



SRI Y.N.COLLEGE (AUTONOMOUS), NARSAPUR

(Affiliated to Adikavi Nannaya University)

Thrice Accredited by NAAC at 'A' Grade

Recognized by UGC as 'College with Potential for Excellence'

BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

I – Year

(w.e.f. 2021 Admitted Batch)

First Semester Syllabus

B.C.A Semester-I

S.No	Paper Code	Subject	Hours/ Week	No of Credits	Max. Marks	Max. Marks University Exam	Total Marks
					Internal assessment		
1.		English – I	4	3	25	75	100
2.		Language(H/T/S) – I	4	3	25	75	100
3.		Life Skill Course – I	2	2	-0-	50	50
4.		Skill Development Course – I	2	2	-0-	50	50
5.	C1	Computer Fundamentals & Office tools	4	4	25	75	100
	C1-P	Computer Fundamentals & Office tools-Lab	2	1	-0-	50	50
6	C2	Programming in C	4	4	25	75	100
	C2-P	Programming in C Lab	2	1	-0-	50	50
7.	C3	Numerical and Statistical Methods	4	4	25	75	100
	C3-P	Numerical and Statistical Methods- Lab	2	1	-0-	50	50
Total			30	25	125	625	750

- Two mid semester examinations will be held and the average of those two be the Mid Semester Exam



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Second Semester Syllabus

B.C.A Semester-II

S.No	Paper Code	Subject	Hours/ Week	No of Credits	Max.Marks	Max. Marks University Exam	Total Marks
					Internal assessment		
1.		English – II	4	4	25	75	100
2.		Language(H/T/S) – II	4	3	25	75	100
3.		Life Skill Course – II	2	2	-0-	50	50
4.		Skill Development Course – II	2	2	-0-	50	50
5.		Skill Development Course – III	2	2	-0-	50	50
6.	C4	Data Structures	4	4	25	75	100
	C4-P	Data Structures Lab	2	1	-0-	50	50
7.	C5	Introduction to Python Programming	4	4	25	75	100
	C5-P	Introduction to Python Programming Lab	2	1	-0-	50	50
8.	C6	Database Management Systems	4	4	25	75	100
	C6-P	Database Management Systems Lab	2	1	-0-	50	50
Total			32	28	125	675	800

- Two mid semester examinations will be held and the average of those two be the Mid Semester Exam



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II – Year

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Third Semester Syllabus

B.C.A Semeste

S.No	Paper Code	Subject	Hours/ Week	No of Credits	Max.Marks	Max. Marks University Exam	Total Marks
					Internal assessment		
1.		English –III	4	3	25	75	100
2.		Language(H/T/S)– III	4	3	25	75	100
3.		Life Skill Course – III	2	2	-0-	50	50
4.		Life Skill Course – IV	2	2	-0-	50	50
5.		Skill Development Course – IV	2	2	-0-	50	50
6.	C7	Accounting and Financial Management	4	4	25	75	100
	C7-P	Accounting and Financial Management Lab	2	1	-0-	50	50
7.	C8	Object Oriented Programming Through Java	4	4	25	75	100
	C8-P	Object Oriented Programming Through Java Lab	2	1	-0-	50	50
8.	C9	Operating Systems	4	4	25	75	100
	C9-P	Operating Systems Lab	2	1	-0-	50	50
Total			32	27	125	675	800

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Fourth Semester Syllabus

B.C.A Semester-IV

S.No	Paper Code	Subject	Hours/ Week	No of Credits	Max.Marks	Max. Marks University Exam	Total Marks
					Internal assessment		
1.	C10	Cyber Laws	4	4	25	75	100
	C10-P	Cyber Laws Lab	2	1	-0-	50	50
2.	C11	Data Mining and Data Warehousing	4	4	25	75	100
	C11-P	Data Mining and Data Warehousing Lab	2	1	-0-	50	50
3.	C12	Web Programming	4	4	25	75	100
	C12-P	Web Programming Lab	2	1	-0-	50	50
4.	C13	Data Communications & Networks	4	4	25	75	100
	C13-P	Data Communications & Networks Lab	2	1	-0-	50	50
5.	C14	Data Analytics using R	4	4	25	75	100
	C14-P	Data Analytics using R Lab	2	1	-0-	50	50
6.	C15	Object Oriented Software Engineering	4	4	25	75	100
	C15-P	Object Oriented Software Engineering Lab	2	1	-0-	50	50
Total			36	30	150	750	900

- Two mid semester examinations will be held and the average of those two be the Mid Semester Exam



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III – Year

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Fifth Semester Syllabus

B.C.A Semester-V

S.No	Paper Code	Subject	Hours/Week	No of Credits	Max.Marks	Max. Marks University Exam	Total Marks
					Internal assessment		
1.	SEC1		4	3	25	75	100
	SEC1-P		2	2	-0-	50	50
2.	SEC2		4	3	25	75	100
	SEC2-P		2	2	-0-	50	50
3.	SEC3		4	3	25	75	100
	SEC3-P		2	2	-0-	50	50
4.	SEC4		4	3	25	75	100
	SEC4-P		2	2	-0-	50	50
5.	SEC5		4	3	25	75	100
	SEC5-P		2	2	-0-	50	50
6.	SEC6		4	3	25	75	100
	SEC6-P		2	2	-0-	50	50
Total			36	30	150	750	900



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I – Year

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First Semester Syllabus

B.C.A Semester-I

S.No	Paper Code	Subject	Hours/Week	No of Credits	Max. Marks	Max. Marks University Exam	Total Marks
					Internal assessment		
1.		English – I	4	3	25	75	100
2.		Language(H/T/S) – I	4	3	25	75	100
3.		Life Skill Course – I	2	2	-0-	50	50
4.		Skill Development Course – I	2	2	-0-	50	50
5.	C1	Computer Fundamentals & Office tools	4	4	25	75	100
	C1-P	Computer Fundamentals & Office tools-Lab	2	1	-0-	50	50
6	C2	Programming in C	4	4	25	75	100
	C2-P	Programming in C Lab	2	1	-0-	50	50
7.	C3	Numerical and Statistical Methods	4	4	25	75	100
	C3-P	Numerical and Statistical Methods- Lab	2	1	-0-	50	50
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I – Year

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First Semester

BCA	Course Code	Semester: I	Credits: 04
	C1	Computer Fundamentals and Office Tools	Hrs/Wk:04

Course Objectives:

- To introduce the concepts of computer fundamentals and their applications for the efficient use of office technology in a business environment.
- To introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of computer hardware and software.
- To provide hands-on use of Word, Excel and PowerPoint.

Course Outcomes:

- Describe the usage of computers and why computers are essential components in business and society.
- Identify categories of programs, system software and applications. Organize and work with files and folders.
- Compose, format and edit a word document and working with macros.
- Create work sheets and using various functions.
- Make presentations and inserting multimedia in them.



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I – Year
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First Semester

PAPER C1: COMPUTER FUNDAMENTALS AND OFFICE TOOLS

UNIT – I: Introduction: Characteristics of Computer, The evolution of Computers, The Computer Generations.

Basic Computer Organization: Input Unit, Output Unit, Storage Unit, Arithmetic Logic Unit, Control Unit, Central Processing Unit.

Secondary Storage Devices: Magnetic Disk, Optical Disk. Magneto optical Disk, Mass Storage Devices, Flash Drive and Other related Concepts.

UNIT – II: Computer Software: Types of Software, Logical systems Architecture, Acquiring Software, Software developmental Steps.

Computer Languages: Machine Language, Assembly Language, High Level Language, Some High Level Languages, Characteristics of good Programming Language.

Number Systems: Binary, Hexa Decimal, Conversion from one number system to another system.

UNIT –III : MS-Word: Features of MS-Word, MS-Word Window components, working with formatted text, Shortcut keys, Formatting documents: Selecting text, Copying & moving data, Formatting characters, changing cases, Paragraph formatting, Indents, Drop Caps, Using format painter, Page formatting, Header & footer, Bullets & numbering, Tabs, Forming tables. Finding & replacing text, go to (F5) command, proofing text (Spell check, Auto correct), Reversing actions, Macros, Inserting pictures, Hyperlinks, Equation editor, Mail merging, Printing documents.

UNIT-IV : MS-Excel: Excel Features, Spreadsheets, workbooks, creating, saving & editing a workbook, Renaming sheet, cell entries (numbers, labels, and formulas), find and replace, Adding and deleting rows and columns Filling series, fill with drag, data sort, Filters, Formatting worksheet, Functions and its parts, Some useful Functions in excel (SUM, AVERAGE, COUNT, MAX, MIN, IF), Cell referencing (Relative, Absolute, Mixed), What-if analysis Introduction to charts: types of charts, creation of charts, printing a chart, printing worksheet.

UNIT V: MS-PowerPoint: Features of PowerPoint, Uses, components of slide, templates and wizards, using template, choosing an auto layout, using outlines, adding subheadings, editing text, formatting text, using master slide, adding slides, changing color scheme, changing background and shading, adding header and footer, adding clip arts and auto shapes. Various presentation, Working in slide sorter view (deleting, duplicating, rearranging slides), adding transition and animations to slide show, inserting music or sound on a slide, viewing slide show, Printing slides.

TEXT BOOKS:

1. Computer Fundamentals – Pradeep .K.Sinha: BPB Publications. Fundamentals of Computers -ReemaThareja, Oxford University Press India

REFERENCES:

1. Fundamentals of Computers – V. Rajaraman, Prentice Hall of India Introduction to Computers –Peter Norton McGraw Hill.

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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First Semester
Paper C1: COMPUTER FUNDAMENTALS AND OFFICE TOOLS
MODEL QUESTION PAPER

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Explain Computer Organization.
2. Explain any two secondary storage devices.
3. Explain software development steps.
4. Write about any three high level languages.
5. Explain about Number Systems.

SECTION – B

6. Explain the Features of MS Word.
7. Explain mail merge in MS Word.
8. Explain about Features of Excel and Some Useful Functions in Excel.
9. Explain templates in MS Power point.
10. Write about Master slide, adding of slides and its steps in MS Power point.

PART-II

SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Write about the characteristics of computer.
12. Write about various output units.
13. What are the various types of software?
14. What are headers and footers in MS word?
15. Write about macros in MS Word.
16. Write about Creating, Saving & Editing Workbook in Excel.
17. Define cell referencing. What are the various types of cell referencing in MS Excel?
18. What is slide sorter view in MS Powerpoint?



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First Semester

BCA	Course Code	Semester: I	Credits: 01
	C1-P	Computer Fundamentals and Office Tools Lab	Hrs/Wk:02

List of Experiments:

- 1) Design a visiting card for managing director of a company as per the following specification.
 - Size of visiting card is $3\frac{1}{2}\times 2$
 - Name of the company with big font
 - Phone number, Fax number and E-mail address with appropriate symbols.
 - Office and Residence address separated by a line
- 2) Create a table with following columns and display the result in separate cells for the following
 - Emp Name, Basic pay, DA, HRA, Total salary.
 - Sort all the employees in ascending order with the name as the key
 - Calculate the total salary of the employee
 - Calculate the Grand total salary of the employee
 - Find highest salary and
 - Find lowest salary
- 3) Prepare an advertisement to company requiring software professional with the following
 - Attractive page border
 - Design the name of the company using WordArt
 - Use at least one clipart.
 - Give details of the company (use bullets etc)
 - Give details of the Vacancies in each category of employee's (Business manager,

DA: - 56% of the basic pay if Basic pay is greater than 20000 or else 44%

HRA: - 15% of the Basic pay subject to maximum of Rs.4000.

GPF: - 10% of the basic pay.

INCOME TAX: - 10% of basic if Basic pay is greater than 20000. Find who is getting highest salary& who is get lowest salary?

- 10) The ABC Company shows the sales of different product For 5 years. Create BAR Graph,3D and Pie chart for the following.

A	B	C	D	E	F
S.No.	Year	Pro 1	Pro 2	Pro 3	Pro 4
1	1989	1000	800	900	1000
2	1990	800	80	500	900
3	1991	1200	190	400	800
4	1992	400	200	300	1000
5	1993	1800	400	400	1200

- 11) Create a suitable examination database and find the sum of the marks (total) of each student and respective, class secured by the student.

Pass: if marks in each subject ≥ 35

Distinction: if average ≥ 75

First class: if average ≥ 60 but < 75 **Second class:** if average ≥ 50 but less than 60 **Third class:** if average ≥ 35 but less than 50 **Fail:** if marks in any subject < 35

- 12) Enter the following data into the sheet.

Name	Department	Salary
Anusha	Accounts	12000
Rani	Engineering	24000
Lakshmi	Accounts	9000
Purnima	Marketing	20000
Bindu	Accounts	4500
Tejaswi	Accounts	11000
Swetha	Engineering	15000
Saroja	Marketing	45000
Sunitha	Accounts	5600
Sandhya	Engineering	24000
Harika	Marketing	8000

- Extract records for department in Accounts and Salary > 10000
- Sort the data by salary with the department using “sortcommands”.

- Calculate total salary for each department using Subtotals

13) Enter the following data into the sheet.

	Raju	Rani	Mark	Rosy	Ismail	Reshma
English	76	89	43	51	76	87
2nd Lang	55	85	78	61	47	33
Maths	65	82	34	58	52	65
Computers	45	91	56	72	49	56
Human Values	51	84	54	64	32	64

Apply the conditional formatting for marks

- 35 belowRed
- 35 to 50Blue
- 51 to 70Green
- 71 to 100 Yellow

- 14) Create a presentation using templates.
- 15) Create a Custom layout or Slide Master for professional presentation.
- 16) Create a presentation with slide transitions and animation effects.
- 17) Create a table in PPT and apply graphical representation Unit.

PRACTICAL BREAK UP OF MARKS:

- | | |
|-----------------------|----------|
| 1. Procedure/Steps - | 10 Marks |
| 2. Execution - | 20 Marks |
| 3. Practical Record - | 10 Marks |
| 4. Viva - | 10 Marks |

Total

50 Marks



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First Semester

BCA	Course Code	Semester: I	Credits: 04
	C2	Programming In C	Hrs/Wk:04

Course Objectives:

- Provides knowledge on Algorithms, Flow chart and different programming languages.
- To train the students with basic concepts of programming using C.
- Provides complete knowledge of C language.
- Helps to develop logics which will help them to create program and applications in C.
- Learning the basic programming constructs, they can easily switch over to any other language in future.

Course Outcomes:

Upon successful completion of this course, students will be able to-

- Understand the basic terminology used in computer programming.
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Understand the dynamics of memory by the use of pointers and Structures.
- Apply different operations in File handling.



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First Semester

PAPER C2: PROGRAMMING IN C

UNIT - I: Introduction to Algorithms and Programming Languages: Algorithm - Key features of Algorithms - examples of Algorithms, Flow Charts– Pseudo code, Programming Languages – Generation of Programming Languages – Structured Programming Language.

Introduction to C: Introduction – Structure of C Program, Writing the first C Program, File used in C Program – Compiling and Executing C Programs, Using Comments – Keywords – Identifiers, Basic DataTypes in C, Variables – Constants, I/O Statements in C, Operators in C, Programming Examples, Type Conversion and Type Casting.

UNIT -II: Control Structures and Functions: Decision Control and Looping Statements: Introduction to Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, Break and Continue Statement – Goto Statement.

UNIT - III: Arrays and Strings: Arrays: Introduction, Declaration of Arrays, Accessing elements of the Array – Storing Values in Array, Calculating the length of the Array, Operations that can be performed on Array, One dimensional array, Accessing one dimensional array, two dimensional Arrays, Accessing two dimensional arrays. **Strings:** Introduction, String Operations using String functions.

