:]

[Signature: Sandeep ...]

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**DEPARTMENT OF COMPUTER SCIENCE AND
APPLICATIONS SCHEME AND SYLLABUS OF
EXAMINATION FOR
Bachelor of (Honours/Honours with Research) in
Computer Application
Duration 4Years (8Semesters) w.e.f. Academic
Session 2023-24**

Semester-IV Scheme-D									
Course Code	Course Title	Credit	L: T:P: CH	Internal Marks		External Marks		Total Marks	
				Th	Pr	Th	Pr	Min	Max
Major/Core Courses									
BCA23-CC401	Data Structures and Applications	4	3 :0:1:5	20	10	50	20	40	100
BCA23-CC402	Front-End Development	4	3 :0:1:5	20	10	50	20	40	100
BCA23-CC403	Computer Graphics	4	3 :0:1:5	20	10	50	20	40	100
Minor/Vocational Courses									
BCA23-M401	Modeling for OOP	2	1 :0:1:3	10	05	20	15	20	50
Ability Enhancement Courses									
	To be opted by students from the Central Pool	2	1 :0 :1:3	15	-	35	-	20	50
Value Added Courses									
	To be opted by students from the Central Pool	2	2 :0:0:2	15	-	35	-	20	50
Total		18		23					450

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BCA23-CC401

Data Structures and Applications

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks

: 30[Theory(20)+Practical(10)]

External End Term Exam Marks :70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives: After completing this course, the learner will be able to:

1. Learn the basics of data structure and algorithm complexities.
2. Acquire knowledge of arrays and strings.
3. Understand the idea of implementation for linked lists and stacks.
4. Learn various searching and sorting techniques along with the implementation of queues.
5. Develop the project with data structures.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Data Structure Definition, Data Type vs. Data Structure, Classification of Data Structures, Data Structure Operations, Applications of Data Structures. Algorithm Specifications: Performance Analysis and Measurement (Time and Space Analysis of Algorithms- Average, Best and Worst Case Analysis). Arrays: Introduction, Linear Arrays, Representation of Linear Array in Memory, Two Dimensional and Multidimensional Arrays, Sparse Matrix and its Representation.

UNIT-II

String Handling: Storage of Strings, Operations on Strings viz., Length, Concatenation, Substring, Insertion, Deletion, Replacement, Pattern Matching. Linked List: Introduction, Array vs. linked list, Representation of linked lists in Memory, Traversing a Linked List, Insertion, Deletion, Searching into a Linked list, Type of Linked List.

UNIT-III

Stack: Array Representation of Stack, Linked List Representation of Stack, Algorithms for Push and Pop, Application of Stack: Polish Notation, Postfix Evaluation Algorithms, Infix to Postfix Conversion, Infix to Prefix Conversion, Recursion. Introduction to Queues: Simple Queue, Double Ended Queue, Circular Queue, Priority Queue, Representation of Queues as Linked List and Array, Applications of Queue.

UNIT-IV

Tree: Definitions and Concepts, Representation of Binary Tree, Binary Tree Traversal (Inorder, postorder, preorder), Binary Search Trees – Definition, Operations viz., searching, insertions and deletion, Searching and Sorting Techniques, Sorting Techniques: Bubble sort, Quick sort, Insertion Sort. Searching Techniques: Sequential Searching, Binary Searching.

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UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on Java Language during the laboratory work.

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

- Seymour Lipschutz, Data Structures, Tata McGraw- Hill Publishing Company Limited, Schaum's Outlines.
- YedidyanLangsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, Data Structures Using C, Pearson Education.
- Trembley, J.P. And Sorenson P.G., An Introduction to Data Structures with Applications, McGraw-Hill.
- Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Addison- Wesley.

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BCA23-CC402

Front-End Development

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives: After completing this course, the learner will be able to:

1. Understand the basic concept of objects and regular expressions in JavaScript;
2. Acquire knowledge of JavaScript events and DOM
3. Learn to use forms and BOM in JavaScript;
4. Get familiar with jQuery
5. Develop the project.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Objects in JavaScript: Introduction to objects, Type of objects in JavaScript, creating objects, Object methods, Constructor function, Prototype in JavaScript, Inheritance using prototype chain. Regular Expressions: Introduction to RegExp, Regular expression usage, Modifiers, RegExp patterns, RegExp methods, String methods for RegExp, Type conversion in JavaScript.

