Learning Outcome Based Scheme and Syllabus of Examination

for

Bachelor of Computer Application (BCA)

Courses Effective from Academic Session 2022-23

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1. **Title of the program:** The title of the programme shall be Bachelor of Computer Application (B.C.A.).
2. **Eligibility for admission:** Eligibility of admission in BCA will be as follow:
   i. Student must passed H.Sc. (Class 12th) in any stream/Three year diploma course in any branch of technical education or equivalent from recognized board.
   ii. Student must have minimum aggregate of 40% marks in H.Sc. examination (Relaxation in percentage will be as per rule of C.G. Govt.).
3. **Scheme of examination:** Each theory paper is divided into two components as follow, however there shall not be any Internal Assessment (IA) for practical subject.
   i. University Examination (UE): 75 Marks
   ii. Internal Assessment (IA): 25 Marks
4. **Internal Assessment (IA):** The structure of IA shall be as follow:
   i. **Internal test (15 Marks):** There shall be three internal tests of 15 marks each, the average of best two shall be considered as the marks of internal test.
   ii. **Other activity (10 Marks):** Presentation/Group discussion /Assignment/ MOOC course certification (List of MOOC course shall be provided to the students through notice board/college website by the HOD concern after mapping it from SWAYAM, Coursera or any other similar popular platforms at the beginning of each academic session) or any other similar activity.
5. **University Examination (UE)**: The pattern of examination shall be as follow:
   i. There shall be two sections of question paper: A and B
   ii. Section A (15 Marks) shall be compulsory and shall consists 15 short/objective questions each of one mark covering the entire syllabus.
   iii. Section B (60 Marks) shall consist questions from 5 unites as per the syllabus with internal choice (Student has to attempt only one question from each unit). Each unit shall be of 12 marks.

6. **Programme Learning Outcomes for Bachelor of Computer Application (BCA)**

On completion of this programme, the students are expected to:

PLO1: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.

PLO2: Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

PLO3: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

PLO4: Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PLO5: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

PLO6: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

PLO7: Develop software projects in various languages as per the demand of the market.

PLO8: Work on research based projects.

PLO9: Develop live software projects and will be capable of working in IT companies.

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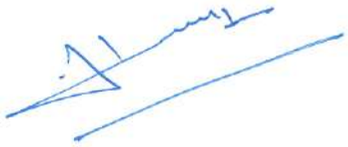
PLO10: Explore and gain new knowledge through MOOC courses.
PLO11: Ability to pursue higher studies of specialization and to take up technical employment.
PLO12: Ability to formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate.
PLO13: Apply standard Software Engineering practices and strategies in real-time software project development.
PLO14: The ability to work independently on a substantial software project and as an effective team member.
PLO15: Ability to operate, manage, deploy and configure software operation of an organization.



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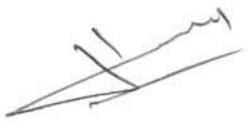
Scheme of BCA

Year	Course Code	Subject Name	Theory/ Practical	Total Credit	Marks			
					UE	IA	Total	
					Max	Max	Max	Min
First	BCA-1T	Discrete Mathematics	Theory	6	75	25	100	33
	BCA-2T	Computer Fundamental and MS office	Theory	4	75	25	100	33
	BCA-3T	Programming with C and C++	Theory	4	75	25	100	33
	BCA-4T	Data Structure	Theory	6	75	25	100	33
	BCA-5T	Digital Electronics	Theory	6	75	25	100	33
	BCA-6T	Hindi	Theory	5	50	-	50	17
	BCA-7T	English	Theory	5	50	-	50	17
	BCA-1P	LAB 1: PC software	Practical	2	100	-	100	33
	BCA-2P	LAB 2: Programming with C and C++	Practical	2	100	-	100	33
Second	BCA-8T	Numerical Mathematics	Theory	6	75	25	100	33
	BCA-9T	Operating System	Theory	6	75	25	100	33
	BCA-10T	Relational Database Management System	Theory	4	75	25	100	33
	BCA-11T	Computer Networking and Cyber Technology	Theory	6	75	25	100	33
	BCA-12T	Web Technology	Theory	4	75	25	100	33
	BCA-13T	Hindi	Theory	5	50	-	50	17
	BCA-14T	English	Theory	5	50	-	50	17
	BCA-3P	LAB 3: Relational Database Management System	Practical	2	100	-	100	17
	BCA-4P	LAB 4: Web Technology	Practical	2	100	-	100	17
Third	BCA-15T	Python Programming	Theory	4	75	25	100	33
	BCA-16T	Java Programming	Theory	4	75	25	100	33
	BCA-17T	Software Engineering	Theory	6	75	25	100	33
	BCA-18T	Artificial Intelligence and Expert System	Theory	6	75	25	100	33
	BCA-19T	E-Commerce	Theory	6	75	25	100	33
	BCA-20T	Communication Skill	Theory	5	100	-	100	33



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	BCA-5P	LAB 5: Java	Practical	2	100	-	100	33
	BCA-6P	LAB 6: Python	Practical	2	100	-	100	33
	BCA-7P	Project	Practical	5	100	-	100	33

Note:

1. Syllabus of Foundation Courses: Hindi and English shall be similar to B.Sc. Computer Science/IT program.
2. Students has to pass environment studies subject as per the rule of any other B.Sc. program.
3. There shall be four extra credits in all the years of under graduation for internship/apprenticeship/skill development program. The certificate of extra credits would be provided by the concern university and is not mandatory.

Abbreviations used:

UE: University Exam
IA: Internal Assessment



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Part A: Introduction				
Program: **Certificate Course**		Class: **B.C.A. I Year**	Year: **2022**	Session:**2022-2023**
1	Course Code	**BCA-1P**		
2	Course Title	**LAB1: PC Software**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	No		
5	Course Learning. Outcomes (CLO)	At the end of course, Students will be able to: • Learn Modern office activities and their software requirements. • Create a new Word document and formatting a document using MS-WORD. • Create an electronic spreadsheet using MS-Excel, familiarize oneself with Excel's basicand advance features. • Create a slide show presentation and explore the Microsoft Office PowerPointenvironment.		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 33**

Part B: Content of the Course	
	Total Periods: 30
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. **MS Word** 1. Prepare **a grocery list** having four columns (Serial number, the name of the product,quantity and price) for the month of April, 06. • Font specifications for Title (Grocery List): 14-point Arial font in bold and italics. • The headings of the columns should be in 12-point and bold. • The rest of the document should be in 10-point Times New Roman. • Leave a gap of 12-points after the title. 2. Create a **telephone directory**. • The heading should be 16-point Arial Font in bold. • The rest of the document should use 10-point font size. • Other headings should use 10-point Courier New Font. • The footer should show the page number as well as the date last updated. 3. Design a **time-table form** for your college. • The first line should mention the name of the college in 16-point Arial Fontand should be bold. • The second line should give the course name/teacher's name and the departmentin 14-point Arial. • Leave a gap of 12-points. • The rest of the document should use 10-point Times New Roman font. • The footer should contain your specifications as the designer and date of creation. 4. XYZ Publications plans to release a new book designed as per your syllabus. Design the **First page of the book** as per the given specifications. • The title of the book should appear in bold using 20-point Arial font. • The name of the author and his qualifications should be in the center of the page in 16-point Arial font. • At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.

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- The details of the offices of the publisher (only location) should appear in the footer.

5. Create the following one page documents.
   - Compose a note inviting friends to a get-together at your house, including a listof things to bring with them.
   - Design a certificate in landscape orientation with a border around the document.
   - Design a Garage Sale sign.
   - Make a sign outlining your rules for your bedroom at home, using a numberedlist.
6. Create the following documents:
   - A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
   - Use a newsletter format to promote upcoming projects or events in your classroom or college.
7. Convert following text to a table, using comma as delimiterType the following as shown (do not bold).

Color, Style, Item
Blue, A980, Van
Red, X023, Car
Green, YL724, Truck
Name, Age, Sex
Bob, 23, M
Linda, 46, F
Tom, 29, M

8. Enter the following data into a table given on the next page.

Salesperson	Dolls	Trucks	Puzzles
Kennedy, Sally	1327	1423	1193
White, Pete	1421	3863	2934
Pillar, James	5214	3247	5467
York, George	2190	1278	1928
Banks, Jennifer	1201	2528	1203
Atwater, Kelly	4098	3079	2067
Pillar, James	5214	3247	5467
York, George	2190	1278	1928
Banks, Jennifer	1201	2528	1203
Atwater, Kelly	4098	3079	2067

Add a column **Region** (values: S, N, N, S, S, S) between the **Salesperson** and **Dolls** columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:
In this exercise, you will add a new row to your table, place the word **Total** at the bottom of the Salesperson column, and sum the Dolls, Trucks, and Puzzles columns.

9. Wrapping of text around the image.

MS Excel

1. Enter the Following data in Excel Sheet

REGIONAL SALES PROJECTION						
State	Qtr1	Qtr2	Qtr3	Qtr4	Qtr Total	Rate Amount
Delhi	2020	2400	2100	3000	15	
Punjab	1100	1300	1500	1400	20	
U.P.	3000	3200	2600	2800	17	

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Haryana	1800	2000	2200	2700	15	
Rajasthan	2100	2000	1800	2200	20	
TOTAL						
AVERAGE						

(a) Apply Formatting as follow:
- i. Title in TIMES NEW ROMAN
- ii. Font Size - 14
- iii. Remaining text - ARIAL, Font Size -10
- iv. State names and Qtr. Heading Bold, Italic with Gray Fill Color.
- v. Numbers in two decimal places.
- vi. Qtr. Heading in center Alignment.
- vii. Apply Border to whole data.

(b) Calculate State and Qtr. Total
(c) Calculate Average for each quarter
(d) Calculate Amount = Rate * Total.

2. Given the following worksheet

	A	B	C	D
1	Roll No.	Name	Marks	Grade
2	1001	Sachin	99	
3	1002	Sehwag	65	
4	1003	Rahul	41	
5	1004	Sourav	89	
6	1005	HarBhajan	56	

Calculate the grade of these students on the basis of following guidelines:

If Marks	Then Grade
>=80	A+
>= 60 and < 80	A
>= 50 and < 60	B
< 50	F

3. Given the following worksheet

	A	B	C	D	E	F	G
1	**Salesman**	**Sales in (Rs.)**					
2	No.	Qtr1	Qtr2	Qtr3	Qtr4	Total	Commission
3	S001	5000	8500	12000	9000		
4	S002	7000	4000	7500	11000		
5	S003	4000	9000	6500	8200		
6	S004	5500	6900	4500	10500		
7	S005	7400	8500	9200	8300		
8	S006	5300	7600	9800	6100		

Calculate the commission earned by the salesmen on the basis of following Candidates:

If Total Sales	**Then Commission**
< 20000	0% of sales
> 20000 and < 25000	4% of sales
> 25000 and < 30000	5.5% of sales
> 30000 and < 35000	8% of sales
>= 35000	11% of sales

The total sales are sum of sales of all the four quarters.

4. Company XYZ Ltd. pays a monthly salary to its employees who consist of basic salary, allowances & deductions. The details of allowances and deductions are as follows:
   - **HRA Dependent on Basic**

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30% of Basic if Basic <=1000
25% of Basic if Basic>1000 & Basic<=3000
20% of Basic if Basic >3000

- **DA Fixed for all employees, 30% of Basic**
- **Conveyance Allowance (CA)**
  Rs. 50/- if Basic is <=1000
  Rs. 75/- if Basic >1000 & Basic<=2000
  Rs. 100 if Basic >2000
- **Entertainment Allowance (EA)**
  NIL if Basic is <=1000
  Rs. 100/- if Basic > 1000

Deductions

- **Provident Fund**
  6% of Basic
- **Group Insurance Premium**
  Rs. 40/- if Basic is <=1500
  Rs. 60/- if Basic > 1500 & Basic<=3000
  Rs. 80/- if Basic >3000

Calculate the following:

Gross Salary= Basic + HRA + DA + CA + EA
Total Deduction = Provident Fund + Group Insurance Premium
Net Salary= Gross Salary – Total Deduction

5. Create Payment Table for a fixed Principal amount, variable rate of interests and time inthe format below:

No. of Installments	5%	6%	7%	8%	9%
3	XX	XX	XX	XX	XX
4	XX	XX	XX	XX	XX
5	XX	XX	XX	XX	XX
6	XX	XX	XX	XX	XX

6. Use an array formula to calculate Simple Interest for given principal amounts given therate of Interest and time

Rate of Interest	8%
Time	5 Years
Principal	Simple Interest
1000`	?
18000	?
5200	?

7. The following table gives year wise sale figure of five salesmen in Rs.

Salesman	2019	2020	2021	2022
S1	10000	12000	20000	50000
S2	15000	18000	50000	60000
S3	20000	22000	70000	70000
S4	30000	30000	100000	80000
S5	40000	45000	125000	90000

(a) Calculate total sale year wise.
(b) Calculate the net sale made by each salesman
(c) Calculate the maximum sale made by the salesman
(d) Calculate the commission for each salesman under the condition.
(i) If total sales >4,00,000 give 5% commission on total sale made by the

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salesman.

(ii) Otherwise give 2% commission.

(e) Draw a bar graph representing the sale made by each salesman.

(f) Draw a pie graph representing the sale made by salesman in 2000.

8. Enter the following data in Excel Sheet

PERSONAL BUDGET FOR FIRST QUARTER

Monthly Income (Net): 1,475

EXPENSES	JAN	FEB	MARCH QUARTER TOTAL	QUARTER AVERAGE
Rent	600.00	600.00	600.00	
Telephone	48.25	43.50	60.00	
Utilities	67.27	110.00	70.00	
Credit Card	200.00	110.00	70.00	
Oil	100.00	150.00	90.00	
AV to Insurance	150.00			
Cable TV	40.75	40.75	40.75	
Monthly Total				

Calculate Quarter total and Quarter average.

(a) Calculate Monthly total.

(b) Surplus = Monthly income - Monthly total.

(c) What would be total surplus if monthly income is 1500.

(d) How much does telephone expense for March differ from quarter average.

(e) Create a 3D column graph for telephone and utilities.

(f) Create a pie chart for monthly expenses.

9. Enter the following data in Excel Sheet

TOTAL REVENUE EARNED FOR SAM'S BOOKSTALL

Publisher Name	1997	1998	1999	2000	Total
A	Rs. 1,000.00	Rs. 1100.00	Rs. 1,300.00	Rs. 800.00	
B	Rs. 1,500.00	Rs. 700.00	Rs. 1,000.00	Rs. 2,000.00	
C	Rs. 700.00	Rs. 900.00	Rs. 1,500.00	Rs. 600.00	
D	Rs. 1,200.00	Rs. 500.00	Rs. 200.00	Rs 1,100.00.	

(a) Compute the total revenue earned.

(b) Plot the line chart to compare the revenue of all publishers for 4 years.

(c) Chart Title should be _Total Revenue of Sam's Bookstall (1997-2000)'

(d) Give appropriate categories and value axis title.

