DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM & MARKING SCHEME

BCA – III, IV, V, VI SEMESTER

(BACHELOR OF COMPUTER APPLICATION)

(Based on Choice Based Credit System)

SESSION : 2024-25

ESTD: 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A+, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

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Govt. V.Y.T. PG Autonomous College Durg (CG)

SCHEME OF EXAMINATION
&
SYLLABUS

Of

Choice Based Credit System (CBCS)
for

Bachelor of Computer Application (BCA)
III, IV,V and VI Semester Exam

Under

Department of Computer Science

Session – 2024-25

(Approved by Board of studies)

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

BCA –III SEMESTER

Course Code	Course Name	Theory Marks		Internal Marks		Practical Marks		Total Marks		Teaching Load per Week			Credits
										L	T	P	
		Max. (A)	Min. (B)	Max. (C)	Min. (D)	Max. (E)	Min. (F)	Max.	Min.				
BCA 301(L)	AEC- Environmental Studies and Human Rights	50	20	10	4			50	20	2	1		2
BCA 302(L)	DSC- Calculus and Differential Equations	80	32	20	8			100	40	5	1		4
BCA 303(L)	DSC- Operating System with LINUX	60	24	15	6			75	30	5	1		3
BCA 304(L)	DSC- Programming in Java	60	24	15	6			75	30	5	1		3
BCA 305(P)	LAB I: PC Operating System Lab					50	20	50	20	-	-	1X2	1
BCA 306(P)	LAB II: Programming in Java Lab					50	20	50	20	-	-	1X2	1
BCA 307(L+P)	SEC– Computer Hardware and Networking	20	8	05	2	25	10	50	20	1		1x2	2
BCA 308 (L)	DSE- SAD & MIS	80	32	20	8			100	40	5	1		4
BCA 109 (L+P)	VAC- Indian History and Culture	20	10	05	2	25	10	50	20	1		1x2	2
TOTAL MARKS								600	240				22

The syllabus for BCA is hereby approved for the session 2024-25.

Part A: Introduction			
Program: **BCA**	Class: **BCA –III Semester**	Year: **2024**	Session:**2024-2025**
Course Code	**BCA-302(L)**		
Course Title	**DSC- Calculus and Differential Equations**		
Course Type	**Core Course (Theory)**		
Pre-requisite (if any)	None		
Course Outcome	At the end of this course, the students will be able to: 1. Recognize differential equations that can be solved by each of the three methods – direct integration, separation of variables and integrating factor method – and use the appropriate method to solve them 2. use an initial condition to find a particular solution of a differential equation, given a general solution 3. check a solution of a differential equation in explicit or implicit form, by substituting it into the differential equation 4. understand the terms 'exponential growth/decay', 'proportionate growth rate' and 'doubling/halving time' when applied to population models, and the terms 'exponential decay', 'decay constant' and 'half-life' when applied to radioactivity 5. Solve problems involving exponential growth and decay.		
Credit Value	**4 Credits**	**1 credit =15 Hours – Learning and Observation**	
Total Marks	**Maximum Marks :100**	**Minimum Passing Marks:40**	

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)

Unit	Topics (COURSE CONTENTS)	No. of Periods
I	**Calculus:** Limits-Definition of limits, Continuity of one variable, Types of continuity, Properties of continuous function: Borel's Theorem, Boundedness Theorem, Mostest Theorem, Intermediate value theorem, Differentiability of function(s) of one variable.	**12**
II	Differentiation of Functions, Differentiation of functions of functions, parametric functions, product of functions, function in Product and quotient form, Logarithmic differentiation, Differentiation of Parametric functions. Higher order derivative, Maxima and Minima.	**12**
III	**Integration:** Indefinite Integral- Basic integration Formulas, Trigonometric Integrals, Integration by Parts, Integration by substitution.	**12**

IV	Definite Integrals- Introduction, Properties of definite integrals, Problem based on properties of definite integrals.	**12**
V	**Introduction to differential equation:** Definition, order and degree of differential equation, derivation of a differential equation, general and particular solution of differential equation, separation of variables.	**12**

Part C -Learning Resources

Text Books, Reference Books, Other Resources

TEXT BOOK:

1. Calculus and Statistical Analysis : H.K. Pathak
2. Calculus : B.R. Thakur
3. Differential Equation : H.K. Pathak

REFERENCE:

1. Differential Calculus : Gorakh Prasad
2. Differentiation & Integration : H.K. Pathak
3. Integral Calculus : Gorakh Prasad
4. Differential Equation : Gorakh Prasad
5. Calculus : Rey & Sharma

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (02 each)	04 x 5 = 20 Marks
	Question - C: Short answer type question	05 x 5 = 25 Marks
	Question -D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 80 Marks**

Name & Signature of Members of Board of Studies

Part A: Operating Systems with Linux			
Program: **BCA**	Class: **BCA –III Semester**	Year: **2024**	Session- **2024-25**
Course Code	**BCA-303(L)**		
Course Title	**DSC - Operating Systems with Linux**		
Course Type	**Core Course (Theory)**		
Pre-requisite (if any)	None		
Course Outcome	1. Understand the basics of operating systems like kernel, shell, types and views of operating systems 2. Describe the various CPU scheduling algorithms and remove deadlocks. 3. Explain various memory management techniques and concept of thrashing. 4. Use disk management and disk scheduling algorithms for better utilization of external memory. 5. Recognize file system interface, protection and security mechanisms.		
Credit Value	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
Total Marks	**Maximum Marks :100**		**Minimum Passing Marks:40**

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	Topics (COURSE CONTENTS)	No. of Periods
I	**Introduction:** Defining operating system, History and Evolution of operating system, **Basic Concepts:** batch processing, spooling, multi-programming, multiprocessor system, time-sharing, real time systems Functions and Goals of operating system.	9
II	**Process Management:** Process concept, Process Control Block, **Process State:** State Transition Diagram, **Scheduling Queues:** Queuing Diagram, Types of Schedulers-contexts switching and dispatcher, various types of CPU scheduling algorithms and their evaluation, multilevel queues and multilevel feedback queues.	9
III	**Memory Management:** Preliminaries of memory management, Contiguous memory allocation, fragmentation, partition allocation policies, compaction, Non-Contiguous memory allocation, Paging, Segmentation, **Virtual Memory:** Demand paging, Swapping, **Page replacement policies:** FIFO, Optimal, LRU, MRU.	9

IV	**Introduction to UNIX** Introduction to Multi-user System, Emergency and history of Unix, Feature and benefits, Versions of Unix. **System Structure:** - Hardware requirements, Kernel and its function, introduction to System calls and shell. **File System:** Feature of Unix File System, Concept of i-node table, links, commonly used commands like who, pwd, cd, mkdir, rm, ls, mv, lp, chmod, cp, grep, sed, awk, pr, lex, yacc, make, etc. Getting started (login/logout).	9
V	**Shell Programming** **Vi Editor:** - Intro to text processing, command and edit mode, invoking vi, command structure, deleting and inserting line, deleting and replacing character, searching strings. Introduction to shell feature, wild card characters, i/out re-directions, standard error redirection, system and user created shell variables, profile files, pipes/tee, background processing, command line arguments, command substitution, read statements, conditional execution of commands, special shell variables $ #, #?, $* etc. Shift commands, loops and decision making for, while and until, choice making using case .... esac, decision making if .... Fi, using test, string comparison, numerical comparison, logical operation, using expr.	9

Part C -Learning Resources

Text Books, Reference Books, Other Resources

BOOKS RECOMMENDED:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin and Greg Gagne (Wiley India Edition)
2. Modern Operating System, Andrew S.Tanenbaum, (PHI)
3. UNIX Complete Reference.

Reference Books

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods: **Maximum Marks:** **100 Marks** **Continuous Comprehensive Evaluation (CCE):** **20 Marks** **Semester End Exam (SEE):** **80 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)		Internal Test of 20 Marks each and Assignment of 20 Marks
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) Question - C: Short answer type question Question -D: Long answer type question **Total**	04 x 5 = 20 Marks 05 x 5 = 25 Marks 07 x 5 = 35 Marks **= 80 Marks**

Name & Signature of Members of Board of Studies

Part A: Programming in Java			
Program: **BCA**	Class: **BCA –III Semester**	Year: **2024**	Session:**2024-25**
Course Code	**BCA-304(L)**		
Course Title	**DSC - Programming in Java**		
Course Type	**Core Course (Theory)**		
Pre-requisite (If any)	Basics of programming in C and C++		
Course Outcome	**On completion of the course, students will be able to:** **1:** Understand the concepts of basics of Java programming Language and get hands on with selection and iterative building blocks for coding. **2:** Understand and implement the concept of Inheritance, Interface and packages in java. **3:** Understand and implement the exception handling and multithreading mechanism using java. **4:** Describe basics of input-output streams and JDBC programming in java **5:** Describe fundamental of software development using the concept of Applet and AWT in java		
Credit Value	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
Total Marks	**Maximum Marks :100**	**Minimum Passing Marks:40**	

	PART B: CONTENT OF THE COURSE	
	Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)	
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Introduction:** History of java, C++ verses Java, features of java, data types, control structures: if else, switch case, looping statement: while, do while, for loop, new version of for loop, break, continue statement, arrays and its types, string and String Buffer class, Wrapper Classes, vectors.	**9**
II	**Basics of class and object**: Class and Object, constructor and its types, methods and its types, method overloading, this keyword. **Inheritance:** Basics types, method Overriding, using abstract classes, uses of final keyword final classes, using super. **Packages and Interfaces:** Defined CLASSPATH, importing packages, implementing interface.	**9**
III	**Exception Handling: Basics of** Exception handling, types of exception, using try and catch, throwing exceptions, user defined exceptions, finally, throw verses throws. **Multithreaded Programming:** Java thread model, thread life cycle. Various functions of Thread class and Runnable interface, creating threads, and thread priorities, synchronization. Inter thread communication.	**9**
IV	**Input/Output:** Basic of Streams, Byte and Character Stream, IO stream package, predefined streams, reading and writing from console and reading and writing from files. **Networking:** Networking Basics. TCP/IP client & server sockets, URL connection.	**9**

V	**Applets:** Fundamentals of Applet, life cycle of applet, overriding update method, HTML APPLET tag, passing parameters. Developing single applets. **Introduction to AWT:** Window fundamentals, creating windowed, programs working with graphics, using AWT controls, menus. Delegation event model: handling mouse and keyboard events.	9

Part C -Learning Resources
Text Books, Reference Books, Other Resources
BOOKS RECOMMENDED: 1. JAVA COMPLETE REFERENCE - BY HERBERT SCHILDT 2. PROGRAMMING WITH JAVA - BY E. BALAGURUSAMY 3. JAVA PROGRAMMING - KHALID MUGHAL **Reference Books** **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)** 1. https://www.w3schools.com/java/ 2. https://www.javatpoint.com/java-tutorial 3. https://docs.oracle.com/javase/tutorial/ 4. https://www.geeksforgeeks.org/java/

PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods: **Maximum Marks:** **100 Marks** **Continuous Comprehensive Evaluation (CCE):** **20 Marks** **Semester End Exam (SEE):** **80 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks	
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) Question - C: Short answer type question Question -D: Long answer type question **Total**	04 x 5 = 20 Marks 05 x 5 = 25 Marks 07 x 5 = 35 Marks **= 80 Marks**

Name & Signature of Members of Board of Studies

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

Lab Course

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA Semester -III		Session:2024-2025
1	Course Code	BCA-305(P)		
2	Course Title	Operating System Lab		
3	Course Type	Practical		
4	Course Learning Outcome (CLO)	This Course will enable the students to: 1. Students will be able to understand key features of the various Operating Systems. 2. Implement various commands of Linux Operating System. 3. Students will be able to understand the directory structure of Operating System.		
5	Credit Value	1 Credit	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks: 50		Minimum Passing Marks: 20

Note:

1. In every program there should be comment for each coded line or block of code.
2. Practical files should contain printed program with name of author, date, path of program, unit no and printed output.
3. All the following programs or a similar type of programs should be prepared.

PART B: CONTENT OF THE COURSE
Total no. of Teaching/ Learning Periods = 2 Periods/ week
1.Change your shell environment-path, home, ifs, mail, psl, ps2, term, log name i) at command line ii) at shell level iii) at login level 2. Change tha wallpaper, scrcen saver in GNOME, KDE. 3. Install Linux with following specifications-usename,password,partions for various directories such as/etc./home,etc.

