PRESTIGE
INSTITUTE OF MANAGEMENT, GWALIOR
UGC NAAC ACCREDITED 'A' GRADE INSTITUTE
UGC APPROVED AUTONOMOUS INSTITUTE

DETAILED CURRICULUM STRUCTURE
AND
SCHEME OF EXAMINATION

for

B.C.A.
(Bachelor of Computer Applications)
Three Years Degree Course

Choice Based Credit System (CBCS)
w.e.f. Batch 2020 – 2023

Prestige Institute of Management, Gwalior – BCA – Session 2020-23

SCHEME FOR CHOICE BASED CREDIT SYSTEM IN BCA					
Semester	Core Course (CC) (14 Pairs: Theory & Lab/Tutorial)	Discipline Specific Elective (DSE) (4 Pairs)	Generic Elective/ Interdisciplinary (GE) (4 Pairs)	Ability Enhancement Elective- Skill Based (SEC) (1 Pair)	Ability Enhancement Compulsory (AEC) (1 Pair)
I	Computer Organization & Architecture Programming in C		GE1		Communicative English Grammar
II	Object Oriented Programming in C++ Data Structure		GE2		Communication Techniques
III	DBMS Computer Graphics & Multimedia Introduction to Operating System		GE3	Visual Basic.Net	
IV	Web Technologies Programming in Java Software Engineering		GE4	Python Programming	
V	Programming in Advance Java Computer Networks	Artificial Intelligence Major Project			
VI	Introduction to Asp.net & C# Mobile Application Development	Software Testing Data Mining			

Prestige Institute of Management, Gwalior – BCA – Session 2020-23

Semester	Course Code	Course Category	Course Title	Teaching Hrs./ Week			Ins. Hrs. / Week	Credit	Examination Scheme (Max. Marks)		
				Lecture	Tutorial	Practical			Term End Examination	Internal Assessment	Total
I	BCA-101	AEC	Communicative English Grammar	3	1	-	4	4	60	40	100
	BCA-102	CC	Computer Organization & Architecture	3	1	-	4	4	60	40	100
	BCA-103	CC	Programming in C	3	1	-	4	4	60	40	100
	BCA-104	GE	Mathematics-I (Calculus)	3	1	-	4	4	60	40	100
	BCA-105	CC	Programming in C Lab	-	-	2	4	2	30	20	50
	BCA-106	CC	IT Lab	-	-	2	4	2	30	20	50
			Total				24	20	300	200	500
II	BCA-201	AEC	Communication Techniques	3	1	-	4	4	60	40	100
	BCA-202	CC	Object Oriented Programming in C++	3	1	-	4	4	60	40	100
	BCA-203	CC	Data Structure	3	1	-	4	4	60	40	100
	BCA-204	GE	Mathematics-II (Differential Equations)	3	1	-	4	4	60	40	100
	BCA-205	CC	Object Oriented Programming in C++ Lab	-	-	2	4	2	30	20	50
	BCA-206	CC	Data Structure Lab	-	-	2	4	2	30	20	50
			Total				24	20	300	200	500
III	BCA-301	CC	DBMS	3	1	-	4	4	60	40	100
	BCA-302	CC	Computer Graphics & Multimedia	3	1	-	4	4	60	40	100
	BCA-303	CC	Introduction to Operating System	3	1	-	4	4	60	40	100
	BCA-304	GE	Mathematics-III (Discrete Mathematics)	3	1	-	4	4	60	40	100
	BCA-305	SEC	Visual Basic.Net	1	-	2	3	2	30	20	50
	BCA-306	CC	DBMS Lab	-	-	4	4	2	30	20	50
	BCA-307	CC	Computer Graphics & Multimedia Lab	-	-	4	4	2	30	20	50
	BCA-308	CC	Minor Project-I	-	-	4	4	2	30	20	50
			Total				31	24	360	240	600
Abbreviation		CC: Core Course, AEC: Ability-Enhancement Compulsory Course, GE: Generic Elective, SEC: Skill Enhancement Course, DSE: Discipline Specific Enhancement									

Prestige Institute of Management, Gwalior – BCA – Session 2020-23

Semester	Course Code	Course Category	Course Title	Teaching Hrs./ Week			Ins. Hrs. / Week	Credit	Examination Scheme (Max. Marks)		
				Lecture	Tutorial	Practical			Term End Examination	Internal Assessment	Total
IV	BCA-401	CC	Web Technologies	3	1	-	4	4	60	40	100
	BCA-402	CC	Programming in Java	3	1	-	4	4	60	40	100
	BCA-403	CC	Software Engineering	3	1	-	4	4	60	40	100
	BCA-404	GE	Mathematics-IV (Numerical & Statistical Analysis)	3	1	-	4	4	60	40	100
	BCA-405	SEC	Python Programming	1	-	2	3	2	30	20	50
	BCA-406	CC	Web Technologies Lab	-	-	4	4	2	30	20	50
	BCA-407	CC	Programming in Java Lab	-	-	4	4	2	30	20	50
	BCA-408	CC	Minor Project-II	-	-	4	4	2	30	20	50
			Total				31	24	360	240	600
V	BCA-501	CC	Programming in Advance Java	3	1	-	4	4	60	40	100
	BCA-502	CC	Computer Networks	3	1	-	4	4	60	40	100
	BCA-503	DSE	Artificial Intelligence	3	1	-	4	4	60	40	100
	BCA-504	DSE	Major Project	-	-	8	8	4	60	40	100
	BCA-505	CC	Programming in Advance Java Lab	-	-	4	4	2	30	20	50
	BCA-506	CC	Oracle Lab	-	-	4	4	2	30	20	50
			Total				28	20	300	200	500
VI	BCA-601	CC	Introduction to Asp.net & C#	3	1	-	4	4	60	40	100
	BCA-602	CC	Mobile Application Development	3	1	-	4	4	60	40	100
	BCA-603	DSE	Software Testing	3	1	-	4	4	60	40	100
	BCA-604	DSE	Data Mining	3	1	-	4	4	60	40	100
	BCA-605	CC	Introduction to Asp.net & C# Lab	-	-	4	4	2	30	20	50
	BCA-606	CC	Mobile Application Development Lab	-	-	4	4	2	30	20	50
			End Semester Total				24	20	300	200	500
			Total Course Credit					128			3200

*Subjects for Generic Electives are-
Mathematics-I (Calculus)
Mathematics-II (Differential Equations)
Mathematics-III (Discrete Mathematics)
Mathematics-IV (Numerical & Statistical Analysis)
(Student can opt any paper from the above mentioned papers in I to IV Semester)

BCA – 101   Communicative English Grammars

Course Objective: To enable students to learn General English Grammar and its use in daily life.

Course Outcomes: On successful completion of this course students will be able to

CO-1. Enhance the learner's communication skills by giving adequate exposure in listening, speaking, reading and writing skills and the related sub-skills.
CO-2. Recognize and operate in various styles and registers in English.
CO-3. Get rid of his present flaws and mistakes in pronunciation and grammar.
CO-4. Identify and repair the voids in his present vocabulary and pronunciation targeting those specific array of words which create a barrier in his thought process.
CO-5. Boost confidence in oral and interpersonal communication by reinforcing the basics of pronunciation specially focusing on interviews/ corporate meetings/ international business travels.
CO-6. Achieve adequate linguistic skills to help him compete well in international certification tests of English such as IELTS and TOEFL.

Course Contents:

Unit-I
Sentence- its kinds, subject and predicate. Parts of Speech- Noun, Pronoun, Adjective, Verb and Adverb, Preposition, Conjunction, Interjection in detail.

Unit-II
The Structure of Sentences- Clauses (subordinate and coordinate) and Phrases, Simple, Complex and Compound Sentences.

Unit-III
Tenses- Present, Past and Future (Indefinite, Continuous, Perfect, Perfect Continuous) Conditional Sentences, Subject Verb Agreement (Concord), Active and Passive Voice, Direct and Indirect Narration.

Unit-IV
Infinitive and the Ing form, Participles and Gerund, Relative Clauses, Articles, Determiners, Punctuation.

Unit-V
Letters and Application, Writing, Newspaper Reports, Paragraph Writing, Precis Writing, Seminar Presentation, Writing a CV/ Resume.

Suggested Text Books:
1. Leech, G. N., Leech, G., & Svartvik, J. (2002). *A communicative grammar of English*. Pearson Education.
2. Thomson, A. J., & Martinet, A. V. (1980). *A practical English grammar*. Oxford University Press.
3. Wood, F. T. (1965). *A remedial English grammar for foreign students*. Macmillan.

Reference Books:
1. Lewis, N. (1991). *Word power made easy*. Simon and Schuster.
2. Swan, M. (2005). *Practical english usage*. Oxford Univ. Press.
3. Allen, W. S. (1954). *Living English structure: a practice book for foreign students and key*. Longmans, Green.

BCA – 102   Computer Organization and Architecture

Course Objectives: The course focus on structure and function of the computer system. Analyze and understand the Logic Gates, Boolean algebra, Combinational and sequential circuits, instruction set. Addressing modes, Memory hierarchy, I/O systems DMA Technique.

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

CO-1: Identify various components of computer and their interconnection.
CO-2: Understand the concepts of logic gates, Different Digital Circuit.
CO-3: Use of the data representation technique.
CO-4: Compare and select various Memory devices.
CO-5: Understanding the various types of IO mapping techniques.

Course Contents:

Unit-I
Digital Logic Circuits: Logic gates Boolean algebra, map simplification, combinational circuits, and sequential circuits.

Unit-II
Data Representation: Representation signed and unsigned integer, fixed-point representation, floating – point representation, other binary codes.

Unit-III
Basic Computer Organization and Design: computer instruction, Instruction codes, timing and control, execution and instruction, input-output and interrupt, priority interrupt, design of computer.

Unit-IV
Central Processor Organization: Processor bus organization, arithmetic logic unit (ALU) instruction formats, addressing modes, data transfer and manipulation, program control, microprocessor organization.

Unit-V
Memory Organization: Auxiliary memory, microcomputer memory hierarchy, associative memory, virtual memory, cache memory. **Input-Output Organization:** Peripheral devices. Asynchronous and synchronous data transfer, direct memory access (DMA), input –output processor (IOP).

Suggested Text Books:
1. Williams S. *Computer Organization and Architecture*. PHI.
2. Mano, M.M. *Computer Organization and Architecture*, PHI.

Reference Book:
1. John P. Hayes, *Computer Architecture and Organization*, Tata McGrawHill.

BCA – 103   Programming in C

Course Objectives: The course is designed to initiate the students into the discipline of Programming. It aims to start off the development of problem solving ability using computer programming. This course teaches not only the mechanics of programming, but also how to create programs that are easy to read, maintain, and debug. Students are introduced to the design principles for writing good programs. Also by learning the basic programming constructs they can easily switch over to any other language in future.

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

CO-1: Understand the programming concepts.
CO-2: Develop the logic of programs.
CO-3: Use of Different Control Structure.
CO-4: Understanding the Array, Structure and user-defined function.
CO-5: Tracing the execution of program for better understanding.