UNIT-II

Event handling: JavaScript events, Event handler, Event flow, Event bubbling and capturing, Event listeners, Event types. Document Object Model (DOM): Introduction to DOM, Types of DOM, DOM standards and methods, Manipulating documents using DOM, Handling images, Table manipulation, Animation, Node and Node-list handling

UNIT-III

Browser Object Model (BOM): Introduction to BOM, DOM vs BOM differences, Window object and methods, BOM navigator, BOM history, BOM location, BOM timer, Introduction to Cookies, Session and persistent cookies. Form Handling: Introduction to forms, Form processing, Forms object, Accessing data from forms, Form validation, Additional features in forms, Validation APIs

UNIT-IV

Introduction to jQuery: jQuery Syntax, jQuery Selectors, jQuery Events, jQuery Effects, jQuery HTML, jQuery Traversing, jQuery AJAX, jQuery Misc.



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UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on Linux commands during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

- David Flanagan, JavaScript: The Definitive Guide: The Definitive Guide.
- Kogent Learning, Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML, AJAX – Black Book, Wiley India Pvt. Ltd.
- JavaScript and jQuery: Interactive Front-End Web Development by Jon Dockett
Head First JavaScript Programming: A Brain-Friendly Guide by Elisabeth Robson and Eric Freeman

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BCA23-CC403
Computer Graphics

Max.Marks:100
Min.PassMarks:40

Internal Assessment Marks :30[Theory(20) + Practical(10)]
External End Term Exam Marks:70[Theory(50)+Practical(20)]

Time: Theory(3Hours),Practical(3Hours)

Credit:4

Course Objectives:

1. Understand the basic concepts of computer graphics.
2. Understand usage of various graphics functions.
3. Learn about importance of graphics in designing.
4. Learn to work with initiate graphics mode.
5. To work with various image drawing algorithms and functions.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Introduction: History of Computer Graphics (CG), Applications of Computer Graphics, Components of interactive graphics systems. Display devices: Refresh CRT, Color CRT, Plasma Panel displays LCD Panels, Raster-scan System, Random scan System, Graphic software, Input/Output Devices, Tablets

UNIT-II

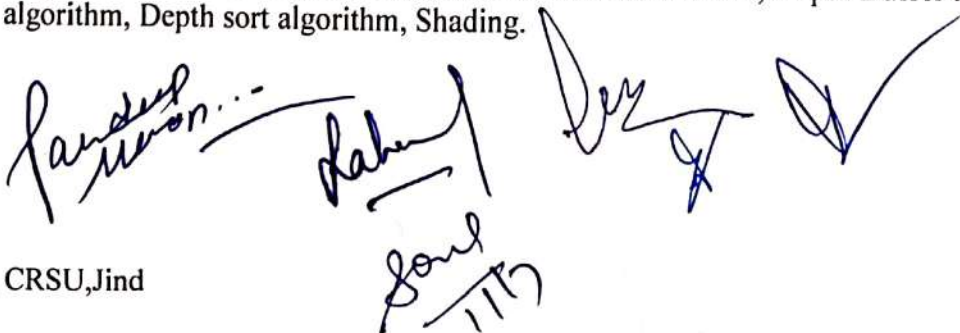
Output Primitives: Points and Lines, Line Drawing Algorithms: DDA algorithm, Bresenham's algorithm. Circle drawing Algorithms: Polynomial Method, Bresenham's algorithm. Parametric representation of Cubic Curves, Bezier Curves

UNIT-III

2D Transformation: Use of Homogeneous Coordinates Systems, Composite Transformation: Translation, Scaling, Rotation, Mirror Reflection, Rotation about an Arbitrary Point. Clipping and Windowing, Clipping Operations. Line Clipping Algorithms: The Mid-Point subdivision method, Cohen-Sutherland Line Clipping Algorithms, Polygon Clipping, Sutherland Hodgeman Algorithms, Text Clipping.

UNIT-IV

3-D Graphics: 3-D object representations, 3-D Transformations: Translation, Rotation, Scaling, Projections. Hidden surface elimination: Back face removal, Depth Buffer algorithm, Scan-line algorithm, Depth sort algorithm, Shading.