4. Add a user and password, change the password.

5. Add & remove a group.

6. Create partitions on your disk.

7. Install and configure (i)printer (ii) scanner

Using VI editor do the following exercises

1. In a file

   i) replace the words 'has' with 'has not'.

   ii) locate n^{th} character

   iii) Sort lines 21 to 40

2. In a file copy/cut and paste following text-

   i At i^{th} line, n lines to j^{th} line.

   ii Yank a few words

   iii Cut and paste n words to i^{th} position in l^{th} line

3. Open to files 'txtfile'and 'newfile' and copy/cut 5 lines from txtfile and paste them in newfile using vi editor.

4. Open 'txtffile' and copy/cut following and paste to the 'newfile'

   i. 1^{th} to the last line in it

5. **Create macro**

   i. to paste your name at any position in the file.

   ii. to make the 1th function key to search for "loop" and copy into the buffer'a'.

   all text following it up to but not including the string "end".

   iii. to remove all leading spaces in a file

   iv. to save and quit vi editor in input mode.

Write commands

- List all files that match a class
- List all files that do not match a class.
- Change the fill permissions
- Configure or set characteristics of your terminal. Describe any 3.
- Display the lines in a file that contain a particular word.
- Append the contents of two files in a file JABC.
- Count the number of files in a directory.

Write shell programs

1. Display all the users currently logged in detail with colim headers.
2. List all files in current directory and save the list in a file ABC. Also save the contents of the files in ABC and display the contents in ABC in sorted order.
3. Sort the contents of a file ABC and save it in OABC
4. Display all the users currently logged in detail with column headers.
5. To save current date & time, number of files & directories in the current

a. directory and contents of all the files to a single file NFL.

6. To input a number and test whether it is +ve, -ve, or zero.
7. To test whether a filename is a regular file or a directory or of other type
8. To list only the directories in current path.
9. To print the greatest of three numbers.
10. To print 12 terms of Fibonacci series.
11. To display all users currently logged in & also check a particular user every 30 seconds until he logs in.
12. To save current date & time, number of files in the current directory and
    a. contents of all the files matching a pattern to a single file NPFL.
13. To display particular messages depending on the weekday.
14. To display common messages for following group of days- Monday &
    a. Wednesday, Tuesday & Thursday and Friday & Saturday and other day.
15. xv. To accept a string from the terminal and echo a suitable message if it doesn't have at least 9 characters.
16. Write a Shall Script to find the factorial of a number.
17. Write a Shall Script to swap numbers using third variable.
18. Write a Shall Script to print prime numbers between 1 to 20.
19. Write a Shall Script to greatest of three numbers.
20. Write a Shall Script to sort the contents of a file XYZ and save it in BCAII
21. Write a Shall Script to display mathematical table of any number in the format Ex.:-3*1=3

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks: 50 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

Name & Signature of Members of Board of Studies

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

Lab Course

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA Semester -III		Session:2024-2025
1	Course Code	BCA-306(P)		
2	Course Title	Java Lab		
3	Course Type	Practical		
4	Course Learning Outcome (CLO)	This Course will enable the students to: 1. Students will be able to understand key features of the various Operating Systems. 2. Implement various commands of Linux Operating System. 3. Students will be able to understand the directory structure of Operating System.		
5	Credit Value	1 Credit	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks: 50		Minimum Passing Marks: 20

Note:

1. In every program there should be comment for each coded line or block of code.
2. Practical files should contain printed program with name of author, date, path of program, unit no and printed output.
3. All the following programs or a similar type of programs should be prepared.

PART B: CONTENT OF THE COURSE
Total no. of Teaching/ Learning Periods = 2 Periods /week
Java Programs to implement the basics of Java. 1. WAP that implements the Concept of Encapsulation. 2. WAP to demonstrate concept of Polymorphism (Overloading and Over-ridding) 3. WAP the use Boolean data type and print the Prime number Series up to 50. 4. WAP for matrix multiplication using input/output Stream. 5. WAP to add the elements of Vector as arguments of main method (Run time) and rearrange them, and copy it into an Array.

6. WAP to check that the given String is palindrome or not.
7. WAP to arrange the String in alphabetical order.
8. WAP for String Buffer class which perform the all methods of that class.
9. WAP to calculate Simple Interest using the Wrapper Class.
10. WAP to calculate Area of various geometrical figures using the abstract class.
11. WAP where Single class implements more than one interfaces and with help of interface reference variable user call the methods.
12. WAP that use the multiple catch statements within the try-catch mechanism.
13. WAP where user will create a self-Exception using the "throw" keyword.
14. WAP for multithread using the isAlive(), join() and synchronized() methods of Thread class.
15. WAP to create a package using command and one package will import the another package.
16. WAP for AWT to create Menu and Popup Menu for Frame.
17. WAP for Applet that handle the KeyBoard Events.
18. WAP, which support the TCP/IP protocol, where client gives the message and server will be, receive the message.
19. WAP to illustrate the use of all methods of URL class.
20. WAP for JDBC to insert the values into the existing table by using prepared Statement.
21. WAP for JDBC to display the records from the existing table.
22. WAP to demonstrate the Border Layout using applet.
23. WAP for Applet who generate the MouseMotionListener Event.
24. WAP for display the checkboxes, Labels and TextFields on an AWT.
25. WAP to calculate the Area of various geometrical figures using the abstract class.
26. WAP for creating a file and to store data into that file.(Using the FileWriterIOStream)
27. WAP to display your file in DOS console use the Input/Output Stream.
28. WAP to create an Applet using the HTML file, where Parameter Pass for font Size and Font type and Applet message will change to corresponding parameters.

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks: 50 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

Name & Signature of Members of Board of Studies

GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

SEC Course

PART A: INTRODUCTION				
Program: BCA (UG)		**Class: BCA**	**Semester -III**	**Session:2024-2025**
1	**Course Code**	**BCA-307(L+P)**		
2	**Course Title**	**SEC - Computer Hardware and Networking**		
3	**Course Type**	**Theory + Practical**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** 1. Students will be able to Assemble the computer System and Installation of Operating System. 2. Also able to understand and configure computer network using various network devices.		
5	**Credit Value**	**2 Credit**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks: 50**		**Minimum Passing Marks: 20**

PART B: CONTENT OF THE COURSE
Total no. of Teaching/ Learning Periods = 1 Periods /week
Introduction to Computer Hardware. Introduction to Computer hardware, various io devices, Mother board and other circuit boards, Internal and external DOS Commands for computer hardware. **Introduction to Computer Network.** Basics of Computer Network. Types of networks, various Computer networking devices. Practical: - Hands on Training of Assembling the computer, Identifying Computer hardware devices circuit boards, memory devices, networking devices, cables, buses, ports etc.

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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program: BCA (UG)		**Class: BCA**	**Semester - III**	**Session:2024-2025**
1	**Course Code**	**BCA-308(L)**		
2	**Course Title**	**DSE- SAD & MIS**		
3	**Course Type**	**Theory**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Describe cloud computing concepts. • Identify various cloud services. • Evaluate various cloud delivery models. • Assess cloud characteristics and service attributes, for compliance with enterprise objectives. • Contrast the risks and benefits of implementing cloud computing		
5	**Credit Value**	**4 Credits**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :100**		**Minimum Passing Marks:40**

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Introduction** – Systems Concepts and the information systems environment: Definition of system, Characteristics of system, elements of system, types of system, The system Development life cycle: consideration of candidate's system. The Role of System Analyst: Introduction, the multiphase role of the analyst, the analyst/user interface, the place of the analyst in the MIS organization.	**12**

II	**System Analysis, Tools of Structured Analysis, Feasibility Study-** System Planning and initial investigation: Basis for planning in systems analysis, initial investigation, fact finding, fact analysis, determination of feasibility. Information Gathering: Kind of information gathering tools. Structured Analysis, flow chart, DFD, Data Decision Tree, Structured English, Decision Table, System Performance, Feasibility Study, Data analysis.	12
III	**System Design & System Implementation** –The process of Design Methodologies. Input Design. Form Design, File Structure, File organization, data base design, System Testing, the test plan, quality assurance, data processing auditor, Conversion, post implementation review, Software Maintenance.	12
IV	**Introduction To Mis & Other Subsystem –** Evolution of MIS, Need of MIS, Definition & Benefits of MIS, Characteristic, Role component of Information system, data base as a future of MIS, Decision making, logic of Management Information system, Structure of MIS.	12
V	**Information System Concept** – Deference between Transaction Processing, System (TPS) and Management Information System, How MIS works, MIS and Information Resource Management, Quality information Building Blocks for the information system, information system concept, other system characteristic (Open & Closed System), difference between MIS -& Strategic System Adaptive system, Business function information system.	12

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books:

1. System Analysis And Design – Elias M.Awad.
2. System Analysis And Design – Alan Dennis & Barbara Haley Wixo.
3. Management Information Systems – C.S.V. Murthy, Himalaya Publication House.
4. J. Kanter, "Management/Information Systems", PHI.
5. Gordon B. Davis, M. H. Olson, "Management Information Systems – Conceptual foundations, structure and Development", McGraw Hill.

Reference Books:

Online Resources: (e- Resources/ e- Books/ e- Learning Portals):

PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods: **Maximum Marks:** **100 Marks** **Continuous Comprehensive Evaluation (CCE):** **20 Marks** **Semester End Exam (SEE):** **80 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks	
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**	

Name & Signature of Members of Board of Studies

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FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

BCA –IV SEMESTER

Course Code	Course Name	Theory Marks		Internal Marks		Practical Marks		Total Marks		Teaching Load per Week			Credits
										L	T	P	
		Max. (A)	Min. (B)	Max. (C)	Min. (D)	Max. (E)	Min. (F)	Max.	Min.				
BCA 401(L)	AEC- Environmental Studies and Human Rights	50	20	10	4			50	20	5	1		2
BCA 402(L)	DSC- Database Management System	60	24	15	6			75	30	5	1		3
BCA 403(L)	DSC- Data Structure	60	24	15	6			75	30	5	1		3
BCA 404(L)	DSC- Computer Networks	80	32	20	8			100	40	5	1		4
BCA 405(P)	LAB I: PC DBMS Lab					50	20	50	20	-	-	1X2	1
BCA 406(P)	LAB II: Data Structure Lab					50	20	50	20	-	-	1X2	1
BCA 407(L+P)	SEC– Artificial Intelligence	20	8	5	2	25	10	50	20	1		1x2	2
BCA 408 (L)	DSE- Software Engineering	80	32	20	8			100	40				4
BCA 409 (L+P)	VAC-	25	10	20	8	25	10	50	20	1		1x2	2
TOTAL MARKS								600	240				22

Part A: Introduction			
Program: **BCA**	Class: **BCA –III Semester**	Year: **2024**	Session:**2024-2025**
Course Code	**BCA-402(L)**		
Course Title	**DSC-Database Management System**		
Course Type	**Core Course (Theory)**		
Pre-requisite (if any)	None		
Course Outcome	At the end of this course, the students will be able to: 1. Understand the Databases and their design & development 2. Intellectual Cognitive/ analytical skills: Normalization of Databases. 3. Practical Skills: Using SQL and PL/SQL. 4. Transferable skills: Usage of DBMS design and administration. 5. Gather data to analyze and specify the requirements of a system and Design system components and environments. 7. Build general and detailed models that assist programmers in implementing a system.		
Credit Value	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
Total Marks	**Maximum Marks :100**	**Minimum Passing Marks:40**	

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Overview of Database Management:** Data. Information and knowledge, increasing use of data as a corporate resource, data processing verses data management, file-oriented approach verses database-oriented approach to data management, data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational.	9
II	**Relational Model & Relational Algebra :** Entry-Relational model as a tool for conceptual design-entities, attributes and relationships. ER diagrams; Concept of keys, Case studies of ER modelling Generalization; specialization and aggregation converting an ER model into relational schema. Extended ER features. Introduction to UML, Representation in UML, diagram (Class Diagram etc.)	9
III	**Relational Model & Relational Design: Relational Algebra:** select, project, cross product different types of joins (inner join, outer joins, self-join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages.	9

IV	**Structured Query Language (SQL):** Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms(1NF,2NF,3NF), Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF, De-normalization.	9
V	**Query Processing and Security:** Introduction to SQL, constructs (SELECT-----FROM, WHERE----GROUP BY---HAVING------ORDERBY------) INSERT, DELETE, UPDATE, DROP, VIEW definition and use, Temporary tables, Nested queries and correlated nested queries, Integrity constraints; Not Null unique, check, primary, key, foreign key, references, Inner and Outer joins. **Query processing:** parsing, translation, optimization, evaluation and overview of Query processing **protecting the Data Base:** Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security & Authorization in SQL.	9