Course Contents:

Unit-I
Programming fundamentals: program concept, algorithms, flow charts - symbols, rules for making flow chart, types of flowchart, advantage & disadvantage, techniques of problem solving: programming techniques – top down, bottom up, modular, structured - features, merits & demerits, programming logic- simple, branching, looping. Testing & debugging & their tools.

Unit-II
Programming in c including features of 'c', c tokens, variables, identifiers, keywords, data types, constants, operator and expression, operators: arithmetic, logical, relational, conditional and bit wise operators, precedence and associativity of operators, type conversion in expression, basic input/output and library functions single character input/output i.e. getch(), getchar(). Getche(), putchar(),formatted input output i.e. printf() and scanf().

Unit-III
Branching constructs: If statement, if.....else statement, nesting of if....else statement, else if ladder, the ?: operator, switch statement, compound statement, loop controls: for, while, do-while loops, break, continue, goto statement, arrays : what is array, declaring initializing 1d, 2d and 3d array. String: declaration, string functions – strcat, strcpy, strcmp, strlen, strstr.

Unit-IV
Functions: Categories of functions user defined and library function, recursion, function arguments, return values and nesting of function, calling of functions, scope and life of variables - local and global variable, storage classes - auto, extern, static, pointers: operations on pointers, operators for pointers, pointers and function, array of pointers, pointer and strings.

Unit-V
Preprocessor directives: #define, defining functions like macros, include, conditional compilation directives. Structures: the concept of structure, initializing a structure, the structure tag, dot operator, array of structure, structure and pointer, arrow operator and nesting of structure. Unions: initialization and use of it in a program. Command line arguments

Suggested Text Books:
1. Kanitkar Y. *Let us C.* BPB Publicatiuon.
2. *C Programming.* Schaum's series.
3. Balgurusuamy. *Programming in ANSI C.* Tata McGraw Hill

BCA – 105   Programming in C Lab

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.
3. WAP to compute the sum of the first n terms of the following series S = 1/2+1/3+1/4+……
4. WAP to compute the sum of the first n terms of the following series S =1-2+3-4+5……….
5. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.
6. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.
7. WAP to compute the factors of a given number.
8. Write a macro that swaps two numbers. WAP to use it.
9. WAP to print a triangle of stars as follows (take number of lines from user):

```
        *
       ***
      *****
     *******
    *********
```

10. WAP to perform following actions on an array entered by the user:
    i) Print the even-valued elements ii) Print the odd-valued elements iii) Calculate and print the sum and average of the elements of array iv) Print the maximum and minimum element of array v) Remove the duplicates from the array vi) Print the array in reverse order The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter array and to quit the program.
11. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
12. Write a program that swaps two numbers using pointers.
13. Write a program in which a function is passed address of two variables and then alter its contents.
14. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
15. Write a program to find sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc()/ calloc() functions .
16. Write a menu driven program to perform following operations on strings:
    a) Show address of each character in string b) Concatenate two strings without using strcat function. c) Concatenate two strings using strcat function. d) Compare two strings e) Calculate length of the string (use pointers) f) Convert all lowercase characters to uppercase g) Convert all uppercase characters to lowercase h) Calculate number of vowels i) Reverse the string
17. Given two ordered arrays of integers, write a program to merge the two-arrays to get an ordered array.
18. WAP to display Fibonacci series (i)using recursion, (ii) using iteration
19. WAP to calculate Factorial of a number (i)using recursion, (ii) using iteration
20. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion

21. 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. WAP to count frequency of each element of an array.
23. WAP to find encoded array from original array for any parameter.
24. WAP to perform following operation on string without using Library function:
    a) Length of a string
    b) Reverse of a String
    c) Check it is palindrome or not
25. WAP to count sum of each digit of string if string have only digits.
26. WAP to calculate sum of n number using command line argument.
27. WAP to convert lower to upper case or vice-versa of each character of string..
28. WAP to count vowel's in a string.
29. WAP to create a structure of student (ID, Name, Age) perform Insert and display operation.
30. WAP to perform operation on file handling:
    a) Write character into a file.
    b) Read character from a file.
    c) Create Copy a file.

BCA – 104   Mathematics –I (Calculus)

Course Objective: The objective of this course is to familiarize the students with core concepts of calculus.

Course Outcomes: Upon successful completion of this course students will be able to

CO-1. Understand the key concept of differentiation, Partial derivative, curvature of a function and tracing of curves.
CO-2. Evaluate differentiation at different points of given interval using different theorems.
CO-3. Analyse curvature of a function and tracing of curves.
CO-4. Apply integration to calculate the area and volume of different types of curve.
CO-5. Knowledge about beta and gamma functions to simplify integration.

Course Contents:

Unit-I
Successive, Leibnitz Theorem, Taylor's & Maclaurin's series, Curvature, Tests for Concavity and Convexity, Points of Inflexion, Multiple Points, Asymptotes, Tracing of Curves in Cartesian and polar co-ordinates.

Unit-II
Partial differentiation: Function of several variables, Limits, continuity and differentiability, Partial derivatives, Euler's Theorem, Mean value theorem & Taylor's theorem for functions of two variables.

Unit-III
Envelopes, Evolutes, Maxima, Minima and saddle points of functions of two variables, Lagrange's multiplier method

Unit-IV
Gamma and Beta functions and their properties, some important deductions (duplication formula)

Unit-V
Multiple integrals: Integration of functions of two & three variables, Double & triple integrals, Change of order of Integration, Use of double and triple integrals in finding areas and volumes.

Suggested Text Books:
1. Agrawal, D.C. *Calculus-I*. Shree Sai Prakashan, Meerut
2. Apostol, Tom M. *One-Variable Calculus with an Introduction to Linear Algebra, Vol (1), 2e*. Wiley Eastern.

Reference Books:
1. Stewart, J. *Calculus with Early Transcendental Functions, 7e*. Cengage Learning India
2. Hallett H. *Calculus – Single and Multivariable, 6e*. John-Wiley and Sons.
3. Robert, T., Smith & Roland, B. M. *Calculus-Single variable, 2e*. McGraw-Hill.

BCA – 106 IT Lab

Practical exercises based on MS Office tools using document preparation, presentation preparation and spreadsheet handling packages.

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 Font and should be bold.
   - The second line should give the course name/teacher's name and the department in 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. BPB 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.
   - The details of the offices of the publisher (only location) should appear in the footer.

5. Create the following one page documents.
   a. Compose a note inviting friends to a get-together at your house, Including a list of things to bring with them.
   b. Design a certificate in landscape orientation with a border around the document.
   c. Design a Garage Sale sign.
   d. Make a sign outlining your rules for your bedroom at home, using a numbered list.
6. Create the following documents:
   (a) A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
   (b) 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 delimiter. Type 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:
Then 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.
10. Following features of menu option must be covered
    FILE Complete menu
    EDIT Complete menu
    VIEW Complete menu
    INSERT Complete menu
    FORMAT Complete menu
    TABLE Complete menu
    WINDOW Complete menu
    HELP Complete menu
    TOOLS All options except Online collaboration, Tools on Macro, Templates

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	
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	Bhajan	56	

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

If Marks	Then Grade
>= 80	A+
>= 60 < 80	A
>= 50 < 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	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 is sum of sales of all the four quarters.

4. A company XYZ Ltd. pays a monthly salary to its employees which consists of basic salary, allowances & deductions. The details of allowances and deductions are as follows:

Allowances

- HRA Dependent on Basic
    - 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
    - Rs. 50/- if Basic is <=1000
    - Rs. 75/- if Basic >1000 & Basic<=2000
    - Rs. 100 if Basic >2000
- Entertainment Allowance
    - 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 + Conveyance + Entertainment
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 in the format below:

No. of Instalments	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 the rate 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	2000	2001	2002	2003
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 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	
E	Rs 800.00	Rs. 1,000.00	Rs. 3,000.00	Rs. 560.00	

(a) Compute the total revenue earned.
(b) Plot the line chart to compare the revenue of all publisher for 4 years.
(b) Chart Title should be _Total Revenue of sam's Bookstall (1997-2000)'
(c) Give appropriate categories and value axis title.

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

BCA – 201   Communication Techniques

Course Objective: The course is designed to enable students to enhance ability to comprehension of spoken and written English (and use English) required for effective communication in their professional work.

Course Outcomes: On successful completion of this course students will be able to

CO-1. Distinguish among various levels of organizational communication and communication barriers while developing an understanding of communication as a process in an organization

CO-2. Draft effective business correspondence with brevity and clarity.

CO-3. Demonstrate his verbal and non-verbal communication ability through presentations.

CO-4. Use technology to communicate effectively in various settings and contexts.

CO-5. Understand and apply knowledge of human communication and language processes as they occur across various contexts, e.g., interpersonal, intrapersonal, small group, organizational, media, gender, family, intercultural communication, technologically mediated communication, etc. from multiple perspectives.

Course Contents:

Unit-I
Language Skills (Listening, Speaking, Reading, Writing): An introduction, Communication: Its Process, Types and Significance, Media, Channels, Role of Communication. Communication: Principles of Communication, Barriers to Communication, Seven C'S, Verbal and Non Verbal Communication, Body Language.

Unit-II
Listening: Effective and efficient listening in various situations (discussions, lectures, news, seminars, speech, telephone calls etc.); Strategies for effective listening, Difference between Listening and Hearing.
Reading: Purpose; Comprehension; Tactics and strategies for good reading; Writing: Guidelines for good writing; various writing styles (General and Technical writing styles).

Unit-III
Presentation and delivery; role of speaker and audience; style and body language. Business Reports, Business letters, Memos, Presentation Skills, Press management, Meetings, Agenda, Notices, Minutes, Seminars, Conferences, Workshops.

Unit-IV
Group Discussion, Interview Process, Frequently asked questions, Writing Emails, PPT Presentations, Telephone Etiquettes, Negotiation Skills.

Unit-V
General and Technical documents (correspondence (applications, letters, Resumes), drafts, proposals, précis, synopsis,)

References:
1. Ajmani, J. C. (2011). *Good English: getting it right*. Rupa Publications.
2. Hasson, G. (2012). *Brilliant communication skills: What the best communicators know, do and say*. Pearson UK.
3. Raman, M., & Sharma, S. (2015). *Technical communication: Principles and practice*. Oxford University Press.

BCA – 202   Object Oriented Programming in C++

Course Objectives:
1. To strengthen the problem solving ability by applying the characteristics of an object-oriented approach.
2. Demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
3. To introduce object oriented concepts in C++.

Course Outcomes: At the end of the course, students will be able to
CO-1: Explain what constitutes an object-oriented approach to programming and identify potential benefits of Object-oriented programming over other approaches.
CO-2: Analyze and decompose problem specifications from Object Oriented Perspectives
CO-3: Understanding the concept of different features of OOPs.
CO-4: Develop console application, using object-oriented approach.
CO-5: Use of File handing in CPP programming.