10. Generate 25 random numbers between 0 & 100 and find their sum, average and count. Howmany no. are in range 50-60.

MS Power Point

1. Do the following task:

i. Start a new blank presentation

ii. Your first Slide is going to be a Title Slide

iii. Write the Text as in the preview below:
Lighthouse Co Ltd

iv. Make the Font of "Lighthouse" Arial Black and size 88

v. Insert a second slide this should be with a layout of Bulleted List

vi. Write the Text as in preview below

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(a) [Title]: Lighthouse Co Ltd
(b) [Body]:
   i. Mission Statement
   ii. Company Objectives
   iii. Management Team
   iv. Employees
   v. Sales

vii. Make the Font Colour of the Points to Green

viii. Insert a third slide this should be an Organization Chart.
Include the following people in the chart:
   a. David Brent, General Manager
   b. Tim Canterbury, Head of Sales
   c. Gareth Keenan, Assistant to the General Manager
   d. Dawn Tinsley , Human Resources Manager

ix. Add a fourth slide this should be a Table Chart.
The chart should look like the following:

New Products	Discontinued Products
Digital Cameras	8mm Cameras
Ultra Slim Video Camera	8x Zoom Video Camera
25" Plasma TVs 21"	Black and White TVs
DVD Recorders	Video Players
7.1 Dolby Surround Systems	2 channel stereo systems

x. Make the titles New Products and Discontinued Products with a shadow effect and centred in the cell. Widen columns to fit Text as above.

xi. The Fifth slide should be a Chart slide. The chart should be a bar chart, and include the following data must be used to form the chart:

	January	February	March	April
TVs	20	27	90	75
DVDs	30	38	34	31
Wifi equipment	45	46	45	43
Video Recorders	25	29	15	40

xii. Change the colours of the chart so that the series of bars are red, yellow, pink, and green.

xiii. Add a light coloured background to all slides in the presentation.

xiv. Add also Transition effects between each slides and also different effects for all text and pictures it the presentation.

xv. Reverse the order of the second and third slides

xvi. Save the presentation as Light House Ltd.

2. Do the following:

i. Load your Presentation Application and start a new presentation

ii. The first slide is a Title Slide. Select the appropriate layout and enter the title: **Annual Food Fair**

iii. Add the sub title: **.A Celebration of Eating**

iv. Insert a small, red circle at the bottom right of the title slide.

v. Change the font colour for the whole title and sub title to blue, and apply a text shadow effect just to the words **Food** and **Fair**

vi. Insert a second slide to the presentation, selecting a layout appropriate for a series of bullet points, and using the title: **The Menu**. Enter the following text:
   i. Chocolate Desserts
   ii. Cakes and Puddings
   iii. Roast Meals
   iv. Using Pasta Creatively

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vii. Change the line spacing for these bullet points to 1.5 lines.
viii. Increase the font size for the words **The Menu** in the title.
ix. Add a footer with your name and the text: **Food Fair** so they both appear on every slide, and number all the slides. (Make sure the number is not obscured by the red circle on the title slide)
x. Insert a third slide, which is to be an organisation chart. Use the title **Meet The Team**. Enter: **Maggie Peet, Manager** at the top of the chart, and show the following three as reporting to Maggie Peet: **Brian Webb, Bookings**; **Janine Newton, Publicity; Gregg Brown, Accounts**
xi. Embolden the text in the title of the third slide, and change the font to Arial.
xii. Apply a light coloured background to all the slides in the presentation
xiii. On the third slide, insert an image suitable for the topic of food from an image library. Reduce the size of the image and place it where it will not interfere with text.
xiv. Save the presentation as **foodfair**.
xv. Print the presentation with three slides per page, and close the presentation.

3. Do the followings:
i. Load your Presentation Application and start a new presentation
ii. The first slide is a Title Only Slide. Select the appropriate layout and enter the title: **Cook Family Cruises**.
iii. Add a small blue rectangle at the top left of this slide.
iv. Change the font colour for the whole title to red, and apply a text shadow effect just to the word **Cruises**.
v. Insert a second slide to the presentation, selecting a layout appropriate for a series of bullet points, and using the title: **Our Itinerary**. Enter the following text:
    a. Canary Islands
    b. Mediterranean
    c. Greek Islands
vi. Change the line spacing for these bullet points to 2 lines. Increase the font size of the word **Itinerary** in the title. Add a footer with your name and the text: **Cruise Information** so they both appear on every slide, and number all the slides.
vii. Insert a third slide, which is to be a graph. Use the title **Our Market Share**. Use the following data to produce a pie chart: Cook 54%; Jackson 28%; Wilson 12%; Bennett 5%
viii. Embolden the text in the title of the third slide, and change the font to Arial.
ix. Apply a different background to each slide in the presentation.
x. On the third slide, insert an image suitable for the topic of holidays from an image library. Reduce the size of the image and place it where it will not interfere with text.
xi. Add a 4th slide containing nothing but the text: **Travel with us for less!!**
xii. Save the presentation as holidays.
xiii. Print the presentation with 4 slides per page, and close the presentation.
4. Create an animation looks like the leaf is falling in a tree.
5. Create an animation looks like demolish a world trade center in America.

Keywords: MS Word, MS Excel, MS Power Point.

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Part C - Learning Resource
Text Books, Reference Books, Other Resources
Suggested Readings: **Text Books:** 1. OFFICE 2007 in Simple Steps, Kogent Solution Inc., DremTech Press 2. EXCEL 2007 in Simple Steps, Kogent Solution Inc., DremTech Press 3. POWERPOINT 2007 in Simple Steps, Kogent Solution Inc., DremTech Press

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 100 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

The syllabus of this subject is frame as per the TOR of department of higher education, Chhattisgarh.

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member
   Prof. and Head, SoS in Computer Science, Pt. Ravishankar Shukla University, Raipur
3. Mr. Jitendra Kumar - Member
   Asst. Prof., Dept. of Computer Science and Application
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11. Ms. Anjeeta Kujur - Member

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12. Mr. Suresh Kumar Thakur - Member

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13. Dr. Ugrasen Suman - Member
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Part A: Introduction				
Program: **Certificate Course**		Class: **BCA I Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**BCA-1T**		
2.	Course Title	**Discrete Mathematics**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	Knowledge of basic mathematics.		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Learn about partially ordered sets, lattices and their types. • Understand Boolean algebra and Boolean functions, logic gates, switching circuits and their applications. • Solve real-life problems using finite-state and Turing machines. • Assimilate various graph theoretic concepts and familiarize with their applications.		
6.	**Credit Value**	**Theory: 6**		
7.	**Total Marks**	**Max. Marks: 25+75**	**Min Passing Marks : 33**	

Part B: Content of the Course		
Total Periods: 90		
Unit	Topics	No. of Periods
I.	**Partially Ordered Sets:** Definitions, examples and basic properties of partially ordered sets (Poset), Order isomorphism, Hasse diagrams, Dual of a poset, Duality principle, Maximal and minimal elements, Least upper bound and greatest upper bound, Building new poset, Maps between posets.	18
II.	**Lattices:** Lattices as posets, Lattices as algebraic structures, Sublattices, Products and homomorphisms; Definitions, examples and properties of modular and distributive lattices; Complemented, relatively complemented and sectionally complemented lattices.	18
III.	**Boolean Algebras and Switching Circuits:** Boolean algebras, De Morgan's laws, Boolean homomorphism, Representation theorem; Boolean polynomials, Boolean polynomial functions, Disjunctive and conjunctive normal forms, Minimal forms of Boolean polynomials, Quine–McCluskey method, Karnaugh diagrams, Switching circuits and applications.	18
IV.	**Finite-State and Turing Machines:** Finite-state machines with outputs, and with no output; Deterministic and nondeterministic finite-state automaton; Turing machines: Definition, examples, and computations.	18
V.	**Graphs:** Definition, examples and basic properties of graphs, Königsberg bridge problem; Subgraphs, Pseudographs, Complete graphs, Bipartite graphs, Isomorphism of graphs, Paths and circuits, Eulerian circuits, Hamiltonian cycles, Adjacency matrix, Weighted graph, Travelling salesman problem, Shortest path and Dijkstra's algorithm.	18
Keywords: Set, Lattices, Switching Circuit, Bipartile, Path, Circuit, Lattices, Boolean algebra, Turing Machine, finite state, Graph.		

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Part C - **Learning Resource**
Text Books, Reference Books, Other Resources

Suggested Readings:

1. B. A. Davey & H. A. Priestley (2002). Introduction to Lattices and Order (2nd edition). Cambridge University Press.
2. Edgar G. Goodaire & Michael M. Parmenter (2018). Discrete Mathematics with Graph Theory (3rd edition). Pearson Education.
3. Rudolf Lidl & Günter Pilz (1998). Applied Abstract Algebra (2nd edition). Springer.
4. Kenneth H. Rosen (2012). Discrete Mathematics and its Applications: With Combinatorics and Graph Theory (7th edition). McGraw-Hill.
5. C. L. Liu (1985). Elements of Discrete Mathematics (2nd edition). McGraw-Hill.

E Resources:

- Topics Related to Discrete Mathematics from SWAYAM/NPTEL
  1. https://onlinecourses.swayam2.ac.in/cec20_ma02/preview
  2. https://youtu.be/sPQ3ptUMltA

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100
Continuous Comprehensive Evaluation (CCE): 25 Marks
University Exam(UE): 75 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

Declaration

The syllabus of this subject is frame as per the TOR of department of higher education, Chhattisgarh.

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13. Dr. Ugrasen Suman - Member
Prof. and Head, Dept. of Computer Science (Present Online)
Devi Ahila Vishwavidyalaya, Indore

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Part A: Introduction				
Program: **Certificate Course**		Class: **B.C.A. II Year**	Year: **2022**	Session: **2022-2023**
1	Course Code	**BCA-2P**		
2	Course Title	**LAB 2: Programming with C and C++**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Theoretical knowledge of C and C++		
5	Course Learning Outcomes (CLO)	At the end of course, Students will be able to: • Understand the fundamental programming concepts and methodologies which are essential to create good C/C++ programs. • Code, test, and implement a well-structured, robust computer program using the C/C++ programming language. • Write reusable modules (collections of functions). • Understand design/implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing. • Develop an in-depth understanding of functional, logic, and object-oriented programming paradigms.		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 33**	

Part B: **Content of the Course**	
Total Periods: 30	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. 1. Write a program in C/C++ for addition of two numbers using float data type. 2. Write a program in C/C++ to find the biggest number between two numbers. 3. Write a program in C/C++ to find the factorial value of any entered number using do – while loop. 4. Write a program in C/C++ for various arithmetic operations using switch case statements. 5. Write a program in C/C++ for Multiplication of two 3X3 matrix. 6. Write a program in C/C++ to store five books information using structure. 7. Write a program in C/C++ to store six employee information using union. 8. Write a program in C/C++ to calculate simple interest using call by value and call by reference method. 9. Write a program in C/C++ for swapping of two numbers using pointer. 10. Write a program in C/C++ to make a text file using file handling. 11. Write a program to count word, space and lines in a text file. 12. Write a program to demonstrate work of calloc().

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Part A: Introduction				
Program: **Certificate Course**		Class: **B.C.A. II Year**	Year: **2022**	Session: **2022-2023**
1	Course Code	**BCA-2P**		
2	Course Title	**LAB 2 : Programming in C and C++**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Theoretical knowledge of C and C++		
5	Course Learning Outcomes (CLO)	At the end of course, Students will be able to: • Understand the fundamental programming concepts and methodologies which are essential to create good C/C++ programs. • Code, test, and implement a well-structured, robust computer program using the C/C++ programming language. • Write reusable modules (collections of functions). • Understand design/implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing. • Develop an in-depth understanding of functional, logic, and object-oriented programming paradigms.		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks : 33**	

Part B: Content of the Course	
Total Periods: 30	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. 1. Write a program in C/C++ for addition of two numbers using float data type. 2. Write a program in C/C++ to find the biggest number between two numbers. 3. Write a program in C/C++ to find the factorial value of any entered number using do – while loop. 4. Write a program in C/C++ for various arithmetic operations using switch case statements. 5. Write a program in C/C++ for Multiplication of two 3X3 matrix. 6. Write a program in C/C++ to store five books information using structure. 7. Write a program in C/C++ to store six employee information using union. 8. Write a program in C/C++ to calculate simple interest using call by value and call by reference method. 9. Write a program in C/C++ for swapping of two numbers using pointer. 10. Write a program in C/C++ to make a text file using file handling. 11. Write a program to count word, space and lines in a text file. 12. Write a program to demonstrate work of calloc().

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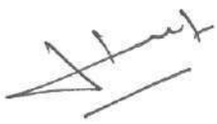
13. Write a program to demonstrate work of malloc(), realloc() and free().
14. Write a program in C++ to find the sum and average of five numbers using class and objects.
15. Write a program in C++ to multiply two numbers using private and public member functions.
16. Write a program in C++ to print structure like this using scope resolution operator

    1
    1 2
    1 2 3
    1 2 3 4
    1 2 3 4 5
17. Write a program in C++ for constructor and Destructor.
18. Write a program in C++ for multiple inheritance.
19. Write a program in C++ for operator overloading.
20. Write a program in C++ for friend class and friend function.
21. Write a program in C++ for virtual function and virtual class.
22. Write a program in C++ for Exception Handling.
23. Write a program in C++ to open and close a file using file Handling.
24. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
25. WAP to display Fibonacci series (i) using recursion, (ii) using iteration
26. WAP to calculate Factorial of a number (i) using recursion, (ii) using iteration
27. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion.
28. Create Matrix class using templates. Write a menu-driven program to perform following Matrix Operations (2-D array implementation): a) Sum b) Difference c) Product d) Transpose 22. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
29. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
30. Create a class Box containing length, breath and height. Include following methods in it: a) Calculate surface Area b) Calculate Volume c) Increment, Overload ++ operator (both prefix & postfix) d) Decrement, Overload -- operator (both prefix & postfix) e) Overload operator == (to check equality of two boxes), as a friend function f) Overload Assignment operator g) Check if it is a Cube or cuboid Write a program which takes input from the user for length, breath and height to test the above class.
31. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
32. Write a program to retrieve the student information from file created in previous



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	question and print it in following format: Roll No. Name Marks 33. Copy the contents of one text file to another file, after removing all whitespaces. 34. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void. 35. Write a program for exception handling.

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Program Design, Peter Juliff, PHI Publications.
2. Let us C: Yashwant Kanetkar, BPB Publications.
3. Programming in ANSI C, E. Balaguruswamy, Tata McGraw Hill
4. Let us C++ ,Y. Kanetkar, B.P.B Publication.
5. Programming in C++, E. Balaguruswamy, Tata McGraw Hill.