UNIT - IV: Functions: Introduction, Using functions – Function declaration/ prototype – Function definition, Function call – Return statement – Passing parameters, Passing one dimensional array to function, Scope of variables, Storage Classes, Recursive functions.

UNIT – V: Pointers, Structures and Unions: Pointers: Understanding Computer Memory – Introduction to Pointers, Declaring Pointer Variable, Dynamic Memory Allocation, Drawbacks of Pointers. **Structures:** Introduction to structures, Nested Structures. **Union:** Introduction to Union – accessing union elements.

File Handling: Files: Introduction to Files, Using Files in C, Reading Data from Files, Writing Data from Files.

PRESCRIBED TEXT BOOKS:

1. Computer Fundamentals and Programming in C by REEMA THAREJA from OXFORD UNIVERSITY PRESS

REFERENCE BOOKS:

1. E. Balagurusamy, COMPUTING FUNDAMENTALS & C PROGRAMMING – Tata McGraw-Hill, Second Reprint 2008, ISBN 978-0-07-066909-3.
2. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publ, 2002.
3. Henry Mullish & Huubert L. Cooper: The Sprit of C, Jaico Pub, House, 1996.
4. Teach your C Skills- Kanithker.

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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First Semester

PAPER C2: PROGRAMMING IN C

MODEL QUESTION PAPER

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Discuss various Built in Data Types available in C.
2. What are the various operators used in C.
3. Clarify different iterative control statements in C with suitable examples.
4. Explain the switch statement with syntax and example.
5. Explain about Break and Continue Statements with an example.

SECTION – B

6. What is an Array? Explain about declaration and accessing elements of an array with example.
7. Explain about different string operations in C.
8. What is Function? Write about Call by value and Call by reference in detail with example.
9. Compare and contrast Structures with Unions.
10. List out various file handling functions and write a C program to read data from a text file.

PART-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Explain various symbols used in Flow Chart Design.
12. Write about Structure of C Program.
13. Write a C program to find factorial of a given number
14. Explain calculating the length of an Array with example.
15. Write a short note on String Operations using String Functions.
16. Explain passing One Dimensional Array to function with example.
17. Write a short note on Recursion.
18. List out various drawbacks of pointers.



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First Semester

BCA	Course Code	Semester: I	Credits: 01
	C2-P	Programming In C Lab	Hrs/Wk:02

List of Experiments

1. Write a C program to convert hours into seconds.
2. Write a C program to check given number is even or odd
3. Write a C program to check given year is leap year or not.
4. Write a C program to check whether the given number is Prime or Not.
5. Write a C program to find the sum of individual digits of a given number.
6. Write a program to check whether given number is Palindrome or Not.
7. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
8. Write a C program to print the numbers in triangular form.
1
1 2
1 2 3
1 2 3 4
9. Program to display number of days in given month using Switch –Case.
10. Write a program to find given number in an array (linear search).
11. Write a C program to perform addition of two matrices.
12. Write a C program to determine if the given string is a palindrome or not.
13. Write a C program to find the factorial of a given integer using recursive function.

14. Write a C program to swap two numbers using Call by Value and Call by Reference.
15. Program to display Student Details using Structures.
16. Write a C program to
 - i. Write data into a File.
 - ii. Read data from a File.

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks
Total	----- 50 Marks -----



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First Semester

BCA	Course Code	Semester: I	Credits: 04
	C3	Numerical and Statistical Methods	Hrs/Wk:04

Course Objectives:

- To learn how to perform error analysis for arithmetic operations.
- To demonstrate working of various numerical methods.
- To provide a basic understanding of the derivation and use of methods of interpolation and numerical integration.
- To impart knowledge of various statistical techniques.
- To develop students understanding through laboratory activities to solve problems related to above stated concepts.

Course Outcomes:

- Skill to choose and apply appropriate numerical methods to obtain appropriate solutions to difficult mathematical problems.
- Ability to apply various statistical techniques such as Measures of Central Tendency and Dispersion.
- Understanding of relationship between variables using the method of Correlation and Fit Analysis.
- Skill to execute programs of various Numerical Methods and Statistical techniques for solving mathematical problems.



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(w.e.f. 2021 Admitted Batch)

First Semester

PAPER C3: NUMERICAL AND STATISTICAL METHODS

UNIT - I: Solution of equations (polynomial and transcendental equations) interval having methods, secant, Regula– Falsi, Newton – Raphson methods, Fixed point Iteration method.

UNIT - II: Solution of system of linear equations: Gauss – Elimination method, Gauss – Jordan, Gauss – Siedel iteration method, LU- Decomposition method, Eigen values and Eigen vectors of a square matrix.

UNIT - III: Interpolation: Forward and backward differences, Newton's forward and backward formula, Lagrange's interpolation and Lagrange's inverse interpolation formula.

Numerical differentiation, integration: Numerical differentiation forward and backward formula, Trapezoidal and Simpsons formulas.*Statistical Methods:*

UNIT- IV: Basic concepts and definition of statistics: Mean, Median, Mode , standard deviation, coefficient of variation ,skewness and kurtosis ,Karl Pearson Correlation coefficient ,Rank Correlation and illustrated examples .

UNIT V: Probability : Basic concepts and definition of probability , Probability axioms , Conditional probability , Addition and Multiplication theorem of probability (Based on set theory concepts) , Bayes theorem , problems and applications.

TEXT BOOKS:

- 1) Sunil S .Patil Numerical and Statistical Methods EBPB.
- 2) S.S.Shastry Introductory methods of Numerical Analysis PHI (New Delhi).

REFERENCE BOOKS:

- 1) Gupta S.C & Kapuram VK Fundamentals of Mathematical Statistics
- 2) Numerical Analysis, Sultan Chand & Sons New Delhi.

GUIDELINES TO THE PAPER SETTER**BLUE PRINT**

Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

I – Year

(w.e.f. 2021 Admitted Batch)

First Semester

PAPER C3: NUMERICAL AND STATISTICAL METHODS

MODEL QUESTION PAPER

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

- 1.
- 2.
- 3.
- 4.
- 5.

SECTION – B

- 6.
- 7.
- 8.
- 9.
- 10.

PART-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.



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I – Year

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First Semester

BCA	Course Code	Semester: I	Credits: 01
	C3-P	Numerical and Statistical Methods Lab	Hrs/Wk:02

UNIT - I

- 1) Find the root of the Equation $x^x = 1.2$ by using Regula - Falsi method.
- 2) Solve the Equation $\sin x = 5x - 2$ by Iteration method.
- 3) Apply Newton - Raphson method , to find and approximate root , correct to three decimal places , of the Equation $x^3 - 3x - 5 = 0$, which lies near $x = 2$.
- 4) Find the root of the Equation $x \sin x + \cos x = 0$ by using Newton – Raphson method.
- 5) Find the root of the Equation $x^3 + x - 1 = 0$ by Iteration method, given that a root lies near

UNIT - II

- 1) Solve the system of Equations $3x+y-z = 3$, $2x-8y+z=-5$, $x-2y+9z=8$ using Gauss – Elimination method.
- 2) Using Gauss –Jordan method solve the system, $2x+y+z=10$, $3x+2y+3z = 18$, $x+4y+9z=16$.
- 3) Solve the Equations $2x+3y+z=9$, $x+2y+3z=6$, $3x+y+2z=8$ by LU – Decomposition method.
- 4) Solve the system of Equations , $8x-3y+2z=20$, $4x+11y-z=33$, $6x+3y+12z=35$ by using Gauss- Seidel method.
- 5) Find the Eigen values & Eigen vectors of a square matrix $A=[8 - 62 - 67 - 42 - 43]$.

UNIT - III:

1) Using Newton's forward interpolation formula, the given table of values ,

X	1.1	1.3	1.5	1.7	1.9
f(x)	0.21	0.69	1.25	1.89	2.61

Obtain the value of f(x) when x = 1.4

2) Using Lagrange's Interpolation formula , find the value of y , corresponding to x = 10

3) from the following table

X	5	6	9	11
Y	12	13	14	16

4) From the following table of values of x & y , obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for x = 1.5

X	1.5	2.0	2.5	3.0	3.5	4.0
Y	3.375	7.0	13.625	24.0	38.875	59.0

5) Evaluate $\int_0^1 x^3 dx$ with five sub-intervals by Trapezoidal rule.

6) Evaluate $\int_0^1 \frac{1}{1+x} dx$ using Simpson's 3/8 rule taking h = 1/6.

UNIT - IV

1) Find the Karl Pearson's coefficient of skewness for the following data :

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of students	10	12	18	25	16	14	8

2) Find Bowley's coefficient of skewness for the following data :

Salary	500-600	600-700	700-800	800-900	900-1000	1000-1100	1100-1200	1200-1300
No. of persons	10	28	40	64	25	18	9	6

3) Find the standard deviation from Assumed mean method for the following data :

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	1	4	17	45	26	5	2

4) Find the coefficient of skewness for the following data :

Variable	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	2	5	7	13	21	16	8	3

5) Find the rank correlation coefficient for the following data:

X	65	45	67	38	48	50	26	47	70	62
Y	64	40	58	46	52	49	38	47	59	60

UNIT - V

- 1) Three dice are tossed together. Find the probability that exactly two of the three numbers that show on them are equal.
- 2) What is the probability that a card drawn at random from the pack of playing cards may be either a Queen or a Jack?
- 3) If two cards are drawn from a well shuffled pack, find the probability that at least one of the two is Hearts.
- 4) A bag contains 4 Red, 6 Blue balls and a second bag contains 4 Blue & 6 Green balls. A ball is taken out from each bag. Find the probability that one ball is red and the other ball is Green. The probability that an event A happens in one trail of an experiment is 0.4. Three independent trails of the experiment are performed. Find the probability that the event A happens at least once

PRACTICAL BREAK UP OF MARKS:

- | | |
|-----------------------|----------|
| 1. Procedure/Steps - | 10 Marks |
| 2. Execution - | 20 Marks |
| 3. Practical Record - | 10 Marks |
| 4. Viva - | 10 Marks |

Total	----- 50 Marks -----
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I – Year

(w.e.f. 2021 Admitted Batch)

Second Semester Syllabus

B.C.A Semester-II

S.No	Paper Code	Subject	Hours/ Week	No of Credits	Max.Marks	Max. Marks University Exam	Total Marks
					Internal assessme nt		
1.		English – II	4	4	25	75	100
2.		Language(H/T/S) – II	4	3	25	75	100
3.		Life Skill Course – II	2	2	-0-	50	50
4.		Skill Development Course – II	2	2	-0-	50	50
5.		Skill Development Course – III	2	2	-0-	50	50
6.	C4	Data Structures	4	4	25	75	100
	C4-P	Data Structures Lab	2	1	-0-	50	50
7.	C5	Introduction to Python Programming	4	4	25	75	100
	C5-P	Introduction to Python Programming Lab	2	1	-0-	50	50
8.	C6	Database Management Systems	4	4	25	75	100
	C6-P	Database Management Systems Lab	2	1	-0-	50	50
Total			32	28	125	675	800
<ul style="list-style-type: none"> Two mid semester examinations will be held and the average of those two be the Mid Semester Exam 							



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I – Year

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Second Semester

BCA	Course Code	Semester: II	Credits: 04
	C4	Data Structures	Hrs/Wk:04

Course Objectives

To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms. In addition, another objective of the course is to develop effective software engineering practice, emphasizing such principles as decomposition, procedural abstraction, and software reuse.

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

1. Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.
2. Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs.
3. Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
4. Demonstrate different methods for traversing trees
5. Compare alternative implementations of data structures with respect to performance
6. Compare and contrast the benefits of dynamic and static data structures implementations
7. Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack.
8. Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.



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Second Semester

PAPER C4: DATA STRUCTURES

UNIT- I: Concept of Abstract Data Types (ADTs)- Data Types, Data Structures, Primitive and Non- primitive DataStructures, Linear and Non-linear Structures.

Linear Lists - ADT, Array and Linked representations (Single and Double Linked lists), Pointers.

UNIT- II: Stacks: Definition, Stacks using Array and Linked representations, expressions, notations.

Queues: Definition, Queue using Array and Linked representations, Circular Queues, Dequeues.

UNIT- III: Trees: Binary Tree, Definition, Properties, Trees using Array and Linked representations, Implementations and Applications, Heaps Trees.

Binary Search Trees (BST) - Definition, Operations and Implementations. B Trees, B+ Trees Implementation

UNIT IV: Graphs – Graph and its Representation, Graph Traversals, Connected Components, Basic Searching Techniques, Minimal Spanning Trees.

UNIT- V: Sorting and Searching: Selection, Insertion, Bubble, Merge, Quick, Sequential and Binary Searching.

TEXT BOOKS:

1. "Data Structures through C", Yashvanth Kanetkar, BPB Publications.
2. "Data Structures through C", E.Balaguru Swamy, Tata Mc Graw-Hill.

REFERENCE BOOKS:

1. SamanthaD, Classic Data Structures, Prentice-Hall of India,2001
2. Heilman G I,. Data Structures, Algorithms and Object-OrientedProgramming, Tata McGraw-Hill.2002. (Chapters I and14).
3. Tremblay .1 P, and Sorenson P G, Introduction to Data Structures and Applications, Tata McGraw-Hill,
4. Data Structures by AllenWeiss

Note: All Data Structures Concepts are implemented in C Language.

GUIDELINES TO THE PAPER SETTER**BLUE PRINT**

Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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I – Year
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Second Semester
PAPER C4: DATA STRUCTURES
MODEL QUESTION PAPER

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. What is a Data Structure and explain various types of Data structure?
2. Explain various operations performed on Double Linked List (DLL)?
3. Discuss about implementation of STACK ADT using arrays.
4. Discuss about implementation of Queue ADT using arrays.
5. Explain Circular Queue ADT operations?

SECTION – B

6. Define Tree Data Structure. Explain the Tree Terminology with an example.
7. What is BST (Binary Search Tree) ? Discuss various operations of BST?
8. What is Minimum Spanning Tree and Explain Kruskal's and Prim's algorithm?
9. Brief the implementation of Insertion sort Mechanism with Example?
10. Explain Binary search mechanism with example?

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Explain about Data Types.
12. Explain about Abstract Data Type (ADT).
13. Explain STACK applications?
14. What are the applications of Binary search trees?
15. Explain about B-tress?
16. Explain about graph representation?
17. Explain about sequential search?
18. Explain selection sort procedure?



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I – Year

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Second Semester

BCA	Course Code	Semester: II	Credits: 01
	C4 - P	Data Structures Lab	Hrs/Wk:02

List of Lab Experiments

1. Write Programs to implement the Stack operations using an array.
2. Write Programs to implement the Queue operations using an array.
3. Write Programs to implement the Stack operations using Linked lists.
4. Write Programs to implement the Queue operations using Linked lists.
5. Write a program for postfix expression evaluation.
6. Write a program to convert prefix to postfix.
7. Write a program for Binary search Tree Traversals
8. Write a program to implement dequeue using a doubly linked list.
9. Write a program to search an item in a given list using
 - (i) LinearSearch
 - (ii) BinarySearch.
10. Write a program for
 - (i) BubbleSort
 - (ii) Quick Sort
 - (iii) Merge Sort.