UNIT-V(PRACTICUM)

Practicum:

In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on SQL commands during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	5	5	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	5	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	10	-	
Total	20	10	

Suggested Readings:

- Donald Hearn, M. Pauline Baker, Computer Graphics, Pearson Education.
- J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, Computer Graphics - Principles and Practice, Pearson Education.
- Newmann&Sproull, Principles of Interactive Computer Graphics, McGraw Hill.
- Rogers, David F., Procedural Elements of Computer Graphics, McGraw Hill.
- Zhigang Xiang, Roy Plastock, Computer Graphics, Tata McGraw Hill.

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BCA23-M401 Modeling for OOP

Max.Marks:50
Min.PassMarks:20

Time: Theory(3Hours),Practical(3Hours)

Internal Assessment Marks :15[Theory(10)+Practical(05)]
External End Term Exam Marks:35[Theory(20) +Practical(15)]

Credit:2

Course Objectives:

1. Understand the basic concepts of UML.
2. Understand need of drawing models.
3. Understand interdependency of various models
4. Learn problem solving strategies
5. Learn UML tools.

Examiner Note: Examiner will set a total of NINE questions. Out of which FIRST question will be compulsory and the remaining EIGHT questions will be set from four units selecting two questions from each unit. All questions will carry equal marks. First question will comprise of short answer type questions covering entire syllabus. Candidate will have to attempt FIVE questions in all, selecting one question from each unit. Examination will be of three-hour duration.

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.

UNIT-I

Factional view: Use case diagram, Requirement Capture with Use case, Building blocks of Use Case diagram - actors, use case guidelines for use case models, Relationships between use cases - extend, include, generalize. Activity diagram: Elements of Activity Diagram - Action state, Activity state, Object, Node, Control and Object flow, Transition (Fork, Merge, Join), Guidelines for Creating Activity Diagrams.

UNIT-II

Static view: Classes, values and attributes, operations and methods, responsibilities for abstract classes, access specifier ,Relationships among classes: Associations, Dependencies., Inheritance - Generalizations, Aggregation, Adornments on Association: association names, association classes, qualified association, n-ary associations, ternary and reflexive association, Dependency relationships among classes, notations.

UNIT-III

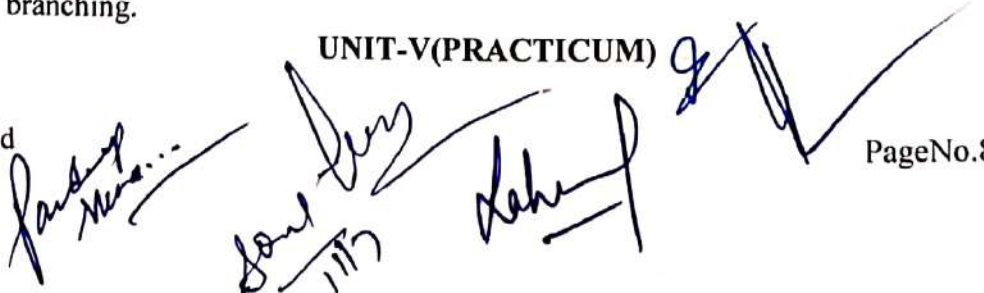
Dynamic View: State diagram, Notations, Events (signal events, change events, Time events), States: Composite states, parallel states, History states, transition and condition, State diagram behavior(activity effect, do-activity, entry and exit activity).

UNIT-IV

Interaction diagrams: Sequence diagram Notations, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links, Activations in sequence diagram, Collaboration diagram - Collaboration diagram notations, iterations, conditional messaging, branching.

UNIT-V(PRACTICUM)

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In practical component the teacher concerned / instructor will ensure minimum 15 programs / case studies execution based on elements of UML along with their graphical syntax during the laboratory work.

Suggested Evaluation Methods:

Internal Assessment:	Theory	Practicum	End Term Examination:
Class Participation	4	-	A three hour exam for both Theory and Practicum
Seminar/presentation/assignment/quiz/class test etc	-	-	
Seminar/Demonstration/Viva-voce/Lab records etc.:	-	5	
Mid-Term Exam	6	-	
Total	10	5	

Suggested Reading

1. Designing Flexible Object Oriented systems with UML - Charles Ritcher
2. Object Oriented Analysis & Design, Sat/inger. Jackson, Burd Thomson
3. Object oriented Modeling and Design with UML - James Rumbaugh. Micheal Blaha (second edition)
4. The Unified Modeling Language User Guide - Grady Booch, James Rumbaugh, Ivar Jacobson.
5. Object Oriented Modeling and Design - James Rumbaugh