Part C -Learning Resources

Text Books, Reference Books, Other Resources

BOOKS RECOMMENDED:

1. **Database System Concept:** *A. Silberschatz, H. F. Korth and S. Sudarshan, TMH*
2. **Fundamentals of database Systems**: *Elmasri & Nawathe, pearson Education*
3. **An Introduction to Database Systems:** *C.J. Date, AWL publishing Company*
4. **SQL, PL/SQL**: *Ivan Bayross, BPB Publication*
5. **An Introduction to Database Systems**: *Bipin Desai, Galgotia publication.*
6. **Datebase Management System:** *A. K. Majumdar & P. Bhattacharya, TMH.*

Reference Books

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

1. https://www.javatpoint.com/dbms-tutorial
2. https://www.geeksforgeeks.org/dbms/
3. https://www.tutorialspoint.com/dbms/index.htm

PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods: **Maximum Marks:** **100 Marks** **Continuous Comprehensive Evaluation (CCE):** **20 Marks** **Semester End Exam (SEE):** **80 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks	
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total** **= 80 Marks**	

Name & Signature of Members of Board of Studies

Part A: Introduction			
Program: **BCA**	Class: **BCA –III Semester**	Year: **2024**	Session:**2024-2025**
Course Code	**BCA-403(L)**		
Course Title	**DSC-Data Structure**		
Course Type	**Core Course**		
Pre-requisite (if any)	None		
Course Outcome	At the end of this course, the students will be able to: 1. Understand the basic concept of data structure 2. Describe the basics of array, record and pointers. 3. Understand and implement the uses of linked list, stack and queue. 4. Understand and implement the uses of trees. 5. Understand and implement the uses of various searching and sorting algorithm.		
Credit Value	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
Total Marks	**Maximum Marks :100**	**Minimum Passing Marks:40**	

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**INTRODUCTION:** Introduction, Basic terminology, Elementary data organization, Data structure, Data structure operation, Algorithms: complexity, time-space Tradeoff. Mathematical Notation and functions, Algorithmic Notation	9
II	**CONCEPT OF ARRAYS, RECORDS AND POINTERS:** Linear Array; Single Dimensional Array, Multidimensional Array, Static Array, Dynamic Array; **Pointers:** Introduction of Pointer, **Records:** Record Structures.	9
III	**LINKED LISTS, STACKS, QUEUES, RECURSION:** Link lists, traversing a linked list, searching a linked list; Insertion into a linked List, Deletion from a Linked List, Stacks, Array Representation of Stack; Queues.	9
IV	**TREES:** Binary Trees, Representing Binary Trees in Memory, Traversing binary tree, Traversal Algorithms using stacks, header nodes; threads, Binary Search Tree, Searching and Inserting in Binary Search Tree, Deleting in Binary Search tree.	9

V	**SORTING AND SEARCHING: Sorting:** Bubble Sort, Quick Sort, Insertion Sort, Selection Sort, Merge Sort; **Searching:** Liner Search, Binary Search, Searching and data modification, Introduction to hashing.	9

Part C -Learning Resources

Text Books, Reference Books, Other Resources

BOOKS RECOMMENDED:

I. Data Structure - **Seymour Lipschutz (Schaum's Series).**
2. Data *Structure & Program Design* - **Robert L. Kruse, 3" Ed., Prentice Hall.**

Reference Books

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.javatpoint.com/data-structure-tutorial
3. https://www.w3schools.com/dsa/
4. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **100 Marks**

Continuous Comprehensive Evaluation (CCE): **20 Marks**

Semester End Exam (SEE): **80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (02 each)	04 x 5 = 20 Marks
	Question - C: Short answer type question	05 x 5 = 25 Marks
	Question -D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 80 Marks**

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Part A: Introduction			
Program: **BCA**	Class: **BCA –III Semester**	Year: **2024**	Session:**2024-2024**
Course Code	**BCA-404(L)**		
Course Title	**DSC- Computer Network**		
Course Type	**Core Course**		
Pre-requisite (if any)	None		
Course Outcome	At the end of this course, the students will be able to: 1. State the fundamentals related to network protocols, topology andvarious types of computer network. 2. Explain various transmission of digital data. 3. Understand basics of OSI models and its functions. 4. Understand basics of various functions and protocols of TCP/IP Model. 5. Understand the fundamentals and features of computer network security.		
Credit Value	**4 Credits**	**1 credit =15 Hours – Learning and Observation**	
Total Marks	**Maximum Marks :100**	**Minimum Passing Marks:40**	

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	Topics (COURSE CONTENTS)	No. of Periods
I	**Introduction to Computer Networking:** Data Communication, Networks – Distributed Processing, Network Criteria, Applications; Protocols and Standards, Standard Organization, Line Configuration – Point to Point, Multi Point; Topology – Mesh, Star, Tree, Bus, Ring, Hybrid; Transmission mode, Categories of Network – LAN, MAN, WAN, Inter Networks.	**12**
II	**Transmission of Digital Data:** Analog and Digital, digital data transmission – parallel transmission, serial transmission, DTE-DCE interface – data terminal equipment, data circuit terminating equipment, standards, modems Transmission rate, Modem standards.	**12**
III	**The OSI Model:** ISO organization, The model – Layered architecture, functions of the layers – Physical layer , Data Link layer, Network layer, Transport layer, session layer, Presentation layer, Application layer.	**12**
IV	**TCP/IP Model & Protocols:** The TCP/IP reference model, comparison of TCP/IP & OSI, Introduction to Internet – ARPANET, Architecture of Internet, Client server model, WWW, IP Address Classes, Protocols: IP, HTTP, TCP, FTP, ARP.	**12**

V	**Network Security:** Introduction of Network Security and its importance. **Cryptography:** Definitions, **Symmetric Key Cryptography:** Traditional Ciphers, Simple modern Ciphers, **Asymmetric Key Cryptography: RSA,** Security Services, Digital Signatures.	**12**

Part C -Learning Resources
Text Books, Reference Books, Other Resources
BOOKS RECOMMENDED; 1. Introduction to Data communication & Networking – Behrouz & Forouzan 2. Computer Networking – Andres & Tanenbaum **Reference Books** **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)** 1. https://www.geeksforgeeks.org/computer-network-tutorials/ 2. https://www.javatpoint.com/computer-network-tutorial 3. https://www.tutorialspoint.com/data_communication_computer_network/index.htm

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**

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Lab Course

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA	Semester - V	Session:2024-2025
1	Course Code	BCA-405(P)		
2	Course Title	DSC- DBMS Lab		
3	Course Type	Practical		
4	Course Learning Outcome (CLO)	This Course will enable the students to: 1. Demonstrate an understanding of the relational data model. 2. Transform an information model into a relational database schema and to use a DDL, DCL and DML, and/or utilities to implement the schema using a DBMS. 3. Formulate, using relational algebra, solutions to a broad range of query problems. 4. Formulate, using SQL, solutions to a broad range of query and data update problems.		
5	Credit Value	1 Credit	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks: 50		Minimum Passing Marks: 20

Note:

1. In every program there should be comment for each coded line or block of code.
2. Practical files should contain printed program with name of author, date, path of program, unit no and printed output.
3. All the following programs or a similar type of programs should be prepared.

PART B: CONTENT OF THE COURSE
Total no. of Teaching/ Learning Periods = 2 Periods/ week

List of Practical

1. Using the following database,

   Colleges (ename, city, address, phone, afdate)
   Staffs (sid, sname, saddres, contacts)
   Staffjoines (sid, cname, dept, DOJ, post salary0
   Techings (sid, class, paperid, fsession, tsession)
   Subject (paperid subject paperno, papername)

   Write SQL statements for the following –

   a) Create the above tables with the given specifications and constraints.
   b) Insert about 10 rows as are appropriate to solve the following queries.
   c) List the name of the teachers teaching computer subjects.
   d) List the name and cities of all staff working in your college.
   e) List the names and cities of all staff working in your college who earn more than 15,000

f) Find the staffs whose names start with 'M' or 'R' and ends with 'A' and /or 7 characters long
g) Find the staffs whose date of joining is 2005.
h) Modify the database so that staff N1 now works in C2 College
i) List the names of subjects, which T1 teaches in this session or all sessions.
j) Find the classes that T1 do not teach at present session.

a. Find the colleges who have most number of staffs.
b. Find the staffs that earn a higher salary who earn greater than average salary of their college.
c. Find the colleges whose average salary is more than average salary of C2
d. Find the college that has the smallest payroll.
e. Find the colleges where the total salary is greater than the average salary of all colleges
f. List maximum average, minimum salary of each college.

a. List the names of the teachers, departments teaching in more than one department
b. Acquire details of staffs by name in a college of each college.
c. Find the names of staff that earn more than each staff of C2 College.
d. Give all principals a 10% rise in salary unless their salary become greater than 20,000 in such case give 5% rise.
e. Find all staff that do not work in same cities as the colleges they work.
f. List names of employees in ascending order according to salary who are working in your college or all colleges.

a. Create a view having fields sname, cname, dept, DOJ, and post
b. Create a view consisting of cname, average salary and total salary of all staff in that college.
c. Select the colleges having highest and lowest average salary using above views.

2. Create the following database,

Enrollment (enrollno, name, gender, DOB, address, phone)
Admission (admno, enrollno, course, yearsem, date, cname)
Colleges (cname, city, address, phone, afdate)
Fee Structure (course, yearsem, fee)
Payment (billno, admno, amount, pdate, purpose)

a) Create the above tables with the given specifications and constraints.
b) Insert about 10 rows as are appropriate to solve the following queries.
c) Get full detail of all students who took admission this year class wise
d) Get detail of students who took admission in Bhilai colleges.
e) Calculate the total amount of fees collected in this session
i) By your college ii) by each college iii) by all colleges
a) List the students who have not payed full fee
i) in your college ii) in all colleges
b) List the number of admission in your class in every year.
c) List the students in the session who are not in the colleges in the same city as they live in.
d) List the students in colleges in your city and also live in your city.

3. Create the following database,

Subjects (paperid, subject, paper, papername)
Test (paperid, date, time, max, min)
Score (rollno, paperid, marks, attendence)
Students (admno, rollno, class, yearsem)

a. Create the above tables with the given specifications and constraints.
b. Insert about 10 rows as are appropriate to solve the following queries.

c. List the students who were present in a paper of a subject.
d. List all roll numbers who have passed in fi9rst division .
e. List all student in BCA-II who have scored higher than average
   i) in your college ii) in every college
f. List the highest score, average and minimum score in BCA-II
   i) In your college ii) in every college

4. Using the following database
   Colleges (cname, city, address, phone, afdate)
   Staffs (sid, sname, saddress, contacts)
   Staff Joins (sid, cname, dept, DOJ, post salary)
   Teachings (sid, class, paperid, fsession, tsession)
   Subjects (paperid, subject, paperno, papername)

   Write SQL statements for the following –
   a. Create the above tables with the given specifications and constraints.
   b. Insert about 10 rows as are appropriate to solve the following queries.
   c. List the name of the teachers teaching computer subjects.
   d. List the names and cities of all staff working in your college.
   e. List the names and cities of all staff working in your college who earn more than 15,000
   f. Using the following database
      Colleges (cname, city, address, phone, afdate)
5. Using the following database
   Colleges (cname, city, address, phone, afdate)
   Staffs (sid, sname, saddress, contacts)
   Staff Joins (sid, cname, dept, DOJ, post, salary)
   Teachings (sid, class, paperid, fsession, tsession)
   Subjects (paperid, subject, paperno, papername)
   a. Find the staffs whose names start with 'M' or 'R' and ends with 'A' and/or 7 characters long.
   b. Find the staffs whose date of joining is 2005.
   c. Modify the database so that staff N1 now works in C2 college
   d. List the names of subjects which T1 teaches in this session or all sessions.
6. Using the following database
   Colleges (cname, city, address, phone, afdate)
   Staff (sid, sname, saddress, contacts)
   Staff Joins (sid, cname, dept, DOJ, post, salary)
   Teachings (sid, class, paperid, fsession, tsession)
   Subjects (paperid, subject, paperno, papername)
   a. Find the classess that T1 do not teach at present session.
   b. Find the college who have most number of staffs.
   c. Find the staffs who earn a higher salary who earn greater than everage salary of their college.
   d. Find the colleges whose average salary is more than average salary of C2
   e. Find the college that has the smallest payroll.
   f. Find the colleges where the total salary is greater than the average salary of all colleges.
   g. List maximum, average, minimum salary of each college
7. Using the following database
   Colleges (cname, city, address, phone, afdate)

Staffs (sid, sname, saddress, contacts)
Staff Joins (sid, cname, dept, DOJ, post, salary)
Teachings (sid, class, paperid, fsession, tsession)
Subjects (paperid, subject, paperno, papername)

a. Find the classes that T1 do not teach at present session.
b. List the names of the teachers, departments teaching in more than one departments.
c. Acquire details of staffs by name in a college or each college.
d. Find the names of staff who earn more than each staff of C2 college.
e. Give all principals a 10% rise in salary unless their salary becomes greater than 20,000 in such case give 5% rise.
f. Find all staff who do not work in same cities as the colleges they work.
g. List names of employees in ascending order according to salary who are working in your college or all colleges.