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps - 10 Marks

2. Execution - 20 Marks

3. Practical Record - 10 Marks

4. Viva - 10 Marks

Total -----
50 Marks



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I – Year

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Second Semester

BCA	Course Code	Semester: II	Credits: 04
	C5	Introduction to Python Programming	Hrs/Wk:04

Objective:

To introduce the student to the basic features of python programming and impart skills in an Industry standard programming language

Outcomes: On the completion of this course, the student will be able to

- Understand the concepts of python programming
- Students should be able to develop logic for Problem Solving.
- Students should be able to apply the problem solving skills using syntactically simple language
- Create new GUI based programming to solve industry standard problems



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I – Year

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Second Semester

PAPER C5: INTRODUCTION TO PYTHON PROGRAMMING

UNIT-I: Introduction to Python - Features of Python - Executing python program using command line window and IDLE graphics window, Python Virtual Machine - Identifiers - Reserved Keywords – Variables, Comments in Python – Input , Output and Import Functions - Operators – Data Types and Operations – int, float, complex, Strings, List, Tuple, Set, Dictionary - Mutable and Immutable Objects – Data Type Conversion, Illustrative programs

UNIT-II: Decision Making -conditional (if), alternative (if-else), if..elif..else -nested if - Loops for, range(), while, break, continue, pass; Functions, Arrays- Fruitful functions- return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Python arrays, Access the Elements of an Array, array methods.

UNIT-III: LISTS, TUPLES, DICTIONARIES- Lists: List operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters, list comprehension; Tuples: Tuple assignment, tuple as return value, tuple comprehension; Dictionaries: operations and methods, comprehension;

UNIT-IV: FILES, EXCEPTIONS, MODULES, PACKAGES- Built-in Modules - Creating Modules - Import statement - Locating modules - Namespaces and Scope - The dir() function - The reload function – Some useful Packages in Python (datetime, time, OS , calendar, math module)

Files and exception: text files, reading and writing files Renaming and Deleting files Exception handling exceptions, Exception with arguments, Raising an Exception - User defined Exceptions - Assertions in

UNIT-V: GUI Programming- Introduction – Tkinter Widgets – Label – Message Widget – Entry Widget – Text Widget – tk Message Box – Button Widget – Radio Button- Check Button – List box Frames – Top level Widgets – Menu Widget

TEXT BOOKS:

1. “Taming PYTHON By Programming”, Jeeva Jose Khanna Publications
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition,

REFERENCE BOOKS:

1. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.
2. Learning Python, Mark Lutz, Orielly
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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I – Year

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Second Semester

**PAPER C5: INTRODUCTION TO PYTHON PROGRAMMING
MODEL QUESTION PAPER**

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Explain various Operators in Python
2. Explain various Data Types in Python.
3. Explain various Iterative Statements in python.
4. Write a python script to check weather given number in prime or not.
5. Explain about various String Functions.

SECTION – B

6. Explain List Data Structure in Detail with various operations performed on lists.
7. Explain about Tuples in Python.
8. Write about Exception Handling with an example..
9. Explain about Label, Message, Entry and Text Widgets.
10. Explain about Button, Radio Button & Check Button Widgets.

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Explain Features of Python.
12. How to read Input from Keyboard in Python.
13. What is the difference between Break, Continue and Pass.
14. Write about List Mutability in Python.
15. Write about Dictionaries in Python.
16. Write about Namespaces and Scope in Python.
17. Write a short note on Some useful Packages in Python.
18. Write a short note on Frames



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I – Year

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Second Semester

BCA	Course Code	Semester: II	Credits: 01
	C5 - P	Introduction to Python Programming Lab	Hrs/Wk:02

List of Lab Experiments

1. Enter the number from the user and depending on whether the number is even or odd, print out an appropriate message to the user.
2. Write a program to generate the Fibonacci series.
3. Write a program that prints out all the elements of the given list list that are less than 5.
4. Write a program that takes two lists and returns True if they have at least one common member.
5. Write a Python program to clone or copy a list
6. Write a Python program to demonstrate arrays with list comprehension
7. Write a Python script to sort (ascending and descending) a dictionary by value.
8. Write a Python program to sum all the items in a dictionary
9. Write a program with a function that accepts a string and returns number of vowels, consonants and special symbols in it.
10. Write a Python program to read an entire text file.
11. Write a Python program to append text to a file and display the text.
12. Write a program to implement exception handling.
13. Write a GUI program that converts Celsius to Fahrenheit temperature using widgets

PRACTICAL BREAK UP OF MARKS:

- | | |
|-----------------------|----------|
| 1. Procedure/Steps - | 10 Marks |
| 2. Execution - | 20 Marks |
| 3. Practical Record - | 10 Marks |
| 4. Viva - | 10 Marks |

Total	----- 50 Marks -----
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Second Semester

BCA	Course Code	Semester: II	Credits: 04
	C6	Data Base Management System	Hrs/Wk:04

Course Objective:

The objective of the course is to introduce the design and development of databases with special emphasis on relational databases.

Course Learning Outcomes:

On completing the subject, students will be able to:

1. Gain knowledge of Database and DBMS.
2. Understand the fundamental concepts of DBMS with special emphasis on relational data model.
3. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database
4. Model database using ER Diagrams and design database schemas based on the model.
5. Create a small database using SQL.
6. Store, Retrieve data in database.



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Second Semester

PAPER C6: DATA BASE MANAGEMENT SYSTEM

UNIT -I: Overview of Database Management System: Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-Based System, database approach, Classification of Database Management Systems, advantages of database approach, Components of Database Management System, three schema architecture of database.

UNIT -II: Data Models, Entity-Relationship Model: Introduction, the building blocks of ER model, classification of entity sets, attribute classification, relationship degree, relationship classification. Enhanced entity- relationship model (EER model), generalization and specialization, Inheritance - IS A relationship, constraints on specialization and generalization, advantages of EER modelling.

UNIT -III: Relational Model: Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra. Normalization: Functional dependencies and normal forms upto 3NF.

UNIT -IV: Structured Query Language: Introduction, History of SQL Standard, Commands in SQL (DDL, DML, DCL, TCL), Data Types in SQL, Aggregate functions, Join Operation, Set Operations, View, Sub Query.

UNIT -V: PL/SQL: Introduction, Structure of PL/SQL, Data Types, Operators Precedence, Control Structure, Program, Iterative Control, Cursors, Procedure, Function, Database Triggers, Types of Triggers.

TEXT BOOKS:

1. Database System Concepts by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill
2. Database Management Systems by Raghu Ramakrishnan, McGrawhill
3. Principles of Database Systems by J. D. Ullman
4. Fundamentals of Database Systems by R. Elmasri and S. Navathe
5. SQL: The Ultimate Beginners Guide by Steve Tale.

REFERENCES BOOKS:

1. Database Principles, Programming, and Performance, P.O'Neil, E.O'Neil,2nd ed.,ELSEVIER.
2. Database Systems, A Practical approach to Design implementation and Management Fourth edition, Thomas Connolly, carolynBegg, Pearson education.
3. Database Systems Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.

GUIDELINES TO THE PAPER SETTER**BLUE PRINT**

Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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I – Year

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Second Semester

PAPER C6: DATA BASE MANAGEMENT SYSTEM

MODEL QUESTION PAPER

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Explain the drawbacks of file-based system.
2. Explain the Classification of Database Management System.
3. Write about hierarchical and network data models.
4. Explain about Enhanced Entity Relationship Model.
5. Write about specialization and generalization.

SECTION – B

6. Explain about relational algebra operations.
7. Explain the concept of Normalization.
8. Explain various commands in SQL.
9. Explain procedures and functions with examples.
10. Write about data base triggers and its types

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Write about the components of data base management system.
12. Write about three schema architecture of database.
13. What are the relationship classifications?
14. Write about any five CODD's rules.
15. What are the various types of keys?
16. Explain various data types in SQL.
17. Explain Views in SQL.
18. Write about Cursors in PL/SQL.



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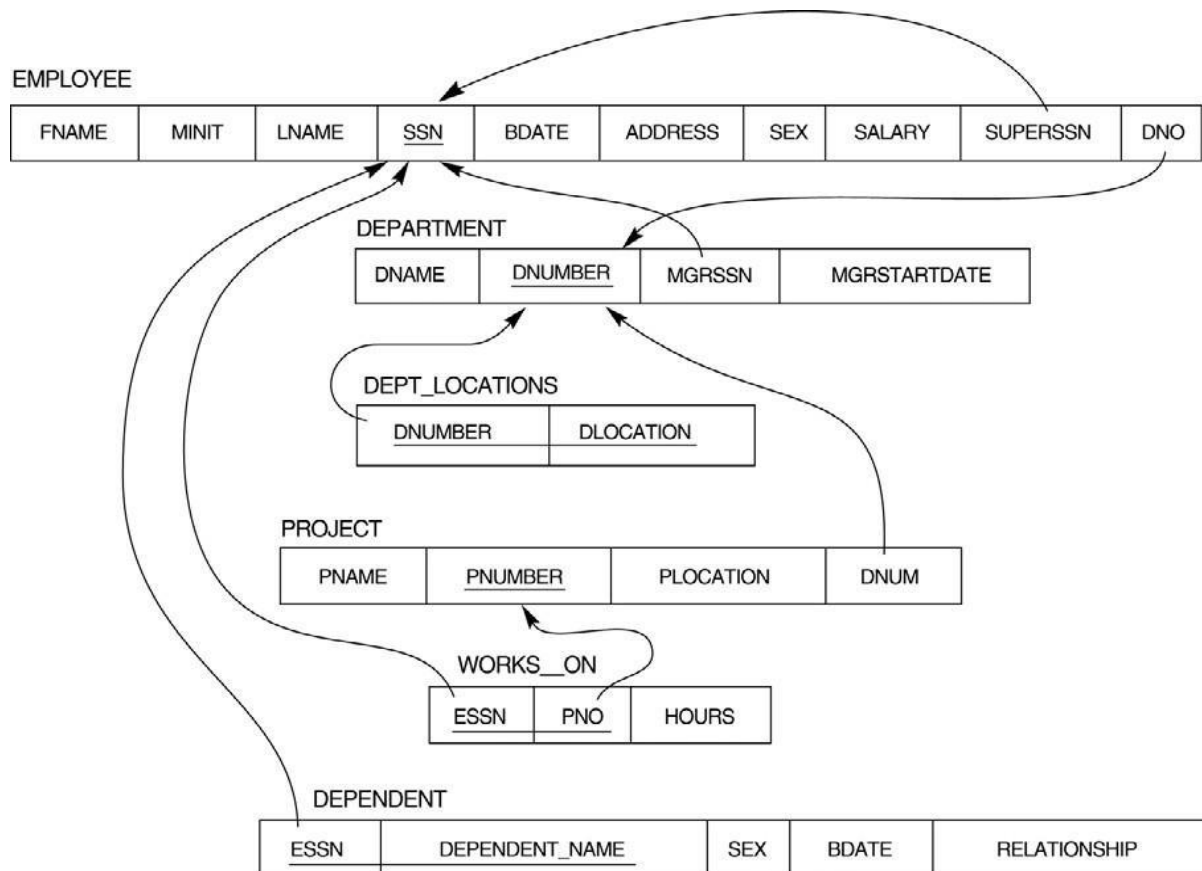
BACHELOR OF COMPUTER APPLICATIONS (B.C.A)
I – Year
 (w.e.f. 2021 Admitted Batch)

Second Semester

BCA	Course Code	Semester: II	Credits: 01
	C6 - P	Data Base Management System Lab	Hrs/Wk:02

1. Draw ER diagram for hospital administration
2. Creation of college database and establish relationships between tables
3. Relational database schema of a company is given in the following figure.

Relational Database Schema - COMPANY



Questions to be performed on above schema

1. Create above tables with relevant *Primary Key, Foreign Key and other constraints*
2. Populate the tables with data
3. Display all the details of all employees working in the company.
4. Display ssn, lname, fname, address of employees who work in department no 7.
5. Retrieve the Birthdate and Address of the employee whose name is 'Franklin T. Wong'
6. Retrieve the name and salary of every employee
7. Retrieve all distinct salary values
8. Retrieve all employee names whose address is in 'Bellaire'
9. Retrieve all employees who were born during the 1950s
10. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)
11. Retrieve the names of all employees who do not have supervisors
12. Retrieve SSN and department name for all employees
13. Retrieve the name and address of all employees who work for the 'Research' department
14. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
15. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
16. Retrieve all combinations of Employee Name and Department Name
17. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.
18. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
19. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
20. Select the names of employees whose salary does not match with salary of any employee in department 10.

21. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
22. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
23. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
24. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
25. Delete all dependents of employee whose *ssn is '123456789'*.
26. Perform a query using alter command to drop/add field and a constraint in Employee table.

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks
Total	----- 50 Marks -----



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester Syllabus

B.C.A Semester-III

S.No	Paper Code	Subject	Hours/ Week	No of Credits	Max.Marks	Max. Marks University Exam	Total Marks
					Internal assessment		
1.		English –III	4	3	25	75	100
2.		Language(H/T/S)– III	4	3	25	75	100
3.		Life Skill Course – III	2	2	-0-	50	50
4.		Life Skill Course – IV	2	2	-0-	50	50
5.		Skill Development Course – IV	2	2	-0-	50	50
6.	C7	Accounting and Financial Management	4	4	25	75	100
	C7-P	Accounting and Financial Management Lab	2	1	-0-	50	50
7.	C8	Object Oriented Programming Through Java	4	4	25	75	100
	C8-P	Object Oriented Programming Through Java Lab	2	1	-0-	50	50
8.	C9	Operating Systems	4	4	25	75	100
	C9-P	Operating Systems Lab	2	1	-0-	50	50
Total			32	27	125	675	800

- Two mid semester examinations will be held and the average of those two be the Mid Semester Exam



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

BCA	Course Code	Semester: III	Credits: 04
	C7	Accounting and Financial Management	Hrs/Wk:04

Course Objectives:

- This paper is designed to impart knowledge regarding concepts of Financial Accounting. This course is useful for Students to get placements in different offices as well as companies inAccounts departments.

Course Outcomes:

- Company Setup &Configurations.
- Recording Financial Transactions.
- Financial Reports Analysis.



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

PAPER C7: ACCOUNTING AND FINANCIAL MANAGEMENT

UNIT - I: Fundamentals of Accounting: Meaning of Accounting, its scope; Objects and limitations; Meaning and application of double entry system, Books of Accounts, Ledgers - Debtors ledger, Creditors ledgers and General ledger; Cash Book and Bank Reconciliation Statement.

UNIT - II: Financial Statements: Meaning and Components of Financial statements, Preparation of Financial Statements, Trading Account, Profit and loss Account, Meaning and Purpose of Balance Sheet, Steps for preparation of Balance Sheet, Marshalling of Balance Sheet, Format of Balance Sheet

UNIT - III: Accounting Ratio and Cash Flow Statement: Ratio Analysis, Objectives of Ratio Analysis, Classification of Accounting Ratios, Advantages of Ratio Analysis, Analysis of Financial Statement through Ratios, Cash Flow Statement, Meaning of Cash Flow Statement, Importance of Cash Flow Statement, Cash Flow Statement as per as 3, Illustration Preparation of Cash Flow Statement.

UNIT -IV: Cost Concepts and Cost Sheet: Meaning of Cost, Classification of Cost, Various Cost Concepts, Cost Centre, Types of Cost Centres, Cost Unit, Elements of Costs, Cost Sheet.

UNIT - V: Budgetary Control and Marginal Costing: Meaning of Budget, Purpose of Budget, Budgetary Control: Meaning and Essentials, Merits OF budgetary Control system, Steps in preparation of budgets, Classification of budgets, Standard cost and standard costing, Variance analysis, Marginal cost and marginal costing, Advantages of marginal costing, Managerial Application of marginal costing, Break Even Analysis. Capital and Working Capital: Meaning of capital, cost of capital, shares, debentures, capitalisation and capital structure; Meaning of working capital, its components and estimation.