Course Contents:

Unit-I
Introduction, OOP languages, characteristics of OOP's languages, application of OOP's, OOP's paradigm, concepts, benefits of OOP's, disadvantage of OOP's. Application of OOP's., Classes & Objects: Specifying a Class, Creating Objects, Accessing Class members, Defining member function, Outside Member Functions as inline, Accessing Member Functions within the class, Static data member, Access Specifiers: Private, Protected and Public Members. Passing objects to function, Returning objects, Object assignment, This pointer.

Unit-II
Constructor & Destructor: Introduction, Constructor, Parameterized constructor, Multiple constructor in a class, Constructor with default argument, Copy constructor, Default Argument, Destructor.
Array, Pointers, and references: Array of objects, Pointers to object, , Pointer to class members. References: Reference parameter, Passing references to objects, Returning reference, Independent reference, The Dynamic Allocation operators, Initializing allocated memory, Allocating Array, Allocating objects.

Unit-III
Function & operator overloading : Function overloading, Overloading constructor function finding the address of an overloaded function, Operator Overloading: Creating a member operator function, Creating Prefix & Postfix forms of the increment & decrement operation, Overloading the shorthand operation (i.e. +=,-= etc), Operator overloading restrictions, Operator overloading using friend function, Overloading New & Delete, Overloading some special operators, Overloading [ ], ( ), -, comma operator, Overloading << and >> .

Unit-IV
Inheritance: Base class Access control, Inheritance & protected members, Protected base class inheritance, Inheriting multiple base classes, Constructors, destructors & Inheritance, When constructor & destructor function are executed, Passing parameters to base class constructors, Granting access, Virtual base classes .
Virtual functions & Polymorphism: Virtual function, Pure Virtual functions, Early Vs. late binding

Unit-V

The C++ I/O system basics: C++ streams, The basic stream classes: C++ predefined streams, Formatted I/O: Formatting using the ios members, Using manipulators to format I/O, Creating your own manipulators, -File Management: Introduction – File handling, File structure, File handling function, File types, Streams, Text, Binary, File system basics, The file pointer, Opening a file, Closing a file, Reading and Writing File.

Suggested Text Books:
1. R. Subburaj. *Object Oriented Programming With C++*. Vikas Publishing House, New Delhi.
2. E. Balguruswamy. *C++*. TMH Publication.

Reference Books:
1. Schildt H. *C++ The complete reference*. TMH Publication.
2. Stroustrup B. *The C++ Programming Language*. Addison-Wesley.

BCA – 205   Object Oriented Programming in C++ Lab
Practical No.: 1

Objective: To illustrate the the use of simple Input and output using cout , cin and to use arithmetic operators.

1. Write a program which calculates the salary by given basic salary.Hra is 20 % of basic and da is 40% of basic.
2. Write a program, which converts temperature in degree to Fahrenheit.
3. Write a program which calculates the Bill from given qty. and price and 10% discount.

Practical No.: 2

Objective: To Illustrate the Control statements (Branching and Looping).

1. Write a program to print the following output.
   ```
   *
   * *
   * * *
   * * * *
   ```
2. Write a program which prints the grade of a student according to give percentage.
100 to 70 %	HONOURS
69 to 60 %	First
59 to 50 %	Second
else	Fail.

   Using nested IF.
3. Write a program to find greatest among three numbers.

Practical No.: 3

Objective: To Implement Function Overloading, Inline function and the advantages of using them.

1. Write a program which defines three overloaded functions
   Sum(int , int)

          Sum(int , float)
          Sum(int ,float,int)
          Calculates the sum of given parameters.

2. Write a program which defines following Overloaded functions
   Max(int , int ,int)
   Max(int , float)
   Max(float ,float ,float)
   Max(float ,int ,float ,int)
   The above functions prints the maximum number of given parameters.
3. Write an Inline function **square (float)** which prints the square of the given parameter.
4. Write a CPP program to represent Default Arguments.

Practical No.: 4

Objective: To Implement the Classes and Objects. Use of public and private access specifiers. To implement the Constructors and Destructors.

1. Write a program which defines a Class **Employee** with member variables **name , address , basic, netsal**. And following functions **getdata(), calculatesal() , display().**
2. Write a program which defines a Class **Employee** with member variables **name , address , basic, netsal**. And following functions **getdata(), calculatesal() , display().** Define a constructor which initialize basic and netsal to 0 (Zero).Define a Destructor .

Practical No.: 5

Objective: To implement Operator Overloading unary and binary operator.

1. Write a program which overloads ++ operator (pre and post) which increments the object.
2. Write a program that overloads – operator, which changes all the variables of class to negative.
3. Write a program to overload binary operator + which perform following operations.
   Obj + 100.
   Obj3 = Obj1+Obj2;
4. Write a program that Concatenates two string by overloading + operator.
5. Write a program that adds polar coordinates by overloading + operators.

Practical No.: 6

Objective: To implement simple ,multiple Inheritence
1. WAP to calculate students grade using Inheritance show in figure like:

```
┌─────────────────┐
│  Student Class  │
└─────────────────┘
         │
         ▼
┌─────────────────┐
│  Subject Class  │
└─────────────────┘
```
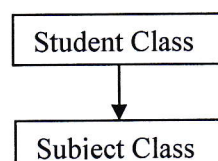
2. WAP to implement Multiple Inheritance by using any example.
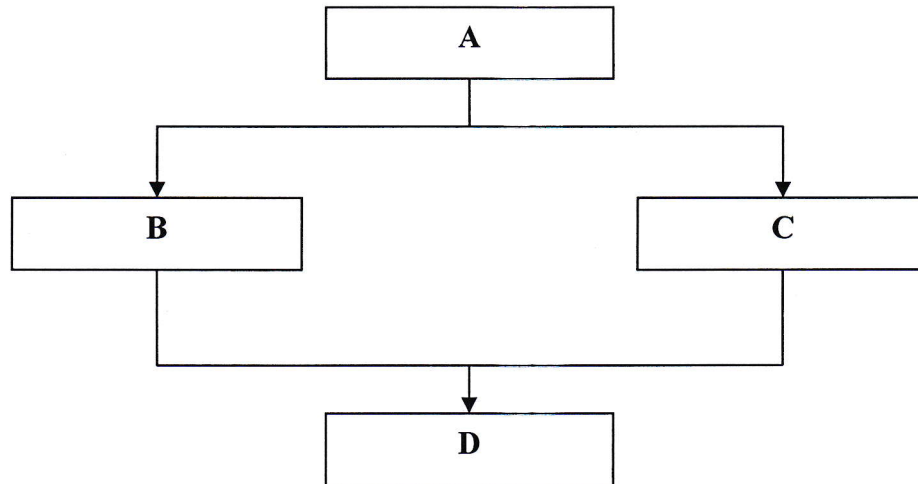3. WAP to implement Hierarchical inheritance.

Practical No.: 7

Objective: Implementation of Pointers Virtual function and Dynamic binding.

1. Create following structure of classes.

Define a variables I in class A. In main assign the value 10 to I using object of D using virtual inheritance.

2. Define a class Media with members title ,price.define two derived classes Book (with member pages ,read(),display()) and Tape (with member runtime ,read() and display() Declare a pointer type object of class Media .Read the type of media from user and call corresponding functions. Hint: Use dynamic polymorphysm.

Practical No.: 8

Objective: To read and write data to File using Files and Streams.

1. Write a program which defines a class Emp with members name, age, sal, read() write the data to a file Data.dat .Then read the data from that file and display the data.
2. Define a Class Person with members **Name, Age, Sal and address** and function get() which read these members and a function put() which writes these members to a file **Data.dat.**

BCA – 203   Data Structure

Course Objectives: The goal of this subject is to introduce the theory and develop the algorithm of different types of data structure. Understanding the operation of different data structure and implement in C++. Explain use and application in real life for different data structure.

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

CO-1:   Understand how data structures map onto physical memory.

CO-2:   Develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include: arrays, linked lists, binary trees, heaps, and hash tables.

CO-3:   Knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.

CO-4:   Compare different implementations of the same or different data structure.

Course Contents:

Unit-I
Introduction To Data Structure, Array, Records, Stacks Introduction to Stack & Primitive Operation on Stack, Stack as an Abstract Data Type, Multiple Stack, Stacks Application: Infix, Post Fix, Prefix and Recursion, Introduction to Queues, Primitive Operations on the Queues, Queue as an Abstract Data Type, Circular Queue, Dequeue, Priority Queue, Applications of Queue.

Unit-II
Pointer, It's Limitation and Operation. Linked List & their type: linear, circular & Doubly linked list, Operations on various type of linked list, application of Linked list: Polynomial manipulation.

Unit-III
Tree: General & Binary Tree. Conversion of General to Binary Tree. Binary Search Tree (BST) & It's Representation And Operation. Traversal Methods- In Order, Preorder & Post Order, Application of Binary Tree: Manipulation of Arithmetic Expression. Multiway Search Tree, Balance Tree & Their Types.

Unit-IV
Graph: Graph & Their Category & Representations, Traversing Technique: Breadth First & Depth First Search. Spanning Trees (St), Technique of Minimun Spanning Tree (MST), Application of Graphs: Pert & Related Techniques.

Unit-V
Heaps and Hash Table. Introduction to file organization; Sequential, Indexed sequential, Relative & Direct file organization. Searching : Linear & Binary Search. Sorting: Concept, selection sort, Bubble sort merge Sort, Tree sort & Partition - Exchange sort.

Suggested Text Books:
1. Trembley & Sorrenson. *Data Structure*. Tata Mcgraw Hill.
2. Salaria R.S. *Data Structures and Algorithms using C++*. Khanna Publishing.
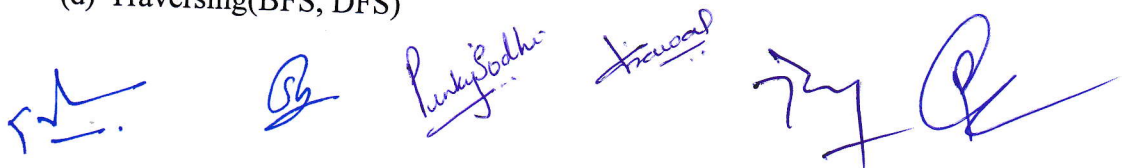3. Lipschuists. *Data Structure*. Schaum's Outline Series. Mcgraw Hill Publication.

Reference Books:

1. Kruse R.L. *Data Structure and Program design in C*. PHI
2. Sahni S. & Horowitz E. *Fundamentals of Data Structure*. Galgotia Publication.