8. Using the following database

Colleges (cname, city, address, phone, afdate)
Staffs (sid, sname, saddress, contacts)
Staff Joins (sid, cname, dept, DOJ, post, salary)
Teachings (sid, class, paperid, fsession, tsession)
Subjects (paperid, subject, paperno, papername)

a.Find the classes that T1 do not teach at present session.
b. Create a view having fields sname, cname, dept, DOJ, and post
c.Create a view consisting of cname, average salary and total salary of all staff in that college.
d. Select the colleges having highest and lowest average salary using above views.
e. List the staff names of a department using above views.

9. Enrollment (enrollno, name, gender, DOB, address, phone)
Admission (admno, enrollno, course, yearsem, yearsem, data, cname)

a. Create the above tabls with the given specifications and constraints.
b. Insert about 10 rows as are appropriate to solve the following queries.
c. Get fullo detail of all students who took admission this year Classwise
d. Get detail of students who took admision in Bhilai colleges.
e. Calculate the total amount of fees collected in this session
i) by your college ii)bye each college iii)by all colleges

10. Enrollment (enrollno. Name, gender, DOB, address, phone)

Admission (admno, enrollno, course, yearsem, date, cname)

Colleges (cname, city, address, phone, afdate)

Fee Structure (course, yearsem, fee)

Payment (billno, admno, amount, pdate, purpose)

a.List the students who have not payed full fee
i) In your college ii) in all colleges
b. List the number of admissions in your class in every year.

c. List the students in the session who are nt in the colleges in the same city as they live in.

d. List the student in colleges in your city and also live in your city.

11. Subjects (paperid, subject, paper, papername)
Test (paperid, date, time, max, min)
Score (rollno, paperid, marks, attendence)
Students (admno, rollno, class, yearsem)

a. Create the above tables with the given specifications and Constraints

b. Insert about 10 rows as are appropriate to solve the following queries.

c. List the students who were present in paper of a subject.

d. List all roll numbers who have passed in first division.

e. Lit all students in BCA-II who have scored higher than average

i) in your college ii) in every college

f. List the highest score, average and minimum score in BCA-II

i) in your college ii) in every college

PART C - LEARNING RESOURCES
Text Books, Reference Books, Other Resources
BOOKS RECOMMENDED: 1. **Database System Concept:** *A. Silberschatz, H. F. Korth and S. Sudarshan, TMH* 2. **Fundamentals of database Systems**: *Elmasri & Nawathe, pearson Education* 3. **An Introduction to Database Systems:** *C.J. Date, AWL publishing Company* 4. **SQL, PL/SQL**: *Ivan Bayross, BPB Publication* **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)** 1. https://www.javatpoint.com/dbms-tutorial 2. https://www.geeksforgeeks.org/dbms/ 3. https://www.tutorialspoint.com/dbms/index.htm
PART D: ASSESSMENT AND EVALUATION
Suggested Continuous Evaluation Methods: **Maximum Marks: 50 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**

Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

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Note:

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA	Semester - V	Session:2024-2025
1	Course Code	BCA-406 (P)		
2	Course Title	**Data Structure Lab**		
3	Course Type	Practical		
4	Course Learning Outcome (CLO)	This Course will enable the students to: 1. Implement various basic data structures and its operations. 2. Implement various sorting and searching algorithms. 3. Implement various tree operations. 4. Implement various graphs algorithms. 5. Develop simple applications using various data structures. Develop algorithms using various searching and sorting techniques		
5	Credit Value	1 Credit	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks: 50		Minimum Passing Marks: 20

1. In every program there should be comment for each coded line or block of code.
2. Practical files should contain printed program with name of author, date, path of program, unit no and printed output.
3. All the following programs or a similar type of programs should be prepared.

PART B: CONTENT OF THE COURSE
Total no. of Teaching/ Learning Periods = 2 Periods/ week

List of Pratical

1. Write a program to perform following operations in one dimensional array, Insertion, Deletion and Searching (Linear &Binary).
2. Write a program to implement stack and perform push and pop operations.
3. Write a program to convert infix to postfix expressions using stack.
4. Write a program to perform following operations on a linear queue - addition, deletion, traversing.
5. Write a program to perform following operations on a circular queue - addition, deletion, traversing.
6. Write a program to perform following operations on a double ended queue - addition, deletion, traversing.
7. Write a program to perform following operations on a single link list-creation, inversion, deletion.
8. Write a program to perform following operations on a double link list – creation, insertion, deletion.
9. Write a program to implement polynomial in link list and perform.

a) Polynomial arithmetic b) Evaluation of polynomial

10. Write a program to implement a linked stack and linked queue.
11. Write programs to perform Insertion, selection and bubble sort.
12. Write a program to perform quick sort.
13. Write a program to perform merge sort.
14. Write a program to perform heap sort.
15. Write a program to create a Binary search tree and perform –insertion, deletion & traversal.
16. Write a program to traversal of graph (B.F.S, D.F.S)

PART C - LEARNING RESOURCES
Text Books, Reference Books, Other Resources
Recommended Books: 1. "Data structure using C" by Samir kumarBandyopadhyay, KashiNathDey 2. "C and Data structures" by Ashok K Kamthane Pearson Education. 3. "An Introduction to Data Structures with Application" by Tremblay & Sorenson (TMH) 4. "Fundamentals of Data Structure" by Horowitz &Sahni (Golgotia) 5. "Data Structures using C/C++" by Rajesh Shukla, Wiley India **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)** 1. https://www.geeksforgeeks.org/data-structures/ 2. https://www.javatpoint.com/data-structure-tutorial 3. https://www.w3schools.com/dsa/ 4. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
PART D: ASSESSMENT AND EVALUATION
Suggested Continuous Evaluation Methods: **Maximum Marks: 50 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**

Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

SEC Course

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA	Semester -III	Session:2024-2025
1	Course Code	BCA-407(L+P)		
2	Course Title	SEC - Artificial Intelligence		
3	Course Type	Theory + Practical		
4	Course Learning Outcome (CLO)	**This Course will enable the students to** understand Artificial Intelligence and its concept. Also able to write logical programming using PROLOG.		
5	Credit Value	2 Credit	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks: 50		Minimum Passing Marks: 20

PART B: CONTENT OF THE COURSE
Total no. of Teaching/ Learning Periods = 1 Periods /week

Introduction to Artificial Intelligence

Introduction to Artificial Intelligence, History, Applications of Artificial Intelligence, Types of Artificial Intelligence. Intelligent Agent, Knowledge base, Problem-solving algorithms, Applications of AI, recent trends in AI, Future of AI in Computer science.

Practical based on AI will be performed in Python/ PROLOG/ LISP

Recommended Books:

Artificial Intelligence – A Modern Approach, 3rd Edition, Author: Stuart Russell and peter Norving, Publisher: Prentice Hall.

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GOVT. V.Y.T.PG AUTONOMOUS COLLEGE DURG

FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA Semester - IV		Session:2024-2025
1	Course Code	BCA-408(L)		
2	Course Title	DSE- Software Engineering		
3	Course Type	Theory		
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics • Understand the various process models. • An ability to communicate effectively with a range of audiences. • Be able to design software by applying the software engineering principles. • Understand the concept of software requirement specification.		
5	Credit Value	4 Credits	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :100		Minimum Passing Marks:40

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)		
Unit	Topics (COURSE CONTENTS)	No. of Periods
I	**Introduction** – Systems Concepts and the information systems environment: Definition of system, Characteristics of system, elements of system, types of system, The system Development life cycle: consideration of candidate's system. The Role of System Analyst: Introduction, the multiphase role of the analyst, the analyst/user interface, the place of the analyst in the MIS organization.	12

II	**System Analysis, Tools of Structured Analysis, Feasibility Study-** System Planning and initial investigation: Basis for planning in systems analysis, initial investigation, fact finding, fact analysis, determination of feasibility. Information Gathering: Kind of information gathering tools. Structured Analysis, flow chart, DFD, Data Decision Tree, Structured English, Decision Table, System Performance, Feasibility Study, Data analysis.	12
III	**System Design & System Implementation** –The process of Design Methodologies. Input Design. Form Design, File Structure, File organization, data base design, System Testing, the test plan, quality assurance, data processing auditor, Conversion, post implementation review, Software Maintenance.	12
IV	**Introduction To Mis & Other Subsystem** – Evolution of MIS, Need of MIS, Definition & Benefits of MIS, Characteristic, Role component of Information system, data base as a future of MIS, Decision making, logic of Management Information system, Structure of MIS.	12
V	**Information System Concept** – Deference between Transaction Processing, System (TPS) and Management Information System, How MIS works, MIS and Information Resource Management, Quality information Building Blocks for the information system, information system concept, other system characteristic (Open & Closed System), difference between MIS -& Strategic System Adaptive system, Business function information system.	12

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books:

1. System Analysis And Design – Elias M.Awad.
2. System Analysis And Design – Alan Dennis & Barbara Haley Wixo.
3. Management Information Systems – C.S.V. Murthy, Himalaya Publication House.
4. J. Kanter, "Management/Information Systems", PHI.
5. Gordon B. Davis, M. H. Olson, "Management Information Systems – Conceptual foundations, structure and Development", McGraw Hill.

Reference Books:

Online Resources: (e- Resources/ e- Books/ e- Learning Portals):

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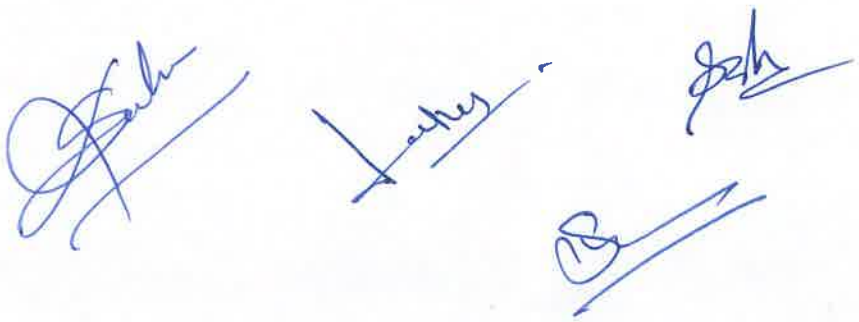
FOUR YEARS UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

BCA -V SEMESTER

Course Code	Course Name	Theory Marks		Internal Marks		Practical Marks		Total Marks		Teaching Load per Week			Credits
										L	T	P	
		Max. (A)	Min. (B)	Max. (C)	Min. (D)	Max. (E)	Min. (F)	Max.	Min.				
BCA 501(L)	DSC- Statistical Analysis	80	32	20	8			100	40	5	1		4
BCA 502(L)	DSC-Dot Net Technology	60	24	15	6			75	30	4	1		3
BCA 503(L)	DSC- Computer Graphics	60	24	15	6			75	30	4	1		3
BCA 504(P)	LAB I: Dot Net Technology Lab					25	10	25	10	-	-	1X2	1
BCA 505(P)	LAB II: Computer Graphics Lab					25	10	25	10	-	-	1X2	1
BCA 506(L)	DSE1- Cloud Computing	80	32	20	8			100	40	5	1		4
BCA 507(L)	DSE2-E-Commerce and its Application	80	32	20	8			100	40	5	1		4
BCA 508 (L+P)	SEC –Project / Internship					50	20	50	20	1		1x2	2
TOTAL MARKS								550	220				22



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FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