SUGGESTED READINGS:

1. Financial Accounting, Ashis Bhattacharya, prentice-Hall India Publication.
2. Financial Accounting, S.N. Maheshwari, Vikas Publication House Pvt. Ltd., New Delhi.
3. Theory and Practice of Accountancy By B. B. Dam, R. A. Maheswari, R. Barman and BKalita.

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

Paper C7: ACCOUNTING AND FINANCIAL MANAGEMENT

MODEL QUESTION PAPER

Time : 3 hours

Max Marks : 75M

PART – I

Answer any Five Questions from Section - A and Section - B taking atleast two from each section

5X10 = 50M

SECTION – A

1. Explain the scope and objectives of Accounting
2. Describe different types of Ledgers.
3. Discuss the components of Financial Statements
4. Explain the Trading Account with its format
5. what are the steps for preparation of Balance Sheet

SECTION - B

6. Describe the classification of Accounting Ratios.
7. What is meant by cash flow statement? Explain the importance of cash flow statement.
8. Define cost and explain various cost concepts.
9. Describe the classification of budgets
10. Explain different types of shares

PART – II
SECTION – C

Answer any Five Questions.

5x5 = 25M

11. Write about the double entry system
12. Explain Bank reconciliation statement
13. Discuss profit and loss account
14. Explain the objectives of ratio analysis
15. Describe the Preparation of Cash Flow Statement
16. Explain various cost concepts
17. Discuss the elements of Costs
18. Explain the advantages of Marginal Costing.



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

BCA	Course Code	Semester: III	Credits: 01
	C7 - P	Accounting and Financial Management Lab	Hrs/Wk:02

List of Lab Experiments

- 1) Create Company using Accounts only.
- 2) Alter a Company, Shut a Company and Delete a Company in Tally?
- 3) Splitting Company Data.
- 4) Creation of Group Companies.
- 5) Single Ledger Creation with Interest parameters setting.
- 6) Multi Ledger creation any Ten Accounts.
- 7) Bank Reconciliation Statement in Tally.
- 8) Creation of Tally Vault & Change Tally vault Password.
- 9) Creating Contra voucher.
- 10) Creating Payment voucher.
- 11) Creating Receipt voucher.
- 12) Creating Journal voucher.
- 13) Creating Sales voucher.
- 14) Creating Credit Note voucher.
- 15) Creating Purchases voucher.
- 16) Creating Debit Note voucher.
- 17) Displaying Day Book.
- 18) Displaying Trial Balance.
- 19) Displaying Profit and Loss Account.
- 20) Displaying Balance Sheet.

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks
Total	----- 50 Marks -----



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

BCA	Course Code	Semester: III	Credits: 04
	C8	Object Oriented Programming through Java	Hrs/Wk:04

Course Objectives:

To make the students understand fundamentals of Java programming.

- To expose the students to develop OOPs Concepts
- To make the students to design appropriate Exception Handling in Java
- To make the students to understand the concepts of Threads, Files and I/O Streams, Applets, Servlets in java.

Course Outcomes:

The student would become competent enough to write, debug, and document well-structured java applications

- Demonstrate good object-oriented programming skills in Java
- Able to describe, recognize, apply and implement selected design patterns in Java
- Understand the capabilities and limitations of Java
- Be familiar with common errors in Java and its associated libraries
- Develop excellent debugging skills



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

PAPER C8: OBJECT ORIENTED PROGRAMMING THROUGH JAVA

UNIT -I: Object Oriented Programming: Introduction to OOP, Objects and Classes, Characteristics of OOP, Difference between OOP and Procedure Oriented Programming. **Introduction to Java Programming:** Introduction, Features of Java, Comparing Java and other languages (C & C++), Java Development Kit, Structure of Java Program, Prerequisites for Compiling and Running Java Programs.

UNIT - II: Java Language Fundamentals: Data types, variable declarations, Operators and Assignment, Control structures, Arrays, Strings, The String Buffer Class.

Java as an OOP Language: Defining classes, Constructors, Overloading, Modifiers, Packages.

UNIT - III: Inheritance, Interfaces, Exception Handling: Inheritance, Types of Inheritance, Interfaces, Interface Implementation, Exception Handling in Java, Throwing User-defined Exceptions, Advantages of Exception.

Multithreading: An Overview of Threads, Creating Threads, Thread Life-cycle, Thread Priorities, Thread Synchronization, Daemon Threads, Communication of Threads.

UNIT - IV: Files and I/O Streams: An Overview of I/O streams, Java I/O, File Streams, FileInputStream and File Output Stream, Filter streams, Random Access File, Serialization. **Applets:** Introduction, Java applications versus Java Applets, Applet Life-cycle, Working with Applets, The HTML Applet Tag.

UNIT - V: Database Handling Using JDBC: An Overview of DBMS, JDBC Architecture, Working with JDBC Servlets: Introduction, How to run servlets, The Life-cycle of the servlet, servlet API, Multitier Applications using JDBC from a servlet.

TEXT BOOKS:

1. Object Oriented Programming through Java, Universities Press (2008),by P. Radha Krishna.

REFERENCE BOOKS:

1. Learn Object Oriented Programming using Java, Venkateswarlu, EVPrasad, S. Chand
2. Programming in Java2, DrKSoma Sundaram, JAICO Publishing house
3. JAVA8, R Nageswararao, Core Java Black Book. An Integrated approach

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

PAPER C8: OBJECT ORIENTED PROGRAMMING THROUGH JAVA

MODEL QUESTION PAPER

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Define OOP. Explain about Objects and Classes in OOP with examples.
2. Explain various Features of Java.
3. Explain Data Types in Java.
4. Explain various Decision Control Statements in Java.
5. What is Constructor? Explain the concept of Constructor Overloading with an example.

SECTION – B

6. What is Inheritance? Explain about types of Inheritance in java.
7. Explain about Thread Life Cycle.
8. What is an Applet? How to create Applets in Java with an example?
9. Briefly Discuss JDBC Architecture and various components of JDBC.
10. Explain about the Life Cycle of Servlet.

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Distinguish the features of Procedure Oriented and Object Oriented Languages.
12. Write the Structure of Java program.
13. Write about String Buffer Class.
14. Write advantages of Exception.
15. Explain the Thread priority concept with example.
16. Write short notes on Serialization
17. List any five HTML tags.
18. How to run Servlets?



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

BCA	Course Code	Semester: III	Credits: 01
	C8 - P	Object Oriented Programming through Java Lab	Hrs/Wk:02

List of Lab Experiments

1. Write a Java program that prints all roots of quadratic equation $ax^2 + bx + c = 0$.
2. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.
3. Write a Java program to create a Student class with following fields
 - i. Hall ticket number
 - ii. Student Name
 - iii. DepartmentCreate 'n' number of Student objects where 'n' value is passed as input to constructor
4. Write Java program to implement Hierarchical Inheritance
5. Write Java program to implement multiple inheritance through interface
6. Write a Java program to demonstrate String comparison using == and equals method.
7. Write a Java program that creates three threads. First thread displays "Good Morning" everyone second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds
8. Write a Java program to demonstrate Exception Handling
9. Write a Java program that displays the number of characters, lines and words in a text file
10. Write a Java Program to create Applet for timer
11. Write a Java program to connect to Database using JDBC
12. Write a Java program to demonstrate Servlet life cycle

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks

Total	----- 50 Marks -----
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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

BCA	Course Code	Semester: III	Credits: 04
	C9	Operating Systems	Hrs/Wk:04

Course Objectives:

1. To know the basic Structure, Components and Organization of Operating System.
2. To learn the notation of a Process-a Program in Execution, Management, Scheduling and Classic Problems of Synchronization.
3. To gain knowledge in various Memory Management Techniques.
4. To understand Unix Operating System and Various File operations.

Course Outcomes:

The students will be able to:

1. Understand the main components and Structure of Operating System& their functions.
2. Analyze various ways of Process Management& CPU Scheduling Algorithms.
3. Evaluate various device and resources like Memory, Time and CPU Management techniques in distributed systems.
4. Apply different methods for Preventing Deadlocks in a Computer System.
5. Create and build an Application/Service over the UNIX operating system.



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

PAPER C9: OPERATING SYSTEMS

UNIT - I: Introduction: What Operating Systems do, Computer system organization, Computer system architecture, Operating system structure. System Structure: Operating system services, User operating system interface, System Calls, Types of System Calls, Overview of UNIX Operating System, Basic features of Unix operating System.

UNIT - II: Process Concept: Process Concept, Process Scheduling, Operation on Process.

Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, CPU Scheduling in UNIX.

UNIT - III: Synchronization: Background, The critical section problem. Semaphores: Usage, Implementation, Deadlocks and Starvation, Classic problems of synchronization. Deadlocks: System Model, Deadlock Characterization, Deadlock Prevention.

UNIT - IV: Memory Management: Background, Basic hardware, Address Binding, Swapping, Contiguous memory allocation, Paging: Basic Method, Hardware Support, Protection, Memory Management in UNIX.

UNIT - V: Files and Directories in UNIX, File Structure, File System Implementation of Operating System Functions, File permission, Basic Operation on Files, Changing Permission Modes, Standard files, Processes Inspecting Files, Operating On Files.

TEXT BOOKS:

1. Operating system Concepts: Abraham Silberschatz, Peter B. Galvin, Greg Gagne, 8th Edition, Wiley.
2. Unix and shell Programming by B.M Harwani, OXFORD University Press

REFERENCE BOOKS:

1. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.
2. Principles of Operating Systems by Naresh Chauhan, OXFORD University Press
3. Unix Concept and application-Sumitabha das
4. Unix Shell Programming-Yashwant Kanetkar

GUIDELINES TO THE PAPER SETTER**BLUE PRINT**

Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

PAPER C9: OPERATING SYSTEMS

MODEL QUESTION PAPER

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Explain Operating System Services. Discuss.
2. What is System Call? Explain in detail.
3. Discuss Scheduling Criteria. What is Dispatch Latency.
4. Differentiate Pre-emptive and Non Pre-emptive Scheduling algorithms.
5. Explain Medium Term scheduling algorithm.

SECTION – B

6. What is Semaphore? Discuss Critical Section problem.
7. Differentiate Deadlock prevention and Deadlock avoidance.
8. What is paging? Differentiate paged segmentation and demand paging.
9. Explain File allocation Methods. Discuss.
10. Discuss Files and Directories in UNIX.

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Write about Computer System Architecture.
12. Write about basic features of UNIX Operating System.
13. Write about Operation on Process.
14. Write about usage of Semaphore.
15. Write about Deadlock Prevention.
16. Write about Swapping briefly.
17. What is optimal page replacement algorithm?
18. Explain various file permissions.



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Third Semester

BCA	Course Code	Semester: III	Credits: 01
	C9 - P	Operating Systems Lab	Hrs/Wk:02

List of Experiments

1. Introduction to UNIX Operating System, Compare with Windows OS. Writing and executing simple Hello World C Program in UNIX Environment.
2. Working with vi editor: Creating and editing a text file using the standard commands.
3. Getting hands-on on basic UNIX Commands.
4. Execute of various file/directory handling commands.
5. Write a Simple shell script for basic arithmetic and logical calculations.
6. Write Shell scripts to check various attributes of files and directories.
7. Write Shell scripts to perform various operations on give n strings.
8. Write Shell scripts to explore system variables such as PATH, HOME etc.
9. Use seed instruction to process /etc/password file.
10. Write a shell script to display list of users currently logged in.
11. Write a shell script to delete all the temporary files.
12. Write a shell script to search an element from an array using binary searching.
13. Write C programs to implement the following Scheduling Algorithms:
 - i. First Come First Serve.
 - ii. Shortest Job First.
 - iii. Round Robin.

Reference Text Books:

1. Brian W. Kernighan and Rob Pike, “The UNIX Programming Environment” Prentice Hall India (Edition available in LRC and in the form of E Book on student resource).
2. Yashwant Kanetkar, “UNIX Shell Programming” BPB Publications (First Edition).

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks
Total	----- 50 Marks -----



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)
II – Year
(w.e.f. 2021 Admitted Batch)
Fourth Semester Syllabus

B.C.A Semester-IV

S.No	Paper Code	Subject	Hours/ Week	No of Credits	Max.Marks	Max. Marks University Exam	Total Marks
					Internal assessment		
1.	C10	Cyber Laws	4	4	25	75	100
	C10-P	Cyber Laws Lab	2	1	-0-	50	50
2.	C11	Data Mining and Data Warehousing	4	4	25	75	100
	C11-P	Data Mining and Data Warehousing Lab	2	1	-0-	50	50
3.	C12	Web Programming	4	4	25	75	100
	C12-P	Web Programming Lab	2	1	-0-	50	50
4.	C13	Data Communications & Networks	4	4	25	75	100
	C13-P	Data Communications & Networks Lab	2	1	-0-	50	50
5.	C14	Data Analytics using R	4	4	25	75	100
	C14-P	Data Analytics using R Lab	2	1	-0-	50	50
6.	C15	Object Oriented Software Engineering	4	4	25	75	100
	C15-P	Object Oriented Software Engineering Lab	2	1	-0-	50	50
Total			36	30	150	750	900

- Two mid semester examinations will be held and the average of those two be the Mid Semester Exam



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Fourth Semester

BCA	Course Code	Semester: IV	Credits: 04
	C10	Cyber Laws	Hrs/Wk:04

Course Objectives:

- Enable learners to understand, explore, and acquire a critical understanding of CyberLaw.
- Develop competencies for dealing with frauds and deceptions (confidence tricks, scams) and other cyber-crimes for example, child pornography etc. that are taking place via the Internet.
- Make learners conversant with the social and intellectual property issues emerging from 'Cyberspace'.
- Explore the legal and policy developments in various countries to regulate Cyberspace.
- Develop the understanding of relationship between commerce and cyberspace; and give learners in depth knowledge of Information Technology Act and legal frame work of Right to Privacy, Data Security and Data Protection.

Course Outcomes:

At the end of the course, students should be able to:

- Critically evaluate ongoing developments in law relating to information technologies.
- Display an understanding of how these developments relate to one another.
- Examine areas of doctrinal and political debate surrounding rules and theories;
- Evaluate those rules and theories in terms of internal coherence and practical outcomes.
- Draw on the analysis and evaluation contained in primary and secondary sources.



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

2021-2022 BATCH

(w.e.f. 2021-2022 Admitted Batch)

Fourth Semester

PAPER C10: CYBER LAWS

UNIT - I: Introduction: Computers and its Impact in Society, Overview of Computer and Web Technology, Need for Cyber Law, *Cyber Jurisprudence* at International and Indian Level.

UNIT II: Cyber Law- International Perspectives: UN &International Telecommunication Union (ITU)Initiatives, Council of Europe -Budapest Convention on Cybercrime, Asia-Pacific Economic Cooperation(APEC), Organization for Economic Co-operation and Development(OECD), World Bank, Commonwealth of Nations.

UNIT -III: Constitutional& Human Rights Issues in Cyberspace: Freedom of Speech and Expression in Cyberspace, Right to Access Cyberspace – Access to Internet, Right to Privacy, Right to Data Protection.

UNIT - IV: Cyber Crimes & Legal Framework: Cyber Crimes against Individuals, Institution and State, Hacking, Digital Forgery, Cyber Stalking/Harassment, Cyber Pornography, Identity Theft &Fraud, Cyber terrorism, Cyber Defamation, Different offences under IT Act,2000.