BCA – 206   Data Structure Lab

1. Write a program to search an element from a list. Give user the option to perform Linear or Binary search. Use Template functions.
2. WAP using templates to sort a list of elements. Give user the option to perform sorting using Insertion sort, Bubble sort or Selection sort.
3. Implement Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list and concatenate two linked lists (include a function and also overload operator +).
4. Implement Doubly Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
5. Implement Circular Linked List using templates. Include functions for insertion, deletion and search of a number, reverse the list.
6. Perform Stack operations using Linked List implementation.
7. Perform Stack operations using Array implementation. Use Templates.
8. Perform Queues operations using Circular Array implementation. Use Templates.
9. Perform Queue operations using Linked List implementation.
10. WAP to scan a polynomial using linked list and add two polynomial.
11. WAP to perform following operation on BST:
    (a) Insert a Node
    (b) Delete a Node
    (c) Search a Node
    (d) Traversing BST using (Inorder, Preorder, Postorder)
    (e) Find Max Node
    (f) Find Min Node
    (g) Count Internal Node
    (h) Count External Node
    (i) Count Total Node.
12. WAP to perform following operation on Graph:
    (a) Insert a Node
    (b) Insert a Edge
    (c) Search a Node
    (d) Traversing(BFS, DFS)

BCA – 204   Mathematics –II (Differential Equations)

Course Objective: The objective of this course is to strengthen the students in differential equations.

Course Contents: Upon successful completion of this course students will be able to
CO-1. Understand the key concept of differential equation, partial differential equation, power series, Bessel and Legendre functions.
CO-2. Solve simultaneous differential equation of first order.
CO-3. Formulate classify and solve Linear and Non-Linear PDE of first order.
CO-4. Demonstrate methods to solve linear PDE of higher order.
CO-5. Apply PDE which include solution of one dimensional heat and wave equation.

Unit–I
Differential Equations of First Order and First Degree: Homogeneous Differential Equations, Reducible to Homogeneous Differential Equations, Linear Differential Equations, Reducible to Linear Differential Equations, Bernoulli's Equation, Exact Differential Equations, Change of Variables. **Differential Equations of First Order and Higher Degree:** Differential Equations solvable for p, solvable for y, solvable for x, Clairaut's Equation.

Unit–II
Family of Curves: Linear Differential Equations of Higher order with constant coefficients, Differential Equations reducible to Linear Differential Equations with Constant Coefficients, Simultaneous differential equation of first order.

Unit–III
Partial Differential Equations: Definition and Formation. Partial Differential equation of first order, Lagrange's method, standard forms, Charpit's method, Linear Partial Differential Equation of Higher order with Constant Coefficients.

Unit–IV
Linear Differential Equations of second order, Application of Partial differential equation: Method of separation of variables, Solution of One dimensional wave equation and one dimensional heat equation.

Unit–V
Series Solution of Differential Equations: Power series method, Bessel and Legendre functions and their properties, Recurrence relations for Bessel function & Legendre function.

Suggested Text Books:

1. Raisinghania, M. D. *Ordinary and Partial Differential Equations*. S. Chand & Company Ltd.
2. Grewal, B.S. *Higher Engineering Mathematics*. Khanna Publishers Meerut

Reference Books:

1. Kreyszig, E. *Advanced Engineering Mathematics*. Wiley Publ.
2. Shepley, L. Ross. *Differential Equations*. John Wiley & Sons, Inc.
3. Snadden. *Elements of Partial Differential Equation*. Dover Publication
4. Brannan and Boyce. *Differential Equations: An Introduction to Modern Methods and Applications*. Wiley Publ.

BCA – 301   Data Base Management System (DBMS)

Course Objective: This course covers fundamentals of database architecture, database management systems, and database systems. Principles and methodologies of database design, and techniques for database application development.

Course Outcomes: on completion of the course the students will be able to

CO-1: Understand key concepts of database, ER model and relational model, principles of transaction concept and distributed database.

CO-2: Acquire knowledge about Integrity rules and apply various normalization techniques.

CO-3: Execute various advance SQL queries related to relational algebra.

CO-4: Develop an enterprise data model that reflects the organization's fundamental business rules.

CO-5: Knowledge about Protection of database against crashes, Backup and Integrity violation.

Course Contents:

Unit-I

Introduction: Database system concepts, Data base system, Advantages of database systems; Data Architecture of data system: View/Schema, logical, conceptual and physical and their interrelationship DDL, DML and data dictionary, Data base administrator. Entity Relationship Model as a tool of conceptual design: Entities &Entity set, Relationship & Relationship set, Attributes, Mapping Constraints, Keys, Entity-Relationship diagram (E-R diagram): Strong & weak entities, Generalization, Specialization, Aggregation, Reducing ER diagram to tables.

Unit-II

Relational, Hierarchical and Network Model their advantages and disadvantages, storage organization for Relations. Rational Model: Structure tupple Attributes, Normalization: First, Second, Third & BCNF Normal Forms, key, primary key, Candidate key, Integrity rules: Entity integrity, Referential integrity rule.

Unit-III

Relational Algebra: Select, Project, Cross Product, Different types of Joins i.e. Theta Join, Equi Join, Natural join, Outer Join, Set Operations, Definition of Union, Set Difference, Cartesian Product, Selection, Intersection, Relational Query Language.

Unit-IV

Functional Protection and Crash Recovery: Protection, against crashes, Different types of crashes, Backup, Journal, Rollback, Committed and Uncommitted transactions, Security on Database.

Unit-V

Transaction concept, Transaction state, serializability security or Database: user identification. Physical Protection and maintenance, Transmitted of Rights. Integrity: Integrity violation, Implementation of check's in enforcing integrity; Concept of Distributed database.

Suggested Text Books:

1. Ullman. *Principles of Database Systems, 2e*. Galgotia Publications.
2. Silberschatz, Korth, & Sudershan. *Database System Concepts, 5e*. McGraw Hill.

3. Desai, Bipin C. *An Introduction to Database System.* Galgotia Publications.

Reference Books

1. Date, C.J. *An Introduction to Data Base Systems, 8e.* Narosa Publications.
2. Patric, O`neil, & Elizabeth, O`neil. *Database Principles, Programming and Performance, 2e.* Margon Kaufmann Publishers Inc.
3. Ramez, Elmasri, & Shamkant. B. *Fundamentals of Database Systems, 6e.* Navathe Addison-Wesley.

BCA – 306   Data Base Management System (DBMS) Lab

Create and use the following database schema to answer the given queries.

Employee Schema

Field	Type	NULL	KEY	DEFAULT
Eno	Char(3)	NO	PRI	NIL
Ename	Varchar(50)	NO		NIL
Job_type	Varchar(50)	NO		NIL
Manager	Char(3)	Yes	FK	NIL
Hire_date	Date	NO		NIL
Dno	Integer	YES	FK	NIL
Commission	Decimal(10,2)	YES		NIL
Salary	Decimal(7,2)	NO		NIL

DEPARTMENT Schema

Field	Type	NULL	KEY	DEFAULT
Dno	Integer	No	PRI	NULL
Dname	Varchar(50)	Yes		NULL
Location	Varchar(50)	Yes		New Delhi

Query List

1. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee with the Employee Number appearing first.
2. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
3. Query to display the Employee Name and Salary of all the employees earning more than $2850.
4. Query to display Employee Name and Department Number for the Employee No= 7900.
5. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.
6. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
7. Query to display Name and Hire Date of every Employee who was hired in 1981.
8. Query to display Name and Job of all employees who don't have a current Manager.
9. Query to display the Name, Salary and Commission for all the employees who earn commission.
10. Sort the data in descending order of Salary and Commission.
11. Query to display Name of all the employees where the third letter of their name is 'A'

12. Query to display Name of all employees either have two 'R's or have two 'A's in their name and are either in Dept No = 30 or their Manger's Employee No = 7788.
13. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
14. Query to display the Current Date.
15. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
16. Query to display Name and calculate the number of months between today and the date each employee was hired.
17. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
18. Query to display Name with the 1st letter capitalized and all other letter lower case and length of their name of all the employees whose name starts with 'J', 'A' and 'M'.
19. Query to display Name, Hire Date and Day of the week on which the employee started.
20. Query to display Name, Department Name and Department No for all the employees.
21. Query to display Unique Listing of all Jobs that are in Department # 30.
22. Query to display Name, Dept Name of all employees who have an 'A' in their name.
23. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
24. Query to display Name and Employee no. Along with their Manger's Name and the Manager's employee no; along with the Employees' Name who do not have a Manager.
25. Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns a commission.
26. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
27. Query to display the number of employees performing the same Job type functions.
28. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
29. Query to display Name and Hire Date for all employees in the same dept. as Blake.
30. Query to display the Employee No. And Name for all employees who earn more than the average salary.

BCA – 302   Computer Graphics & Multimedia

Course Objectives: The goal of this course is to introduce the theory and practice of computer graphics. The course will assume a good background in programming in C or C++ and a background in mathematics including familiarity with the theory and use of coordinate geometry and of linear algebra such as matrix multiplication.

To understand the principles of computer graphics requires not only study of the literature, but experimental work on a graphics system. Therefore, as part of this course, the students will design and implement a substantial computer graphics program and will generate some complex illustrations with this system.

Course Outcomes: on completion of the course the students will be able to:

CO-1: Understand the different display devices, Algorithms, 2D transformation, their techniques and use.

CO-2: Basic description of various input device, output devices and their use.

CO-3: Understand the algorithm for different geometry object & develop the program using C/C++.

CO-4: Use the 2D geometric transformation & their category and solve through the examples.

CO-5: Use of multimedia objects and understands the architecture of multimedia.

Course Contents:

Unit-I
Basics of Graphics Systems Applications, Display Devices: Video Displays, Raster- Scan Displays, Random Scan Displays, DVST, Flat- Panel Displays. Input Devices: Keyboards, Mouse, Trackball, and Space Ball, Joysticks, Digitizers, Image Scanner, Touch Panel, Light Pens, Voice Systems etc.

Unit-II
Line Drawing Algorithms: DDA Algorithm, Bresenham's line Algorithm. Bresenham's Circle drawing algorithm, Mid-Point Circle Algorithm, Scan-line Polygon Fill Algorithm, Inside-Outside test, Boundary Fill algorithm, Flood-Fill algorithm. Pixel, Pixel addressing, Antialiasing.

Unit-III
Clipping: COHEN-SUTHERLAND Line Clipping Algorithm, Line Clipping Using Non Rectangular Clip Windows, Polygon Clipping, Text Clipping.

Unit-IV
Two-dimensional Geometric Transformation: Translation, Rotation, Scaling, Reflection, Shear, Matrix representation and Homogeneous coordinates. Composite transformation: Translations, Rotations, Scaling, General Pivot-Point Rotation and Scaling.

Unit-V
Introduction to Multimedia: Review of Multimedia, Multimedia Applications, Multimedia Systems Architecture, Multimedia Hardware, Multimedia Software, Representation and Operations on Various Multimedia Data Types: Text, Images, Graphics, Video and Audio, Introduction to Multimedia Authoring.

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Suggested Text Books:

1. Gomes, J., & Velho, L. (1997). *Image processing for computer graphics*. Springer Science & Business Media.
2. Hearn, D., & Baker, M. P. (2004). *Computer graphics with OpenGL*. Upper Saddle River, NJ: Pearson Prentice Hall.
3. Rogers, D. F., & Earnshaw, R. (Eds.). (2001). *Computer graphics techniques: Theory and practice*. Springer Science & Business Media.