E Resources:

C/C++ different topics from SWAYAM/NPTEL

1. Introduction
   https://onlinecourses.nptel.ac.in/noc19_cs38/preview
   https://onlinecourses.nptel.ac.in/noc22_cs103/preview
   https://www.youtube.com/watch?v=KG4hjVDw-p8&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=2

2. Constant and Inline Function
   https://www.youtube.com/watch?v=pX6LufLso2M&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=10

3. Pointer and Reference
   https://www.youtube.com/watch?v=GtsBZ5e1-cE&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=12

4. Function Overloading
   https://www.youtube.com/watch?v=uJGmGAShHeU&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=13

5. Operator Overloading
   https://www.youtube.com/watch?v=0jpOwe4d-FE&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=17

6. Dynamic Memory Management
   https://www.youtube.com/watch?v=lkFK2X6qIc0&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=18

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B4KrM9uOEdvPIVFUkU3jNc6D2&index=18

7. Class and Object
https://www.youtube.com/watch?v=wtuks_f3vP4&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=24

8. Access Specifiers
https://www.youtube.com/watch?v=6ki_W7cXdM0&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=22

9. Constructor and Destructor
https://www.youtube.com/watch?v=wtuks_f3vP4&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=24

- C different topics from W3School
https://www.w3schools.com/c/
- C++ different topics from W3School
https://www.w3schools.com/CPP/default.asp
- C different topics from Javatpoint
https://www.javatpoint.com/c-programming-language-tutorial
- C++ different topics from Javatpoint
https://www.javatpoint.com/cpp-tutorial

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 100 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

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Not Agree because Syllabus is lengthy

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Part A: Introduction				
Program: **Certificate Course**		Class: **B.C.A. I Year**	Year: **2022**	Session:**2022-2023**
1	Course Code	**BCA-2T**		
2	Course Title	**Computer Fundamental and MS Office**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	No		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Describe the history and types of computers and various input/output devices. • Understand the concept of memory and its types. • Understand the MS Word with page setup, formatting text, print documents and mail merge • Understand the MS Excel with creating sheets, calculation in cell and prepare charts. • Understand the sorting & filter in MS Excel. • Understand the MS Power point with design templates, slide transaction and animation effects.		
6	**Credit Value**	**Theory: 4**		
7	**Total Marks**	**Max. Marks: 25+75**	**Min Passing Marks : 33**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I.	**Introduction**: History of computer, Generation of computer, Block diagram of CPU, Digital and Analogue computers and its evolution. Major components of digital computers, types of digital computers, Memory addressing capabilityof CPU. Word length and processing speed of computers, Microprocessors, Single chip Microcomputer, Large and small computers, Users interface, hardware, software and firmware, multiprogramming multiuser system, Dumb smart and intelligent terminals, Number systems & Computer Codes.	12
II.	**I/O Devices:** Keyboard, Mouse, Monitor, Impact and Non-Impact Printers, Plotters, Scanner, other Input/output devices: Scan method of Display, Raster Scan, Vector Scan, Bit Mapped Scan, CRT Controller, I/O Port, Programmable and Non Programmable I/O port, Inbuilt I/O ports, Parallel and Serial ports, USB, IEEE 1394, AGP, Serial data transfer scheme, Microcontroller, Signal Processor, I/O processor, Arithmetic Processor.	12
III.	**Memory:** Memory hierarchy, Primary and Secondary Memory, Cache memory, Virtual Memory, Direct Access storage devices (DASD) Destructive and Non-destructive Readout, Program and data memory, Memory Management Unit (MMU), PCMCIA cards and Slots.	12

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IV.	**MS-Word:** Introduction to word processing software and it's features, Creating new document, Saving documents, Opening and Printing documents. Home Tab: Setting fonts, Paragraph settings, Various styles (Normal, No spacing, Heading1, Heading2, Title, Strong), Find &Replace, Format painter, Copy paste and paste special. Insert Tab: Pages, Tables, Pictures, Clipart, Shapes, Header & Footer, Word Art, Equation and Symbols. Page Layout Tab: Page setup, Page Background, Paragraph (indent and spacing). Mailing Tab: Create Envelops and Labels, Mail Merge. Review Tab: Spelling and Grammar check, New comment, Protect document, View Tab: Document views, Zoom, Window (New window, Split, Switch window).	10
V.	**Working with MS-Excel & PowerPoint** **MS-Excel:** Introducing Excel, Use of Excel sheet, creating new sheet, Saving, Opening, and Printing workbook. Home Tab: Font, Alignment, Number, Styles and cells and editing, Conditional Formatting. Insert Tab: Table, Charts (column chart, Pie chart, Bar chart, Line chart) and Texts (header & footer, word art, signature line). Page Layout Tab: Page setup options, Scale to fit (width, height, scale). Formulas Tab :Auto sum (sum, average, min, max), Logical (IF, and ,or ,not ,true, false), Math & Trig (sin, cos, tan, ceiling, floor, fact, mod, log), Sort and Filter options , Data validation, Group and ungroup. Review Tab: Protect sheet, Protect workbook, and Share workbook. View Tab: Page breaks, Page layout, Freezing Panes, Split and hide. **PowerPoint:** Introducing power point, Use of power point presentation, Creating new slides saving, Opening and printing. Home Tab: New slide, Layout, Reset, Delete, Setting text direction, Align text, Convert to smart art, Drawing options. Insert Tab: Table, Picture, Clipart, Photo album, Smart art, Shapes and chart, Movie and sound, Hyperlink and action, Text box , Word art, Object. Design Tab: Page setup options, Slide orientation, Applying various themes, Selecting background style and formatting it. Animations Tab: Custom animation for entrance, Exit and emphasis, Applying slide transition, Setting transition speed and sound, Animation on rehears timing. Slide show & View Tab: Start slide, Show options, and Setup options. View tab: Presentation views, Colors and Window option.	14
Keywords: Computer, Input /Output Devices, Memory, MS Word, MS Excel, MS Power Point, Memory, Operating System, Hardware, Software.		

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

Text Books:

1. Computer Fundamentals, P.K. Sinha, BPB Publication, Sixth Edition.
2. Computer Fundamentals Architecture and Organization, B. Ram, New Age International Publishers, Fifth Edition.
3. Fundamentals of Computers, V. Rajaraman, PHI, Sixth Edition.
4. Computers Today, Donald H. Sanders, McGraw-Hill, Third Edition.

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5. IBM PC and Clones, B. Govindarajulu, McGraw-Hill, Second Edition. Text Books:
6. Computer science: an overview, Brookshear, J.G., Pearson Education
7. Fundamental of Computers, Raja Raman V., Prentice Hall of India, New Delhi.
8. OFFICE 2007 in Simple Steps, Kogent Solution Inc., DremTech Press
9. EXCEL 2007 in Simple Steps, Kogent Solution Inc., DremTech Press
10. POWERPOINT 2007 in Simple Steps, Kogent Solution Inc., DremTech Press

E Resources:

1. Introduction to Computer Fundamental:
   https://www.w3schools.blog/computer-fundamentals-tutorial
   https://vikaspedia.in/education/digital-litercy/it-literacy-courses-in-associating-with-msup/computer-fundamentals
   https://www.tutorialspoint.com/computer_fundamentals/index.htm
   https://vikaspedia.in/education/digital-litercy/it-literacy- courses-in-associating-with-msup/computer-fundamentals
   https://nptel.ac.in/courses/106/103/106103068/
2. Introduction to MS-Word:
   https://www.w3schools.blog/ms-word-tutorial
3. Introduction to MS-Excel:
   https://www.w3schools.com/excel/excel_introduction.php
4. Introduction to MS-Power Point:
   https://www.w3schools.blog/powerpoint-tutorial

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 25 Marks University Exam(UE): 75 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

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Date: 03.06.2022

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Part A: Introduction				
Program: **Diploma Course**		Class: **B.C.A. II Year**	Year: **2022**	Session:**2022-2023**
1	Course Code	**BCA-3P**		
2	Course Title	**LAB 3: Relational Database Management System**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Basic Knowledge of SQL		
5	Course Learning. Outcomes (CLO)	At the end of course, Students will be able to: • Learn about Database Concepts, Architecture, various Users, Data Models and Data Management which helps them to interact with various Databases. • Develop various Tables and Databases which helps them to develop new Software. • Practice various SQL commands which helps them to generate new relationships among various Tables and Databases which are useful for Software Development. • Familiar about RDBMS Software like Oracle and SQL Server which are used as Backend for Software Development. • Develop new Databases for their Minor and Major Project Development which enhances their Data Storage, Data Accessibility and Data Management.		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks: 33**	

Part B: Content of the Course	
Total Periods: 30	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. 1. Design an employee table in Oracle/SQL Server having eid(primary key) ename, edesignation, edoj, edob, eaddress, salary, econtact as fields and answer the following questions : a) Insert five records in above created table. b) Display all five records. c) Delete the fourth record. d) Update the third record of field ename as 'hari'. e) Add one new field in the table. 2. Design a salary table Oracle/SQL Server with one primary key and foreign key(employee table) having following fields : Month, working days, deptid, gross, incentive, deduction and net salary. a) Insert five records in above created table.



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b) Display all five records.
c) Use foreign key relation and display records.
d) Update the second record of field deptid as 'Sales '.
e) Add one new field in the table.

3) Create a new user in Oracle/SQL Server.
4) Create a view in Oracle/SQL Server.
5) Create a new table in Oracle/SQL Server and practice for join operation.
6) Create a new user in Oracle/SQL Server and practice for commit and rollback command.
7) Create a new database in Oracle/SQL Server having atleast five tables for Hotel Management System.
8) Create a new database in Oracle/SQL Server having atleast four tables for Covid Vaccination Management System.
9) Create a new database in Oracle/SQL Server having atleast five tables for Library Management System.
10) Create a new table in Oracle/SQL Server and practice for Group by and Order by Clause.
11) Create a new table in Oracle/SQL Server and practice for max(), min(), avg() and count() functions.
12) Create a new table in Oracle/SQL Server and practice for lower(), substr(),trim() and upper() functions.
13) Create a new table in Oracle/SQL Server and practice for unique and check constraint.
14) Create a new table in Oracle/SQL Server and practice for any two date formats.
15) Create a new table in Oracle/SQL Server and practice for using clause.
16) Create a new table in Oracle/SQL Server and practice for having clause with sub queries.
17) Create a new table in Oracle/SQL Server and practice for alias in any table.
18) Create a new table in Oracle/SQL Server and practice for inner and outer join.
19) Create a new table in Oracle/SQL Server and practice for Drop command.
20) Write a PL/SQL program for addition of two numbers .
21) Write a PL/SQL program to find the factorial value of any entered number.
22) Write a PL/SQL program for swapping of two numbers.
23) Write a PL/SQL program to print first ten Natural Numbers.

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		24) Write a PL/SQL program to generate Even series upto five digits starting from 2 and sum all the terms. 25) Write a PL/SQL program to practice for implicit and explicit cursor.

Part C - Learning Resource
Text Books, Reference Books, Other Resources
Suggested Readings: 1. Database system concept , H. Korth and A. Silberschatz, TMH Publications . 2. Data Base Management System, Alexies&Mathews,Vikash publication. 3. Data Base Management System, C. J. Date ,Narosha Publication. 4. Data Base Management System By James Matin . 5. Principles of Database System By Ullman. 6. Program Design, Peter Juliff, PHIPublications . 7. The Complete Reference, Kevin Loney, Oracle Press. 8. SQL, PL/SQL The Programming Language of Oracle, Ivan Bayross , PustakKosh Publication. 9. Microsoft SQL Server Management and Administration, Ross, STM Publications . **E Resources:** 1. SWAYAM url link for DBMS and RDBMS: https://youtu.be/f6LGtJutWyA 2. SWAYAM url link for DBMS and RDBM: https://youtu.be/IoL9Ve2SRwQ 3. SWAYAM url link for DBMS and RDBMS : https://**swayam**.gov.in/courses/4434-data-base-management-system

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 100 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

Declaration

The syllabus of this subject is frame as per the TOR of department of higher education, Chhattisgarh.

1. Dr. H.S. Hota - Chairman
   Prof. and Head, Dept. of Computer Science and Application
2. Dr. Sanjay Kumar - Member

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Part A: Introduction				
Program: **Certificate Course**		Class: **B.C.A. I Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**BCA-3T**		
2.	Course Title	**Programming with C and C++**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	**No**		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Develop programming skill and learn how to implement a new software. • Develop programming and logical concepts which helps to build up source code of concern programming language. • Understand the concept of programming like Compilation, Debugging, Executing, Linking and Loading. • Familiar about the structure of C and C++ program. • Understand about the cursor movement and control structure of C and C++ program. • Write simple C and C++ programs using programming concepts. • Familiar about procedure oriented and object oriented concepts. • Understand the concept of inheritance and polymorphism which helps them to develop programs to solve real world problems. • Use file handling concepts in C and C++ to develop programs for real life projects. • Develop new applications with C and C++ which helps them to switch in Software Industry.		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max. Marks: 25+75**	**Min Passing Marks: 33**	

Part B: Content of the Course		
	Total Periods: 60	
Unit	Topics	No. of Periods
I.	**Introduction and Programming Concepts :** Definition of Program, Source file, Object file, Executable file, Header file, Language Translator- Assembler, Interpreter, Compiler, Testing, Debugging, Linker and Loader, Algorithms, Flow Charts, History of C language, Structure of C program , C Tokens: Identifiers , Keywords, Constants, Variables, Operators , Data Types , Control structure : Conditional and looping statements, Operator Precedence and Associativity, Array and it's types.	12
II.	**Core Concepts of C Programming: Functions :** Standard Library and User defined functions, function prototype, Call by value and Call by reference, recursive functions, String functions, **Structure :** Declaration and Definition, Nested structure, array within structure. **Union:** Declaration and Definition, union variables, **Pointers:** Declaration and Definition, using & and * operators, pointer arithmetic, pointer to pointer, **Dynamic memory allocation functions:** malloc, calloc, realloc, free, **File Handling**: Basics, File Pointer, various file accessing functions.	12
III.	**Introduction to Object Oriented Programming:** Concepts, Features of C++, Bottom up Approach, Structure of C++ program, Data types, Class and Objects, Access Specifiers: Private, Public, Protected, I/O statements,	12

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	Insertion and Extraction operator, Scope resolution operator, Array, this pointer, **Constructor :**, Default constructor, Copy constructor, Parameterized constructor , Destructor.	
IV.	**Inheritance:** Definition, Concept of base and derived class, Types of Inheritance: Single, Multilevel, Multiple, Hierarchical and Hybrid Inheritance. **Polymorphism:** Definition, Compile time polymorphism: Function overloading, Operator overloading, Run time polymorphism: Virtual Function, pure virtual function. Inline function, friend function, friend class.	12
V.	**Input-Output and File Handling :** I/O classes, File and Stream classes, Char I/O, String I/O, Object I/O, File Pointer, Opening and Closing file. **Exception Handling and Standard Template Library :** Definition, Exception basics, try, catch and throws keywords, Template, Components of STL.	12
Keywords: Token, datatype, Operators, Functions, Class, Inheritance, Polymorphism.		

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Program Design, Peter Juliff, PHI Publications.
2. Let us C: Yashwant Kanetkar, BPB Publications.
3. Programming in ANSI C, E. Balaguruswamy, Tata McGraw Hill
4. Let us C++ ,Y. Kanetkar, B.P.B Publication.
5. Programming in C++, E. Balaguruswamy, Tata McGraw Hill.

E Resources:

- **C/C++ different topics from SWAYAM/NPTEL**

1. Introduction
   https://onlinecourses.nptel.ac.in/noc19_cs38/preview
   https://onlinecourses.nptel.ac.in/noc22_cs103/preview
   https://www.youtube.com/watch?v=KG4hjVDw-p8&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=2

2. Constant and Inline Function
   https://www.youtube.com/watch?v=pX6LufLso2M&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=10

3. Pointer and Reference
   https://www.youtube.com/watch?v=GtsBZ5e1-cE&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=12

4. Function Overloading
   https://www.youtube.com/watch?v=uJGmGAShHeU&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=13

5. Operator Overloading
   https://www.youtube.com/watch?v=0jpOwe4d-FE&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=17

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6. Dynamic Memory Management
   https://www.youtube.com/watch?v=lkFK2X6qIc0&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=18

7. Class and Object
   https://www.youtube.com/watch?v=wtuks_f3vP4&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=24

8. Access Specifiers
   https://www.youtube.com/watch?v=6ki_W7cXdM0&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=22

9. Constructor and Destructor
   https://www.youtube.com/watch?v=wtuks_f3vP4&list=PLmp4ylk-B4KrM9uOEdvPIVFUkU3jNc6D2&index=24

- **C different topics from W3School**
  https://www.w3schools.com/c/
- **C++ different topics from W3School**
  https://www.w3schools.com/CPP/default.asp
- **C different topics from Javatpoint**
  https://www.javatpoint.com/c-programming-language-tutorial
- **C++ different topics from Javatpoint**
  https://www.javatpoint.com/cpp-tutorial

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100
Continuous Comprehensive Evaluation (CCE): 25 Marks
University Exam(UE): 75 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

Declaration

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Part A: Introduction				
Program: **Diploma Course**		Class: **B.C.A. II Year**	Year: **2022**	Session: **2022-2023**
1	Course Code	**BCA-4P**		
2	Course Title	**LAB 4: Web Technology**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Theoretical knowledge of Web Technology		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Analyze a web page and identify its elements and attributes. • Create web pages using HTML, CSS, JAVASCRIPT, XHTML • Build dynamic web pages using JavaScript (Client side programming). • Create XML documents and Schemas. • Build interactive web applications using, PHP, AJAX. • Handling Database using MYSQL		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks : 33**	

Part B: Content of the Course

Total Periods: 30

Tentative Practical List

Note: This is tentative list; the teachers concern can add more program as per requirement.