UNIT - V: Cyber Torts: Cyber Defamation, Different Types of Civil Wrongs under the IT Act, 2000, Intellectual Property Issues in Cyber Space, Interface with Copyright Law, Interface with Patent Law, Trade marks &Domain Names Related issues

Reference Books:

1. Chris Reed & John Angel, Computer Law, OUP, New York, (2007).
2. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012).
3. Verma K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004)
4. Jonathan Rosenoer, Cyber Law, Springer, New York, (1997).
5. Sudhir Naib, The Information Technology Act, 2005: A Handbook, OUP, New York, (2011)
6. S.R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd., Jaipur (2003).
7. Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi, (2003).

GUIDELINES TO THE PAPER SETTER**BLUE PRINT**

Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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II – Year

(w.e.f. 2021 Admitted Batch)

Fourth Semester

PAPER C10: CYBER LAW

MODEL QUESTION PAPER

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section. (5 X 10 = 50M)

SECTION – A

1. Explain about Computers and its Impact in Society.
2. Explain the Cyber Jurisprudence at International and Indian Level.
3. Explain UN and ITU initiatives in Cyber Crimes.
4. Explain about Asia-Pacific Economic Cooperation (APEC).
5. Explain Organization for Economic Co-operation and Development (OECD).

SECTION – B

6. Discuss various Constitutional & Human Rights Issues in Cyberspace.
7. Describe about the Freedom of Speech and Expression in Cyberspace
8. Discuss about different offences under IT Act, 2000.
9. Explain various Intellectual Property Issues in Cyber Space
10. Explain about different types of Civil Wrongs under the IT Act, 2000.

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Write a short note on Computer and Web Technology.
12. Discuss the need of Cyber Law.
13. Write a short note on Commonwealth of Nations.
14. Write a short note on Right to Privacy.
15. Write a short note on Right to Data Protection.
16. Write about Digital Forgery.
17. Write about Cyber Pornography.
18. Write a short note on Interface with Patent Law.



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II – Year

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Fourth Semester

BCA	Course Code	Semester: IV	Credits: 01
	C10 - P	Cyber Laws Lab	Hrs/Wk:02

Lab Experiments

1. Write a program for recovering deleted files from a hard disk.
2. Write a program for gathering evidence.
3. Write a program for viewing files of various formats.
4. Write a program for locating files needed for a forensics investigation.
5. Write a program for performing image and file conversions.
6. Write a program for handling evidence data.
7. Write a program for creating a disk image file of a hard disk partition.
8. Give at least ten cyber crime scenarios to students and make them analyse the scenario and submit report citing cyber laws which are violated.

PRACTICAL BREAK UP OF MARKS:

- | | |
|-----------------------|----------|
| 1. Procedure/Steps - | 10 Marks |
| 2. Execution - | 20 Marks |
| 3. Practical Record - | 10 Marks |
| 4. Viva - | 10 Marks |

Total -----
50 Marks



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II – Year

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Fourth Semester

BCA	Course Code	Semester: IV	Credits: 04
	C11	Data Mining and Data Ware Housing	Hrs/Wk:04

Course Objectives:

- Be familiar with mathematical foundations of data mining tools.
- Understand and implement classical models and algorithms in data warehouses and data mining
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Master data mining techniques in various applications like social, scientific and environmental context. Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcomes:

At the end of the course, the student will demonstrate the following. The students will be able to:

- Examine the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system.
- Apply preprocessing statistical methods for any given raw data
- Discover interesting patterns from large amounts of data to analyze and extract patterns to solve problems, make predictions of outcomes
- Comprehend the roles that data mining plays in various fields and manipulate different data mining techniques
- Select and apply proper data mining algorithms to build analytical applications.
- Evaluate and implement a wide range of emerging and newly-adopted methodologies and technologies to facilitate the knowledge discovery.



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II – Year

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Fourth Semester

PAPER C11: DATA MINING AND DATA WARE HOUSING

UNIT -I: Introduction: Data Mining and Importance, Relational Databases, Data Warehouses, Transactional Databases. Data Mining Functionalities, Kinds of Patterns. Data Preprocessing: Why Preprocess the Data?, Descriptive Data Summarization: Measuring the Central Tendency, Measuring the Dispersion of Data, Data Cleaning, Data Integration and Transformation, Data Reduction.

UNIT - II: Data Warehouse and OLAP Technology: An Overview, What Is a Data Warehouse? , A Multidimensional Data Model, From Tables and Spreadsheets to Data Cubes, Stars, Snowflakes, and Fact Constellations: Schemas for Multidimensional databases, Examples, Measures: Their Categorization and Computation, Concept Hierarchies, OLAP Operations in the Multidimensional Data Model.

Data Warehouse Architecture: Steps for the Design and Construction of Data Warehouses, A Three- Tier Data Warehouse Architecture, Data Warehouse Back-End Tools and Utilities. Data Warehouse Implementation.

UNIT - III: Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Mining Methods: The Apriori Algorithm: Finding Frequent Itemsets Using Candidate Generation, Generating Association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, Mining Frequent Itemsets without Candidate Generation. Mining various kinds of Association Rules: Mining Multilevel Association Rules, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses.

UNIT - IV: Tree Induction, Attribute Selection Measures. Bayesian Classification: Naïve Bayesian Classification Classification and Prediction: Classification, Prediction, Regarding Classification and

Prediction, Decision, **Rule-Based Classification**: Using IF-THEN Rules for Classification, Rule Extraction from a Decision Tree, Rule Induction Using a Sequential Covering Algorithm.

UNIT V: Cluster Analysis: Cluster Analysis, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods Hierarchical Methods: Agglomerative and Divisive Hierarchical Clustering, Density-Based Methods, Outlier Analysis.

PRESCRIBED TEXT BOOK:

1. Data Mining: Concepts and Techniques Second Edition Jiawei Han University of Illinois at Urbana-Champaign Micheline KambeR.

REFERENCES:

1. Data Mining by Vikram Pudi, P. Radha Krishna, Oxford Universal Press
2. Data Warehousing by Reema Thareja, Oxford University Press
3. J. Han, M. Kamber and J. Pei, Data Mining: Concepts and Techniques, 3rd. Edition Morgan Kaufmann, 2011
4. Introduction to data mining –G. K. Gupta, PHI
5. Data mining, Data warehouse & Olap-Berson, Tata McGraw Hill

STUDENT ACTIVITY:

1. Predict the course taken by a student based on his activities and way of learning
2. Learn visual patterns of any real time data

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Fourth Semester

**PAPER C11: DATA MINING AND DATA WARE HOUSING
MODEL QUESTION PAPER**

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Explain different kinds of patterns in Data Mining?
2. Explain Data Pre-processing Steps in Data Mining?
3. Explain OLAP operations in Multidimensional Data Model?
4. Briefly discuss Three- Tier Data Warehouse Architecture?
5. Explain Data Warehouse Implementation.

SECTION – B

6. Briefly explain Apriori algorithm with example.
7. Explain about Mining Multilevel and Multidimensional Association Rules in Data Mining
8. Explain Attribute Selection Measures with example.
9. Define Cluster Analysis. Explain Types of Data in Cluster Analysis?
10. Explain about Hierarchical Methods of Clustering.

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. What is Data Mining and explain its importance?
12. Explain Data Mining Functionalities.
13. Write a short note on Data Cubes.
14. Explain Mining Frequent Item sets without Candidate Generation.
15. Explain about Mining Multilevel Association Rules?
16. Write a short note on Bayesian Classification.
17. Explain Decision Tree Induction.
18. Explain Density-Based Methods.



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)
II – Year
(w.e.f. 2021 Admitted Batch)

Fourth Semester

BCA	Course Code	Semester: IV	Credits: 01
	C11 - P	Data Mining and Data Ware Housing Lab	

List of Experiments

1. Demonstration of preprocessing on dataset student.arff.
2. Demonstration of preprocessing on dataset labor.arff.
3. Demonstration of Association rule process on dataset contactlenses.arff using Apriori algorithm.
4. Demonstration of Association rule process on dataset test.arff using Apriori algorithm.
5. Demonstration of classification rule process on dataset student.arff using j48 algorithm.
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm.
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm.
8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm.
9. Demonstration of clustering rule process on dataset iris.arff using simple k-means.
10. Demonstration of clustering rule process on dataset student.arff using simple k-means.

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks
Total	----- 50 Marks -----



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Fourth Semester

BCA	Course Code	Semester: IV	Credits: 04
	C12	Web Programming	Hrs/Wk:04

Course Objectives:

- To learn about the Building Blocks of PHP, Arrays.
- To learn about PHP functions and file handling.
- To learn about working with Forms, Sessions, Cookies.
- To learn about Java Script basics.

Course Outcomes:

- Able to use Building Blocks of PHP, Access array elements.
- Able to use various functions and handle data using files..
- Able to use working with Forms, Sessions, Cookies.
- Able to implement JavaScript.



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II – Year

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Fourth Semester

PAPER C12: WEB PROGRAMMING

UNIT – I: Basics of HTML & Java Script: Basic structure of an HTML document, HTML Tags, Lists, Tables and Frames, Forms and controls. **Java Script:** Introduction – Basic commands – Variables – Operators – Control structures – Arrays - Window and document object – Forms and form elements – String, math and dates – multiple windows.

UNIT -II: Basics of PHP :Introduction to PHP, Identifiers, Variables, Constants, Data Types, Operators, Conditional Statements, PHP Loops. Working with **Arrays:** Arrays, Creating Arrays, some Array-Related Functions. Working with Objects:Creating Objects, Object Instance. Working with Strings, Dates and Time: Formatting Strings with PHP), Investigating Strings with PHP , Manipulating Strings with PHP, Using Date and Time Functions in PHP.

UNIT - III: Advanced PHP:Functions, Advantages of Using functions, Types of functions, creating and invoking functions, returning values, recursive functions Object Oriented Concepts, File handling and Data Storage: creating, open/close a file, file operations: read, write, append. File truncate, file uploading, EOF in PHP.

UNIT IV: Working with Forms in PHP: Creating Forms, Accessing Form - Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user.

PHP with MySQL: Creating Database in MySQL, Connecting to MYSQL, Reading and Writing form data from MYSQL

UNIT - V: Working with Cookies and User Sessions: Introducing Cookies, Setting a Cookie with PHP, Session Function Overview, Starting a Session, Working with session variables, passing session IDs in the Query String, Destroying Sessions and Unsetting Variables, Using Sessions in an Environment with Registered Users.

REFERENCE BOOKS:

1. Fundamentals Of Open Source Software, Mn Rao, Phi,2015.
2. Julie C. Meloni, PHP MySQL and Apache, SAMS Teach Yourself, Pearson Education (2007).
3. Web Technologies, A. a. Puntambekar, 2013, Technical Publications

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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II – Year

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Fourth Semester

**PAPER C12: WEB PROGRAMMING
MODEL QUESTION PAPER**

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Explain Table creation in HTML document.
2. Explain Control structures in JavaScript.
3. Explain Operators in PHP.
4. Explain about Arrays in PHP with example.
5. Explain Strings functions in PHP.

SECTION – B

6. Define Function. Explain about Creating and Invoking Functions with example.
7. Explain various File Operations in PHP with examples.
7. How to combine HTML and PHP code in a single page?
8. Explain Cookies and Setting a Cookie with PHP?
9. How to pass session IDs in the Query String explain with an example in PHP?

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Explain the Structure of HTML Document.
12. Explain about types of Lists in HTML with examples.
13. Explain the Data Types in PHP.
14. Write about advantages of functions in PHP.
15. Explain Recursive Functions in PHP.
16. Explain about Creating Forms in PHP.
17. How to Redirecting the user in PHP?
18. Write a short note on Session Function.



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Fourth Semester

BCA	Course Code	Semester: IV	Credits: 01
	C12 - P	Web Programming Lab	Hrs/Wk:02

Lab experiments

1. Create a basic student registration form and add validations using JavaScript
2. Create a PHP program to find odd or even number from given number.
3. Write a PHP program to find maximum of three numbers.
4. Demonstrating while loop in PHP for accessing array elements.
5. Demonstrating for each loop in PHP.
6. Write a PHP program to demonstrate various string functions.
7. Write a PHP program to demonstrate Date and Time functions.
8. Write a PHP program to perform read and write operations on a file.
9. Creating user login form in PHP with MYSQL.
10. Demonstrating File Uploads.
11. Demonstrating Working with Cookies.
12. Demonstrating User Sessions.

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks

Total -----
50 Marks



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Fourth Semester

BCA	Course Code	Semester: IV	Credits: 04
	C13	Data Communications & Networking	Hrs/Wk:04

Course Objectives:

This course will enable the students to

1. Appreciate the use of computer networking in various walks of life, describe the types of networks, network configurations and network topologies. Also Write the OSI and TCP/IP reference models for networking.
2. Explain responsibilities of data link layer, its implementation and associated protocols, algorithms/pseudo codes.
3. Explain the various techniques used to access a shared channel in the network and IEEE specifications for LANs.
4. List types of networking devices, backbone networks and Internet Protocol (IP) addressing.
5. Explain the responsibilities of network, transport and application layers.

Course Outcomes:

At the end of the course the student will be able to

1. Define computer networks, list network configurations, types, topologies, the applications of computer networks in different fields, network models and description of physical layer.
2. Reason the need for flow and error control at the data link layer and explain the associated protocols.
3. Enumerate the shared channel access methods, associated protocols and Wired & Wireless LAN standards and implementations.

4. List the types of networking devices / equipments and also explain the addressing scheme used at the network layer.
5. Explain how network layer, transport layer and application layer facilitates the transfer of message from one node to another in a global network



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)
II – Year
(w.e.f. 2021 Admitted Batch)

Fourth Semester

PAPER C13: DATA COMMUNICATIONS & NETWORKING

UNIT - I: Introduction to Data communications, Network Criteria, point-to-point and multi point connection, physical topology, Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Wireless Networks, protocols and standards.

Network Models: Layered tasks, Connection-Oriented and Connectionless Services, Service Primitives, The OSI Reference Model, The TCP/IP Reference Model, Comparison of the OSI and TCP/IP Reference Models, addressing.

UNIT – II: Physical Layer: Basis for Data Communication: Transmission of digital signals: Bit rate, bit length, baseband and broadband transmission, transmission impairment, data rate limits, performance, Guided Transmission Media Twisted Pair Coaxial Cable and Fiber Optics

Data Link Layer: Framing, Error Control, Flow Control, Error-Detection and correction: Introduction, Error detection using CRC. Data Link Protocols: Simplest Protocol, Stop-and-Wait Protocol, Stop-and- Wait ARQ, GoBack-N ARQ, Selective Repeat ARQ, HDLC.

UNIT – III: Multiple Accesses. Random Access: ALOHA, Carrier Sense Multiple Access (CSMA) Protocols, CSMA

with Collision Detection, CSMA with Collision Avoidance. Controlled Access: Reservation, Polling and Token Passing. Channelization: FDMA, TDMA, CDMA.

Wired LAN: Ethernet, IEEE standards, Standard Ethernet.Changes in the standards, Fast Ethernet, Gigabit Ethernet, **Wireless LAN (802.11).**

UNIT - IV: Connecting LANs, Backbone and Virtual LANs: Connecting devices, Back bone Networks, Virtual LANs. Network Layer: Need for network layer, Logical addressing, Ipv4 addresses, Ipv6 addresses, Ipv4 and Ipv6 datagrams, Transition from Ipv4 to Ipv6.

UNIT - V: Network Layer: Delivery, Forwarding, Types of Routing protocols, Unicast Routing Protocols, The Transport Layer: Process to process Delivery, User Datagram Protocol (UDP) and TCP. Application layer: Domain name space, Distribution of name space, Resolution.