Reference Books:

1. Rajaraman, A. *Computer Graphics with Multimedia*. Narosa Publication.
2. Newman, W. S., & Sproul, R. S. (1981). *Principles of interactive computer graphics*. McGraw-Hill International.

PAPER CODE BCA – 307
Computer Graphics & Multimedia Lab

1. Write a program to implement DDA line generation algorithm.
2. Write a program to implement Bresenham's line drawing algorithm.
3. Write a program to implement mid-point circle drawing algorithm.
4. Write a program to clip a line using Cohen and Sutherland line clipping algorithm.
5. Write a program to clip a polygon using Sutherland Hodgeman algorithm.
6. Write a program to apply various 2D transformations on a 2D object (use homogenous coordinates).

BCA – 303   Introduction to Operating System

Course Objectives: This course aims to familiarize the students with basic components of a computer operating system along with the interactions among those components. The course will cover an introduction to the policies of CPU scheduling, deadlocks, memory management strategies, process synchronization and system calls

Course Outcomes: On successful completion of this course, the students will be able to

CO1: Analyze the structure of computer system and basic architectural components involved in OS design.

CO2: Develop and understanding of the concepts related to process and its life cycle.

CO3: Evaluate CPU scheduling algorithms and solve numerical problems related to the same.

CO4: Demonstrate a grasp on the concepts of process synchronization and inter process communication.

CO5: Illustrate an in-depth understanding of deadlocks and techniques of handling deadlocks.

CO6: Explore various algorithms pertaining to memory allocation and memory management techniques.

Course Contents:

Unit-I
Computer System Overview, Basic Components of Computer System, Operating System Services, Functions of Operating System, Types of Operating Systems: Instruction Execution Cycle, Interrupts & System Calls, Interrupt Processing, Processor Registers, I/O Communication techniques

Unit-II
Process Management: Concept of Process, Creation & Termination of Process, Process Attributes; Process Control Block, Process State Models- Two State, Five State, and Seven State. CPU Scheduling: Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-Time Scheduling.

Unit-III
Process Synchronization: The Critical Section Problem, Peterson's Solution, Semaphores, Classical Problems of Synchronization, Monitors, Atomic Transactions.

Unit-IV
Deadlocks: System Model, Deadlock Characterization: Necessary Conditions for Deadlock, Resource Allocation Graph; Method for Handling Deadlocks: Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Unit-V
Memory Management Strategies: Memory Hierarchy, Cache Memory, Swapping, Loading and Linking, Information Protection, Memory Allocation, Fixed partitioning, dynamic partitioning, Paging, Segmentation, Segmetation with Paging, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithms

Suggested Textbooks:

1. Silberschatz, Abraham, Peter Baer Galvin, Greg Gagne (2009). *Operating System Concepts, 8e.* Wiley Publications
2. Stallings, W. (2013). *Operating Systems: Internals and Design Principles, 7e.* Pearson Education India

Reference Books:

1. Tanenbaum, Andrew S. (2016). *Modern Operating Systems, 4e.* Pearson Education India
2. Bach, Maurice J. (2015). *Design of the UNIX Operating System, 1e.* Pearson Education India
3. Arpaci-Dusseau, Remzi H. & Andrea C. Arpaci-dusseau (2018). *Operating Systems: Three Easy Pieces.* Amazon Digital Services

BCA – 304   Mathematics-III (Discrete Mathematics)

Course Objective: To understand the role of 'Discrete Mathematical Structures' in scientific computing and logic development through practical exercises aspiring to be successful in the world of Computer Science.

Course Outcomes: Upon successful completion of this course students will be able to
CO-1. Understand the key concept of propositions, set, relation and function and its operations.
CO-2. Construct truth table of any compound proposition and use logically equivalent statements.
CO-3. Evaluate Boolean algebra expressions and functions; algebraic representations of the functioning of logic gates.
CO-4. Simplify the Boolean expression representing circuits.
CO-5. Demonstrate graph, path, cycles, complement of a graph, trees and its types
CO-6. Knowledge about representing matrix, operations on matrix and to solve system of linear equations using rank.

Course Contents:

Unit-I

Introduction and Preliminaries: Logical connectives, Truth tables, Tautologies and Contradiction, Logical equivalence, Algebra of propositions. **Set Theory:** Set, Singleton set, Finite and Infinite sets, Subsets, Proper subsets, Equality of sets, Union, Intersection and Difference of sets, Universal set, De Morgan laws, Symmetric difference of sets, Generalized De Morgan laws, Cartesian product of sets.

Unit-II

Relations: Relation between two sets, Binary relation on a set, Types of binary relations, Equivalence relation, Equivalence class, Partition of a set, Fundamental theorem of equivalence relation, Composition of relations. **Functions:** Function or mapping, One-one, Many-one, into and onto mappings, Identity mapping, Constant mapping, Equality of mappings, Inverse of a mapping, Composition of mappings.

Unit-III

Boolean algebra: Definition and properties of Boolean algebra, a brief introduction to the application of Boolean algebra to switching theory, conversion of complicated switching circuits to simple one, Disjunctive and Conjunctive normal forms. **Graph Theory:** Introduction to graph theory, Paths and Circuits, Trees, Spanning trees, Cut-sets, Fundamental circuits and cut-sets.

Unit-IV

Matrices: Introduction, Expression of complex numbers in the form of a matrix, De Moivre's theorem, Elementary transformations, Elementary matrices, Equivalent matrices, Properties of equivalent matrices, Sub-matrix of a matrix, Rank and Nullity of a matrix, Row equivalence and canonical form, Normal form of a matrix.

Unit-V

Solution of Homogeneous and Non-homogeneous system of linear equations, Characteristic roots and Characteristic vectors of a matrix, Caley-Hamilton theorem, to find the inverse of a non-singular matrix using Caley-Hamilton theorem.

Suggested Readings

Main Text Books

1. Tremblay, J. P., & Manohar, R. (1975). *Discrete mathematical structures with applications to computer science*. McGraw-Hill, Inc..
2. Deo, N. (2017). *Graph theory with applications to engineering and computer science*. Courier Dover Publications.

Reference Books

1. Liu, C. L. (1987). *Elements of discrete mathematics*. Tata McGraw-Hill Education.
2. Johnsonbaugh, R. (2005). *Discrete Mathematics*. Pearson Education.
3. Bernard, K., Robert, B., & Sharon, R. (1996). *Discrete mathematical structures*. Prentice Hall of India.

BCA – 305 Visual Basic.Net

Course Objective: This course is designed to familiarize students with the syntax of VB.NET, design of windows applications, connectivity with databases and design of web applications.

Course Outcomes: Upon successful completion of this course students will be able to
CO-1. Understand .NET Framework and describe some of the major enhancements to the new version of Visual Basic.
CO-2. Describe the basic structure of a Visual Basic.NET project and use main features of the integrated development environment (IDE).
CO-3. Create applications using Microsoft Windows Forms and ADO.NET.

Course Contents:

Unit-I
Introduction to .NET Framework: CLR, The Just-In-Time Compiler, Class Library, Applications. Garbage Collection. **Visual studio IDE,** Creating Applications, Visual development & event drive Programming –Class, Methods and events.

Unit-II
The VB.NET Language- Variables -Declaring variables, Data Type of Variables. Control flow statements: conditional statement, loop statements. Arrays: One Dimensional, Two Dimensional. Static and Dynamic Arrays. Procedures: Sub, Function, Get, Set, Operator.

Unit-III
VB.NET Language Controls: Text Boxes, Buttons, Labels, Check Boxes, and Radio Buttons. List Boxes, Combo Boxes. Picture Boxes, Scrollbars, Splitters, Timer, Menus, Built-in Dialogs Image List, Tree Views, List Views, Toolbars, Status Bar and Progress bars, Dialog Boxes, Message box & Input box.

Unit–IV
Object Oriented Programming in VB.Net: Creating User-Defined Classes. Understanding Constructors and Instance Variables. Understanding Built-In Classes. Class Library Overview: Creating a Class Library. Working with the Class Library Introduction to Error Types: Understanding Syntax Errors, Logical Error, Runtime Error. Debugging using Breakpoints, Watch, Tracing. Exception Handling.

Unit-V
Database Handling using ADO.Net: Connection Object, Command Object, Data Adapters, and Datasets, Data Reader. CRUD operations on databases. Data binding with controls like Text Boxes, Combo Box, List Boxes, Data Grid etc., Data validation.

Suggested Text Books:
1. Mastering VB.NET by Evangelos Petroutsos, BPB publications
2. Introduction to .NET, Worx publication

Reference Books:
1. Christian Nagel,Bill Evjen,Jay Glynn, Morgan Skinner Professional C# 2005
2. Bill Evjen,Billy Hollis,Rockford Lhotka Professional VB.NET 2003

BCA – 401   Web Technologies

Course Objective:

To understand the role of web technologies (HTML, JavaScript, PHP, MYSQL etc..) to develop static and dynamic web pages through practical.

Course outcomes: Upon successful completion of this course students will be able to

CO-1. Understand the use and key concept of HTML, CSS, JavaScript, Jquery, PHP and MySql

CO-2. Implements the database (MySql) and web technologies (HTML, CSS, JavaScript, Jquery and PHP) to create static and dynamic web pages.

CO-3. Demonstrate the use of web controls according to the requirements in web application.

CO-4. Apply JavaScript validation, Jquery Validation to maintain the consistency in applications.

CO-5. Evaluate the use of web application develop by using web technologies.

Unit-I

Overview of HTML: Concept of Hypertext, Versions of HTML, Elements of HTML, Formatting Tags, Links, Hyperlinks, Image & Image map, List, Tables, Frames, Forms, Style sheets, Background and Color Controls, Cascading Style Sheets (CSS): CSS Properties, Creating Classes and IDs, Generating External Style Sheets, Types of styles, specifying class within HTML document, Style placement: Inline style, Span & div tags, header styles, Text and font attributes: Font Vs CSS, changing fonts, text attributes, Advance CSS properties: Backgrounds, Box properties and Positioning.