HTML

1. Write an HTML program to create the following table:

Class	Subject 1	Subject 2	Subject 3
BCA-I	Visual Basic	PC Software	Electronics
BCA-II	C++	DBMS	English
BCA-III	Java	Multimedia	CSA

2. Write an HTML program to create the following lists:
   - C
   - C++
   - Fortran
   - COBOL
3. Write an HTML program to create the following lists:
   1. Java
   2. Visual Basic
   3. Basic
   4. COBOL
4. Write an HTML program to demonstrate hyper linking between two web pages.
5. Create a marquee & also insert an image.
6. Write an HTML program to create frame in HTML with 3 columns (width= 30%, 30%, 40%).
7. Write an HTML program to create a webpage with a blue background and print the following text with white background.
8. Write an HTML program to create the following table:

Course	OC	BC	MB	SC/ST	Total
Computer Science	**9**	**18**	**5**	**5**	**37**
Commerce	**14**	**25**	**6**	**5**	**50**

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Grand Total		87

9. Write an HTML program to create the following table:

Maruti		Tata		Ford	
Model	**Price**	**Model**	**Price**	**Model**	**Price**
Maruti 800	2 Lac	Sumo	2 Lac	Icon	5 Lac
Omni	3 Lac	Scorpio	3 Lac	Gen	2 Lac

10. Write an HTML program to create the following table:

Pandit Ravishankar Shukla University		
Name	**Roll No.**	**Class**
Rahul	40	BCA-I
Preeti	85	BCA-I
Priya	74	BCA-I
Richa	95	BCA-I

11. Write an HTML program to create the following table:

Students Record

Name	Subject	Marks
Arun	Java	70
	C	80
Ashish	Java	75
	C	69

12. Write an HTML program to create the following table and also insert an image in the webpage.

Subject	Max	Min	Obtain
Java	100	33	75
Multimedia	100	33	70
Operating System	100	33	68
C++	100	33	73

13. Write an HTML program to create the following table:

Name Roll No.		Rahul 101	
Subject	**Max**	**Min**	**Obtain**
Java	100	33	75
Multimedia	100	33	70

14. Write an HTML program to create a form as the following:

Enter Name :

Enter Roll No. :

Enter Age :

Enter DOB :

15. Write an HTML program to create the following webpage with background and the following text:
16. Write an HTML program to create the following form:

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User Name :

Password :

When user types characters in a password field. The browser displays asterisks or bullets instead of character.

Submit

17. Write a HTML Program to create Student Registration Form
18. Write a HTML Program to create Contact Form
19. Write a HTML Program to insert Audio & Video in HTML
20. Write the HTML coding for the following equations:

$C_2H_5OH+PCL_5=C_2H_5CL+POCL_3+HCL$

$4H_3PO_3=3H_3PO_4+PH_3$

$PCL_3+CL_2=PCL_5$

21. Write the HTML code to display the following:
    - Actors
        - Bruce Wills
        - Gerand Butler
        - Vin Diesel
        - Bradd Pitt
        - Paul Walker
        - Jason Statham
    - Actress
        - Julia Roberts
        - Angelina Jolie
        - Kate Wins let
        - Cameron Diaz
22. Write the HTML code to display the following:
    1. Cricket Players
        A. Batsman
            i. Sachin Tendulkar
            ii. Rahul Dravid
            iii. Virendra Sehwag
        B. Bowlers
            i. Kumble
            ii. Zaheer Khan
            iii. Balaji
        C. Spinner
            i. Harbhajan
            ii. Ravindra Jadeja
            iii. Kartik

JavaScript

1. Create a script using for loop to prime number between 1 and 50.
2. Write a script to get the largest value in an array.
3. Write a function to calculate the factorial of a number (a non-negative integer).
4. Write a script to demonstrate data validation.
5. Write a program to print date using JavaScript.
6. Write a program to Sum and Multiply two numbers using Javascript.

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DHTML

1. Create a web page which shows the changes of header dynamically.
2. Create a webpage which explains the use of relative positioning.
3. Display an alert box to alert the x and y coordinates of the cursor.

PHP

1. Create a script using for loop to all integers between 0 and 30 and display the total.
2. Create a script to construct the following pattern, using nested for loop exercises.
3. Write a PHP script to get the largest key in an array.
4. Write a function to calculate the factorial of a number (a non-negative integer).
5. Write a PHP script to check string for palindrome.

MySQL

1. Create the following table in MySQL:

College (cname, city, caddress, cphone)
Staffjoins (sid, cname, dept, doj, post, salary)
Staffs (sid, sname, saddress , scontacts)
Teaching (sid, class, paprid, fsession, tsession)
Subject (paperid, subject, paper, papername)

1. List the name and post of teacher teaching computer subject.
2. List the name and city of all staffs working in your college.
3. List the name and city all staffs working in your college who earn more then 15000.
4. Find the staff whose date of joining is 2005.
5. Find the staffs whose names start with 'M' or 'R' and 'A' and/or 7 character long.
6. Modify the database so that staffN1 now work in C2 college .
7. List maximum, average, minimum salary of each college.
8. Acquire detail of staffs by name in a college or each college.
9. List names of staffs in ascending order according to salary who are working in all colleges.
10. Find the staffs that earn a higher salary who earn greater than average salary of their college.

2. Create the following table MySQL:

Enrollment (enrollno, name, gender, DOB, address, phone)
Admission (adno, enrollno, course, yearsem, date, cname)
Feestucture (course_yearsem, fee)
Payment (billno, admno, amount, pdate,purpose)

1. Get full detail of all students who took admission this year class wise.
2. Get detail of students who took admission in sai colleges.
3. Calculate the total amount of fees collected in this session.
4. List the student who have not payed full fee in your colleges.
5. List the number of admission in your college in every year.
6. List the students in colleges in your city and also live in your city.

3. Create the following table MySQL:

Subject (paperid, subject, paper, papername)
test(paperid,tdate,max,min)
score(rollno,paperid,marks,attendance)
students(admno,rollno,class,yearsem)

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	1. List roll no of students who were present in a paper of a subject. 2. List all roll numbers who have passed in first division. 3. List all students in BCA-II who have scored higher than average in your college. 4. List the highest score

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Xavier, C, "Web Technology and Design", New Age International.
2. Ivan Bayross, "HTML, DHTML, Java Script, Perl & CGI", BPB Publication.
3. Ramesh Bangia, "Internet and Web Design", New Age International.
4. Ullman, "PHP for the Web: Visual Quick Start Guide", Pearson Education.
5. Jim Converse & Joyce Park, "PHP & MySQL Bible", Wiley India Publication
6. "Internet and Internet Engineering", Daniel Minoli, TMH.
7. Chuckmusiano & Bill Kenndy, O Reilly, HTML The Definite Guide"
8. Joseph Schmuller, Dynamic HTML, BPB, 2000.
9. Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
10. Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill.

E Resources:

1. HTML different topics from Javatpoint
   https://www.javatpoint.com/html-tutorial/
2. JavaScript different topics from Javatpoint
   https://www.javatpoint.com/javascript-tutorial
3. JavaScript different topics from Javatpoint
   https://www.javatpoint.com/php-tutorial
4. DHTML different topics from Javatpoint
   https://www.javatpoint.com/dhtml
5. PHP different topics from W3Schools
   https://www.w3schools.com/php/
6. PHP different topics from W3Schools
   https://www.w3schools.com/html/
7. MySQL different topics from W3Schools
   https://www.w3schools.com/mySQl/default.asp
8. MySQL different topics from Javatpoint
   https://www.javatpoint.com/mysql-tutorial

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Part A: Introduction				
Program: **Diploma Course**		Class: **B.C.A. II Year**	Year: **2022**	Session: **2022-2023**
1	Course Code	**BCA-4P**		
2	Course Title	**LAB 4: Web Technology**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Theoretical knowledge of Web Technology		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Analyze a web page and identify its elements and attributes. • Create web pages using HTML, CSS, JAVASCRIPT, XHTML • Build dynamic web pages using JavaScript (Client side programming). • Create XML documents and Schemas. • Build interactive web applications using, PHP, AJAX. • Handling Database using MYSQL		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks : 33**	

Part B: Content of the Course

Total Periods: 30

Tentative Practical List

Note: This is tentative list; the teachers concern can add more program as per requirement.

HTML

1. Write an HTML program to create the following table:

Class	Subject 1	Subject 2	Subject 3
BCA-I	Visual Basic	PC Software	Electronics
BCA-II	C++	DBMS	English
BCA-III	Java	Multimedia	CSA

2. Write an HTML program to create the following lists:
   - C
   - C++
   - Fortran
   - COBOL
3. Write an HTML program to create the following lists:
   1. Java
   2. Visual Basic
   3. Basic
   4. COBOL
4. Write an HTML program to demonstrate hyper linking between two web pages.
5. Create a marquee & also insert an image.
6. Write an HTML program to create frame in HTML with 3 columns (width= 30%, 30%, 40%).
7. Write an HTML program to create a webpage with a blue background and print the following text with white background.
8. Write an HTML program to create the following table:

Course	OC	BC	MB	SC/ST	Total
Computer Science	**9**	**18**	**5**	**5**	**37**
Commerce	**14**	**25**	**6**	**5**	**50**

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Grand Total		87

9. Write an HTML program to create the following table:

Maruti		Tata		Ford	
Model	**Price**	**Model**	**Price**	**Model**	**Price**
Maruti 800	2 Lac	Sumo	2 Lac	Icon	5 Lac
Omni	3 Lac	Scorpio	3 Lac	Gen	2 Lac

10. Write an HTML program to create the following table:

Pandit Ravishankar Shukla University		
Name	**Roll No.**	**Class**
Rahul	40	BCA-I
Preeti	85	BCA-I
Priya	74	BCA-I
Richa	95	BCA-I

11. Write an HTML program to create the following table:

Students Record

Name	Subject	Marks
Arun	Java	70
	C	80
Ashish	Java	75
	C	69

12. Write an HTML program to create the following table and also insert an image in the webpage.

Subject	Max	Min	Obtain
Java	100	33	75
Multimedia	100	33	70
Operating System	100	33	68
C++	100	33	73

13. Write an HTML program to create the following table:

Name Roll No.		Rahul 101	
Subject	**Max**	**Min**	**Obtain**
Java	100	33	75
Multimedia	100	33	70

14. Write an HTML program to create a form as the following:

Enter Name :

Enter Roll No. :

Enter Age :

Enter DOB :

15. Write an HTML program to create the following webpage with background and the following text:
16. Write an HTML program to create the following form:

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User Name :

Password :

When user types characters in a password field. The browser displays asterisks or bullets instead of character.

Submit

17. Write a HTML Program to create Student Registration Form
18. Write a HTML Program to create Contact Form
19. Write a HTML Program to insert Audio & Video in HTML
20. Write the HTML coding for the following equations:

$C_2H_5OH+PCL_5=C_2H_5CL+POCL_3+HCL$

$4H_3PO_3=3H_3PO_4+PH_3$

$PCL_3+CL_2=PCL_5$

21. Write the HTML code to display the following:
    - Actors
        - Bruce Wills
        - Gerand Butler
        - Vin Diesel
        - Bradd Pitt
        - Paul Walker
        - Jason Statham
    - Actress
        - Julia Roberts
        - Angelina Jolie
        - Kate Wins let
        - Cameron Diaz
22. Write the HTML code to display the following:
    1. Cricket Players
        A. Batsman
            i. Sachin Tendulkar
            ii. Rahul Dravid
            iii. Virendra Sehwag
        B. Bowlers
            i. Kumble
            ii. Zaheer Khan
            iii. Balaji
        C. Spinner
            i. Harbhajan
            ii. Ravindra Jadeja
            iii. Kartik

JavaScript

1. Create a script using for loop to prime number between 1 and 50.
2. Write a script to get the largest value in an array.
3. Write a function to calculate the factorial of a number (a non-negative integer).
4. Write a script to demonstrate data validation.
5. Write a program to print date using JavaScript.
6. Write a program to Sum and Multiply two numbers using Javascript.

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DHTML

1. Create a web page which shows the changes of header dynamically.
2. Create a webpage which explains the use of relative positioning.
3. Display an alert box to alert the x and y coordinates of the cursor.

PHP

1. Create a script using for loop to all integers between 0 and 30 and display the total.
2. Create a script to construct the following pattern, using nested for loop exercises.
3. Write a PHP script to get the largest key in an array.
4. Write a function to calculate the factorial of a number (a non-negative integer).
5. Write a PHP script to check string for palindrome.

MySQL

1. Create the following table in MySQL:

College (cname, city, caddress, cphone)
Staffjoins (sid, cname, dept, doj, post, salary)
Staffs (sid, sname, saddress , scontacts)
Teaching (sid, class, paprid, fsession, tsession)
Subject (paperid, subject, paper, papername)

1. List the name and post of teacher teaching computer subject.
2. List the name and city of all staffs working in your college.
3. List the name and city all staffs working in your college who earn more then 15000.
4. Find the staff whose date of joining is 2005.
5. Find the staffs whose names start with 'M' or 'R' and 'A' and/or 7 character long.
6. Modify the database so that staffN1 now work in C2 college .
7. List maximum, average, minimum salary of each college.
8. Acquire detail of staffs by name in a college or each college.
9. List names of staffs in ascending order according to salary who are working in all colleges.
10. Find the staffs that earn a higher salary who earn greater than average salary of their college.

2. Create the following table MySQL:

Enrollment (enrollno, name, gender, DOB, address, phone)
Admission (adno, enrollno, course, yearsem, date, cname)
Feestucture (course_yearsem, fee)
Payment (billno, admno, amount, pdate,purpose)

1. Get full detail of all students who took admission this year class wise.
2. Get detail of students who took admission in sai colleges.
3. Calculate the total amount of fees collected in this session.
4. List the student who have not payed full fee in your colleges.
5. List the number of admission in your college in every year.
6. List the students in colleges in your city and also live in your city.

3. Create the following table MySQL:

Subject (paperid, subject, paper, papername)
test(paperid,tdate,max,min)
score(rollno,paperid,marks,attendance)
students(admno,rollno,class,yearsem)

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	1. List roll no of students who were present in a paper of a subject. 2. List all roll numbers who have passed in first division. 3. List all students in BCA-II who have scored higher than average in your college. 4. List the highest score

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Xavier, C, "Web Technology and Design", New Age International.
2. Ivan Bayross, "HTML, DHTML, Java Script, Perl & CGI", BPB Publication.
3. Ramesh Bangia, "Internet and Web Design", New Age International.
4. Ullman, "PHP for the Web: Visual Quick Start Guide", Pearson Education.
5. Jim Converse & Joyce Park, "PHP & MySQL Bible", Wiley India Publication
6. "Internet and Internet Engineering", Daniel Minoli, TMH.
7. Chuckmusiano & Bill Kenndy, O Reilly, HTML The Definite Guide"
8. Joseph Schmuller, Dynamic HTML, BPB, 2000.
9. Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
10. Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill.