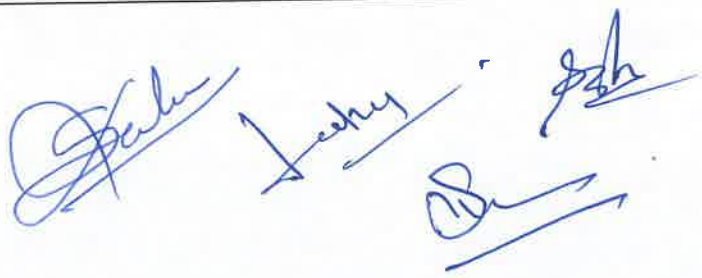
COURSE CURRICULUM 2024-25

Theory Course

BCA V SEMESTER

PART A: INTRODUCTION				
Program: BCA (UG)		**Class: BCA**	**Semester - V**	**Session:2024-2025**
1	**Course Code**	**BCA-501(L)**		
2	**Course Title**	**DSC- Statistical Analysis**		
3	**Course Type**	Theory		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Organize, manage and present data. • Analyze statistical data graphically using frequency distributions and cumulative frequency distributions. • Apply the rules and algorithm of probability and statistics in various logical problems. • Analyze statistical data using measures of central tendency, dispersion and location. • Mathematical probabilistic models for different problems, to analyze them and to interrupt the results.		
5	**Credit Value**	**4 Credits**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :100**		**Minimum Passing Marks:40**

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	COMBINATORICS: Permutation and Combination, Repetition and Constrained Repetition, Binomial Coefficients, Binomial Theorem.	12



II	Frequency distributions, Histograms and frequency polygons, Measures of central tendency: Mean, Mode, Median, Dispersion, Mean deviation and standard deviation. Moments, Skewness, kurtosis.	12
III	**Elementary probability theory:** Definition, conditional probability, Probability distribution, mathematical expectation. **Theoretical distribution:** Binomial , Poisson and Normal distribution, Relation between the binomial, poisoned Normal distribution.	12
IV	**Correlation and Regression:** Linear Correlation, Measure of Correlation, Least Square Regression lines. **Curve fitting: Method** of least square, least square line, least squares Parabola. Chi-square test: definition of chi-square; signification test: contingency test, coefficient of contingency.	12
V	**Basic of sampling theory:** Sample mean and variance, students t-test, test of Hypotheses and significance, degree of freedom, Z-test, small and large sampling, Introduction to Monte Carlo method.	12

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

1. Advanced Engineering Mathematics: H.K. Doss; S. Chand & Co., 9 Revised Edition, 2001.
2. Discrete Mathematics: S.K. Sarkar; S. Chand & Co., 2000.
3. Numerical Analysis: S.S. Sastry; Prentice Hall of India, 1998.
4. Mathematical Statistics: J.N. Kapoor and H.C. Saxena.
5. Mathematical Statistics: M. Ray and H. Sharma.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

1. https://www.w3schools.com/statistics/
2. https://www.tutorialspoint.com/statistics/index.htm
3. https://www.geeksforgeeks.org/data-analysis-tutorial/

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks:** **100 Marks** **Continuous Comprehensive Evaluation (CCE):** **20 Marks** **Semester End Exam (SEE):** **80 Marks**	
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) - 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**

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PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA Semester - V		Session:2024-2025
1	Course Code	BCA-502(L)		
2	Course Title	DSC- DOT NET TECHNOLOGY		
3	Course Type	Theory		
4	Course Learning Outcome (CLO)	This Course will enable the students to: • **Create** and **manipulate** GUI components in VB. • **Design** and **Implement** Windows Applications using Windows Forms, Control Library, Advanced UI Programming & Data Binding concepts • **Design** and **Implement** database connectivity using ADO.NET in window-based application. • **Identify** and resolve problems (debug /trouble shoot) in VB.NET window-based application • **Identify** Industry defined problem and suggesting solution(s) using .NET application.		
5	Credit Value	3 Credits	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :75		Minimum Passing Marks:30

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	Topics (COURSE CONTENTS)	No. of Periods
I	**Inside the .Net Framework:** Overview of .Net framework, Features of .Net, CLR, Common Language Specification, !IT compilation, MSIL, Namespace, FCL, Assemblies, Common Type System, Cross Language, interoperability, Garbage Collection.	9
II	**Programming with VB.Net:** Data types, Variables, Constant, Type Conversions, Operators, Control Structure: Conditional Statement, loops(do loop, for loop, while loop, for Each...Next loop), arrays, Declaring arrays and dynamic arrays, Types, Structure, Enumeration, Sub Procedure, Functions.	9

III	**Windows Form:** Windows Form: Working with visual Studio IDE, Creating a .Net Solution, simple forms, MDI forms, windows forms: Control class, TextBox, Richtextboxes, Labels, Button, Checkbox, Radio Button, Panels, Group box, Listbox , Checked list box, Combobox , Picture box, Scrollbar, Timer, Trackbar, Progress bar. Msgbox Function, Message Box. Show Method, Input Box function, Creating MDI application. Menus, creating Menu, sub menu Items, Context Menu.	9
IV	**OOPS concept:** Class and objects, creating classes, objects, creating data member, creating class shared data member, shared methods, shared properties, overloading methods and properties, with statement, constructor, Destructor(using finalize method), Inheritance, overriding base class member, inheriting constructor, overloading base class member.	9
V	**Database Programming:** Database concept, Ado.net Architecture, .Net Data Provider (Connection class: OledbConnection, SqIConnection, Command class : SqICommand class, OleDbCommand class, DataAdapter class, DataReader class), Dataset Component, Creating Database application using windows forms(DB connectivity through ADO.Net), accessing data from database, navigate in data, working with Data Grid.	9

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

1. MSDN online — By Microsoft.
2. Visual Basic .NET Complete — BPB Publications, New Delhi.
3. The Complete Reference VB. NET — Jeffery R. Shapiro, Tata McGraw Hill.
4. Visual Basic .NET Programming Black Book — Steven Holzner by Dreamtech Press.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals):

1. **https://dotnettutorials.net/**
2. **https://dotnet.microsoft.com/en-us/learn**
3. **https://www.javatpoint.com/net-framework**
4. **https://www.tutorialspoint.com/dotnet_core/index.htm**
5. **https://www.w3schools.com/asp/default.ASP**

PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods: **Maximum Marks:** **75 Marks** **Continuous Comprehensive Evaluation (CCE):** **15 Marks** **Semester End Exam (SEE):** **60 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks	
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (01 each) Question - C: Short answer type question Question - D: Long answer type question **Total**	02 x 5 = 10 Marks 03 x 5 = 15 Marks 07 x 5 = 35 Marks **= 60 Marks**

Name & Signature of Members of Board of Studies

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA Semester - V		Session:2024-2025
1	Course Code	BCA-503(L)		
2	Course Title	DSC- COMPUTER GRAPHICS		
3	Course Type	Theory		
4	Course Learning Outcome (CLO)	**This Course will enable the students to:** • To implement various algorithms to scan, convert the basic geometrical primitives, transformations and clipping. • To define the fundamentals of animation, graphic design and its related technologies. • To describe the importance of viewing and projections. • To implement Computer Graphics concepts		
5	Credit Value	3 Credits	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :75		Minimum Passing Marks:30

PART B: CONTENT OF THE COURSE

Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)

Unit	Topics (COURSE CONTENTS)	No. of Periods
I	**Introduction of Computer Graphics:** Application areas of Computer Graphics, Overview of graphics systems. Graphics primitives: video-display devices, and raster-scan systems, random scan systems, Plasma displays, LCD, input devices, input techniques.	9
II	**Output Primitives:** Points and lines, Line drawing algorithms: DDA, Bresenham's algorithm, Mid-point algorithm, Circle drawing algorithms: Mid-point algorithm, Bresenham's algorithm, Ellipse drawing Bresenham's algorithm, Filled area primitives: Scan line polygon fill algorithm, Boundary-fill and Flood-fill algorithms.	9
III	**2-D Geometrical Transforms:** Translation, rotation, scaling, reflection and shear transformations, homogeneous coordinate system, composite transforms, transformations between coordinate systems, Introduction of 3-D Transformation	9

IV	**2-D Viewing:** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland – Hodgeman polygon clipping algorithm, Curve clipping, Text clipping.	9
V	**Computer Animation:** Design of animation sequence, General computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.	9

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

1. Donald Hearn & M.Pauline Baker, Computer Graphics C Version, Pearson Education
2. VanDam, Feiner & Hughes, Computer Graphics Principles &Practice, Pearson Education.
3. Steven Harrington, Computer Graphics, Tata McGraw Hill.
4. Schaum's Outline Computer Graphics,McGraw-Hill

Reference Books:

1. Donald Hearn & M.Pauline Baker, Computer Graphics, Prentice Hall of India.
2. Zhigand Xiang, Roy Plastock, Schaum's Outlines, Computer Graphics, Second Edition, Tata Mc-Graw Hill.
3. David F Rogers, Procedural Elements for Computer Graphics, Tata McGraw Hill,
4. Govil Shalin, Principles of Computer Graphics, PAI, Springer.
5. Steven Harrington, Computer Graphics, Tata McGraw Hill.
6. Amrendra N Sinha and Arun D Udai," Computer Graphics", TMH

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

1. https://www.javatpoint.com/computer-graphics-tutorial
2. https://www.tutorialspoint.com/computer_graphics/index.htm
3. https://www.geeksforgeeks.org/computer-graphics-2/

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks:	**75 Marks**
Continuous Comprehensive Evaluation (CCE):	**15 Marks**
Semester End Exam (SEE):	**60 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks.

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit**	
	Question - A & B: (Compulsory) Very short answer type (01 each)	02 x 5 = 10 Marks
	Question - C: Short answer type question	03 x 5 = 15 Marks
	Question - D: Long answer type question	07 x 5 = 35 Marks
	Total	**= 60 Marks**

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FOUR YEARS UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

Lab Course

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA Semester - V		Session:2024-2025
1	Course Code	BCA-504(P)		
2	Course Title	DSC- **Dot Net Technology Lab**		
3	Course Type	Practical		
4	Course Learning Outcome (CLO)	**This Course will enable the students to:** • Create and manipulate GUI components in VB.Net • Design and Implement Windows Applications using Windows Forms, Control Library, Advanced UI Programming & Data Binding concepts • Design and Implement database connectivity using ADO.NET in window based application. • Identify and resolve problems (debug /trouble shoot) in VB.NET window based application • Identify Industry defined problem and suggesting solution(s) using .NET application. •		
5	Credit Value	1 Credit	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :25		Minimum Passing Marks:10

Part B:

List of Programs:

1. Write a program to find maximum between three numbers.
2. Write a program to check whether a number is negative, positive or zero.
3. Write a program to check whether a year is leap year or not.
4. Write a program to check whether a character is alphabet or not.
5. Write a program to find all roots of a quadratic equation

6. Design an application to input marks of five subjects Physics, Chemistry, Biology, Mathematics and Computer. Calculate percentage and grade according to following:
   Percentage >= 90% :
   Grade A Percentage >=
   80% : Grade B Percentage
   >= 70% : Grade C
   Percentage >= 60% :
   Grade D Percentage >=
   40% : Grade E Percentage
   < 40% : Grade F

7. Design an application to input basic salary of an employee and calculate its Gross salary according to following:
   Basic Salary <= 10000: HRA = 20%, DA = 80%
   Basic Salary a 20000: HRA = 25%, DA = 90%
   Basic Salary > 20000: HRA = 30%, DA = 95%
8. Design an application to input electricity unit charges and calculate total electricity bill according to the given condition:
   For first 50 units Rs. 0.50/unit
   For next 100 units Rs. 0.75/unit
   For next 100 units Rs. 1.20/unit
   For unit above 250 Rs. 1.50/unit
   An additional surcharge of 20% is added to the bill
9. Write a program to convert decimal to binary number system using bitwise operator.
10. Write a program to swap two numbers using bitwise operator
11. Write a program to create Simple Calculator using select case.
12. Write a program to find sum of all natural numbers between 1 to n .
13. Write a program to find first and last digit of any number 1
14. Write a program to enter any number and print its reverse.
15. Write a program to enter any number and check whether the number is palindrome or not.
16. Write a program to check whether a number is Armstrong number or not.
17. Write a program to print Fibonacci series up to n terms.
18. Write a program to print Pascal triangle upto n rows.
19. Write a program to print all negative elements in an array.
20. Design a digital clock using timer control.

21. Design an application that accepts the item name from the user and add it to a listbox and combobox.

22.Create an application that offers various food items to select from check boxes and a mode of payment using radio button. It then display the total amount payable.

23.Create an application to implement the working of Context menu on textbox.

24.WAP to illustrate all functionalities of listbox and combobox.

25.WAP using checkboxes for the following font effects.

Bold
Italic
Underline
Increase Font size
Decrease Font size
Font Color

26.WAP for temperature conversion using radiobutton

27. WAP to launch a rocket using Picturebox and Timer control.

28.WAP to change the back color of any control using scrollbox.29.WAP to search an element for one dimensional array.