Unit-II

Introduction to scripting: overview of Java Script, advantages, client side java Script, capturing user input, writing JavaScript into HTML; Basic JavaScript Techniques: Data types, literals, variables and operators, Java Script arrays, dense array, operators, expressions; Java Script Programming Construct: Assignment, data declaration, if, switch, while, for, do while, label, break, Continue, function call, return, with, delete, method invocation.
JQuery Introduction: What is jQuery, Structure of jQuery, Using jQuery and including .js file to HTML, Type of Selectors, Handling Events with jQuery

Unit-III

PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other technologies, scope of PHP, Basic Syntax, PHP variables and constants, Types of data in PHP, Expressions, scopes of a variable (local, global); PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise , ternary and MOD operator, PHP operator Precedence and associativity;
Handling HTML form with PHP: Capturing Form Data, GET and POST form methods, Dealing with multi value fields, Redirecting a form after submission;

Unit-IV

PHP conditional events and Loops: PHP IF Else conditional statements (Nested IF and Else), Switch case, while, For and Do While Loop, goto, Break, Continue and exit; PHP Functions: Function, Need of Function, declaration and calling of a function, PHP Function with arguments, Default Arguments in Function, Function argument with call by value, call by reference, Scope of Function Global and Local;   String Manipulation and Regular Expression: Creating and accessing String, Searching & Replacing String, Formatting, joining and splitting String , String Related Library functions, Use and advantage of regular expression over inbuilt function, Use of preg_match(), preg_replace(), preg_split() functions

in regular expression, Array: Anatomy of an Array ,Creating index based and Associative array ,Accessing array, Looping with Index based array, with associative array using each() and foreach(), Some useful Library function.

Unit-V

Introducing MySQL; database design concepts; the Structured Query, Language (SQL); communicating with a MySQL backend via the PHP.

Suggested Text Books:

1. Fuller, R. G., & Ulrich, L. A. (2004). *HTML in 10 Simple steps or Less*. John Wiley & Sons.
2. Gilmore, W. J. (2010). *Beginning PHP and MySQL: from novice to professional*. Apress.
3. Holzner, S. (2007). *PHP: the complete reference*. Tata McGraw-Hill Education.

Reference Books:

1. Psinas, M. E. (2008). *PHP and MySQL: Create-modify-reuse*. John Wiley & Sons.
2. Nixon, R. (2014). *Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5*. " O'Reilly Media, Inc.".
3. Welling, L., & Thompson, L. (2008). *PHP and MySQL Web Development, 4e*. Addison-Wesley Professsional, 2008.

BCA – 406   Web Technologies Lab

1. Create an HTML document with the following formatting options:
   Bold, Italics, Underline, Headings (Using H1 to H6 heading styles), Font (Type, Size and Color), Background (Colored background/Image in background), Paragraph, Line Break, Horizontal Rule, Pre tag
2. Create an HTML document which consists of:
   Ordered List, Unordered List, Nested List, Image
3. Create a table using HTML which consists of columns for

Result		
Roll no	Name	Grade

4. Create a Table with the following view:

		Place an Image Here

5. Create a form using HTML which has the following types of controls:
   I. Text Box   II. Option/radio buttons   III. Check boxes   IV. Reset and Submit buttons

in regular expression, Array: Anatomy of an Array ,Creating index based and Associative array ,Accessing array, Looping with Index based array, with associative array using each() and foreach(), Some useful Library function.

Unit-V

Introducing MySQL; database design concepts; the Structured Query, Language (SQL); communicating with a MySQL backend via the PHP.

Suggested Text Books:

1. Fuller, R. G., & Ulrich, L. A. (2004). *HTML in 10 Simple steps or Less*. John Wiley & Sons.
2. Gilmore, W. J. (2010). *Beginning PHP and MySQL: from novice to professional*. Apress.
3. Holzner, S. (2007). *PHP: the complete reference*. Tata McGraw-Hill Education.

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1. Psinas, M. E. (2008). *PHP and MySQL: Create-modify-reuse*. John Wiley & Sons.
2. Nixon, R. (2014). *Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5*. " O'Reilly Media, Inc.".
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BCA – 406   Web Technologies Lab

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Result		
Roll no	Name	Grade

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6. Create a PHP page using functions for comparing three integers and print the largest number.
7. Write a function to calculate the factorial of a number (non-negative integer). The function accept the number as an argument.
8. WAP to check whether the given number is prime or not.
9. Create a PHP page which accepts string from user. After submission that page displays the reverse of provided string.
10. Write a PHP function that checks if a string is all lower case.
11. Write a PHP script that checks whether a passed string is palindrome or not? (A palindrome is word, phrase, or sequence that reads the same backward as forward, e.g., madam or nurses run)
12. WAP to sort an array.
13. Write a PHP script that removes the whitespaces from a string. Sample string : 'The quick " " brown fox' Expected Output : Thequick""brownfox
14. Write a PHP script that finds out the sum of first n odd numbers.
15. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e.name is present in the database) otherwise error message should be displayed.
16. Write a PHP script that checks if a string contains another string.
17. Create a simple 'birthday countdown' script, the script will count the number of days between current day and birth day.
18. Write a PHP script to replace the first 'the' of the following string with 'That'.
    E.g.: 'the quick brown fox jumps over the lazy dog.'
    After replacement the Expected Result: That quick brown fox jumps over the lazy dog.
    Minor Project 1:
    Create a database of person and Make a form in php using HTML to allow data entry to Person Form with the following command buttons:
    1. Apply validation on form
    2. Perform Add, Edit and Delete operation

Name :	[_____]
Password	[_____]
Confirm Password	[_____]
City	Select City ▼
Gender	◯ Male ◯ Female
Gmail	[_____]

[Submit]

Minor Project 2: Create a website to list the product

Step 1: Create a database for the following Table:

1. User (User name, email, DOB, gender, mobile number, Address, City, State, status)
2. Category (Category id, Category Name, Description, Status)
3. Product (Product id, product name, Product Price, discount, quantity, Product image, Product Specification, status)

Step 2: Create the Master form to Add/ Edit/Delete operation

1. User Form   2. Category Form   3. Product Form

BCA – 402   Programming in Java

Course Objectives: This course intends to impart knowledge about basic Java language syntax and semantics to write Java programs. The course will cover the use of fundamentals of object-oriented programming in Java along with various concepts related to String creation and management, Java multithreaded model, and GUI programming using AWT & Swing.

Course Outcomes: On successful completion of this course, the students will be able to

CO-1. Demonstrate an in-depth understanding of conceptual foundations and basics of string handling in Java

CO-2. Successfully describe and define OOP principles in context to Java and write basic Java programs

CO-3. Identify and illustrate the usage of collections framework in Java

CO-4. Analyze the usage of Java's exception handling mechanism

CO-5. Explore and implement interfaces in Java

CO-6. Effectively create and manage packages in Java

CO-7. Develop and implement multithreaded applications using Java

CO-8. Use of various UI components like windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, through AWT & Swing and apply event handling on these components

Course Contents:

Unit-I

Introduction to Java: Versions of Java, Features of java, C++ V/s Java, Setting up Java environment, Java virtual machine. Constants & Variables, Declaration of Variables, Types of Variables, Scope of Variables, Data Types in Java, Operators in Java, Control Statements in Java. **Arrays:** Creating One Dimensional & Two Dimensional Arrays

Unit-II

Basic concepts of OOPS: OOPS terminology, Classes, Methods, Creating Instance & Class Variables, Accessing Class Members, Constructors, Method Overloading, Inheritance and its Types in Java, Method Overriding, Final Variables, Methods and Classes, finalize method, Abstract Methods & Classes, Visibility Control in Java, **Interfaces**: Defining Interfaces, Implementing and Inheriting Interfaces.

Unit-III

Concept of Package: In-built Packages, Using In-Built Packages, Creating User Defined Packages, Accessing a User-Defined Package, Adding a Class to a Package, **Working with Strings:** String, StringBuffer, and StringBuilder. **Collections Framework:** Set, List, Queue, Maps.

Unit-IV

Exception Handling in Java: Types of Exceptions in Java, Try-Catch-Finally, Using Multiple Catch Blocks, Nested Try, Throw and Throws Keyword. **Multithreading in Java:** Java Thread Model, Life Cycle Of a Thread, Creating Threads, Extending Thread Class, Stopping & Blocking A Thread, Thread Exceptions, Thread Priority, Thread Synchronization, Implementing Runnable Interface, Inter Thread Communication.

Unit-V

Introduction to GUI Programming in Java: AWT: Basic GUI Components of AWT, Event Handling, Java Swing: Basic GUI Components of Swing, Difference between AWT and Swing

Suggested Textbooks:
1. Schildt, H. (2017). *Java- The Complete Reference Tenth Edition.* McGraw Hill Education
2. Balaguruswamy, E. (2019). *Programming with Java Sixth Edition.* McGraw-Hill Publications

Reference Books:
1. Sierra, Kathy & Bert Bates (2009). *Head First Java.* O'Reilly Publications
2. Horstmann, Cay S. & Gary Cornell (2007). *Core Java, Volume I—Fundamentals.* Prentice Hall Publications
3. Horstmann, Cay S. (2017). *Core Java Volume II - Advanced Features.* Pearson Education

BCA – 407 Programming in Java Lab

1. Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminate $b^2 - 4ac$ is negative, display a message stating that there are no real solutions
2. The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that prints the nth value in the Fibonacci sequence
3. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer. (use Scanner class to read input)
4. Write a Java program to multiply two given matrices
5. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java.util)
6. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome
7. Write a Java program for sorting list of names. Read input from command line
8. Write a Java program to create a Student class with following fields
   a. Hall ticket number
   b. Student Name
   c. Department
   Create 'n' number of Student objects where 'n' value is passed as input to constructor
9. Write a Java program to demonstrate String comparison using == and equals method
10. Write a java program to create an abstract class named Shape that contains an empty method named numberOfSides(). Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method numberOfSides() that shows the number of sides in the given geometrical figures
11. Write a Java program that creates three threads. First thread displays "Good Morning" everyone second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds
12. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication
13. Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No light is on when the program starts
14. Write a Java program that allows the user to draw lines, rectangles, and ovals.
15. Develop an applet that displays a simple message in center of the screen

BCA – 403   Software Engineering

Course Objectives: The course objectives of Software Engineering Program are to produce graduates who, within three years after graduation, are able to:

1. Be employed in industry, government, or entrepreneurial endeavors to demonstrate professional advancement through significant technical achievements and expanded leadership responsibility;
2. Demonstrate the ability to work effectively as a team member and/or leader in an ever-changing professional environment; and
3. Progress through advanced degree or certificate programs in computing, science, engineering, business, and other professionally related fields.

Course Outcomes : On successful completion of this course, the students will be able to:

CO-1. Basic knowledge and understanding of the analysis and design of complex systems.
CO-2. Ability to apply software engineering principles and techniques and to develop, maintain and evaluate large-scale software systems.
CO-3. To produce efficient, reliable, robust and cost-effective software solutions.
CO-4. Ability to perform independent research and analysis.
CO-5. Ability to work as an effective member or leader of software engineering teams.
CO-6. 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.

Course Contents:

Unit-I

Introduction: Evolving Role of Software, Software characteristics, Software Designing Processes: Software Engineering, Software Process and Characteristics, Need of Software Development Life Cycle Models, Waterfall, Prototype, Spiral Model, RAD Model;

Unit-II

Software Requirement Analysis and Specification: Requirement Elicitation Technique: Interview, Form Analysis, SRS and its Characteristics. Software Project Planning: Issues involved in Software Estimation, Size Estimation like lines of code and Function point method, Cost Estimation Model: COCOMO, Risk Management.