E Resources:

1. HTML different topics from Javatpoint
   https://www.javatpoint.com/html-tutorial/
2. JavaScript different topics from Javatpoint
   https://www.javatpoint.com/javascript-tutorial
3. JavaScript different topics from Javatpoint
   https://www.javatpoint.com/php-tutorial
4. DHTML different topics from Javatpoint
   https://www.javatpoint.com/dhtml
5. PHP different topics from W3Schools
   https://www.w3schools.com/php/
6. PHP different topics from W3Schools
   https://www.w3schools.com/html/
7. MySQL different topics from W3Schools
   https://www.w3schools.com/mySQl/default.asp
8. MySQL different topics from Javatpoint
   https://www.javatpoint.com/mysql-tutorial

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Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 100 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

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Part A: Introduction				
Program: **Certificate Course**		Class: **B.C.A. I Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**BCA-4T**		
2.	Course Title	**Data Structure**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	No		
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Use different types of data structures, operations and algorithms. • Implement appropriate sorting/searching technique for any given problem. • Use stack, Queue, Lists, Trees and Graphs in problem solving. • Find suitable data structure during application development/ Problem Solving.		
6.	**Credit Value**	**Theory: 6**		
7.	**Total Marks**	**Max Marks: 25+75**	**Min Passing Marks: 33**	

Part B: Content of the Course		
Total Periods: 90		
Unit	**Topics**	**No. of Periods**
I.	**Introduction and Basic Concepts of Data Structure:** Data types: primitive, non-primitive data types, ADT, Linear and nonlinear data structure. **Linear Data Structures:** Arrays: One dimensional, Multidimensional array, allocation methods, address calculations, sparse arrays. Linked List: Singly and Doubly Linear link lists, singly and doubly circular linked list: Definitions, operations (INSERT, DELETE, TRAVERSE) on these lists. (Insertion operation includes – insertion before a given element, insertion after a given element, insertion at given position, insertion in sorted linked list)	18
II.	**Stack:** Stack: Definition, Operations PUSH, POP, TRAVERSE, implementations using array and linked list, Applications of stack: Infix, Prefix, Postfix representation and conversion using stack, Postfix expression evaluation using stack. **Queue:** Introduction, and Types of Queues: Priority Queue, Circular queue, Double Ended Queue, operations (INSERT, DELETE, TRAVERSE), implementation using array and linked list and applications	18
III.	**Non-linear Data Structure:** **Trees:** Definition of trees and their types, Binary trees, Properties of Binary trees and Implementation operation (Insertion, deletion, searching and traversal algorithm: preorder, post order, in-order traversal), Binary Search Trees, Implementations, Threaded trees, AVL Trees.	18
IV.	Graph: Definition of Graph and their types, adjacency and incident (matrix & linked list) representation of graphs, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Weighted Graphs, Shortest path Algorithm, spanning tree, Minimum Spanning tree, Kruskal's and prim's algorithms. Static Hashing: Introduction, Hash table, Hash function.	18

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V.	**Sorting Methods:** Types of sorting, Sequential Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort. **Searching**: Linear search, Binary search, Hashing, collision resolution methods, Comparison of Search trees.	12
Keywords: Linear Data Structure, Non-linear Data Structure, Searching, Sorting.		

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. "Data Structures and Algorithms in C++", Michael T. Goodrich, Wiley, 2007
2. "Fundamentals of Data Structures", Horowitz and Sahani, Computer Science Press, 1978
3. "Data structures and Algorithms", Aefred V. Aho, Jhon E. Joperoft and J.E. Ullman.
4. "An Introduction to Data Structures with Applications", Jean Paul Trembley and Paul Sorenson, TMH, International Student Edition, 1985
5. "Data Structures and Program Design in C", R. Kurse, Leung &Tondo, 2nd Edition, PHI publication

E Resources:

- **Data Structure related topics from SWAYAM/NPTEL**

1. Introduction to Data Structure
https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F&index=1
2. Stacks
https://www.youtube.com/watch?v=g1USSZVWDsY&list=PLBF3763AF2E1C572F&index=2
3. Queues and linked list
https://www.youtube.com/watch?v=PGWZUgzDMYI&list=PLBF3763AF2E1C572F&index=3
4. Trees
https://www.youtube.com/watch?v=tORLeHHtazM&list=PLBF3763AF2E1C572F&index=6
5. Graphs
https://www.youtube.com/watch?v=9zpSs845wf8&list=PLBF3763AF2E1C572F&index=24

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100
Continuous Comprehensive Evaluation (CCE): 25 Marks
University Exam(UE): 75 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

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Part A: Introduction				
Program: **Degree Course**		Class: **B.C.A. III Year**	Year: **2022**	Session: **2022-2023**
1	Course Code	**BCA-5P**		
2	Course Title	**LAB 5: Java**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Theoretical knowledge of Java and Python		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Develop front end application using front end technologies. • Demonstrate the principles of object-oriented programming. • Create multi-threaded programs and event handling mechanisms • Express different Decision-Making statements and Functions.		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks : 33**	

Part B: Content of the Course	
Total Periods: 30	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. 1. Create a java program to implement stack and queue concept. 2. Write a java package to show dynamic polymorphism and interfaces. 3. Write a java program to show multithreaded producer and consumer application. 4. Create a customized exception and also make use of all the 5 exception keywords. 5. Convert the content of a given file into the uppercase content of the same file. 6. Develop an analog clock using applet. 6. Develop a scientific calculator using swings. 7. Create an editor like MS-word using swings. 8. Create a servlet that uses Cookies to store the number of times a user has visited your servlet. 9. Create a simple java bean having bound and constrained properties. 10. Write a java program to create an abstract class named shape that contains two integers and an empty method named print Area () Provide three classes named Rectangle. Triangle and Circle such that each one of the classes extends the class shape. Each one of the class contains only the method print Area () that print the area of the given shape. 11. Write a Java program that implements a multithreaded program that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd the third thread will print the value of the cube of the number. 12. Write a java program which creates a list containing ice cream flavours. On selection of any flavour price should be displayed in a text field. 13. Write a JDBC program to create a table product (id number, name varchar. Price varchar). And insert a record in the table.

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	14. Write a program to execute a select query using JDBC. 15. Write a program to execute an Update query using JDBC. 16. Write a server program to return the square root of a number to the client using Socket. 17. Write a server program to return Date and time to clients using socket programming. 18. Write a JSP program for basic arithmetic functions. 19. Write a advance java program to implement registration of student by using JSP. 20. Write a program to design a web page for login form and connect to the database while using JSP and JDBC.

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. The Complete Reference JAVA, Herbert Scheldt, Tata McGraw Hill publication, 5° Edition.
2. Advance JAVA, Gajendra Gupta, Firewall Media, 1" Edition, 2006.
3. JAVA network programming, Elliotte Rusty Harold, O'Reilly Publication, 3" Edition.
4. Core Java for Beginners, Rashmi Kanta Das, Vikas Publishing House Pvt. Ltd.

E Resources:

1. Introduction to Java
   https://www.youtube.com/watch?v=OjdT2I-EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=1
2. Introduction to Database
   https://www.youtube.com/watch?v=mtc0HHrUKpI&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=12
3. Introduction to SQL
   https://www.youtube.com/watch?v=ar2naKy0aPw&list=PLJ5C_6qdAvBEJ6-TBzKoa1Ov21lwDzJfM&index=16

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 100 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

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Part A: Introduction				
Program: **Certificate Course**		Class: **B.C.A. I Year**	Year: **2022**	Session:**2022-2023**
1	Course Code	**BCA-5T**		
2	Course Title	**Digital Electronics**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Examine the structure of number systems and perform the conversion among different number systems • Illustrate reduction of logical expressions using Boolean algebra, k-map and tabulation method and implement the functions using logic gates • Realize combinational circuits for given application • Analysis synchronous and asynchronous sequential circuits using flip-flops • Define combinational logic circuits using programmable logic devices.		
6	**Credit Value**	**Theory: 6**		
7	**Total Marks**	**Max. Marks: 25+75**	**Min Passing Marks: 33**	

Part B:Content of the Course		
Total Periods: 90		
Unit	Topics	No. of Periods
I	**Background of Digital Electronics:** Digital Signals, Semiconductors and Integrated Circuits: Introduction to semiconductors & its types, Diode, PNP & NPN transistors, CE amplifier & Switching characteristics of Transistors, Logic Families, Scale of Integration, RTL, DTL, TTL and its characteristics, Emitter Coupled Logic (ECL), CMOS Logic Family, NMOS and PMOS Logic, Comparison of Different Logic Families.	18
II	**Data Representation**: Decimal, Octal, Binary, Hexadecimal, Conversation from one number system to another number system, Binary Math: Binary Addition, Binary Subtraction, Binary Complements, One's & Two's Complement, Binary Subtraction using Two's Complement, Overflow and Underflow, Codes: ASCII code, EBCDIC codes, Grey codes, Excess-3, BCD codes, Error detection and Correcting codes.	18
III	**Logic Gates Basics:** AND Gate, OR Gate, NOT Gate, NOR Gate, NAND Gate, Exclusive-OR (XOR) Gate, Exclusive-NOR (XNOR) Gate, Truth Tables for Logic Gates, Truth Tables for Combinational Logic.	18
IV	**Boolean Algebra and Karnaugh Maps:** Boolean algebra, Basic Boolean Law, Demerger's theorem, Map Simplification minimizing technique, Sum of products, Product of sums, Converting SOP & POS to Truth Table & Truth	18

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	Table to Expression, K Map, Minimization techniques of Boolean Expression using K-Maps, "Don't Care" Conditions, Minimization of Multiple Output Boolean Functions, VEM Theory of K-Map, MEV and Minimization of Two, Three, Four, Five and Six Variable Maps using VEM.	
V	**Combinational and Sequential Circuit:** Introduction to Combinational and Sequential Circuit, Adders: Half adder & Full adder, Subtractor, Seven-Segment Displays Circuits, Encoder, Decoders, Multiplexers, De-multiplexers, Flip-Flop, D Latch, RS Flip Flop, J-K Flip-Flop, Registers, Counter: Ripple (Asynchronous) Counter and Synchronous Counter, UP/DOWN Counters.	12

Keywords: Number System, Logic Gates, Boolean, K-map, Flip Flop, Combinational and Sequential Circuit, VEM, Truth table.

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

TEXT/REFERENCE BOOKS:

1. Modern Digital Electronics, R.P. Jain, TMH
2. Digital Principles & Application, Leach & Malvino, TMH
3. Digital Logic Design, Morries Mano, PHI
4. Digital design- Principles and Practices, J. F. Wakerly, Pearson India.
5. Digital Integrated Electronics, H.Taub & D. Shilling, McGraw Hill.
6. Digital Principles & Design, Givone, TMH
7. Digital Circuit & Design, S. Aligahanan, S. Aribazhagan, Bikas Publishing House.
8. Fundamentals of Digital Electronics & Microprocessor, Anokh Singh, A.K. Chhabra, S.Chand
9. Digital Circuits and Logic Design, Samuel Lee, PHI publication

E-RESOURCES:

1. SWAYAM URL Link for Digital Electronics: https://onlinecourses.nptel.ac.in/noc20_ee32/preview
2. SWAYAM URL Link for Digital Electronics: https://onlinecourses.nptel.ac.in/noc19_ee51/preview

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100
Continuous Comprehensive Evaluation (CCE): 25 Marks
University Exam(UE): 75 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

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(Present online)

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Part A: Introduction				
Program: **Degree Course**		Class: **B.C.A. III Year**	Year: **2022**	Session: **2022-2023**
1	Course Code	**BCA-6P**		
2	Course Title	**LAB 6: Python**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Theoretical knowledge of Java and Python		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Develop front end application using front end technologies. • Demonstrate the principles of object-oriented programming. • Learn the Numbers, Math functions, Strings, List in Python. • Learn the tuples and dictionaries in Python. • Demonstrate proficiency in handling of loops and creation of functions. • Identify the methods to create and manipulate lists, tuples and dictionaries. • Express different Decision-Making statements and Functions.		
6	**Credit Value**	**Practical: 2**		
7	**Total Marks**	**Max. Marks: 100**	**Min Passing Marks : 33**	

Part B: Content of the Course	
Total Periods: 30	
Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement. 1. Python program to find the union of two lists. 2. Python program to find the intersection of two lists. 3. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature. 4. Using while loop, produce a table of sins, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x, print the value of sin(x), cos(x) and tan(x). 5. Write a program that reads an integer value and prints —leap yearǁ or —not a leap yearǁ. 6. Write a program that takes a positive integer n and then produces n lines of output shown as follows. For example, enter a size: 5 * ** *** **** ***** 7. Write a function that takes an integer _n‘as input and calculates the value of 1 + 1/1! + 1/2! + 1/3! + … + 1/n 8. Write a function that takes an integer input and calculates the factorial of that number. 9. Write a function that takes a string input and checks if it‘s a palindrome or not.



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	10. Write a list function to convert a string into a list, as in list (_abc') gives [a, b, c]. 11. Write a program to generate Fibonacci series. 12. Write a program to check whether the input number is even or odd. 13. Write a program to compare three numbers and print the largest one. 14. Write a program to print factors of a given number. 15. Write a method to calculate GCD of two numbers. 16. Write a program to create Stack Class and implement all its methods. (Use Lists). 17. Write a program to create Queue Class and implement all its methods. (Use Lists) 18. Write a program to implement linear and binary search on lists. 19. Write a program to sort a list using insertion sort and bubble sort. 20. Python program to remove the "i" th occurrence of the given word in a list where words repeat. 21. Python program to count the occurrences of each word in a given string sentence. 22. Python program to check if a substring is present in a given string. 23. Python program to map two lists into a dictionary. 24. Python program to count the frequency of words appearing in a string using a dictionary. 25. Python program to create a dictionary with key as first character and value as words starting with that character. 26. Python program to find the length of a list using recursion. 27. Python program to read a file and capitalize the first letter of every word in the file. 28. Python program to read the contents of a file in reverse order. 29. Python program to create a class in which one method accepts a string from the user and another prints it. 30. Study and Implementation of Database, Structured Query Language and database connectivity.