TEXT BOOKS:

1. Data communications and Networking-4th edition Beharouza.Forouzan, TMH

REFERENCE BOOKS:

1. Data Communications and Computer Networks By Prakash C. Gupta, PHI Publishers.
2. Computer Networks By Andrew S.Tanenbaum, Pearson Education.
3. Wireless Technologies Circuits, Systems and Devices by Krzysztof Iniewski CRC Press.
4. Wireless Networking Technology: From Principles to Successful Implementation by Stephen A.Rackley.

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

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Fourth Semester

PAPER C13: DATA COMMUNICATIONS & NETWORKING

MODEL QUESTION PAPER

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Explain OSI reference model?
2. Explain TCP/IP reference model?
3. Explain different types of transmission media used in physical layer?
4. Explain Data Link Protocols Stop-and-Wait Protocol and Stop-and-Wait ARQ?
5. Explain about Error Correction and Detection with example.

SECTION – B

6. Explain Carrier Sense Multiple Access (CSMA) Protocols?
7. Explain Ethernet and Wireless LAN (802.11)?
8. What is a Logical addressing and Explain types of IPv4 addresses?
9. Explain User Datagram Protocol (UDP)?
10. Discuss about Domain name space?

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. What is Local Area Network and Explain advantages and disadvantages of LAN?
12. Write a short note on Connection – Oriented and Connectionless Services.
12. Explain flow control mechanism in data link layer?
13. Write a short note on Framing.
14. Explain about ALOHA?
15. Explain Polling and Token passing?
16. Write about VLAN?
17. Write about Need for Network Layer.
18. Explain Unicast routing protocols?



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

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Fourth Semester

List of Experiments

BCA	Course Code	Semester: IV	Credits: 01
	C13 - P	Data Communications & Networking Lab	Hrs/Wk:02

- 1) Study of different types of Network cables
- 2) Study of various Network connecting devices
- 3) Configure Host IP, Subnet Mask and Default Gateway in a System in LAN (TCP/IP Configuration)
- 4) Configure Internet connection and use IPCONFIG, PING / Tracer and Net stat utilities to debug the network issues.
- 5) Study of basic network command and Network configuration commands
- 6) Implementation of character stuffing and destuffing
- 7) Implementation of parity checker
- 8) Implementation of CRC
- 9) Implementation of checksum.
- 10) Implementation of shortest path protocol
- 11) Implementation of string encryption and decryption
- 12) To find out details of network from IP addressing scheme using 'C' code

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks
Total	----- 50 Marks -----



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Fourth Semester

BCA	Course Code	Semester: IV	Credits: 04
	C14	Data Analytics Using R	Hrs/Wk:04

Course Objectives:

This course will cover all the fundamental algorithms and techniques used in Data Analytics and provide exposure to theory as well as practical knowledge through R used in data analytics.

After completing the course, student will learn,

- Fundamental basics of statistics used in analysing the data
- How to find the pattern in the given dataset
- How to interpret the data graphically
- How to apply different types of algorithms for the given dataset

Course Outcomes:

- Data-Visualization tools and techniques offer executives and other knowledge workers new approaches to dramatically improve their ability to grasp information hiding in their data.
- Data visualization is a general term that describes any effort to help people understand the significance of data by placing it in a visual context.
- Patterns, trends and correlations that might go undetected in text-based data can be exposed and recognized easier with data visualization software.
- It isn't just the attraction of the huge range of statistical analyses afforded by R that attracts data people to R. The language has also developed a rich ecosystem of charts, plots and visualizations over the years.
- ggplot2 is a data visualization package for the statistical programming language R.



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

II – Year

(w.e.f. 2021 Admitted Batch)

Fourth Semester

PAPER C14: DATA ANALYTICS USING R

UNIT - I: Introduction: Introducing to R Data Structures –Help functions in R –Vectors –Scalars –Declarations –recycling –Common Vector operations –Using all and any –Vectorized operations – NA and NULL values – Filtering – Vectorised if-then else –Vector Equality –Vector Element names
Matrices, Arrays and Lists: Creating matrices –Matrix operations –Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns –Vector/Matrix Distinction –Avoiding Dimension Reduction –Higher Dimensional arrays –lists –Creating lists –General list operations – Accessing list components and values –applying functions to lists –recursive lists

UNIT - II: Data Frames & Packages in R: Creating Data Frames –Matrix-like operations in frames –Merging Data Frames –Applying functions to Data frames –Factors and Tables –factors and levels – Common functions used with factors –Working with tables -Other factors and table related functions - Control statements – Arithmetic and Boolean operators and values –Default values for arguments – Returning Boolean values Packages : Tidy, ggplot2, ggraph, dplyr, tidyquant, dygraphs.

UNIT - III: Introduction to Data analytics: Overview of Bigdata, Need of Data Analytics, Applications of Data Analytics, Datasets, tools for data analytics **Basic Statistics:** Mean, Median, Standard Deviation, Variance, Correlation, Covariance. **Basic Analysis Techniques:** Chi-Square Test, t-Test, Analysis of Variance, Correlation Analysis.

UNIT - IV: Data Analysis Techniques: Linear Regression, Logistic Regression, Classification Techniques, Clustering Techniques, Ensemble model.

UNIT V: Data Visualization Using R: Data Visualization, Libraries used for Data Visualization in R, Bar chart, Histogram, Heatmap, Scatter plot, Box Plot, Correlogram, Area Chart

TEXT BOOK:

1. Data Analytics using R, McGrawHill Publications, Seema Acharya
2. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data by Hadley Wickham, O'Reilly
3. Rumsey D. J. (2010): Statistical Essentials for Dummies. Hoboken: Wiley Publishing

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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II – Year

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Fourth Semester

**PAPER C14: DATA ANALYTICS USING R
MODEL QUESTION PAPER**

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Discuss about vector operations in R with examples?
2. How to create matrices and how to perform matrix operations in R programming?
3. What is data frames and Explain applying functions to data frames?
4. What is package and explain packages Tidy, ggplot2?
5. Explain in detail about dplyr and digraphs.

SECTION – B

6. What are the Applications of Data Analytics?
7. Explain about Basic Statistics.
8. Explain about Clustering Techniques?
9. Explain data visualization using bar chart in R programming?
10. Explain data visualization using Scatter plot in R programming?

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Discuss about help functions in R programming?
12. Explain Higher Dimensional arrays in R programming?
13. Explain table related functions in R programming?
14. What is big data and Explain need of data analytics?
15. Explain about Chi-square Test.
16. Explain Classification Techniques.
17. Explain Ensemble model?
18. What is Data Visualization and List Libraries used for Data Visualization in R?



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Fourth Semester

BCA	Course Code	Semester: IV	Credits: 04
	C15	Object Oriented Software Engineering	Hrs/Wk:04

Course Objective

- To develop background knowledge as well as core expertise in object oriented system.
- To provide the importance of the software design process.
- To assess the unified process and Unified Modeling Language

Course Outcomes

- To describe the three pillars of object-orientation methodologies and explain the benefits of each.
- To create use case documents that capture requirements for a software system.
- To create class diagrams that model both the domain model and design model of a software system.
- To create interaction diagrams that models the dynamic aspects of a software system.
- To understand the facets of the Unified Process approach to designing and building a software system.
- To build a model for the user interface (UI) of a software application



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II – Year
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Fourth Semester
PAPER C15 : OBJECT ORIENTED SOFTWARE ENGINEERING

UNIT –I: Software Engineering: Software engineering process paradigms, Process Models – Waterfall Model, Iterative Model, RAD Model, Prototype Model. Requirement Analysis, Analysis Model.

UNIT -II: Introduction to OOAD – What is OOAD? – What is UML? What are the United process(UP) phases - Inception -Use case Modeling - Relating Use cases – include, extend and generalization.

UNIT -III: Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

UNIT -IV: Basic Behavioral Modeling-I: Interactions, Interaction diagrams, Activity Diagrams. UML state diagrams and modeling, UML deployment and component diagrams

UNIT -V: Object Oriented Testing: Overview of Testing, object oriented Testing, Types of Testing, Object oriented Testing strategies, Test case design for OO software.

REFERENCE BOOKS:

1. Object Oriented Analysis and Design By GradyBooch.

2. Craig Larman,"Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education,2005
3. Mike O'Docherty, "Object-Oriented Analysis & Design: Understanding System Development with UML 2.0", John Wiley & Sons,2005.
4. James W- Cooper, Addison-Wesley, "Java Design Patterns – A Tutorial",2000.
5. Micheal Blaha, James Rumbaugh, "Object-Oriented Modeling and Design withUML", Second Edition,Prentice Hall of India Private Limited,2007
6. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides,"Design patterns: Elements of Reusable object-oriented software", Addison-Wesley,1995.

STUDENT ACTIVITY:

1. Develop a class diagram for the flight services available in your nearby airport
2. Develop a sequence diagram of activities of any automated device.

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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II – Year

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Fourth Semester

**PAPER C15: OBJECT ORIENTED SOFTWARE ENGINEERING
MODEL QUESTION PAPER**

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section. (5 X 10 = 50M)

SECTION – A

1. Explain Software engineering process paradigms?
2. Explain about Analysis model?
3. Explain Use case Modeling with an example?
4. Explain unified process (UP) modeling and its phases?
5. Explain about different UML diagrams in detail.

SECTION – B

6. Explain Relationships in Basic Structural Modeling?
7. Explain Modeling Techniques for class & object diagrams.
8. Explain about UML deployment and component diagrams?
9. Explain Object oriented Testing strategies?
10. Explain different types of testing performed in object oriented systems?

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Explain about waterfall model and its advantages, disadvantages?
12. What is importance of feasibility study report in requirement analysis?
13. What is object oriented analysis design and list out its benefits?
14. Explain classes and object in Basic Structural Modeling?
15. Explain Common Mechanisms in Basic Structural Modeling?
16. What is UML and explain its importance in design?
17. Explain about Activity Diagrams in UML?
18. What is object oriented testing and its importance?



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II – Year
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Fourth Semester

BCA	Course Code	Semester: IV	Credits: 01
	C15 - P	Object Oriented Software Engineering Lab	Hrs/Wk:02

List of Experiments

Case Studies:

Design Following Systems in Object Oriented Approach using UML with open source tools (Eclipse UML2 or any other Open source tools):

1. Online Examination System.
2. Online Railway Reservation.
3. Library Maintenance System.
4. Any E-Commerce Portal.
5. Biometric Attendance System.

Note: Student is expected to analyze the system in object oriented manner and design the system in object oriented approach using UML with open source tools

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks
Total	----- 50 Marks -----



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Skill Enhancement Courses (SECs) for Semester -V

S. No.	Paper Code	Subject	Hours per week	Credits	Max. Marks		Total Marks
					Internal	External (University Exams)	
1	SEC-1	Machine Learning Using Python	4	4	25	75	100
	SEC-1P(Lab)	Python Lab	2	1	--	50	50
2	SEC-2	Digital Imaging	4	4	25	75	100
	SEC-2P(Lab)	Digital Imaging Lab	2	1	--	50	50
3	SEC-3	Cyber Security and Malware Analysis	4	4	25	75	100
	SEC-3P(Lab)	Cyber Security and Malware Analysis Lab	2	1	--	50	50
4	SEC-4	Internet of Things	4	4	25	75	100
	SEC-4P(Lab)	Internet of Things Lab	2	1	--	50	50
5	SEC-5	Mobile Application Development	4	4	25	75	100
	SEC-5P(Lab)	Mobile Application Development Lab	2	1	--	50	50
6	SEC-6	PC Hardware And Networking	4	4	25	75	100
	SEC-6P(Lab)	Computer Networking and PC trouble shooting Labs	2	1	--	50	50
TOTAL			36	30	150	750	900

Note: *Course type code: T: Theory, L: Lab, P: Problem solving

Note: FIRST and SECOND PHASES (2 spells) of APPRENTICESHIP between 1st and 2nd year and between 2nd and 3rd year (two summer vacations)

***Note:** THIRD PHASE of APPRENTICESHIP Entire 5th / 6th Semester

Note-1: The Number of hours per week and credits are assigned to each course as per the course structure which was already approved at the time of finalizing the first FOUR semesters of BCA programme under CBCS by the concerned committee.

Note-2: One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate practical skills related to the domain subject in students. The syllabus of SEC will be skill oriented and hence, teachers shall impart practical training to students on the skills embedded in syllabus citing related real field situations.

Note-3: Since, the proposed SECs are connected to Computer Programming/Software Tools and Skill enhancement, the students need to get exposure on the syllabus content by practicing on the computer. Faculty are advised to engage students in practical based assignments so as to ensure better understanding of the practical usage of the particular skill based subject in real application domain.



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Fifth Semester

BCA	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 6A	Machine Learning Using Python	Hrs/Wk:4

Course Educational Objective: The objective of the course provides the basic concepts and techniques of Machine Learning and helps to use recent machine learning software for solving practical problems. It enables students to gain experience by doing independent study and research.

Course Outcomes: At the end of this course, the student will be able to

- CO1:** Identify the characteristics of machine learning.(**Understand- L2**)
- CO2:** Summarize the Model building and evaluation approaches(**Understand- L2**)
- CO3:** Apply Bayesian learning and regression algorithms for real-world Problems.(**Apply-L3**)
- CO4:** Apply supervised learning algorithms to solve the real-world Problems. (**Apply- L3**)
- CO5:** Apply unsupervised learning algorithms for the real world data. (**Apply- L3**)



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)
III – Year
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Fifth Semester

PAPER SEC-1: MACHINE LEARNING USING PYTHON

UNIT-I: Introduction to Machine Learning and Preparing to Model

Introduction to Machine Learning-Introduction, What is Human Learning? Types of Human Learning, What is Machine Learning? Types of Machine Learning, Problems Not To Be Solved Using Machine Learning, Applications of Machine Learning.

Preparing to Model-Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre- Processing.

UNIT-2: Modeling & Evaluation, Basics of Feature Engineering

Modeling & Evaluation-Introduction, Selecting a Model, Training a Model (for Supervised Learning), Model Representation and Interpretability, Evaluating Performance of a Model.

Basics of Feature Engineering-Introduction, Feature Transformation, Feature Subset Selection.

UNIT-3: Bayesian Concept Learning and Regression

Bayesian Concept Learning - Introduction, Why Bayesian Methods are Important?, Bayes' Theorem, Bayes' Theorem and Concept Learning, Bayesian Belief Network.

Regression: Introduction, Regression Algorithms - Simple linear regression, Multiple linear regression, Polynomial Regression Model, Logistic Regression, Maximum Likelihood Estimation.

UNIT-4: Supervised Learning: Classification, Ensemble Learning

Classification-Introduction, Example of Supervised Learning, Classification Model, Classification Learning Steps, Common Classification Algorithms - k-Nearest Neighbour (kNN), Decision tree, Random forest model, Support vector machines.

Ensemble Learning- Boosting, Bagging

UNIT-5: Unsupervised learning

Unsupervised Learning- Introduction, Unsupervised vs Supervised Learning, Application of Unsupervised Learning, Clustering –Clustering as a Machine Learning task, Different types of clustering techniques, Partitioning methods, Hierarchical clustering, Density-based methods: DBSCAN.

Finding Pattern using Association Rule - Definition of common terms, Association rule, Apriori algorithm.

Text Books:

1. Subramanian Chandramouli, SaikatDutt, Amit Kumar Das, “Machine Learning”,Pearson Education India ,1stedition.
2. Tom M. Mitchell, “Machine Learning’, MGH, 1997.