29. Design a menu such that it contain submenu such as Addition, Subtraction, Scalar Multiplication, Multiplication, Transpose of two metrics.

30. Develop an application which is similar to notepad using menus.

31. Develop an application for facilitating purchasing order.

32. Develop an application for billing system in coffee shop

33. Develop an application which is similar to login formDefine a Class 'ACCOUNT' include following Data members: Name of depositor, Account no, type of Account, balance amount. Member Functions: To Deposit an amount, to withdraw an amount after checking balance, to show balance. Also provide proper validations wherever necessary. Write a main program to test above class.

34. Develop a project which displays the student information in the relevant fields from the database which already exists.

35. WAP to display records of a table using data dapter and code for buttons to move at first record, next record, previous record, last record in the table.

36. Create a table for employee and write a program using Dataset to add, delete, edit & navigate records.

37. WAP to access a database using ADO.net & display a key column in the combo box or list box when an item is selected in it, its corresponding records is shown in Datagridcontrol.

PART C - LEARNING RESOURCES	
Text Books, Reference Books, Other Resources	
TEXT BOOKS Recommended: 5. MSDN online — By Microsoft. 6. Visual Basic .NET Complete — BPB Publications, New Delhi. 7. The Complete Reference VB. NET — Jeffery R. Shapiro, Tata McGraw Hill. 8. Visual Basic .NET Programming Black Book — Steven Holzner by Dreamtech Press. **Online Resources: (e- Resources/ e- Books/ e- Learning Portals):** 6. https://dotnettutorials.net/ 7. https://dotnet.microsoft.com/en-us/learn 8. https://www.javatpoint.com/net-framework 9. https://www.tutorialspoint.com/dotnet_core/index.htm 10. https://www.w3schools.com/asp/default.ASP	
PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks: 25 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

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FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

Lab Course

PART A: INTRODUCTION				
Program: BCA (UG)		**Class: BCA**	**Semester - V**	**Session:2024-2025**
1	**Course Code**	**BCA-505(P)**		
2	**Course Title**	**DSC- Computer Graphics Lab**		
3	**Course Type**	**Practical**		
4	**Course Learning Outcome (CLO)**	**This Course will enable the students to:** • Using OpenGL for implementation of Computer Graphics concepts. • Implementation of the algorithms for 2D primitive object representations. • Implementation of algorithms for 2D modeling, transformations and animation. • To be able to discuss the application of computer graphics in graphic design applications like Adobe Photoshop, Macromedia Flash and Corel Draw. •		
5	**Credit Value**	**1 Credit**	**1 credit =15 Hours – Learning and Observation**	
6	**Total Marks**	**Maximum Marks :25**		**Minimum Passing Marks:10**

Part B

List of Program

1. Study of basic graphics functions defined in "graphics.h ".
2. Write a program to draw a Hut or other geometrical figures.
3. Write a program to draw a line using Bresenhem's Algo.
4. Write a program to draw a line using DDA algorithm.

5. Write a program to draw a line using Mid-Point algorithm.
6. Write a program to draw a circle using mid-point algorithm.
7. Write a program to draw an Ellipse using Mid-Point algorithm.
8. Write a program to rotate a Circle around any arbitrary point or around the boundary of another circle.
9. Write a menu driven program to rotate, scale and translate a line point, square, triangle about the origin.
10. Write a program to perform line clipping.
11. Write a program to implement reflection of a point, line.
12. Write a program to perform shearing on a line.
13. Write a program to implement polygon filling.
14. Write a program to implement transformations in three dimensions.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

1. Donald Hearn & M.Pauline Baker, Computer Graphics C Version, Pearson Education
2. VanDam, Feiner & Hughes, Computer Graphics Principles &Practice, Pearson Education.
3. Steven Harrington, Computer Graphics, Tata McGraw Hill.
4.Schaum's Outline Computer Graphics,McGraw-Hill

Reference Books:

1. Donald Hearn & M.Pauline Baker, Computer Graphics, Prentice Hall of India.
2. Zhigand Xiang, Roy Plastock, Schaum's Outlines, Computer Graphics, Second Edition, Tata Mc-Graw Hill.
3. David F Rogers, Procedural Elements for Computer Graphics, Tata McGraw Hill,
4. Govil Shalin, Principles of Computer Graphics, PAI, Springer.
5. Steven Harrington, Computer Graphics, Tata McGraw Hill.
6. Amrendra N Sinha and Arun D Udai," Computer Graphics", TMH

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

4. https://www.javatpoint.com/computer-graphics-tutorial
5. https://www.tutorialspoint.com/computer_graphics/index.htm
6. https://www.geeksforgeeks.org/computer-graphics-2/

PART D: ASSESSMENT AND EVALUATIO	
Suggested Continuous Evaluation Methods: **Maximum Marks:** 25 Marks **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

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PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA	Semester - V	Session:2024-2025
1	Course Code	BCA-506(L)		
2	Course Title	DSE1- Cloud Computing		
3	Course Type	Theory		
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Describe cloud computing concepts. • Identify various cloud services. • Evaluate various cloud delivery models. • Assess cloud characteristics and service attributes, for compliance with enterprise objectives. • Contrast the risks and benefits of implementing cloud computing		
5	Credit Value	4 Credits	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :100		Minimum Passing Marks:40

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)		
Unit	Topics (COURSE CONTENTS)	No. of Periods
I	**Fundamental Cloud Computing:** Concepts, Terminology, Technologies, Benefits, Challenges, SLAs and business cost metrics associated with cloud computing, SaaS, IaaS, PaaS delivery models, Common cloud deployment models and cloud characteristics, Various applications of cloud computing.	12
II	**Cloud Architecture:** The technology architecture of cloud platforms and cloud-based solutions and services and their utilization via a set of cloud computing design patterns, Hybrid cloud deployment models, Compound design patterns and solution architectures that span cloud and on-premise environments.	12
III	**Cloud Security & Governance:** The cloud security mechanisms, cloud security architecture, A set of security design patterns, The definition of cloud governance precepts, Roles, Practices and processes, Common governance challenges and pitfalls specific to cloud computing.	12

IV	**Cloud Storage:** The cloud storage devices, Structures and technologies, cloud storage mechanisms, Persistent storage, Redundant storage, Cloud-attached storage, Cloud-remote storage, Cloud storage gateways, Cloud storage brokers, Direct Attached Storage (DAS), Network Attached Storage (NAS), Storage Area Network (SAN), Various cloud storage-related design patterns.	12
V	**Cloud Virtualization & Microservices:** Core topic areas pertaining to the fundamental virtualization mechanisms and types used within contemporary cloud computing platforms are explored along with various key performance indicators and related metrics, Microservices of Cloud Computing.	12

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books :

1. Cloud Computing: Concepts, Technology & Architecture, Erl, Pearson Education India; 1 edition, 2014
2. Cloud Computing: Fundamentals By Timothy Chou's.

Reference Books:

1. The Basics of Cloud Computing: Understanding the Fundamentals of Cloud Computing in Theory and Practice 1st Edition byDerrick Rountree (Author), Ileana Castrillo (Author)

2. —Cloud Computing, A Practical Approachl Toby Velte, Anthony Velte, Robert Elsenpeter, McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009.

Online Resources: (e- Resources/ e- Books/ e- Learning Portals):

1. https://www.javatpoint.com/cloud-computing
2. https://www.geeksforgeeks.org/cloud-computing-tutorial/
3. https://www.tutorialspoint.com/cloud_computing/index.htm
4. https://www.w3schools.com/aws/aws_cloudessentials_cloudcomputing.php
5. https://www.simplilearn.com/tutorials/cloud-computing-tutorial
6. https://intellipaat.com/blog/cloud-computing-tutorial/

PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods: **Maximum Marks:** **100 Marks** **Continuous Comprehensive Evaluation (CCE):** **20 Marks** **Semester End Exam (SEE):** **80 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks	
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**	

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PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA	Semester - V	Session:2024-2025
1	Course Code	BCA-507(L)		
2	Course Title	DSE2- E-Commerce and its Application		
3	Course Type	Theory		
4	Course Learning Outcome (CLO)	This Course will enable the students to: • Analyze the impact of E-commerce on business models and • strategy. • Describe the major types of E-commerce. • Explain the process that should be followed in building an • E-commerce presence. • Identify the key securit threats in the E-commerce environment.		
5	Credit Value	4 Credits	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :100		Minimum Passing Marks:40

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)		
Unit	Topics (COURSE CONTENTS)	No. of Periods
I	**History of E-commerce and Indian Business Context:** E-Commerce – Emergence of the Internet – Emergence of the WWW – Advantages of E-Commerce – Transition to E-Commerce in India – The Internet and India – E-transition Challenges for Indian Corporate. Business Models for Ecommerce: Business Model – E-business Models Based on the Relationship of Transaction Parties - E-business Models Based on the Relationship of Transaction Types.	12
II	**Enabling Technologies of the World Wide Web:** World Wide Web, Internet Client-Server Applications, Networks and Internets, Software Agents, Internet Standards and Specifications, ISP. **e-Marketing:** Traditional Marketing – Identifying Web Presence Goals Marketing, E-advertising, E-branding.	12

III	**E-Security:** Information system Security – Security on the Internet – E-business Risk Management Issues – Information Security Environment in India. **Legal and Ethical Issues:** Cybers talking – Privacy is at Risk in the Internet Age – Phishing – Application Fraud – Skimming – Copyright – Internet Gambling – Threats to Children.	12
IV	**e-Payment Systems:** Main Concerns in Internet Banking – Digital Payment Requirements – Digital Token-based e-payment Systems – Classification of New Payment Systems – Properties of Electronic Cash – Cheque Payment Systems on the Internet – Risk and e-Payment Systems – Designing e-payment Systems – Digital Signature – Online Financial Services in India - Online Stock Trading.	12
V	**Information systems for Mobile Commerce:** What is Mobile Commerce? – Wireless Applications –Cellular Network – Wireless Spectrum – Technologies for Mobile Commerce – Wireless Technologies –Different Generations in Wireless Communication – Security Issues Pertaining to Cellular Technology. Portals for E-Business: Portals – Human Resource Management – Various HRIS Modules.	12

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOK:

1. P.T.Joseph, S.J., *"E-Commerce - An Indian Perspective"*, PHI 2012, 4th Edition.

REFERENCE BOOKS:

1. David Whiteley , "*E-Commerce Strategy, Technologies and Applications*", Tata McGraw Hill, 2001.
2. Ravi Kalakota, Andrew B Whinston, "*Frontiers of Electronic Commerce*", Pearson 2006, 12th Impression.

WEB REFERENCES:

- https://www.docsity.com/en/e-commerce-notes-pdf-lecture-notes-universitylevel/2484734/
- https://magnetoitsolutions.com/blog/advantages-and-disadvantages-of-ecommerce
- https://www.researchgate.net/publication/320547139ECommerce_Merits_and_Demerits_A_Review_Paper.

PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods: **Maximum Marks:** **100 Marks** **Continuous Comprehensive Evaluation (CCE):** **20 Marks** **Semester End Exam (SEE):** **80 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment-of 20 Marks	
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**	

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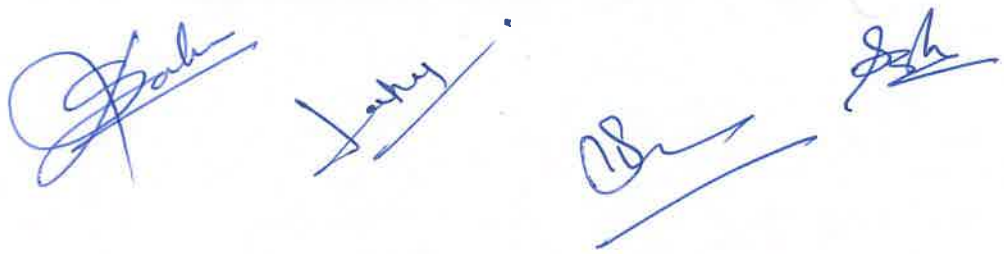

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA Semester - V		Session:2024-2025
1	Course Code	BCA-508(L+P)		
2	Course Title	SEC- WEB DEVELOPMENT USING ANGULARJS		
3	Course Type	Theory+Practical		
4	Course Learning Outcome (CLO)	**This Course will enable the students to:** On successful completion of the course, the student will be having the skill to **implement** modern web programming using AngularJS.		
5	Credit Value	2 Credits (1 theory and 1 practical)	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :50 (25 Theory and 25 Practical)		Minimum Passing Marks: (10 theory and 10 practical)

Part B: Course Content
Angular and AngularJS: overview of Angular, Introduction to AngularJS, AngularJS Expressions, AngularJS Modules, AngularJS Directives, AngularJS Model, AngularJS data binding, AngularJS Scopes, AngularJS Filters, AngularJS services, AngularJS Tables, AngularJS select, AngularJS Events, AngularJS Forms, AngularJS Validation, AngularJS API, AngularJS Dom, AngularJS SQL, AngularJS Application.