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

T. Budd, Exploring Python, TMH, 1st Ed, 2011

1. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Pyth,Freelyavailableonline.2012
2. Luca Massaron John Paul Mueller, Python for Data Science For Dummies, Wiley, 2ed, 2019
3. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition by O'Reilly, 2015
4. Zed A. Shaw, Learn Python 3 the Hard Way (Addison-Wesley, 2016)

E Resources:

1. Introduction
   https://www.w3schools.com/python/default.asp
2. File Handling
   https://www.w3schools.com/python/python_file_handling.asp
3. NumPy
   https://www.w3schools.com/python/numpy/default.asp
4. Pandas
   https://www.w3schools.com/python/pandas/default.asp
5. SciPy

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https://www.w3schools.com/python/scipy/index.php

6. Django
   https://www.w3schools.com/django/index.php
7. Matplotlib
   https://www.w3schools.com/python/matplotlib_intro.asp
8. Machine Learning
   https://www.w3schools.com/python/python_ml_getting_started.asp
9. Python MySQL
   https://www.w3schools.com/python/python_mysql_getstarted.asp
10. https://www.youtube.com/channel/UCxu1cR5XRauYn37yg-Fh6rA (from SWAYAM/NPTEL)
    https://www.youtube.com/channel/UCJAgw1niUkaShdmA5aAZdQw

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100
Continuous Comprehensive Evaluation (CCE): Not Applicable
University Exam(UE): 100 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

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Part A: Introduction				
Program: **Degree Course**		Class: **B.C.A. III Year**	Year: **2022**	Session: **2022-2023**
1	Course Code	**BCA-7P**		
2	Course Title	**LAB 7: Project**		
3	Course Type	**Practical**		
4	Pre-requisite (if any)	Theoretical knowledge of Java and Python		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Evaluate the framework and characteristics of a project. • Identifying areas for improvement.		
6	Credit Value	**Practical: 5**		
7	Total Marks	**Max. Marks: 100**	**Min Passing Marks : 33**	

Part B: **Important Guidelines for Project**

Total Periods: 30

A project report has to be submitted as per the rules described below:

1. **Number of Copies:** The student should submit One hard bound copy of the Project Report with one RW/CD/DVD.
2. **No of students:** Every student has to submit separate project.
3. **Acceptance / Rejection of Project Report:** The student must submit a project report to the Head of Department/Project Guide for approval. The Head of Department/Project Guide holds the right to accept the project or suggest modifications for resubmission.
4. **Format of the Project Report :**The student must adhere strictly to the following format for the submission of the Project Report
   - **I. Paper:** The report shall be typed on white paper, A4 size or continuous computer stationary bond, for the final submission. The report to be submitted to the University must be original and subsequent copies may be photocopied on any paper.
   - **II. Typing:** The typing shall be of standard letter size, double-spaced and on one side of the paper only, using black ribbons and black carbons.
   - **III. Margins:** The typing must be done in the following margins
     Left ----- 35mm, Right ----- 20mm
     Top ----- 35mm, Bottom ----- 20mm
   - **IV. Binding:** The Report shall be Rexene bound in black. Plastic, spiral bound Project Reports not be accepted.
   - **V. Front Cover:** The front cover should contain the following details:
     TOP: The title in block capitals of 6mm to 15mm letters.
     CENTER: Full name in block capitals of 6mm to 10mm letters.
     BOTTOM: Name of the University, year of submission- all in block capitals of 6mm to 10mm letters on separate lines with proper spacing and centring.
   - **VI. Blank Sheets:** At the beginning and end of the report , two white black bound papers should be provided, one for the purpose of binding and other to be left blank.



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5. **Abstract:** Every report should have an abstract following the Institute's Certificate. The abstract shall guide the reader by highlighting the important material contained in the individual chapters, section, subsection etc.
6. **Certificates etc:** The report should contain the following:
    I. Certificate from Company
    II. Institute Certificate: Successful completion of project by competent authority.
    III. Acknowledgment
    IV. List of Figures
    V. Tables
    VI. Nomenclature and Abbreviations
7. **Contents of the Project Report:** The project report must contain following in form of chapter, however student may include any other relevant chapter(s):
    I. **Company Profile:** This chapter should highlight the company details. This would be chapter 1 and should include the main stream activity of the company, the product line of the company and the details of the department where the student has carried out his/her project work. This should not exceed two pages or 800 words.
    II. **Introduction to the project:** This chapter shall highlight the purpose of project work, it will also define the chapters to be followed in the Project Report.
    III. **Scope of work:** Brief scope of the project work done
    IV. **Existing System and Need for proposed System:** If there is some system already in use, then give brief detail of it in order to help to understand the enhancements carried out by the student in the existing system.
    V. **Operating Environment**: Hardware and Software required and used.
    VI. **Proposed System:** Which may contain following:
        a. **Objectives to be fulfilled**: clearly define the objective(s) of the system.
        b. **User Requirements**: State the requirements of the use in an unambiguous manner.
        c. **Requirements Determination Techniques and Systems Analysis Methods Employed:** Use the formal methods to describe the requirements of the use like Fact Finding Methods, Decision Analysis, Data Flow Analysis etc.
        d. **Prototyping:** If the prototypes has been developed prior to the detailed design, then give details of the prototype.
        e. **System Feature**: Which includes as follows:
            - Module specifications
            - D.F.D. and ER
            - System flow charts
            - Data Dictionary
            - Structure charts
            - Database /File layouts
            - Design of Input Design of Output screens and reports
            - User Interfaces
            - Design of Control Procedures
8. **Testing procedures and Implementation phase**
9. **Problems encountered, Drawbacks and Limitations**

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10. Proposed Enhancements/ Future enhancement **11. Conclusions** **12. Bibliography** **Annexure**

Part C - Learning Resources		
Text Books, Reference Books, Other Resources		
Suggested Readings: Not Applicable **E-Resources:**		
Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): Not Applicable University Exam(UE): 100 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable

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Part A: Introduction

Program: **Diploma Course**	Class: **B.C.A. II Year**	Year: **2022**	Session:**2022-2023**

1.	Course Code	**BCA-8T**
2.	Course Title	**Numerical Analysis**
3.	Course Type	**Theory**
4.	Pre-requisite (if any)	Knowledge of basic mathematics
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Obtain numerical solutions of algebraic and transcendental equations. • Find out numerical solutions of system of linear equations and check the accuracy of the solutions. • Learn about various interpolating and extrapolating methods. • Solve initial and boundary value problems in differential equations using numerical methods. • Apply various numerical methods in real life problems.
6.	**Credit Value**	**Theory : 6**
7.	**Total Marks**	**Max. Marks: 25 +75** / **Min Passing Marks : 33**

Part B: Content of the Course

Total Periods: 90

Unit	Topics	No. of Periods
I.	**Numerical Methods for Solving Algebraic and Transcendental Equations:** Round-off error and computer arithmetic, Local and global truncation errors, Algorithms and convergence; Bisection method, False position method, Fixed point iteration method, Newton's method and secant method for solving equations.	18
II.	**Numerical Methods for Solving Linear Systems:** Partial and scaled partial pivoting, Lower and upper triangular (LU) decomposition of a matrix and its applications, Thomas method for tridiagonal systems; Gauss-Jacobi, Gauss-Seidel and successive over-relaxation (SOR) methods.	18
III.	**Interpolation:** Lagrange and Newton interpolations, Piecewise linear interpolation, Cubic spline interpolation, Finite difference operators, Gregory-Newton forward and backward difference interpolations.	18
IV.	**Numerical Differentiation and Integration:** First order and higher order approximation for first derivative, Approximation for second derivative; Numerical integration: Trapezoidal rule, Simpson's rules and error analysis, Bulirsch-Stoer extrapolation methods, Richardson extrapolation.	18
V.	**Initial and Boundary Value Problems of Differential Equations:** Euler's method, Runge-Kutta methods, Higher order one step method, Multi-step methods; Finite difference method, Shooting method, Real life examples: Google search engine, 1D and 2D simulations, Weather forecasting.	18

Keywords: Error, Decomposition, Interpolation, Differentiation, Integration, Higher order, Simulation.

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Part C - **Learning Resource**
Text Books, Reference Books, Other Resources

Suggested Readings:

1. Brian Bradie (2006), A Friendly Introduction to Numerical Analysis. Pearson.
2. C. F. Gerald & P. O. Wheatley (2008). Applied Numerical Analysis (7th edition), Pearson Education, India.
3. F. B. Hildebrand (2013). Introduction to Numerical Analysis: (2nd edition). Dover Publications.
4. M. K. Jain, S. R. K. Iyengar & R. K. Jain (2012). Numerical Methods for Scientific and Engineering Computation (6th edition). New Age International Publishers.
5. Robert J. Schilling & Sandra L. Harris (1999). Applied Numerical Methods for Engineers Using MATLAB and C. Thomson-Brooks/Cole.

E Resources:

- Topics Related to Numerical Analysis from SWAYAM/NPTEL
  1. Introduction
     https://onlinecourses.swayam2.ac.in/cec20_ma11/preview
     https://onlinecourses.nptel.ac.in/noc19_ma21/preview

  2. Introduction to error analysis and linear systems
     https://www.youtube.com/watch?v=_cgzqVmvqtQ&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZCAr5S&index=2

  3. LU decomposition
     https://www.youtube.com/watch?v=1g0G_kjA560&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZCAr5S&index=4

  4. Jacobi and Gauss Seidel methods
     https://www.youtube.com/watch?v=K193avJMCd4&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZCAr5S&index=5

  5. Playlist
     https://www.youtube.com/channel/UCqpVOOZS6-OFQaPKWBZLKJQ
     https://www.youtube.com/watch?v=TWAN_T66Cps&list=PLq-Gm0yRYwTguDcfylj1ZicXxzdZCAr5S (NPTEL)

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 25 Marks University Exam(UE): 75 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

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Part A: Introduction				
Program: **Diploma Course**		Class: **B.C.A. II Year**	Year: **2022**	Session:2022-2023
1.	Course Code	**BCA-9T**		
2.	Course Title	**Operating System**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	No		
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Describe the important computer system resources and the role of operating system in their management policies and algorithms. • To understand various functions, structures and history of operating systems and should be able to specify objectives of modern operating systems and describe how operating systems have evolved over time. • Understanding of design issues associated with operating systems. • Understand various process management concepts including scheduling, synchronization, and deadlocks. • To have a basic knowledge about multithreading. • To understand concepts of memory management including virtual memory. • To have sound knowledge of various types of operating systems including Unix and Android. • Describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to evolve.		
6.	**Credit Value**	**Theory : 6**		
7.	**Total Marks**	**Max. Marks: 25 +75**	**Min Passing Marks : 33**	

Part B: Content of the Course		
Total Periods: 90		
Unit	Topics	No. of Periods
I.	**Introduction to Operating System:** What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.	18
II.	**Operating System Organization and Process Characterization:** Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Pre-emptive and Pre- emptive Scheduling Algorithms.	18
III.	**Process Management (Deadlock):** Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery. **Inter Process Communication and Synchronization:** Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.	18

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IV.	**Memory Management:** Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory.	12
V.	**Introduction to Android Operating System:** Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System, Small Application Development using Android Development Framework.	12
Keywords: Operating System (OS), Process, Kernel, Threads, Deadlock, Critical Section, Semaphores.		

Part C - **Learning Resources**

Text Books, Reference Books, Other Resources

Suggested Readings:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education
4. 1997.
5. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
6. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

E Resources:

1. **SWAYAM/NPTEL - IITD**
   https://youtube.com/playlist?list=PLsylUObW5M3CAGT6OdubyH6FztKfJCcFB

2. **NPTEL - IIT Madras**
   https://youtube.com/playlist?list=PL3-wYxbt4yCjpcfUDz-TgD_ainZ2K3MUZ

3. **Coursera:**
   Introduction:
   https://www.coursera.org/specializations/codio-introduction-operating-systems?
   Memory Management:
   https://www.coursera.org/learn/codio-intro-to-operating-systems-2-memory-management?specialization=codio-introduction-operating-systems

4. **w3shool.com**
   https://www.w3schools.in/operating-system/intro#:~:text=An%20operating%20system%20falls%20under,networking%20hardware%2C%20printers%2C%20etc.

5. **gatevidyalay.com**
   https://www.gatevidyalay.com/operating-system/

6. **javatpoint.com**
   https://www.javatpoint.com/os-tutorial

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Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 25 Marks University Exam(UE): 75 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks



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Part A: Introduction				
Program: **Diploma Course**		Class: **B.C.A. II Year**	Year: **2022**	Session: **2022-2023**
1.	Course Code	**BCA-10T**		
2.	Course Title	**Relational Database Management System**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	No		
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Learn about Database Concepts, Architecture, various Users, Data Models and Data Management which helps them to interact with various Databases. • Develop various Tables and Databases which helps them to develop new Software. • Practice various SQL commands which help them to generate new relationships among various Tables and Databases which are useful for Software Development. • Familiar about RDBMS Software like Oracle and SQL Server which are used as Backend for Software Development. • Develop new Databases for their Minor and Major Project Development which enhances their Data Storage, Data Accessibility and Data Management.		
6.	**Credit Value**	**Theory : 4**		
7.	**Total Marks**	**Max Marks: 25+75**	**Min Passing Marks : 33**	

Part B: Content of the Course		
Total Periods: 60		
Unit	Topics	No. of Periods
I.	**Overview of Database Management**: Data, Information and Knowledge, Data Processing versus Data Management, File Oriented Approach verses Database Oriented Approach, Data Independence, Database Administration Roles, Overview of Database, DBMS Architecture, Different kinds of DBMS users, Introduction to Data Dictionary. Data Models: Network Model, Relational Model, Hierarchical Model. Database Languages: DDL, DML, DCL, And TCL. Structured Query Language :Basic Data Types, Commands : Create, Insert, Select, Delete, Truncate , Drop, Alter, Grant ,Revoke, Commit, Rollback, Queries on Multiple Relation, Join Operation, String Operation, Set Operation, Grouping, Nested Subqueries.	12
II.	**Concepts of Database Management System :** Definition of Tables, Cardinality relationships in a Database, Constraints in a Database, Entity, Attributes, Strong and weak entities, ER-Diagram, Symbols and Implementation, Concept of keys: Candidate key, Primary key, Alternate key, Foreign key, Case studies of ER modeling Generalization, Specialization and Aggregation. Converting an ER model into relational Schema. Extended ER features.	12

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	Schema. Extended ER features.	
III.	**Relational Database Design:** Normalization concept in logical model, Pitfalls in database design, Functional dependencies, Join dependencies, Natural Join, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design: Concepts of indexes, File organization for relational tables, De-normalization. Relational Database :Structure of Relational Database, Schema, Relational Operation : Selection, Projection, Cartesian Production, Union, Intersection and Minus operation .Relational Algebra: Select operation, Project operation, Union operation, Cartesian Product operation, Intersection operation, Join operation, Different types of joins (Inner join, Outer join, Self join).	12
IV.	**SQL Server Basics:** Microsoft SQL Server 2019, Overview of SQL Server 2019,Versions of SQL Server, Installation of SQL Server 2019, SQL Server Management Studio(SSMS), Azure Data Studio(ADS), Features of SQL Server Express, SQL Server Support Life Cycle, Data Definition Language (DDL) Commands, Data Manipulation Language (DML) Commands, Data Control Language (DML) Commands, Transaction Control Language (TCL) Commands, Data Constraints, Stored Procedure, Function .	12
V.	**Oracle Basics :** Oracle Corporation, Versions of Oracle, Oracle Products, Oracle Installation, Oracle Client and Server Products, Online Transaction Processing, Hybrid cloud Installation, Data Definition Language (DDL) Commands, Data Manipulation Language (DML) Commands, Data Control Language (DML) Commands, Transaction Control Language (TCL) Commands, Data Constraints, Introduction to PL/SQL Programming, Data Types, Looping Statements, Cursors, Stored Procedure, Function .	12
Keywords: Data Models, Keys, SQL Commands, DBMS, RDBMS, Oracle, SQL Server.		

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Database system concept , H. Korth and A. Silberschatz, TMH Publications .
2. Data Base Management System, Alexies&Mathews,Vikash publication.
3. Data Base Management System, C. J. Date ,Narosha Publication.
4. Data Base Management System By James Matin .
5. Principles of Database System By Ullman.
6. Program Design, Peter Juliff, PHIPublications .
7. The Complete Reference, Kevin Loney, Oracle Press.
8. SQL, PL/SQL The Programming Language of Oracle, Ivan Bayross , PustakKosh Publication.
9. Microsoft SQL Server Management and Administration, Ross, STM Publications .