Reference Books:

1. Shai Shalev-Shwartz, ShaiBen David, “Understanding Machine Learning: From Theory to Algorithms”, Cambridge.
2. Peter Harington, “Machine Learning in Action” , Cengage, 1st edition, 2012.
3. Peter Flach, “Machine Learning: The art and science of algorithms that make sense of data”, Cambridge university press,2012.
4. Jason Brownlee, “Machine Learning Mastery with Python Understand Your Data, Create Accurate Models and Work Projects End-To-End”,Edition: v1.4, 2011.

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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Fifth Semester

PAPER SEC-1: MACHINE LEARNING USING PYTHON

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. What is Machine Learning? Explain about types of Machine Learning.
2. Explain the Basic Data Types in Machine Learning.
3. What is Modeling? Explain about Model Representation and Interpretability.
4. Explain about Evaluating Performance of a Model.
5. Explain about Feature Transformation.

SECTION-B

6. Explain about Bayes' Theorem.
7. Explain about Polynomial Regression Model.
8. Explain about Classification Model
9. Explain Different types of Clustering techniques.
10. Explain Apriori algorithm

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Write about Types of Human Learning.
12. Write a short note on Machine Learning Activities.
13. Write a short note on Feature Subset Selection.
14. Write a short note on Bayesian Belief Network.
15. Write a short note on Simple linear regression.
16. Write about Decision tree.
17. Write a short note on Support Vector Machines.
18. Differentiate Unsupervised and Supervised Learning.



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III – Year

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Fifth Semester

PAPER SEC-1P: MACHINE LEARNING USING PYTHON LAB

B.C.A	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 6A	Machine Learning Using Python Lab	Hrs/Wk:2

1. EDA Analysis
2. Exploring Feature Selection Algorithms
 - Ranking
 - Wrapper methods
3. Dimensionality Reduction-PCA
4. Exploring Model Evolution Parameters.
5. Probabilistic Classification Algorithm
6. Regression Techniques: Linear, Logistic
7. Classification Techniques – Tree Based
8. Classification Techniques- Neural Network.
9. Ensemble Learning
10. Clustering & Apriori Algorithm.

PRACTICAL BREAK UP OF MARKS:

- | | |
|-----------------------|----------|
| 1. Procedure/Steps - | 10 Marks |
| 2. Execution - | 20 Marks |
| 3. Practical Record - | 10 Marks |
| 4. Viva - | 10 Marks |

Total	-----	50 Marks



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III – Year

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Fifth Semester

PAPER SEC-2: DIGITAL IMAGING

BCA	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 7A	Digital Imaging	Hrs/Wk:4

Course Objective:

Learn about different types of images and how to use basic and advanced features of GIMP Software for creating and image editing tools.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:

1. Gain knowledge about Types of Graphics, Types of Objects, Types of video editing tools
2. Show their skills in editing and altering photographs
for through a basic understanding of the tool box.
3. Gain knowledge in using the layers.
4. Gain knowledge in using the selection tools, repair tools.
5. Gain knowledge in using selection tools , applying filters and can show their skills.



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III – Year

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Fifth Semester

PAPER SEC-2: DIGITAL IMAGING

UNIT-I

Types of Graphics, Raster vs Vector Graphics, Types of Object, Audio formats, Video formats, Image formats, Text document formats, Types of video editing, Different color modes., Image Scanner, Types of Image Scanners

UNIT-II

What is GIMP, GIMP tool box window , layers Dialog, Tool Options Dialog ,Image window,Image window menus

UNIT-III

Improving Digital Photos

Opening files, rescaling saving files,Cropping, Brightening & Darkening, Rotating, Sharpening, Fixing Red Eye

Introduction to layers

What is layer, Using layer to add text, Using move tool, Changing colors, Simple effects on layers, Linking layers together, Performing operations on layers,Using layers to copy and paste, Tour of layers dialog

UNIT-IV

Drawing:

Drawing lines and curves, Changing colors and brushes, Erasing, Drawing rectangles, Circles, other shapes, Outlining and filling regions, Filling with patterns and gradients, Importing brushes or gradients or making your own.

Selection:

Working with selections, Select by color and fuzzy, Select Bezier paths, Intelligent scissors tool, Modifying selections with selection modes Dodge and burn tool

UNIT-V**Erasing and Touching Up:**

Smudging tool, Clone tool, Sharpening using convolve tool, Blurring with Gaussian Blur, Correcting Color Balance, Hue, Saturation, Color balance using curves and levels.

Filters:

Filters, Blur, Enhance, Distort, Noise Filters

Text Book: Beginning GIMP From Novice to professional by Akkana Peck, Second Edition, Apress

Recommended Co-Curricular Activities (participation: total 15 weeks):

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
3. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

B. General

1. Group Discussion
2. Others

Recommended Continuous Assessment Methods:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,

3. Programming exercises,
4. Observation of practical skills,
5. Efficient delivery using seminar presentations,
6. Viva voce interviews.
7. Computerized adaptive testing, literature surveys and evaluations,
8. Peers and self-assessment, outputs form individual and collaborative work

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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Fifth Semester

PAPER SEC-2: DIGITAL IMAGING

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section. (5 X 10 = 50M)

SECTION – A

1. Explain about Raster and Vector Graphics.
2. Explain various Types of Image Scanners.
3. Explain about GIMP tool box window.
4. Explain the role of Layers Dialog in images.
5. Explain about Image window menus

SECTION – B

6. Briefly explain the techniques for Improving Digital Photos.
7. What is layer? Explain the operations performing on layers.
8. Explain the tools for drawing lines, curves, changing colors and brushes & Erasing.
9. Explain about Smudging tool and Clone tool.
10. Explain about Color balance using curves and levels.

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Write about Image formats.
12. Write about Types of video editing.
13. Write about Image window.
14. How to add text using layer?
15. How to perform Copy and Paste using layers.
16. Write about Outlining and filling regions.
17. Write a short note for working with selections.
18. Write about Blurring with Gaussian Blur.



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III – Year
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Fifth Semester

PAPER SEC-2P: DIGITAL IMAGING LAB

B.C.A	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 7A	Digital Imaging Lab	Hrs/Wk:2

1. Designing a Visiting card
2. Design Cover page of a book
3. Paper add for calling tenders
4. Passport photo design
5. Design a Pamphlet
6. Brochure designing
7. Titles designing
8. Custom shapes creation
9. Black & white and color photo conversion
10. Image size modification
11. Background changes
12. Texture and patterns designing
13. Filter effects & Eraser effects

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks
Total	----- 50 Marks -----



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III – Year
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Fifth Semester

PAPER SEC-3: CYBER SECURITY AND MALWARE ANALYSIS

BCA	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 6B	Cyber Security And Malware Analysis	Hrs/Wk:4

COURSE OBJECTIVES:

The main objective of the course is to impart conceptual understanding on Cyber security and protection of electronic systems and information from malware attacks.

COURSE OUTCOMES:

Upon successful completion of this course, students should have the knowledge and skills to

1. Understand the computer networks, networking tools and cyber security
2. Learn about NIST Cyber Security Framework
3. Understand the OWASP Vulnerabilities
4. Implement various Malware analysis tools
5. Understand about Information Technology act 2000



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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

III – Year

(w.e.f. 2021 Admitted Batch)

Fifth Semester

PAPER SEC-3: CYBER SECURITY AND MALWARE ANALYSIS

UNIT-I: Introduction to Networks & cyber security

Computer Network Basics, Computer network types, OSI Reference model, TCP/IP Protocol suite, Difference between OSI and TCP/IP, What is cyber, cyber-crime and cyber-security, All Layer wise attacks, Networking devices: router, bridge, switch, server, firewall, How to configure: router, How to create LAN, Network tools:, IP scanner, port scanner, vulnerability scanner, command tools-- netstack, traceroute, nslookup, tcpview

UNIT-II: NIST Cyber security framework

Introduction to the components of the framework, Cyber security Framework Tiers, What is NIST Cyber security framework, Features of NIST Cyber security framework, Functions of NIST Cyber security framework, Turn the NIST Cyber security Framework into Reality/ implementing the framework

UNIT-III: OWASP

What is OWASP? , OWASP Top 10 Vulnerabilities: ,Injection, Broken Authentication, Sensitive Data Exposure, XML External Entities (XXE), Broken Access Control, Security Misconfiguration, Cross-Site Scripting (XSS), Insecure Deserialization, Using Components with Known Vulnerabilities, Insufficient Logging and Monitoring, **OWASP Juice Shop, Web application firewall**

UNIT-IV: MALWARE ANALYSIS

What is malware, Types of malware, Keyloggers, Trojans, Ransome ware, Rootkits, Antivirus, Firewalls, Malware analysis, VM ware, How to use sandbox, How to create virtual

machine, Process explorer, Process monitor, SYS-internals Suite, SOC-security operations controls - Solar winds (study the tools), Network intrusion detection, Wireshark, IDS, IPS, Snort

UNIT-V: CYBER SECURITY: Legal Perspectives

Cybercrime and the legal landscape around the world, Indian IT ACT 2000 --Cybercrime and Punishments, Weak areas of IT ACT 2000, Challenges to Indian law and cybercrime scenario in India, Amendments of the Indian IT Act

Text books:

1. Computer Networks | Fifth Edition | By Pearson (6th Edition)|Tanenbaum, Feamster&Wetherall
2. Computer Networking | A Top-Down Approach | Sixth Edition | By Pearson | Kurose James F. Ross Keith W.
3. Cyber Security by SunitBelapure, Nina Godbole|Wiley Publications
4. TCP/IP Protocol Suite |Mcgraw-hill| Forouzan|Fourth Edition

Website References:

- <https://csrc.nist.gov/Projects/cybersecurity-framework/nist-cybersecurity-framework-a-quick-start-guide>
- <https://owasp.org/www-project-top-ten/>
- <https://owasp.org/www-project-juice-shop/>

Co-Curricular Activities:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

B. General

1. Group Discussion
2. Try to solve MCQ's available online.

Recommended Continuous Assessment Methods:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Practical assignments and laboratory reports,
4. Observation of practical skills,
5. Individual and group project reports.
6. Efficient delivery using seminar presentations,
7. Viva-Voce interviews.
8. Computerized adaptive testing, literature surveys and evaluations,
9. Peers and self-assessment, outputs form individual and collaborative work

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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PAPER SEC-3: CYBER SECURITY AND MALWARE ANALYSIS

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section. (5 X 10 = 50M)

SECTION – A

1. Explain the OSI Reference Model.
2. Discuss various Network Devices.
3. Explain about Cyber Security Framework Tiers.
4. Discuss about the Functions of NIST Cyber Security Framework.
5. Explain the procedure to turn the NIST Cybersecurity Framework into Reality/ implementing the Framework.

SECTION – B

6. Explain the concepts Broken Authentication and Sensitive Data Exposure.
7. Explain about Web Application Firewall.
8. Discuss about types of Malware.

9. Explain about Cybercrime and Punishments.

10. Discuss about Challenges to Indian law and Cybercrime Scenario in India.

Part-II

SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Write about types Computer Network.

12. Write a short note on Cyber, Cyber-Crime and Cyber-Security.

13. Write about the Components of the framework.

14. Write about Security MisConfiguration.

15. Write about Insufficient Logging and Monitoring.

16. Write about Antivirus.

17. Write a short note on Network intrusion detection.

18. Write a short note on Cybercrime Scenario in India



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Fifth Semester

PAPER SEC-3P: CYBER SECURITY AND MALWARE ANALYSIS LAB

B.C.A	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 6B	Cyber Security And Malware Analysis Lab	Hrs/Wk:2

COURSE OBJECTIVES:

The purpose of this course is to impart practical understanding on Cyber security and protection of electronic systems and information from malware attacks.

1. configure a LAN by using a switch
2. configure a LAN by using Router
- 3.steps to attack a victim computer by using "ProRat" trojan tool
4. Perform the packet sniffing mechanism by download the "wireshark" tool and extract the packets
5. Perform the task of creating mail messages by using fake mail id by using the "fake mailer" website (<https://emkei.cz>)
- 6.Perform the IP scanning mechanism by using "tracert" and "arp" commands
- 7.Perform the port scanning mechanism by using NMAP tool
8. Perform an SQL Injection attack and its preventive measure to avoid Injection attack
9. Perform an activity to access a locked computer without knowing the user's password.

PRACTICAL BREAK UP OF MARKS:

- | | |
|-----------------------|----------|
| 1. Procedure/Steps - | 10 Marks |
| 2. Execution - | 20 Marks |
| 3. Practical Record - | 10 Marks |

4. Viva - 10 Marks

Total -----
50 Marks



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Fifth Semester

PAPER SEC-4: INTERNET OF THINGS

BCA	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 7B	Internet Of Things	Hrs/Wk:4

Course description and objectives:

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop communication system among heterogeneous components i.e. IOT Devices.

Course Outcomes:

- * Able to understand various applications of IOT in real world and industry domain.
- * Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks.
- * Able to understand building blocks of Internet of Things and characteristics.
- * Able to design and develop IOT devices.



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III – Year

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Fifth Semester

PAPER SEC-4: INTERNET OF THINGS

UNIT-1

IOT. Explain Characteristics and component of IOT., Advantages and disadvantages of IOT., various application areas of IoT., Time for Convergence for IoT., reasons to converge the technologies and shift to IOT., smart parking IOT application using figure., smart home IOT application using figure., smart health using IoT., Smart City application of IoT

UNIT-2

M2M Value Chains., IoT architecture outline with diagram., IOT Value Chains using figure., shifting from M2M to IoT., design principles and needed capabilities of IOT, I-GVC using figure., Global Value Chain, M2M Value Chains., IoT-Architecture.

UNIT 3:

ETSI M2M high-level architecture., IOT reference model., IOT function view., IOT reference architecture's deployment and operational view., reference architecture of IOT using figure., Functional View, Information View, Deployment and Operational View, Other Relevant architectural views of IOT reference architecture., Architecture Reference Model of IOT using figure., IoT Domain Model, Open Geospatial Consortium Architecture with a diagram.

UNIT 4

shopping basket can tell: IoT for retailing industry?, future factory concepts.,four aspects in your business to master IoT, Needs of IoT for Oil and Gas Industry., creation from big data and serialization, challenges faced by industry related IoT Applications, four Aspects in one's business to master IoT, eHealth IOT applications, security concerns for industry.shopping basket can tell: IoT for retailing industry, future factory concepts, IoT for Oil and Gas Industry, Smart factory.

UNIT 5

GAMBAS adaptive middleware, smartie approach for IoT., security, privacy and trust in IoT-Data-Platforms for smart cities, Data aggregation for the IoT in smart cities security., contributions from FP7Projects., smartie approach, properties and characteristics.privacy-preserving sharing of IoT Data., activity chain - governance, privacy and security issues.

Co-Curricular Activities:

(Co-curricular activities shall not promote copying from textbook or from others work and shallencourage self/independent and group learning)

A. Measurable

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

B. General

1. Group Discussion
2. Try to solve MCQ's available online.

Recommended Continuous Assessment Methods:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),

2. Closed-book and open-book tests,
3. Practical assignments and laboratory reports,
4. Observation of practical skills,
5. Individual and group project reports.
6. Efficient delivery using seminar presentations,
7. Viva-Voce interviews.
8. Computerized adaptive testing, literature surveys and evaluations,
9. Peers and self-assessment, outputs form individual and collaborative work

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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Fifth Semester

PAPER SEC-4: INTERNET OF THINGS

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Explain the Characteristics and Components of IOT.
2. Explain various Application Areas of IOT.
3. Explain the IOT architecture.
4. Discuss the Design Principles and Needed Capabilities of IOT.
5. Explain about Global Value Chain.