PART C - LEARNING RESOURCES	
Text Books, Reference Books, Other Resources	
TEXT BOOKS Recommended: 1. Brad Green, Shyam Seshadri, "O'Reilly Media, Inc.", 8 Apr 2013 - Computers - 196 pages **Online Resources: (e- Resources/ e- Books/ e- Learning Portals)** 1. https://angular.io/docs 2. https://www.w3schools.com/angular/ 3. https://www.geeksforgeeks.org/angularjs/?ref=ml_lbp 4. https://www.javatpoint.com/angularjs-tutorial	
PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks:** **Theory- 25 Marks** **Practical – 25 Marks** **Total = 50 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

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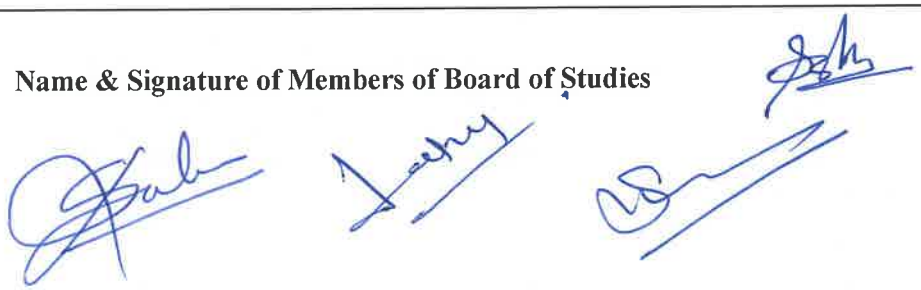

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FOUR YEAR UNDERGRADUATE PROGRAM

DEPARTMENT OF COMPUTER SCIENCE

COURSE CURRICULUM 2024-25

BCA -VI SEMESTER

Course Code	Course Name	Theory Marks		Internal Marks		Practical Marks		Total Marks		Teaching Load per Week			Credits
										L	T	P	
		Max. (A)	Min. (B)	Max. (C)	Min. (D)	Max. (E)	Min. (F)	Max.	Min.				
BCA 601(L)	DSC- Programming in Python	60	24	15	6			75	30	4	1		3
BCA 602(L)	DSC- Basics of IOT	60	24	15	6			75	30	4	1		3
BCA 603(L)	DSC- Computer System Architecture	80	32	20	8			100	40	5	1		4
BCA 604(P)	LAB I: Programming in Python Lab					25	10	25	10	-	-	1X2	1
BCA 605(P)	LAB II: Project Lab					25	10	25	10	-	-	1X2	1
BCA 606(L)	DSE1- Cyber Security.	80	32	20	8			100	40	5	1		4
BCA 607(L)	DSE2- Multimedia and its application	80	32	20	8			100	40	5	1		4
BCA 508 (L+P)	SEC – Project / Internship					50	20	50	20	1		1x2	2
TOTAL MARKS								550	220				22

Part A: Introduction				
Program: **Degree Course**		**Class: BCA**	**Semester - VI**	Session:**2024-2025**
1.	Course Code	**BCA-601(L)**		
2.	Course Title	**Programming in Python**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	Basic knowledge of programming and concept of object-oriented programming		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Define the structure and components of a Python program. • Demonstrate proficiency in handling of loops and creation of functions. Identify the methods to create and manipulate lists, tuples and dictionaries. • Discover the commonly used operations involving regular expressions and file system. • Interpret the concepts of Object-Oriented Programming as used in Python. • Determine the concept of Data visualization using matplotlib.		
6.	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
7.	**Total Marks**	**Maximum Marks :75**	**Minimum Passing Marks:30**	

Part B: Content of the Course		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**Topics**	**No. of Periods**
I	**Introduction to Python:** Installing Python, basic syntax, interactive shell, editing, saving, and running a script, the concept of data types; variables, assignments; immutable variables; numerical types, **Operators in Python** (Arithmetic Operator, Relational Operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise Operator, Increment or Decrement operator) and Expressions, Input and Output Statements, understanding error messages.	9
II	**Creating Python Programs:**, Control statements (Branching, Looping, Conditional Statement, exit function, **Function:** Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.	9
III	**String manipulations:** subscript operator, indexing, slicing a string; **strings and number system**: converting strings to numbers and vice-versa. Binary, Octal, Hexadecimal numbers. **Lists, Tuples, Dictionaries and Set ;** Basic list Operators, replacing, inserting, removing an element, searching and sorting lists, Accessing tuples, Operations, Working, Functions and Methods, dictionary	9

	literals, adding and removing keys, accessing and replacing values, Traversing Dictionaries. Using Set data types, operations on Set.	
IV.	**Classes and Objects:** Class Fundamentals, Declaring Object, Constructors, Defining Methods, method overloading, Inheritance: Inheritance basic and types, Member accessibility modifier: public, protected, private. **Exception Handling:** Exception, Exception Handling, except clause, try, finally clause, User defined exceptions.	9
V.	**Python File Operations:** manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated). **Data Visualization using Matplotlib**: - Purpose of plotting, drawing and saving of different basic Matplotlib charts (line plot, bar graph, histogram). Basic customization of plots: adding label, title, and legend in plots.	9

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Text Books Recommended:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Pyth, Freelyavailableonline, 2012
3. Luca Massaron John Paul Mueller, Python for Data Science For Dummies, Wiley, 2ed, 2019

Reference Books:

1. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition, O'Reilly, 2015
2. Zed A. Shaw, Learn Python 3 the Hard Way, Addison-Wesley, 2016

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

1. https://www.w3schools.com/python/
2. https://docs.python.org/3/tutorial/index.html
3. https://www.tutorialspoint.com/python/index.htm
4. https://www.javatpoint.com/python-tutorial
5. https://www.geeksforgeeks.org/python-programming-language-tutorial/
6. https://www.python.org/about/gettingstarted/

PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods: **Maximum Marks:** **75 Marks** **Continuous Comprehensive Evaluation (CCE):** **15 Marks** **Semester End Exam (SEE):** **60 Marks**		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks and Assignment of 15 Marks	
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (01 each) Question - C: Short answer type question Question - D: Long answer type question **Total**	02 x 5 = 10 Marks 03 x 5 = 15 Marks 07 x 5 = 35 Marks **= 60 Marks**

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Part A: Introduction				
Program: **Degree Course**		**Class: BCA**	**Semester - VI**	Session:**2024-2025**
1	Course Code	**BCA-602(L)**		
2	Course Title	**Basics of IOT**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	Basic knowledge of programming and concept of object-oriented programming		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Define the structure and components of a C# and ASP.Net. • Design the web pages using web controls of ASP.Net. • Understand and apply the validation tools in web pages. • Design a web page using master pages and its various properties. • Connect the SQLServer database with web pages using ASP.Net technology.		
6	**Credit Value**	**3 Credits**	**1 credit =15 Hours – Learning and Observation**	
7	**Total Marks**	**Maximum Marks :75**	**Minimum Passing Marks:30**	

Part B: Content of the Course		
Total no. of Teaching/ Learning Periods = 45 Periods (45 Hours)		
Unit	**Topics**	**No. of Periods**
I	**Introduction:** IOT - What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues. **Various IOT Protocols**.	9
II	**Hardware for IOT:** Sensors, Digital Sensors, Actuators, Radio Frequency Identification (RFID) Technology, Wireless sensor networks, Overview of IoT supported Hardware platforms: Arduino, Netduino.	9
III	**IOT ARCHITECTURE** - IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.	9
IV	WEB OF THINGS - Web of Things versus Internet of Things – Two Pillars of the Web – Architecture StandardizationforWoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence.. Load and LoadComplete events of the Page and MasterPage classes. Understanding ClientID and UniqueID properties.	9

V	**IOT APPLICATIONS** - IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc.	9

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Text Books Recommended:

1. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press,2012.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
3. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a HighlyConnected World", Cambridge University Press, 2010.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key
5. applicationsand Protocols", Wiley, 2012.

Reference Books:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", 1st Edition, Apress Publications, 2013
3. CunoPfister, Getting Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

1. https://www.javatpoint.com/iot-internet-of-things
2. https://www.tutorialspoint.com/internet_of_things/index.htm
3. https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/

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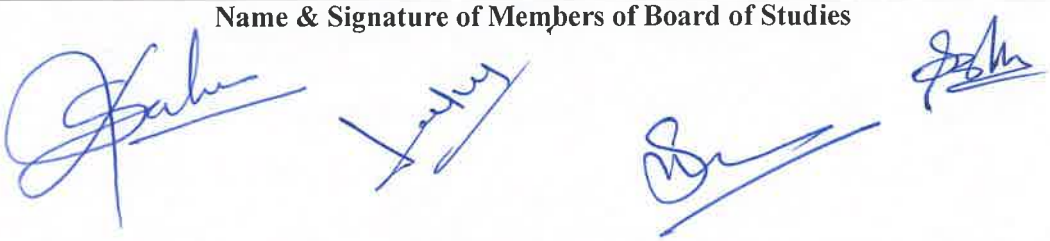

Part A: Introduction				
Program: **Degree Course**		**Class: BCA**	**Semester - VI**	Session:**2024-2025**
1	Course Code	**BCA-603(L)**		
2	Course Title	**Computer System Architecture**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	Basic knowledge of programming and concept of object-oriented programming		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: 1. Describe the fundamental organization of a computer system and number systems. 2. Explain the Boolean algebra with simplification methods and various types of logic circuits. 3. Explain fundamental functions of CPU Organization. 4. Describe basic concept of Input-output organization. 5. Distinguish the organization of various parts of a system memory hierarchy and memory management system.		
6	**Credit Value**	**4 Credits**	**1 credit =15 Hours – Learning and Observation**	
7	**Total Marks**	**Maximum Marks :100**	**Minimum Passing Marks:40**	

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Data Representation** — Data Types, Number System, Fixed Point Representation — I 's, 2's complements, Binary Fixed point representation, Arithmetic operation on Binary operation, Overflow & Underflow, Codes, ASCII, EBCDIC codes, Grey codes, Excess-3, BCD codes, Error detection & correcting codes.	**12**
II	**Digital Logic Circuits —** Logic Gates AND, OR, NOT, Gates & their truth tables, NOR, NAND & XOR Gates, Boolean algebra, Basic Boolean Law, Demorgan's theorem, Map Simplification, Minimizing technique, K Map, Sum of products, Product of sums, Combinational & sequential Circuits Half adder & Full adder, Flip Flop — RS, D, JK & T Flip Flop, Shift register.	**12**

III	CPU organization, ALU & control circuit, Idea about arithmetic circuits, Program control, Instruction sequencing, Introduction to Microprocessor, System buses, Registers, Program counter, Block diagram of a Macro computer system, Microprocessor control signals, Interfacing Devices, Introduction to Motherboard, SMPS.	12
IV	Input output organization, I/O Interface, Properties of simple I/O devices and their Controller, isolated versus Memory mapped I/O, Modes of Data transfer, Synchronous & Asynchronous Data Transfer, Handshaking, Asynchronous serial transfer, I/O processor.	12
V	Auxiliary memory - Magnetic drum, Disk & Tape, Semi conductor memories, Memory Hierarchy, Associative memory, Virtual memory, address space & memory space, Address mapping, Page table, Page replacement, cache memory, Hit ratio, Mapping Techniques.	12

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

1. Computer System architecture— M. Moris Mano
2. Computer Architecture and Organization — Nicholas P Carter, Schaum's Outlines
3. Computer Organization and Architecture — William Stallings

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

1. **https://www.javatpoint.com/computer-organization-and-architecture-tutorial**
2. **https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/**
3. **https://www.tutorialspoint.com/Computer-System-Architecture**

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks:** **100 Marks** **Continuous Comprehensive Evaluation (CCE):** **20 Marks** **Semester End Exam (SEE):** **80 Marks**	
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) - 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**

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Lab Course

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA Semester - VI		Session:2024-2025
1	Course Code	BCA-604 (P)		
2	Course Title	**Programming in Python Lab**		
3	Course Type	Practical		
4	Course Learning Outcome (CLO)	This Course will enable the students to: 1. Know basics of f python to write Programs. 2. Write program to handle String and List. 3. Implement program related to tuples and dictionary. 4. Design program related to objects and classes. 5. Design and plot various graph using matplotlib in python		
5	Credit Value	1 Credit	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :25		Minimum Passing Marks:10

PART B: List of Programs

1. Find the largest/smallest number in a list/tuple
2. Input a list of numbers and swap elements at the even location with the elements at the odd location.
3. Input a list/tuple of elements, search for a given element in the list/tuple.
4. Input a list of numbers and test if a number is equal to the sum of the cubes of its digits. Find the smallest and largest such number from the given list of numbers.
5. Create a dictionary with the roll number, name and marks of n students in a class and display the names of students who have marks above 75.
6. To print the highest and lowest values in the dictionary
    1. Read a text file line by line and display each word separated by #. Read a text file and
        a. display thenumber of vowels/ consonants/ uppercase/ lowercase characters in the
        b. file.
    2. Create a binary file with name and roll number. Search for a given roll number and display the name, ifnot found display appropriate message.
    3. Create a binary file with roll number, name and marks. Input a roll number and update the marks.