Unit-III

Software Project Management Process: Feasibility Study, Project Planning, Project Execution, Project Termination. System Models: Data-flow models, Semantic data models, Object models, Inheritance models, Object aggregation, Service usage models, Data Dictionaries. Basics Software Design: Design Process, Design Fundamentals, Software Design Levels: Architectural Design, High Level design, detail design, Design Notations, Specification and Modularization, Design Structure Chart, Pseudo Codes, Flow charts, Coupling and Cohesion measures.

Unit-IV

Design Strategies: Function Oriented Design, Object Oriented Design, Basic concept of object-oriented analysis & Design. Traditional paradigm versus object oriented paradigm, software design approaches: Top-Down and Bottom-Up Design. Object-oriented design: Object aggregation; Service Usage; Object Interface Design: Design evolution, Function

oriented design: Data –flow design; Structural Decomposition: Detailed design.

Unit-V

Software Metrics: Software measurements What & Why, Token Count, Halstead Software Science Measures, Design Metrics, software testing. Test cases. Software Maintenance: Types of software Maintenance, Software maintenance model, Concept of Software Re-engineering & Software Reverse engineering- Definition, purposes and objectives. Introduction to UML class diagram object diagram, use case diagram, sequence diagram, activity diagram, component diagram, collaboration diagram.

Suggested Text Books:

1. Software Engineering - A practitioner's approach"- R.S.Pressman,5th Ed., McGraw Hill Int.
2. Software Engineering (Principle & Practices Waman S. Jawadekar), Tata Mccraw Hill
3. An Integrated approach to software Engineering, - Pankaj Jalote , Narosa Publication

Reference Books:

1. Software Engineering- Shari Lawrence, Pfleeger. Pearson edu.

PAPER CODE BCA - 404
Numerical & Statistical Analysis

Course Objective: To introduce the concept of computer oriented numerical methods and basic concept of statistics that are useful in decision making problems.

Course Outcomes: Upon successful completion of this course students will be able to
CO-1. Understand the concept of approximate numbers, errors in numbers, zeroes or roots of polynomial and/or transcendental equations, difference operators and statistical terms.
CO-2. Iterative techniques to solve polynomial and/or transcendental equations and simultaneous linear equations.
CO-3. Illustrate mathematical relationships for given observations of the variable using Interpolation techniques.
CO-4. Analyze statistical data using measures of central tendency, dispersion, skewness and kurtosis.
CO-5. Apply correlation and simple linear regression analysis for a set of data.

Course Contents:

Unit-I

Numerical Errors, Iterative methods, Zeros of a single transcendental equation and zeros of polynomials using Bisection, False position, Newton- Raphson and Secant methods, convergence of solutions.

Unit-II

Simultaneous linear equations, Solution of simultaneous linear equations, Gauss elimination method with pivoting, Gauss – Jordan method, Jacobi's iteration method and Gauss – Seidel iteration method, Ill-conditioned equations and refinement of solutions.
Difference Operators and Interpolation: Definition of Forward, Backward, Shifting, Divided difference, Central and Averaging Operators and their relationships.

Unit- III

Newton's forward difference, backward difference and divided difference interpolation formulae, Lagrange's Interpolation formula. General Quadrature formula, Newton Cote's integration, Trapezoidal rule, Simpson's one – third and three – eight rules.

Unit-IV

Introduction: Frequency distribution and Frequency charts, Histogram, Frequency polygons, Frequency curves and Cumulative frequency distribution, Ogives. **Measures of Central Tendency:** Arithmetic mean, weighted arithmetic mean, geometric mean, harmonic mean, median, mode, quartiles, deciles and percentiles. **Measures of Dispersion:** Range, mean deviation, semi-inter quartile range for quartile deviation, absolute and related dispersion, coefficient of variation. **Moments, Skewness and Kurtosis:** Moments of various types, relation between moments, Skewness and kurtosis,

Unit-V

Regression and Correlation: Regression analysis, Least square fit, polynomial and curve fitting, Linear and non-linear regression algorithms, Linear correlation, measures of correlation, coefficient of correlation, rank correlation, multiple and partial correlation for three variables.

Suggested Text Books:
1. Jain & Iyenger. *Numerical Methods for Scientific & Engg. Computer*. New Age International Publishers.

2. Balaguruswamy, E. *Numerical Methods*. TMH
3. Gupta, S.C. *Fundamental of Statistics*. Sultan Chand & Sons.
4. Sancheti, D.C. *Business Statistics*. Sultan Chand & Sons.

Reference Books:

1. Grewal, B.S. *Numerical Methods*. Khanna Publishers
2. Rajaraman, V. *Computer Oriented Numerical Methods*. PHI
3. Sastry, S.S. *Numerical Analysis*. PHI
4. Black, K. *Business Statistics*. Wiley India.

BCA – 405   Python Programming

Course Objectives: This course aims to make the students familiar with the programming paradigms brought in by Python programming language along with a focus on file handling and regular expressions

Course Outcomes: On successful completion of this course, the students will be able to:
CO-1. Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements
CO-2. Express proficiency in the handling of strings and functions
CO-3. Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples, and sets
CO-4. Identify the commonly used operations involving file systems and regular expressions
CO-5. Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python

Course Contents:

Unit-I

History & Features of Python; Introduction to Python: Python Interpreter, Python shell, Indentation. Atoms: Identifiers and keywords, Literals; Variables & Data Types: Numeric types, Sequence types, Mapping types, Set types, Boolean type, Binary types; Operators: Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, precedence of operators; Comments in Python

Unit-II

Input and Output Statements; Conditional statements: conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: while, for, nested loop, state iteration in python, break, continue, pass; String Manipulation: Accessing string, Basic operations, String slices, String functions and methods

Unit-III

Python Collections: Lists: Accessing List, List Operations, Working with Lists, List Functions & Methods; Tuples: Accessing Tuples, Tuple Operations, Working with Tuples, Tuple Functions & Methods; Dictionaries: Accessing Values in dictionaries, Dictionary Operations, Working with Dictionary, Dictionary Properties, Dictionary Functions & Methods; Sets: Working with Set & Frozen Set

Unit-IV

Functions: Defining & Calling a function, Types of functions, Default Arguments, Why Default Arguments?, Default Function Object Argument Example, Variable-length Arguments, Non-keyword Variable Arguments (Tuple), Keyword Variable Arguments (Dictionary), Anonymous functions, Global & Local variables
Exception handling: Exception classes hierarchy, try, except, finally, Raising an exception, user defined exceptions

Unit-V

Object Oriented Programming in Python; Regular Expressions; Importing & Exploring Data using Python Modules: Introduction of numpy module, numpy operations, Working with Arrays using numpy; Introduction of pandas module, pandas operations

Suggested Text Book and Reference Books:

1. Chun, J Wesley, Core Python Programming, Second Edition, Pearson, 2007 Reprint 2010
2. Barry, Paul, Head First Python, 2nd Edition, O Rielly, 2010
3. Lutz, Mark, Learning Python, 4th Edition, O Rielly, 2009

Python Programming lab:

List of Programs

1. Create a stone-paper-scissor game program
2. Explore string functions
3. Implement Selection Sort
4. Read and write into a file
5. Demonstrate usage of basic regular expression
6. Demonstrate use of advanced regular expressions for data validation.
7. Demonstrate use of List
8. Demonstrate use of Dictionaries
9. Demonstrate use of set
10. Demonstrate use of tuples
11. Create Comma Separate Files (CSV), Load CSV files into internal Data Structure
12. Write script to work like a SQL SELECT statement for internal Data Structure made in earlier exercise
13. Write script to work like a SQL Inner Join for an internal Data Structuremade in earlier exercise
14. Demonstrate Exceptions in Python

BCA – 501   Programming in Advance Java

Course Objectives: This course is designed with intent to acquaint the students with tools and techniques for creating a dynamic web application that can interact with databases using Java technologies like JDBC, Servlets, JSP and JavaBeans.

Course Outcomes: On successful completion of this course, the students will be able to:
CO-1. Analyze the key differences between static and dynamic web applications
CO-2. Establish a relevance of various web architecture models
CO-3. Demonstrate an in-depth knowledge of accessing databases through a Java application using Java database Connectivity (JDBC)
CO-4. Analyze & build dynamic web pages using servlets and JSP
CO-5. Develop reusable software components using JavaBeans concepts
CO-6. Design GUI based web applications that can interact with databases, using in-built frameworks of Java

Course Contents:

Unit-I
Starting with Web Applications in Java: Introduction to web applications, Benefits of web applications, Web Architecture Models- Model 1 Architecture, Model 2 Architecture, Introduction to MVC Architecture: Model component, View component, Controller component.

Unit-II
Introduction to JDBC: Introducing JDBC, Communicating with Database: Obtaining Connection, Creating JDBC Statement Object, Types of Statement Objects: Statement, Prepared Statement, Callable Statement, Executing SQL Statement, Closing a Database Connection, Creating DSN and Understanding Various JDBC Drivers; Creating Table by Using JDBC, Working With ResultSet Object.

Unit-III
Introduction to Servlets: Need for Server Side Programming, What is a Servlet, Advantages of using Servlets, Understanding the Servlet API, Generic Servlet Class, Servlet Life Cycle, Servlet Request, Redirection, Servlet Config, Servlet Context, Session Tracking with Servlets, deploying a Servlet Application,.

Unit-IV
Introduction to JSP: Understanding JSP, JSP Architecture, Advantages of JSP, JSP Life Cycle, JSP Scripting Elements: Scriptlet, Expression, Declaration; JSP Implicit Objects, Directive Elements: Page, Include, Taglib; JSP Action Elements: Forward, useBean, Include, setProperty & getProperty, JSTL

Unit-V
Introduction to JavaBeans: Concept of JavaBeans, Advantages of using JavaBeans, Components of JavaBeans: Properties, Methods and Events; JavaBean API

Suggested Textbooks:
1. Schildt, Herbert (2017). *Java- The Complete Reference*. McGraw Hill Education

Reference Books:
1. Sierra, Kathy & Bert Bates (2009). *Head First Java*. O'Reilly Publications
2. Sierra, Kathy & Bert Bates (2011). *Head First Servlets & JSP*. O'Reilly Publications

BCA – 505   Programming in Advance Java Lab

1. Develop a program to perform the database driven operation like insert, Delete, Update and select. To perform theseoperations, create one table named Employee containing the following fields:
   a. EmpId (Integer)
   b. Empname (Varchar)
   c. Emp_desig (Varchar)
   d. Emp_J_Date (Varchar)
   e. Emp_Salary (Numeric)
2. Develop a Java application to perform the database driven operation like insert, Delete, Update and selection using PreparedStatement. To perform the operations use the table from problem 1
3. Write a Java application to invoke a stored procedure using a CallableStatement. For this a stored procedure called incrementSalary may be developed to increase all the employee's salary by a percentage specified in the parameter
4. Write a Servlet to display "Hello World" on browser
5. Write a Servlet to display all the headers available from request.
6. Write a Servlet to display parameters available on request
7. Write a Servlet which displays a message and also displays how many times the page has been visited
8. Assume that the information regarding the marks for all the subjects of a student in the last exam are available in a database, Develop a Servlet which takes the enrollment number of a student as a request parameter and displays the marksheet for the student
9. Develop a Servlet to authenticate a user, where the loginid and password are available as request parameters. In case the authentication is successful, it should setup a new session and store the user's information in the session and then display the user's information like full name, address, etc.
10. Write a simple JSP page to display a simple message (It may contain simple HTML tags)
11. Write a JSP page, which uses the include directive to show its header and footer
12. Develop an application to keep track of one user across several servlet invocations within the same browser session
13. Develop an application to write a JSP that passes control to another page. (Hint: Use <jsp:include> or <jsp:forward>)
14. You want to reduce the amount of Java coding in your JSP using a JavaBean component. (Hint: Use with the name of your bean)
15. Create a servlet filter that logs all access to and from servlets in an application and prints the following to System.out:
    a. The time the request was received
    b. The time the response was sent
    c. How much time it took to process the request
    d. The URL of the resource requested
    e. The IP address of the visitor

BCA – 502   Computer Networks

Course Objectives:
1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

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

CO-1: Independently understand basic computer network technology.