SECTION – B

6. Explain about IOT Reference Model.
7. Explain about IOT Function View.
8. Explain the challenges faced by industry related IoT Applications.
9. Explain about GAMBAS adaptive middleware
10. Explain Data Aggregation for the IoT in Smart Cities Security.

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Write about Advantages and disadvantages of IOT.
12. Write a short note on Smart Health using IoT.
13. Write a short note on M2M Value Chains.
14. Write about Operational View of IOT.
15. Write a short note on IoT Domain Model.
16. Write about the Security Concerns for industry
17. Write about the Needs of IoT for Oil and Gas Industry
18. Write a short note on Security, Privacy and Trust in IoT.



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Fifth Semester

PAPER SEC-4P: INTERNET OF THINGS LAB

B.C.A	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 7B	Internet Of Things Lab	Hrs/Wk:2

IoT Lab Experiments:

1. Define and Explain Eclipse IoT Project
2. List and summarize few Eclipse IoT Projects.
3. Sketch the architecture of IoT Toolkit and explain each entity in brief.
4. Demonstrate a smart object API gateway service reference implementation in IoT toolkit.
5. Write and explain working of an HTTP-to-CoAP semantic mapping proxy in IoT toolkit
6. Describe gateway-as-a-service deployment in IoT toolkit.
7. Explain application framework and embedded software agents for IoT toolkit.
8. Explain working of Raspberry Pi.
9. Connect Raspberry Pi with your existing system components.
10. Give overview of Zetta.



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Fifth Semester

PAPER SEC-5: MOBILE APPLICATION DEVELOPMENT

BCA	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 6C	Mobile Application Development	Hrs/Wk:4

Course objectives:

1. Interpret the features of Android operating systems
2. Configure Android Environment and Development tools
3. Develop user interfaces by using layouts and controls
4. Develop rich user interface in the given view
5. Understand the security services and able to publish android application

Learning Outcomes:

Upon successful completion of the course, a student will be able to:

CO 1. Identify basic terms, tools and software related to android systems

CO 2. Describe components of IDE, understand features of android development tools

CO 3. Describe the layouts and controls

CO 4. Explain the significance of displays using the given view

CO 5. Explain the features of services and able to publish android Application

CO 6. Developing interesting Android applications using MIT App Inventor



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Fifth Semester

PAPER SEC-5: MOBILE APPLICATION DEVELOPMENT

UNIT-1

Introduction to Android ,open headset alliance, Android Ecosystem, Need of Android
Features of Android, Tools and software required for developing an Application,
Android architecture

UNIT-2

operating system, java JDK, Android SDK, Android development tools, Android virtual devices,
steps to install and configure Android studio and sdk

UNIT-3

Control flow, directory structure, components of a screen, fundamental UI design, linear layout,
absolute layout , table layout, relative layout, text view, edit text, button, image button, radio button,
toggle button, radio group, check box, and progress bar,list view , grid view, image view , scroll
view, time and date picker

UNIT-4

Android platform services, Android system Architecture, Android Security model,
Applications development: creating small application

UNIT-5

Introduction of MIT App Inventor, Application Coding 5.3Programming Basics & Dialog,
More Programming Basics, Alarm Clock Application, Audio & Video, Drawing Application, File,
Game, Device Location, Web Browsing

Text Books:

1. Erik Hellman, “Android Programming – Pushing the Limits”, 1st Edition, Wiley India Pvt Ltd, 2014.
2. App Inventor : create your own Android apps by Wolber, David (David Wayne)

Reference Books:

1. Dawn Griffiths and David Griffiths, “Head First Android Development”, 1stEdition, O’Reilly SPD Publishers, 2015.
2. J F DiMarzio, “Beginning Android Programming with Android Studio”, 4thEdition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126565580
3. Anubhav Pradhan, Anil V Deshpande, “ Composing Mobile Apps” usingAndroid, Wiley 2014, ISBN: 978-81-265-4660-2
4. Android Online Developers Guide
5. <http://developer.android.com/reference/> Udacity: Developing Android
6. Apps- Fundamentals
7. <https://www.udacity.com/course/developing-android-appsfundamentals--ud853-nd><http://www.appinventor.mit.edu/>

Recommended Co-Curricular Activities:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

A. Measurable

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity)

B. General

1. Group Discussion
2. Try to solve MCQ's available online.
3. Others

Recommended Continuous Assessment Methods:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Problem-solving exercises,
4. Practical assignments and laboratory reports.
5. Observation of practical skills,
6. Efficient delivery using seminar presentations,
7. Viva voce interviews.
8. Computerized adaptive testing, literature surveys and evaluations,
9. Peers and self-assessment, outputs form individual and collaborative work

GUIDELINES TO THE PAPER SETTER

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



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Fifth Semester

PAPER SEC-5: MOBILE APPLICATION DEVELOPMENT

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Explain Android architecture.
2. Write about Tools and software required for developing an Application.
3. Explain Android development tools.
4. Explain Android virtual devices.
5. Discuss Java JDK and Android SDK.

SECTION – B

6. Explain types of Buttons.
7. Describe various Layouts.
8. Explain Android Security model.
9. Explain Audio & Video Applications.
10. Explain Drawing Applications.

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Explain Features of Android.
12. Explain about Android Ecosystem.
13. Explain Android SDK.
14. Explain about components of a screen.
15. Briefly explain different views.
16. Explain android platform services.
17. Explain Device Location Android Application.
18. Explain Web Browsing.



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Fifth Semester

PAPER SEC-5P: MOBILE APPLICATION DEVELOPMENT LAB

B.C.A	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course: 6C	Mobile Application Development Lab	Hrs/Wk:2

Course objectives:

1. know the components and structure of mobile application development framework for android
2. learn the basic and important design concepts
3. learn the development of mobile application

Outcomes:

1. Understand the android platform
2. Design and implementation of various mobile applications

Experiments:

1. Demonstrate mobile technologies and devices
2. Demonstrate Android platform and applications overview
3. Implement User interface design layouts
4. Working with texts , shapes, buttons and lists
5. Develop a calculator application
6. Implement an application that creates a alarm clock

Note: The list of experiments need not be restricted to the above list. Detailed list of programming/software tool based exercises can be prepared by the concerned faculty members.

PRACTICAL BREAK UP OF MARKS:

1. Procedure/Steps -	10 Marks
2. Execution -	20 Marks
3. Practical Record -	10 Marks
4. Viva -	10 Marks
Total	----- 50 Marks -----



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Fifth Semester

PAPER SEC-6: PC HARDWARE AND NETWORKING

BCA	Semester – V (Skill Enhancement Course- Elective)	Credits:4
Course: 7C	Pc Hardware And Networking	Hrs/Wk:4

Course objectives: Upon successful completion of the course, a student will be able to:

Learning Outcomes:

- CO 1. Identify the computer peripherals, software and hardware devices.
- CO 2. Describe the basics of networks and networking tools
- CO 3. Describe the Network Addressing and sub-netting
- CO 4. Explains the Networks protocols and management
- CO 5. Identifies Basic Network administrator roles



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Fifth Semester

PAPER SEC-6: PC HARDWARE AND NETWORKING

UNIT-1: Introduction to computer hardware

Introduction & Definition of Computer Block Diagram of computer, Classification of computer, Characteristics of Computers, Types of Languages and language translators., History and Generation of computers, Memory-Bits, Bytes, KB, MB, GB, TB, PB, EB, ZB, YB, Brontope byte, Geeope Byte. Etc

IEC Units: kibi, mebi, gibi, tebi, pebi, exbi, zebi, yobi, Computer Software, Types of Software with Ex. (System/Application/Utility S/W, Computer Hardware- Intro. to Hardware components of computer, Components and its parts, Identifying the Important Hardware Components of PC.- CPU, Motherboard, RAM,HDD, ODD, SMPS, K/B, Mouse, Monitor (CRT,LCD,LED) etc

SMPS: About SMPS, Types of SMPS, Power stored in UPS, Components and Circuits inside the SMPS Unit,UPS (Uninterrupted Power Supply), Types of UPS (Offline/Line Interactive & Online), Working Principle of each type of UPS., Connecting, Maintenance and Troubleshooting.

UNIT-2: Computer management and servicing

Assembling and disassembling PCs, Introduction to BIOS / CMOS Setup, POST (Power On SelfTest), Introduction to BIOS/CMOS Setup, POST (Power On Self-Test Demonstration of BIOS/CMOS Configuration (Date, Time, Enable/Disable Devices), Dual BIOS Feature, BIOS/CMOS Setup, Booting Sequence/Boot Order

Introduction to Operating System

Definition and types of Operating Systems -MSDos, Windows 9x/XP/Vista/7/8, Linux,MAC OS, Android etc., Process of Booting the Operating System., Win XP/Win 7. Activation and Automatic Updating procedures.

Computer Management

Computer Management, Disk Management, Defragmentation, Services and Applications, local Users and Groups, Advanced System Settings, Device Manager, Task Manager, Windows Registry

Partitioning

Partitioning of Hard Drive - Primary, Extended, Logical partitions using PartitionTools.

UNIT-3: Overview of Networking

Overview of Networking, Classification of Networks–LAN, MAN, WAN, Hardware and Software Components, Wi-Fi, Bluetooth, Network Communication Standards.

NETWORKING MODEL -OSI Reference Model, TCP/IP Reference Model, LAN Cables, Connectors, wireless network adapter,Wireless network adapter, Functions of LAN Tools, Anti-Magnetic mat, Anti-Magnetic Gloves, Crimping Tool, Cable Tester, Cutter, Loop back plug, Toner probe, Punch down tool, Protocol analyzer, Multi meter, Network Topologies, Bus, Ring, Star, Mesh, Hybrid Topologies

UNIT- 4: Network Addressing and sub-netting

Network Addressing, TCP/IP Addressing Scheme, Components of IP Address and classes Sub-netting, Internet Protocol Addressings - IPv4 ,IPv6, Classful addressing and classless addressing

UNIT-5: Networks protocols and management

Protocols in computer networks, Hyper Text Transfer Protocol(HTTP), File Transfer, Protocol(FTP), Simple Mail Transfer Protocol(SMTP)5.2.3address Resolution Protocol(ARP) Reverse Address Resolution Protocol(RARP), Telnet, ICMP, Simple Network Management Protocol(SNMP), DHCP, DNS, Network Management., Network Monitoring and Troubleshooting., Remote Monitoring (RMON)

Text Book:

1. “Introduction to Data Communications and Networking”, B. Forouzan, TataMcGrawHill
2. “Computer Networks”, Tanenbaum, PHI,
3. PC AND CLONES Hardware, Troubleshooting and Maintenance B.
Govinda rajalu, Tata Mc-graw-Hill Publication

Reference Books:

1. PC Troubleshooting and Repair Stephen J. Bigelow Dream tech Press, New Delhi
2. “Data and Computer Communications”, Stallings, PHI,
3. “DataCommunication”, William Schewber, McGrawHill, 1987
4. IT essential V7 companion guide – Cisco Networking Academy 2020
5. Upgrading and repairing PCs(22nd edition) – Scott Mueller – 2015 Que

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Unit No.	Essay Questions	Short Answer Questions
I	2(Section-A)	2(Section-C)
II	3(Section-A)	1(Section-C)
III	2(Section-B)	2(Section-C)
IV	1(Section-B)	2(Section-C)
V	2(Section-B)	1(Section-C)



SRI Y.N.COLLEGE (AUTONOMOUS), NARSAPUR

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BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

III – Year

(w.e.f. 2021 Admitted Batch)

Fifth Semester

PAPER SEC-6: PC HARDWARE AND NETWORKING

Time: 3 hours

Max Marks: 75M

PART-I

Answer any Five Questions from Section-A and Section-B taking atleast two from each section.

(5 X 10 = 50M)

SECTION – A

1. Explain Classification of computers?
2. Explain about Block Diagram of computer?
3. Define OS. Explain types of Operating Systems.?
4. Explain Computer Management?
5. Explain Partitioning of Hard Drive?

SECTION – B

6. Explain various Network Topologies?
7. Explain OSI Reference Model?
8. Explain IPv4 and IPv6?
9. Explain DNS?
10. Explain Simple Mail Transfer Protocol (SMTP)?

Part-II
SECTION – C

Answer any Five Questions.

(5X5=25M)

11. Characteristics of Computers?
12. Types of UPS?
13. Explain BIOS?
14. Classification of Networks–LAN, MAN, WAN?
15. Bluetooth?
16. Explain IP Addressing?
17. Explain Sub-netting?
18. HTTP.



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Fifth Semester

PAPER SEC-6P: PC HARDWARE AND NETWORKING LAB

B.C.A	Semester – V (Skill Enhancement Course-Elective)	Credits:1
Course:7C	Pc Hardware And Networking Lab	Hrs/Wk:2

Course objectives:

To train the officials to acquire basic knowledge in computer hardware and peripherals for installation, PC assembly, trouble shooting and maintenance including system management and its backup and to undertake disaster prevention, a basic knowledge of TCP/IP networks work group, internet and intranet.

Outcomes:

The student will able to know the Basic of Computer assembling and trouble shooting. This course will provide the brief knowledge of Computer networking and trouble shooting

Experiments:

1. Introduction to PC Hardware and its peripherals
2. Hardware installation and configuration
3. PC Debugging, troubleshooting and basic preventive maintenance
4. Assembling and Disassembling of a Computer System
5. Preparation of Boot disk or USB drive (demo)
6. Software installation and Configuration with CD/DVD or USB drive
7. Installation of commonly used software (Office Suites, Virus Scanners & Utilities)

8. Printer Installation & Print Test Page (Demo)
9. Installation of Web cam and tools like zoom/Edx/Microsoft teams (optional) for online class
10. Identifying network components and devices (hub, Switch and router)
11. Cables – Coaxial and UTP and its connectors/Jacks and preparation of a patchcord
12. Networking Basic and Configuration
13. Run All Types of Network Troubleshooting
Commands(ipconfig, ping, traceroute etc)
14. installation and configuring the proxy server for internet access
15. Exercise on Setting of particular IP address (static) to an existing terminal system
16. Exercise on Installation of network operating system
17. Exercise on Configuration of DHCP and DNS.
18. Exercise on File/Folder accessing rights for sharing and printer sharing
19. Exercise on remote desktop
20. Exercise on setting up of VPN on network
21. Design a network with Cisco Packet tracer 8.0 (freely downloadable)
 - a. Simple network with one server with five desktops (configure static IP addresses)
 - b. Adding and removing network cards in a PC or server
 - c. Design a Network with one DHCP server with 5 desktops (Try exercises 13, 16 and 17 using Cisco packet tracer)

Tools required for PC assembling and software installation

1. Multimeter - 1Rs 500/ basic version
or
Digital voltage tester – 1 Rs 150 (taparia)
2. Earth checking plug – 1 Rs 350 (Mx)
3. Mother board diagnosis card -1 Rs 400/-
4. SMPS power supply tester - 1 Rs 400/-
5. Screw driver kit – 4 Nos Rs 40 each

6. External CD/DVD writer – 1 Rs 2000/-

6. Media for operating system (CD/DVD) or USB drive

(Try with trial versions for windows) or Ubuntu

desktop(Linux)**Note** : Un used old desktops can be used for installation

Tools Required for Network

1. RJ45 crimp tool – 1 Rs 250/- basic model

2. Cable tester - 1 Rs 350/-

3. Rj45 jacks - 100 nos Rs 250(ordinary) - consumables

4. UTP cable - 10 mts for each class Rs 20 per metre - consumables

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