E Resources:

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1. SWAYAM url link for DBMS and RDBMS :https://youtu.be/f6LGtJutWyA
2. SWAYAM url link for DBMS and RDBM : https://youtu.be/IoL9Ve2SRwQ
3. SWAYAM url link for DBMS and RDBMS : https://**swayam**.gov.in/courses/4434-data-base-management-system

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 25 Marks University Exam (UE): 75 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

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Part A: Introduction				
Program: **Diploma Course**		Class: **B.C.A. II Year**	Year: **2022**	Session:2022-2023
1	Course Code	**BCA-11T**		
2	Course Title	**Computer Networking and Cyber Technology**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the basic computer network technology. • Understand and explain the Data Communications System and its components. • Identify the different types of network topologies and protocols. • Understand the layers of the OSI model and TCP/IP. • Expose wireless and wired LANs. • Understand the cyber laws in India.		
6	**Credit Value**	**Theory: 6**		
7	**Total Marks**	**Max. Marks: 25+75**	**Min Passing Marks: 33**	

Part B:Content of the Course		
Total Periods: 90		
Unit	Topics	No. of Periods
I	**Introduction to Computer Network and Physical Layer:** Computer network Fundamentals and Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, ISO-OSI reference model, TCP/IP model, Concept of Analog & Digital Signal, Bandwidth, Multiplexing: TDM, FDM, WDM, CDMA, Transmission Media : Twisted pair, Coaxial cable, Fiber-optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching ,Packet Switching & their comparisons, Line Coding techniques: Bipolar, Unipolar, RZ, NRZ, Manchester, AMI, B8ZS, Block coding techniques.	18
II	**Data Link Layer:** Functions at Data Link Layer, Framing, Error detection and correction codes: checksum, CRC, hamming code, Flow Control: Stop & Wait and Sliding Window Protocols, Data link protocols: HDLC and PPP, Medium Access Sub-Layer: LLC Protocol, IEEE 802.2, Overview of IEEE 802.3,802.4,802.5, 802.6 and brief knowledge of 802 series up to present scenario.	18
III	**Network Layer and Transport Layer:** Functions of Network Layer, Routing Protocols & Algorithms, Principles of Congestion Control, IPv4 addresses, IPv4 Addressing, IPv6 addresses, Internetworking basics, Functions of Transport Layer, Flow Control & Buffering, Introduction to TCP/UDP protocols and their comparison.	18

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IV	**Common Network Architecture:** Protocol Stack for Example Networks, Connection oriented & Connectionless N/Ws, Frame Relay, Example of N/Ws-P2P, X.25, ATM, Ethernet, Wireless LANs - 802.11, 802.11x, Gigabit, Broadband Networks: Integrated Service Digital Networks (ISDN), BroadBand ISDN, ATM, Introduction to Very Small Aperture Terminal (VSAT).	12
V	**Application Layer:** World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), HyperText Transfer Protocol (HTTP), Email Protocols: MIME & SMTP, POP, IMAP, Telnet – Remote Communication Protocol, Proxy Server, Proxy Web Servers. **Cyber Laws in India:** Information Technology Act, 2000 – a brief overview; E – commerce; E – governance; Concept of Electronic Signature; Concept of Cyber contraventions and Cyber Offences.	12
Keywords: Computer Network, TCP/IP Model, OSI Model, Wireless & Wired Networks, Cyber Laws		

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

Text Books:

1. Computer Networks, Andrew S. Tanenbaum, PHI / Pearson Education Inc.
2. Data Communication and Networking, Behrouz A. Forouzan, Tata McGraw-Hill.
3. Internet Law-Text and Materials, Chris Reed, Universal Law Publishing Co., New Delhi
4. Hand book of Cyber Laws, Vakul Sharma, Macmillan India Ltd, New Delhi

Reference Books:

1. Data and Computer Communication, William Stallings, Pearson Education.
2. Computer and Communication Networks, Nader F. Mir, Pearson Education, 2007.
3. Data & Computer Communication, Black, PHI

E Resources:

- NPTEL URL link for Data Communication:
  https://nptel.ac.in/courses/106105082

  Topics From SWAYAM Portal
- Introduction to Data Communication

  https://www.youtube.com/watch?v=swtH_okidQc&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=1
- Layered Architecture
  https://www.youtube.com/watch?v=xHO6LjSHeo0&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=2
- Data and Signal
  https://www.youtube.com/watch?v=6ZGVZ7gUccE&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=3
- Guided Transmission Media
  https://www.youtube.com/watch?v=y7v3EAJsWXA&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=5
- Unguided Transmission Media
  https://www.youtube.com/watch?v=hKq1tYlVxdQ&list=PLUtfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=6

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Part D: Assessment and Evaluation		
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Part A: Introduction				
Program: **Diploma Course**		Class: **B.C.A. II Year**	Year: **2022**	Session:**2022-2023**
1	Course Code	**BCA-12T**		
2	Course Title	**Web Technology**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	No		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Analyze a web page and identify its elements and attributes. • Create web pages using HTML, CSS, JAVASCRIPT, XHTML • Build dynamic web pages using JavaScript (Client side programming). • Create XML documents and Schemas. • Build interactive web applications using, PHP, AJAX. • Handling Database using MYSQL		
6	**Credit Value**	**Theory: 4**		
7	**Total Marks**	**Max. Marks: 25+75**	**Min Passing Marks: 33**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	No. of Periods
I	**Introduction :**Introduction to web, protocols governing the web, web development strategies, Web applications, Introduction to Web Publishing: Introduction, Domain Name Registration, choosing a web host and signing up for an Account, web hosting, web design and development, Testing web site, uploading web pages.	12
II	**HTML:** Introduction, Basic formatting tags: heading, paragraph, line break, bold, italic, underline, superscript, subscript, font and image. Different attributes like align, color, bgcolor, font face, border, size. Navigation Links using anchor tag: internal, external, mail and image links, Link to different web pages and sections. Lists: ordered, unordered and definition, Table tag, HTML Form controls: form, text, password, text area, button, checkbox, radio button, select box, hidden controls, Frameset and frames. Basics of DHTML, XML.	12
III	**Scripting Languages:** Usefulness of Style Sheets, Creating Style sheets, Classes and Pseudo Classes, CSS Tags, Background, Font, Text, Position etc. JavaScript: Overview, Syntax & Conventions, Variables, Expression, Branching & Looping, Function, Array, Objects, Events & Document Object model, Alerts, prompts and conforms.	12

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IV	PHP: Introduction to PHP, Server side scripting, Role of Web Server software, including files, comments, variables and scope, echo and print, Operators: Logical, Comparison and Conditional operators, Branching statements, Loops, break and continue PHP functions. Passing information between pages, HTTP GET and POST method, String functions: strlen, strops, strstr, strcmp, substr, str_replace, string case, Array constructs: array(), list() and foreach(), PHP advanced functions: Header , Session, Cookie, Object Oriented Programming using PHP: class, object, constructor, destructor and inheritance.	12
V	**MySQL:** Features of MySQL, data types, Introduction to SQL commands-SELECT, DELETE,UPDATE, INSERT, PHP functions for MySQL operations: mysql_connect, mysql_select_db, mysql_query,mysql_fetch_row, mysql_fetch_array, mysql_fetch_object, mysql_result, Insertion and Deletion of data using PHP, Displaying data from MYSQL in webpage.	12
Keywords: HTML, PHP, CSS, CSS3, JAVASCRIPT, MYSQL, Dynamic website, Commercial website, Web applications		

Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

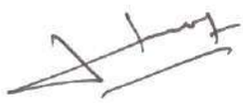
TEXT BOOKS/ REFERENCE BOOKS:

1. Xavier, C, "Web Technology and Design", New Age International.
2. Ivan Bayross, "HTML, DHTML, Java Script, Perl & CGI", BPB Publication.
3. Ramesh Bangia, "Internet and Web Design", New Age International.
4. Ullman, "PHP for the Web: Visual Quick Start Guide", Pearson Education.
5. Jim Converse & Joyce Park, "PHP & MySQL Bible", Wiley India Publication
6. "Internet and Internet Engineering", Daniel Minoli, TMH.
7. Chuckmusiano & Bill Kenndy, O Reilly, HTML The Definite Guide"
8. Joseph Schmuller, Dynamic HTML, BPB, 2000.
9. Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.
10. Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill.

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100
Continuous Comprehensive Evaluation (CCE): 25 Marks
University Exam (UE): 75 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks



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Part A: Introduction				
Program: **Degree Course**		Class: **B.C.A. III Year**	Year: **2022**	Session:**2022-2023**
1.	Course Code	**BCA-15T**		
2.	Course Title	**Python Programming**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	Basic knowledge of programming and concept of object oriented programming		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Define the structure and components of a Python program. • Demonstrate proficiency in handling of loops and creation of functions. Identify the methods to create and manipulate lists, tuples and dictionaries. • Discover the commonly used operations involving regular expressions and file system. • Determine the need for scraping websites and working with CSV, JSON and other file formats. • Interpret the concepts of Object-Oriented Programming as used in Python.		
6.	**Credit Value**	**Theory : 4**		
7.	**Total Marks**	**Max. Marks: 25+75**	**Min Passing Marks : 33**	

Part B: Content of the Course		
Total Periods: 60		
Unit	**Topics**	**No. of Periods**
I.	**Introduction to Python:** Installing Python, basic syntax, interactive shell, editing, saving, and running a script, the concept of data types; variables, assignments; immutable variables; numerical types, Operators (Arithmetic Operator, Relational Operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise Operator, Increment or Decrement operator) and Expressions, comments in the program, understanding error messages.	12
II.	**Creating Python Programs:** Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, exit function, Difference between break, continue and pass.) **Function:** Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.	12
III.	**Strings and text files**: manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated). **String manipulations:** subscript operator, indexing, slicing a string; **strings and number system**: converting strings to numbers and vice- versa. Binary, Octal, Hexadecimal numbers.	12
IV.	**Lists, Tuples, and Dictionaries;** Basic list Operators, replacing, inserting, removing an element, searching and sorting lists, Accessing tuples, Operations, Working, Functions and Methods, dictionary literals, adding and removing keys, accessing and replacing values, Traversing Dictionaries.	12

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V.	**Exception Handling:** Exception, Exception Handling, except clause, try, finally, clause, User defined exceptions. **Python Libraries:** Exploring python libraries like Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy etc.	12
Keywords: List, Tuple, Dictionary, Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy.		

Part C - Learning Resources

Text Books, Reference Books, Other Resources

Suggested Readings:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Pyth, Freelyavailableonline, 2012
3. Luca Massaron John Paul Mueller, Python for Data Science For Dummies, Wiley, 2ed, 2019
4. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, 2nd edition, O'Reilly, 2015
5. Zed A. Shaw, Learn Python 3 the Hard Way, Addison-Wesley, 2016

E-Resources:

1. Introduction
   https://www.w3schools.com/python/default.asp
2. File Handling
   https://www.w3schools.com/python/python_file_handling.asp
3. NumPy
   https://www.w3schools.com/python/numpy/default.asp
4. Pandas
   https://www.w3schools.com/python/pandas/default.asp
5. SciPy
   https://www.w3schools.com/python/scipy/index.php
6. Django
   https://www.w3schools.com/django/index.php
7. Matplotlib
   https://www.w3schools.com/python/matplotlib_intro.asp
8. Machine Learning
   https://www.w3schools.com/python/python_ml_getting_started.asp
9. Python MySQL
   https://www.w3schools.com/python/python_mysql_getstarted.asp
10. Topics related Python from SWAYAM/NPTEL
    https://www.youtube.com/channel/UCxu1cR5XRauYn37yg-Fh6rA
    https://www.youtube.com/channel/UCJAgw1niUkaShdmA5aAZdQw
11. Introduction to Python Programming from Coursera:
    https://www.coursera.org/learn/python-programming-intro

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12. Crash Course on Python:
https://www.coursera.org/learn/python-crash-course

13. Python for everybody:
https://www.coursera.org/specializations/python

14. Introduction to Scripting in Python Specialization
https://www.coursera.org/specializations/introduction-scripting-in-python

15. Topics related to Python from Tutorials
https://www.javatpoint.com/python-tutorial
http://docs.python.org/3/tutorial/index.html
http://interactivepython.org/courselib/static/pythonds
http://www.ibiblio.org/g2swap/byteofpython/read/

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 25 Marks University Exam(UE): 75 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

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Part A: Introduction				
Program: **Degree Course**		Class: **B.C.A. III Year**	Year: **2022**	Session:2022-2023
1.	Course Code	**BCA-16T**		
2.	Course Title	**Java Programming**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	No		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Develop programming skill and learn how to implement new Platform Independent software. • Develop new Packages which help them to develop new application software and Utility Software. • Develop new Online Software and Internet Games with the help of Applet and AWT Packages. • Learn about TCP/IP Client and Server Sockets which helps them to develop Networking Software • Familiar about Applet, Thread and Servlet Life Cycle which helps them to develop value added services for Internet Users. • Learn about new Integrated Development Environment and new Web servers.		
6.	**Credit Value**	**Theory: 4**		
7.	**Total Marks**	**Max Marks: 25+75**	**Min Passing Marks : 33**	

Part B: Content of the Course		
Total Periods: 60		
Unit	Topics	No. of Periods
I.	**Overview of JAVA:** The genesis of java, History of java, Java Virtual Machine (JVM), Java development kit (JDK), Source Files, Jar Files, Compiling and Running of Files, Byte Code, Platform Independency, Data types, Literals, Variables, Constants, Array and it's types, Operators, Conditional and looping statements, various packages, Introduction of class, objects and methods, nested and inner class, string handling, constructor, writing simple JAVA program.	12
II.	**Inheritance, Packages and interface-** Concept of super and sub class, types of inheritance, access specifiers, Method Overriding, Abstract Class, Constructor in Multilevel Inheritance, using final with Inheritance. **Package:** Defining package, Rules for creating a new Package, CLASSPATH, Access protection, Importing Package .**Interface:** Defining and Implementing Interface, extending interface, nested interface, importance of interface in Java.	12
III.	**Exception Handling and Multithreading:** Using try and catch, multiple catch classes, Nested try statements, throw, throws and finally, Built in Exception, Uncaught Exception, Creating own Exception class. **Java Thread Model:** Main thread, Creating own Thread, Life cycle of thread, Thread priorities, Synchronization, Interthread Communication, Suspending, Resuming and Stopping thread.	12

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IV.	**Java Packages: I/O classes:** Byte Stream and Character Stream, Predefined Stream, reading console input, writing console output. **Applet:** Applet Life Cycle, Creating an applet, Using image and sound in applet. **Lang:** Various classes, Importance class Definition, **Util:** Framework, Event Model, Scanner Class **AWT:** Exploring AWT, Event handling – The delegation-event model, Event classes, Source of event, Event listener interfaces ,handling mouse and keyboard event ,Adapter class **Networking:** classes and interface ,Socket, TCP/IP Client Socket and Server Socket, Inet address, URL Connection.	12
V.	**Server site programming and database connectivity:** Servlet – Overview of Servlet, Life cycle of servlet, JAVA servlet architecture , Generic servlet and http servlet ,The servlet interface, Request and response **Integrated Development Environment:** Eclipse IDE, Netbeans IDE, MyEclipse IDE **Web Servers:** Apache Tomcat Web Server, JBoss Server **Database Connectivity:** JDBC API, Basic Connectivity with Oracle and SQL Server.	12
Keywords: Class, Packages, Web Servers, Servlet, Applet, Socket, Java Server Pages (JSP).		