4. Remove all the lines that contain the character `a' in a file and write it to another file.
5. Write a program that reads an integer value and prints —leap year or —not a leap year.
6. Write a program that takes two number and print the sum of these numbers.
7. Write a program to create the following Pattern
8. For example enter a size: 5 -
9. *
10. **
11. **
12. ****
13. *****
14. Write a function that takes an integer n as input and calculates the value of 1 + 1/1! +
15. 1/2! + 1/n!
16. Write a function that takes an integer input and calculates the factorial of that number,
17. Write a function that takes a string input and checks if it is a palindrome or not.
18. Write a list function to convert a string into a list, as in list (-abc) gives [a, b, c].
19. Write a program to generate Fibonacci series.
20. Write a program to check whether the input number is even or odd.
21. Write a program to compare three numbers and print the largest one.
22. Write a program to print factors of a given number.
23. Write a method to calculate GCD of two numbers.
24. Write a program to create Stack Class and implement all its methods, (Use Lists).
25. Write a program to create Queue Class and implement all its methods, (Use Lists)
26. Write a program to implement linear and binary search on lists,
27. Write a program to sort a list using insertion sort and bubble sort and selection sort.
28. Write a Python program to generate a bar graph using matplotlib module.

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

Text Books Recommended:

4. T. Budd, Exploring Python, TMH, 1st Ed, 2011
5. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Pyth, Freelyavailableonline, 2012
6. Luca Massaron John Paul Mueller, Python for Data Science For Dummies, Wiley, 2ed, 2019

Reference Books:

3. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition, O'Reilly, 2015
4. Zed A. Shaw, Learn Python 3 the Hard Way, Addison-Wesley, 2016

Online Resources: (e- Resources/ e- Books/ e- Learning Portals)

7. https://www.w3schools.com/python/
8. https://docs.python.org/3/tutorial/index.html
9. https://www.tutorialspoint.com/python/index.htm
10. https://www.javatpoint.com/python-tutorial
11. https://www.geeksforgeeks.org/python-programming-language-tutorial/
12. https://www.python.org/about/gettingstarted/

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: **25 Marks**

(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)

Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

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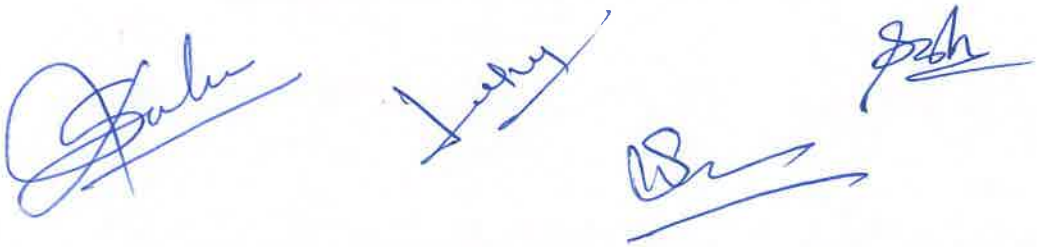

PART A: INTRODUCTION				
Program: BCA (UG)		Class: BCA	Semester - VI	Session:2024-2025
1	Course Code	BCA-605 (P)		
2	Course Title	DSC- Major Project		
3	Course Type	Practical		
4	Course Learning Outcome (CLO)	This Course will enable the students to experience the development of a live software using specific Technology to solve specific given real life problem.		
5	Credit Value	1 Credit	1 credit =15 Hours – Learning and Observation	
6	Total Marks	Maximum Marks :25		Minimum Passing Marks:10

NOTE: Live Project Survey/Visit of a part of IT Industry – Recognized It Company, NIC, CHIPs, Science Center, IT Park, NIT, IIT or Software company to make a student experienced of the Software development.

Use Python or ASP.Net technology for the Major Project.

Format of the student project report on completion of the project:

- Cover page as per format
- Certificate of Approval
- Certificate of project guide/Center Manager
- Certificate of Evaluation
- Declaration / Self certificate
- Acknowledgement
- Synopsis of the project
- Main Report
  - Objective & Scope of the project
  - Theoretical Background of Project
  - Definition of problem
  - System Analysis & Design
  - System Planning (PERT Chart)
  - Methodology adopted, system Implementation & details of Hardware & Software used
  - System maintenance & Evaluation
  - Cost and Benefit Analysis

- Detailed Life Cycle of the project
  - _ ERD, DFD
  - _ Input and Output Screen Design
  - _ Process involved
  - _ Methodology used for testing
  - _ Test Report, Printout of the code sheet
- User/Operational Manual – including security aspect, access rights, backup control etc.
- Conclusion
- References
- Soft copy of the project on CD

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods: **Maximum Marks:** **25 Marks** **(Will include Internal assessment, Lab records and End Semester Viva/Voce and performance)**	
Semester End Exam (SEE)	**Laboratory performance: As per Dept. (LOCF)**

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Part A: Introduction				
Program: **Degree Course**		**Class: BCA**	**Semester - VI**	Session:**2024-2025**
1	Course Code	**BCA-606(L)**		
2	Course Title	**DSE1: - Cyber Security**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	Basic knowledge of programming and concept of object-oriented programming		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Remember the broad set of technical, social & political aspects of Cyber Security. • Understand the importance of ethical hacking, its tool and ethical hacking process. • Analyse security principles to system design. • Understand the methods for authentication, access control, intrusion detection and prevention in Cyber Security		
6	**Credit Value**	**Theory : 5**		
7	**Total Marks**	**Max. Marks: 80**	**Min Passing Marks : 32**	

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Fundamentals of Cyber Security and Threat Landscape:** Importance and challenges in Cyber Security, Cyberspace, and Cyber threats, Cyber warfare, CIA Triad, Cyber Terrorism, Cyber Security of Critical Infrastructure	**12**
II	**Cyber Attacks and Intrusion Techniques:** Types of Hackers - Hackers and Crackers, Cyber-Attacks and Vulnerabilities, Malware threats, Sniffing, Gaining Access - Escalating Privileges, Executing Applications, Hiding Files, Covering Tracks. Worms, Trojans, Viruses, Backdoors	**12**
III	**Ethical Hacking and Information Security Practices:** Ethical Hacking Concepts and Scopes, Threats and Attack Vectors, Information Assurance, Threat Modeling, Enterprise Information Security Architecture, Vulnerability Assessment and Penetration Testing	**12**

IV	**Social Engineering and Insider Threats:** Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social engineering Targets and Defence Strategies.	**12**
V	**Legal Framework and Countermeasures in Cyber Security:** IT Act, Hackers-Attacker-Countermeasures, Web Application Security, Counter Cyber Security Initiatives in India, Cyber Security Incident Handling, Cyber Security Assurance	**12**

PART C - LEARNING RESOURCES

Text Books, Reference Books, Other Resources

TEXT BOOKS Recommended:

1. Cyber Security and Cyber Laws Nilakshi Jain Wiley
2. Cyber Security Nina Godbole Wiley

Online Resources: (e- Resources/ e- Books/ e- Learning Portals):

1.

PART D: ASSESSMENT AND EVALUATION

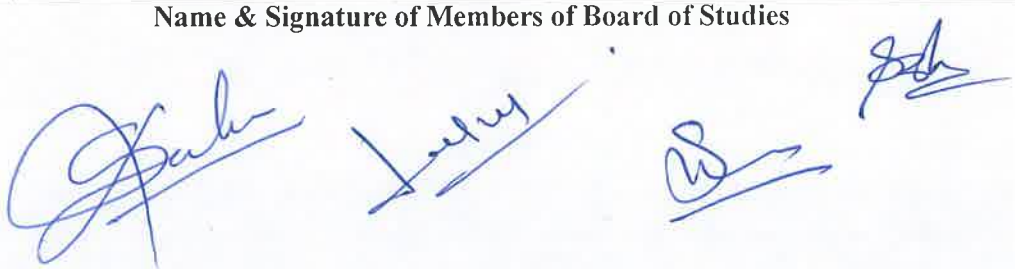
Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks

Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) - 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**

Name & Signature of Members of Board of Studies



Part A: Introduction				
Program: **Degree Course**		**Class: BCA**	**Semester - VI**	Session:**2024-2025**
1	Course Code	**BCA-607(L)**		
2	Course Title	**DSE2: - Multimedia and its Application**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	Basic knowledge of programming and concept of object-oriented programming		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: 1. Understand the concepts and components of multimedia technology. 2. Design and develop multimedia content using appropriate tools and techniques. 3. Integrate various multimedia elements such as text, images, audio, and video. 4. Apply multimedia technologies in interactive applications and presentations. 5. Evaluate and optimize multimedia content for different platforms and devices.		
6	**Credit Value**	**Theory : 5**		
7	**Total Marks**	**Max. Marks: 80**	**Min Passing Marks : 32**	

PART B: CONTENT OF THE COURSE		
Total no. of Teaching/ Learning Periods = 60 Periods (60 Hours)		
Unit	**Topics (COURSE CONTENTS)**	**No. of Periods**
I	**Introduction to Multimedia Technology:** Overview of multimedia technology and its components, Multimedia elements: text, images, audio, video, Multimedia file formats and compression techniques.	**12**
II	**Multimedia Authoring Tools and Techniques:** Multimedia authoring software and tools, Design principles for multimedia content, Multimedia scripting and programming languages	**12**
III	**Image and Video Processing in Multimedia**: Image and video acquisition and editing, Image and video compression techniques, Image and video enhancement and effects.	**12**
IV	**Audio and Animation in Multimedia:** Digital audio concepts and formats, Audio editing and processing techniques, Animation principles and techniques	**12**
V	**Multimedia Integration and Application Development:** Integration of multimedia elements in interactive applications, Multimedia in web design and development, Optimization and delivery of multimedia content.	**12**

PART C - LEARNING RESOURCES
Text Books, Reference Books, Other Resources
TEXT BOOKS Recommended: • Ramesh Bangia-Introduction to Multimedia- Laxmi Publications Pvt. Ltd. • Tay Vaughan-Multimedia: Making It Work,TataMc-Graw Hill. • Bhatnager G. Elsevie-,Introduction to Multimedia Systems, • Satish Jain O Level Introduction to Multimedia (M4.2-R4), BPB Publications. **Online Resources: (e- Resources/ e- Books/ e- Learning Portals):** 1. https://www.tutorialspoint.com/multimedia/index.htm 2. https://www.javatpoint.com/what-is-multimedia 3. https://www.geeksforgeeks.org/what-is-multimedia/

PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	**100 Marks**
Continuous Comprehensive Evaluation (CCE):	**20 Marks**
Semester End Exam (SEE):	**80 Marks**
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 20 Marks each and Assignment of 20 Marks
Semester End Exam (SEE)	**Pattern -FOUR Questions (A, B, C, D) from each Unit** Question - A & B: (Compulsory) Very short answer type (02 each) - 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks **Total = 80 Marks**

Name & Signature of Members of Board of Studies

The Course Curriculum 2024-25 for Program BCA - II, III, IV, V, VI Semesters on 05-07-2024 is hereby approved for the Session 2024-25.

Name and Signatures:

Subject Expert	Departmental members:
Subject Expert	1. H.O.D- Dr. Sanat Kumar Sahu _____
Subject Expert	2. Mr. Dileep Kumar Sahu _____
Representative from Industry/entrepreneur	3. Dr. Latika Tamrakar _____
.....	
Student representative	
Other prof. from Science faculty	