Part C - **Learning Resource**

Text Books, Reference Books, Other Resources

Suggested Readings:

1. The complete reference, Naughton P and Schildt H., Osborne , McGraw-Hill, Berkeley Publication.
2. An Introduction to JAVA programming, James R. Levenick ,Firewall Media publication.
3. Java Programming,By E.Balgurusamy, McGraw-HillPublication.
4. Core JAVA for beginners, Rashmi KantaDas ,Vikas Publication.
5. SWAYAM url link for Java : https://onlinecourses.swayam2.ac.in/aic20_sp13/preview
6. SWAYAM url link for Java : https://onlinecourses.nptel.ac.in/noc19_cs84/preview
7. SWAYAM url link for Java : https://www.dqindia.com/iit-bombay-offers-free-online-course-java-swayam-platform/
8. SWAYAM url link for Java : https://www.classcentral.com/course/swayam-programming-in-java-12930

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
MaximumMarks:100
Continuous Comprehensive Evaluation (CCE): 25 Marks
University Exam(UE): 75 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

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Part A: Introduction				
Program: **Degree Course**		Class: **BCA III Year**	Year: **2022**	Session: **2022-2023**
1.	Course Code	**BCA-17T**		
2.	Course Title	**Software Engineering**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	Basic Knowledge of programming methodology and database management system		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Basic knowledge and understanding of the analysis and design of complex systems. • Ability to apply software engineering principles and techniques. • To produce efficient, reliable, robust and cost-effective software solutions. • Ability to work as an effective member or leader of software engineering teams. • To manage time, processes and resources effectively by prioritising competing demands to achieve personal and team goals Identify and analyzes the common threats in each domain.		
6.	**Credit Value**	**Theory : 6**		
7.	**Total Marks**	**Max. Marks: 25 +75**	**Min Passing Marks : 33**	

Part B: Content of the Course		
Total Periods: 90		
Unit	Topics	No. of Periods
I.	**Software Development Approaches**: Introduction; Evolving Role of Software; Software Characteristics; Software Applications. Software Design Processes: Introduction; What is Meant by Software Engineering? , Definitions of Software Engineering; The Serial or Linear Sequential Development Model; Iterative Development Model; The Incremental Development Model.	18
II.	**Software Design Principles**: Introduction, System Models: Data -flow Models, Semantic Data Models, Object Models, Inheritance Models, Object Aggregation, Service Usage Models, Data Dictionaries; Software Design: The Design Process, Design Methods, Design description, Design Strategies, Design Quality; Architectural Design: System Structuring, The Repository Model, The Client–Server Model, The Abstract Machine Model, Control Models, Modular Decomposition, Domain-Specific Architectures.	18
III.	**Object Oriented Design:** Introduction; Object Oriented Design: Objects, Object Classes & Inheritance, Inheritance, Object Identification, An Object -Oriented Design Example, Object Aggregation; Service Usage; Object Interface Design: Design Evolution, Function Oriented Design, Data–Flow Design; Structural Decomposition: Detailed Design.	18
IV.	**An Assessment of Process Life-Cycle Models**: Introduction; Overview of the Assessment of Process; The Dimension of Time; The Need for a Business Model in Software Engineering; Classic Invalid Assumptions: First Assumption: Internal or External Drivers, Second Assumption: Software or Business Processes, Third Assumption: Processes or Projects, Fourth Assumption: Process Centered or Architecture Centered; Implications of the New Business Model;	18

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	Redefining the Software Engineering Process: Round-Trip Problem-Solving Approach, Activities, Goals, Interdisciplinary Resources, Time.	
V.	**Software Reliability: Introduction;** Software Reliability Metrics; Programming for Reliability: Fault Avoidance, Fault Tolerance, Software Reuse. **Software Testing Techniques:** Introduction; Software Testing Fundamental; Testing Principles; White Box Testing; Control Structure Testing; Black Box Testing; Boundary Value Analysis; Testing GUIs; Testing Documentation and Help Facilities; Software Testing Strategies: Introduction; Organizing for Software Testing; Software Testing Strategy, Unit Testing: Unit Test Considerations, Top -Down Integration, Bottom-Up Integration.	12
Keywords: Software Engineering, Development Model, Data Flow Model, Data Dictionary, Testing.		

Part C - **Learning Resource**
Text Books, Reference Books, Other Resources

Suggested Readings:

1. R. G. Pressman – Software Engineering, TMH
2. Sommerville, Ian, Software Engineering, Pearson Education
3. Pankaj Jalote – An Integrated Approach to Software Engineering, Narosa Publications.
4. Pfleeger, Shari Lawrence, Software Engineering Theory and Practice, second edition. Prentice- Hall 2001.
5. Object Oriented & Classical Software Engineering (Fifth Edition), SCHACH,TMH

E Resources:

1. Introduction to Software Engineering from NPTEL: https://nptel.ac.in/courses/106101061
2. Software Engineering from Coursera https://www.coursera.org/specializations/software-engineering
3. Software Development Life Cycle from Coursera: https://www.coursera.org/specializations/software-development-lifecycle
4. Software Design Architecture fromCoursera: https://www.coursera.org/specializations/software-design-architecture
5. Software Engineering from SWAYAM/NPTEL https://onlinecourses.nptel.ac.in/noc19_cs69/preview

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 25 Marks University Exam(UE): 75 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

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Part A: Introduction

Program: **Degree Course**	Class: **B.C.A. III Year**	Year: **2022**	Session:2022-2023

1.	Course Code	**BCA-18T**	
2.	Course Title	**Artificial Intelligence and Expert System**	
3.	Course Type	**Theory**	
4.	Pre-requisite (if any)	Basic knowledge of data structure	
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand a wide variety of learning algorithm. • Understand how to evaluate models generated form data. • Apply the algorithm to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models. • Apply ML algorithms in various domains. • Simulate real world problems using ML Techniques. • Apply Deep Learning technique for Computer Vision.	
6.	**Credit Value**	**Theory: 6**	
7.	**Total Marks**	**Max Marks: 25+75**	**Min Passing Marks: 33**

Part B: Content of the Course

Total Periods: 90

Unit	Topics	No. of Periods
I.	**Introduction:** Overview of Artificial Intelligence (AI), Domains of Artificial Intelligence, Foundations of AI, Domain-base and Knowledge-base Database, History of AI, Areas and state of the art in A.I., A.I. problems, Knowledge: Introduction, Knowledge Based system, Knowledge representation techniques.	18
II.	**Searching Technique:** Problem solving as state space search, production system, control strategies a problem characteristic, Search techniques: Breadth First search, Depth-first search, Hill-climbing Heuristic search, Best-First search, greedy method, A* algorithm , AO* algorithm.	18
III.	**A.I. Programming languages:** Introduction to LISP, Basic list manipulation functions, Input/output and local variables, Lists and Arrays, simple program in LISP, Introduction to PROLOG.	18
IV.	**Knowledge Representation:** Approaches and Issues ,Frame, Conceptual dependency . Semantic Net, Scripts etc. ,Propositional Logic, First order, Propositional Logic (FOPL), Conversion to clausal form, Inference rules, Resolution principal.	18
V.	**Expert System-** Introduction, Application, Existing Expert systems, Components of typical expert system, Rule based system architecture.	18

Keywords: Heuristic Search, A* Search, Artificial Intelligence (AI), List Processing (LISP), Programming in Logic (PROLOG), Expert System.

Part C - Learning Resources

Text Books, Reference Books, Other Resources

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Suggested Readings:

1. Artificial Intelligence and Machine Learning, Vinod Chandra S.S., AnandHareendrn S, PHI learning private Ltd.
2. Introduction to Artificial Intelligence and Expert System, Dan W. Patterson, PHI Publication.
3. Artificial Intelligence, Elaine Rich and Kevin Knight TMH publication.
4. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems , PHI Publication.
5. Elaine Rich and Kevin Knight , Artificial Intelligence ,TMH publication.
6. V.S. Jankiraman, K. Sarukesi and P. Gopalakrishnan ,Foundations of Artificial Intelligence and Expert Systems , Macmillan Series in Computer Science.

E Resources:

1. Overview of Machine Learning
   https://www.youtube.com/watch?v=whSKA8aO6xQ&list=PLyqSpQzTE6M-SISTunGRBRiZk7opYBf_K&index=3
2. Introduction to Artificial Intelligence
   https://www.youtube.com/watch?v=pKeVMlkFpRc&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH&index=2
3. Problem Solving as State Space Search
   https://www.youtube.com/watch?v=fLw8SfvaJWA&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH&index=3
4. Uninformed Search
   https://www.youtube.com/watch?v=te1K8on1Pk0&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH&index=4
5. Heuristic Search
   https://www.youtube.com/watch?v=0awSpFyh2MY&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH&index=5
6. Informed Search
   https://www.youtube.com/watch?v=-Rf2hOyjZB8&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH&index=6

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks: 100
Continuous Comprehensive Evaluation (CCE): 25 Marks
University Exam(UE): 75 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

Declaration

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Part A: Introduction				
Program: **Degree Course**		Class: **BCA III Year**	Year: **2022**	Session:**2021-22**
1	Course Code	**BCA-19T**		
2	Course Title	**E-Commerce**		
3	Course Type	**Theory**		
4	Pre-requisite (if any)	No		
5	Course Learning. Outcomes (CLO)	• At the end of this course, the students will be able to become familiar with the mechanism for conducting business transactions through electronic means.		
6	**Credit Value**	**Theory: 6**		
7	**Total Marks**	**Max. Marks: 25+75**	**Min Passing Marks: 33**	

Part B: **Content of the Course**

Total No. of Periods: 90

Unit	Topics	No. of Periods
I	**Introduction of E-Commerce:** Meaning, nature, concepts, advantages, disadvantages and reasons for transacting online, types of E-Commerce, e-commerce business models (introduction , key elements of a business model and categorizing major E-commerce business models), forces behind ecommerce. **Technology used in E-commerce:** The dynamics of world wide web and internet (meaning, evolution and features); Designing, building and launching e-commerce website (A systematic approach involving decisions regarding selection of hardware, software, outsourcing vs. in-house development of a website).	18
II	**Security and Encryption:** Need and concepts, the e-commerce security environment: (dimension, definition and scope of e-security), security threats in the E-commerce environment (security intrusions and breaches, attacking methods like hacking, sniffing, cyber-vandalism etc.), technology solutions (Encryption, security channels of communication, protecting networks and protecting servers and clients).	18
III	**IT Act 2000 and Cyber Crimes:** IT Act 2000: Definitions, Digital signature, Electronic governance, Attribution, acknowledgement and dispatch of electronic records, Regulation of certifying authorities, Digital signatures certificates, Duties of subscribers, Penalties and adjudication, Appellate Tribunal, Offences and Cyber-crimes.	18
IV	**E-payment System**: Models and methods of e–payments (Debit Card, Credit Card, Smart Cards, e-money, UPI payment), digital signatures (procedure, working and legal position), payment gateways, online banking (meaning, concepts, importance, electronic fund transfer, automated clearing house, automated ledger posting), risks involved in e-payments.	18
V	**On-line Business Transactions:** Meaning, purpose, advantages and disadvantages of transacting online, E-commerce applications in various industries like banking, insurance, payment of utility bills, online marketing, e-tailing (popularity, benefits, problems and features), online services (financial, travel and career), auctions, online portal, online learning, publishing and entertainment, Online shopping.	18

Keywords: E-Commerce, Encryption, IT Act, Cyber Crime, E-Payment Systems, Online Business Transactions.

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Part C - **Learning Resources**
Text Books, Reference Books, Other Resources

Suggested Readings

1. Kenneth C. Laudon and Carlo Guercio Traver, E-Commerce, Pearson Education.
2. David Whiteley, E-commerce: Strategy, Technology and Applications, McGraw Hill Education.
3. Bharat Bhaskar, Electronic Commerce: Framework, Technology and Application, 4th Ed., McGraw Hill Education.
4. PT Joseph, E-Commerce: An Indian Perspective, PHI Learning.
5. KK Bajaj and Debjani Nag, E-commerce, McGraw Hill Education.
6. TN Chhabra, E-Commerce, Dhanpat Rai & Co.
7. Sushila Madan, E-Commerce, Taxmann
8. TN Chhabra, Hem Chand Jain, and Aruna Jain, An Introduction to HTML, Dhanpat Rai & Co.

E Resources: –

1. Electronic Commerce : https://www.youtube.com/watch?v=xKJjyn8DaAw
2. Technology used in E-Commerce : https://www.youtube.com/watch?v=cPVwPQCsROc
3. E-Commerce : https://www.tutorialspoint.com/e_commerce/index.htm
4. E-Commerce : https://egyankosh.ac.in/handle/123456789/72073

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 25 Marks University Exam(UE): 75 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	25 Marks

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Part A: Introduction				
Program: **Degree Course**		Class: **BCA III Year**	Year: **2022**	Session:**2022-23**
1	Course Code	**BCA-20T**		
2	Course Title	**Communication Skill**		
3	Course Type	Ability Enhancement Course		
4	Pre-requisite (if any)	To study this course, a student must have command over English Language which will be helpful to learn the subject		
5	Course Learning. Outcomes (CLO)	At the end of this course, the students of computer application will be able to speak and write english with a fare degree of grammatical correctness. The inputs in the course contents are designed to let the students develop their communication skills and effectively write and speak in business scenario.		
6	**Credit Value**	**Theory : 5**		
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks : 17**	

Part B: Content of the Course		
Total Periods: 75		
Unit	**Topics**	**No. of Periods**
I	**Structure of sentences:** Simple, Complex and Compound. **Clauses:** Co-ordinate and Subordinate Clause, The senses and aspects, Model, Gerund, Participle: Non Finite and Finite, Infinitive.	15
II	**Transformation of sentences:** Interchange of Active and Passive Voice, Interchange of Affirmative and Negative Sentences, Interchange of Explanative and Assertive Sentences, Interchange of Interrogative and Assertive Sentences, Direct and Indirect Speech.	15
III	**Writing Skills:** Report writing, Resume writing, Applications writing, Letter writings: Formal (Covering Letter, Enquiry Letter, Order Letter, Complaint Letter, Sales Letter) and Informal, Description of events-Designing of Poster, Flyer, Banner.	15
IV	**Presentation Skills:** Precise Writing, Reading Comprehension, Summarizing, Paraphrasing, Presentation Skills, Interview Skills, Group Discussion.	15
V	**Official Communication:** Notice, Circular, Minutes of meeting, Agenda of Meeting, Memorandum. Modern media of communication-Email (Language of Email, Format, E-mail writing strategies, Advantage, Characteristics, Formatting), Use of Social Media, Video Conferencing.	15
Keywords: Clauses, Transformation of Sentences, Writing Skills, Paraphrasing, Official Communication, Social Media.		



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Part C - **Learning Resource**
Text Books, Reference Books, Other Resources

Suggested Readings:

Text Books:

1. Living English Structure by W.S. Allen.
2. A Practical English Grammar by Thomson and Martinet
3. English Grammar and Composition by Wren & Martin
4. Advance Grammar in Use by Martin Hewings
5. Essentials of Business Communication by Rajendra Pal and J.L. Korlahalli
6. Effective Technical Communication by M. Ashraf Rizvi

E-Resources:

1. Grammar (Clauses, Gerund and Infinitives, Coordinating conjunctions) - https://www.digimat.in/nptel/courses/video/109106129/L13.html
2. Voice : https://www.grammarly.com/blog/active-vs-passive-voice/
3. Report Writing : https://www.grammarly.com/blog/how-to-write-a-report/

Part D: **Assessment and Evaluation**		
Suggested Continuous Evaluation Methods: Maximum Marks: 50 Continuous Comprehensive Evaluation (CCE): As per rule University Exam(UE): 50 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	As per rule

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