CO-2: Understand and explain Data Communications System and its components.

CO-3: Identify the different types of network topologies, protocols and n/w devices.

CO-4: Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

CO-5: Understand and building the skills of sub netting and routing mechanisms.

Course Contents:

Unit-I
Data Communication System: Purpose, Components: Source, transmitter, transmission System, receiver, and destination. Data transmission: Frequency, Spectrum and Bandwidth. Time-domain and frequency domain Concepts. Relationship between data-rate and Bandwidth. Network topology with advantages and disadvantages.

Unit-II
Analog and digital data transmission. Data and signal. Analog and digital signaling of analog and digital data. Modem, modulation techniques, codec, digital transmitter etc. Transmission impairments: attenuation and attenuation distortion, delay distortion, noise.

Unit-III
Introduction to Network, OSI reference model, TCP/IP reference model. Transmission Media: Magnetic Media, Twisted-Pair cables, Baseband & Broadband Coaxial cables, Fiber Optics. Wireless Transmission: Radio Transmission, Microwave Transmission, Bluetooth, Infrared, Virtual LAN.

Unit-IV
ISDN; ATM; data link layer: services, framing, error control, error-detecting & correcting codes. Data link protocols: stop-and-wait protocol, sliding window protocol. HDLC; static & dynamic channel allocation in LANS & MANS, FDDI.

Unit-V
Multiple Access Protocols: ALOHA, CSMA/CD; IEEE standards 1002.3 and Ethernet, 1002.4: Token Bus; 1002.5: Token Ring. Bridges, Routers, Gateways, Routing Algorithm, Congestion control Algorithm, Internetworking, The TCP/IP Protocol, IP Addressing, Subnets, Supernets, IPv6.

Suggested Text Books:
1. Tanenbaum A. *Computer Networks*. Prentice Hall- publisher.
2. Forouzan. *Data Communication & Networking*. Mc Graw Hill Publisher.

Reference Books:
1. Stallins W. *Data & Computer Communications*. PHI- Publisher.

BCA – 503   Artificial Intelligence

Course Objectives: This course is designed to familiarize the students with basic principles, techniques, and applications of Artificial Intelligence.

Course Outcomes: On successful completion of this course, the students will be able to:
CO-1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
CO-2. Analyze and apply different searching techniques for solving problems of different nature.
CO-3. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO-4. Demonstrate awareness and fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks, and other machine learning models.
CO-5. Display an in-depth knowledge of Fuzzy Sets and Fuzzy Logic.

Course Contents:

Unit-I
Introduction: Introduction to Artificial Intelligence, Historical Backdrop, what is Intelligence, The bottom line. Defining the problem as state space search, production system and their types, characteristics of problem and production system.

Unit-II
State Space Search: Generate and test, Simple search, Depth First Search (DFS), Breadth First Search (BFS), Comparison of BFS and DFS, Quality of solution, Depth Bounded DFS (DBDFS), Depth First Iterative Deepening(DFID). Heuristic Search: Heuristic Functions, Best First Search, Hill Climbing, Local Maxima, Solution Space Search, Variable Neighborhood Descent, Beam Search, Tabu Search, Peak to Peak Methods.

Unit-III
Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and no monotonic reasoning.

Unit-IV
Learning: Introduction to learning, Neural Networks: Introduction, Model Representation, Gradient Descent vs. Perceptron Training, Stochastic Gradient Descent, Multilayer Perceptrons, Multiclass Representation, Backpropagation Algorithm, Learning rate and it's significance.

Unit-V
Activation functions: sigmoid, tanh, relu, softmax, etc; problems of overfitting in neural networks; regularization techniques: L1 and L2 regularization, dropout, data augmentation, early stopping.
Fuzzy Sets and Fuzzy Logic: Introduction to Classical Sets and Fuzzy Sets. Classical set and Fuzzy sets – Operations and Properties. Fuzzy Relations – Equivalence & Tolerance. Membership Functions, Fuzzification, Membership Value Assignment. Fuzzy to Crisp Conversion.

Suggested Textbooks:
1. Patterson, Dan W. (2007). *Introduction to AI and ES*. Pearson Education
2. Rich, Elaine & Kevin Knight. *Artificial Intelligence*. Tata McGraw Hill
3. Russel, Stuart & Peter Norvig (2007). *AI- A Modern Approac, 2e*. Pearson Education

Reference Books:
1. Clocksin, W.F. & Mellish (2001). *Programming in PROLOG, 3e*. Narosa Publishing House
2. Bratko, Ivan (2000). *Prolog Programming for Artificial Intelligence,3e*. Addison-Wesley, Pearson Education

BCA – 506   ORACLE Lab

List of Experiments in Oracle

1. Data Definition Language (DDL) commands in oracle
2. Data Manipulation Language (DML) and Data Control Language (DCL)
3. High level language extensions with cursors
4. High level language extension with Triggers
5. Procedures and Functions
6. Embedded SQL
7. Working with Sample Databases of Oracle
8. Design and implementation of database for payroll processing system
9. Design and implementation of database for Banking system
10. Design and implementation of database for Library Information System
11. Design and implementation of database for Student Information System

BCA – 601   Introduction to Asp.net & C#

Course Objectives: To design and develop web based applications using ASP.net

Course Outcomes: At the end of this course students will be able to:
CO-1. Explain the architecture of Dot Net platform.
CO-2. Ddevelop simple web form using various controls and implement the concept of master page
CO-3. Create user interactive web pages using ASP.Net.
CO-4. Create simple data binding applications using ADO.Net connectivity.

Unit-I
Programming in C#: Overview of C#, C# environment, datatype, type conversion, variables, constants, operators: Arithmetic Operators , Relational Operators, Logical Operators, Bitwise Operators, Assignment Operators, Misc Operators, , decision making, loops, overview of oop's: (encapsulation, inheritance, polymorphism, abstraction), class, object, methods.

Unit-II
Programming in C#: Arrays, String, Structure, Enum, Operator Overloading, Interfaces, Preprocessor Directives, Namespace, Regular Expression : Character escapes, Character classes, Anchors, Grouping constructs, Quantifiers, Backreference constructs, Alternation constructs, Substitutions, Exception handling, File I/O : StreamReader, StreamWriter, StringReader, StringWriter.
C# Attributes, C# Properties, C# Reflection.

Unit-III
Introduction to ASP.Net: Overview of ASP.NET framework, ASP.NET Application Life Cycle, page life cycle phases : Initialization, Instantiation of the controls on the page, Restoration and maintenance of the state, Execution of the event handler codes, Page rendering. Understanding ASP.NET Controls, Applications Web servers, installation of IIS. Web forms, web form controls -server controls, client controls, web forms & HTML.

Unit-IV
Programming in ASP.Net: Adding controls to a web form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box, etc. Running a web Application, creating a multiform web project. Event Handling- Application and Session Events, Page and Control Events.
Validation controls: RequiredField Validator, RangeValidator, CompareValidator, RegularExpressionValidator, CustomValidator, Validation Summary. States of ASP.Net : View State, Control State, Session State, Application State.

Unit-V
Database connectivity in ASP.Net: Architecture of ADO.NET, Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class, DataAdapter Class, Dataset Class. Display data on data bound Controls and Data Grid. Database Accessing on web applications: Data Binding concept with web, creating data grid, Binding standard web server controls. Display data on web form using Data bound controls.

Suggested Text Books:
1. Beginning ASP.Net in C#, Wrox Publications/Apress Publications
2. Beginning ASP.NET 4.5 in C# and VB, Wrox, 2012

Reference Books:
1. Asp.Net Programming With Visual C# And Sql Server, Don Gosselin

BCA – 605   Introduction to Asp.net & C# Lab

Practical No. : 01
Aim: Write a console application that obtains four int values from the user and displays the product.

Practical No. : 02
Aim: If you have two integers stored in variables var1 and var2, what Boolean test can you perform to see if one or the other (but not both) is greater than 10?

Aim: Write an application that includes the logic from Exercise 1, obtains two numbers from the user, and displays them, but rejects any input where both numbers are greater than 10 and asks for two new numbers.

Practical No. : 03
Aim: Write a console application that places double quotation marks around each word in a string.

Practical No. : 04
Aim: Write an application that uses two command-line arguments to place values into a string and an integer variable, respectively. Then display these values.

Practical No. : 05
Aim: Write an application that receives the following information from a set of students:
Student Id:
Student Name:
Course Name:
Date of Birth:
The application should also display the information of all the students once the data is Entered. Implement this using an Array of Structures.

Practical No. : 06
Aim: Write programs using conditional statements and loops:
1. Generate Fibonacci series.
Aim: Write programs using conditional statements and loops:
2. Generate various patterns (triangles, diamond and other patterns) with numbers.
Aim: Write programs using conditional statements and loops:
3. Test for prime numbers.
Aim: Write programs using conditional statements and loops:
4. Generate prime numbers.
Aim: Write programs using conditional statements and loops:
5. Reverse a number and find sum of digits of a number.
Aim: Write programs using conditional statements and loops:
6. Test for vowels.
Aim: Write programs using conditional statements and loops:
7. Use of foreach loop with arrays.

Practical No. : 07
Aim: Write a program to declare a class „staff‟ having data members as name and post. Accept this data 5 for 5 staffs and display names of staff who are HOD.

Aim: Write a program to declare class 'Distance' have data members dist1, dist2 ,dist3. Initialize the two data members using constructor and store their addition in third data member using function and display addition.

Aim: Write a program using function overloading to swap two integer numbers and swap two float numbers.

Practical No. : 08
Aim: Write a program to implement single inheritance from following figure. Accept and display data for one table.

| Class Furniture |
| Data Members: Material, Price |

↓

| Class Table |
| Data Members: Height, Surface area |
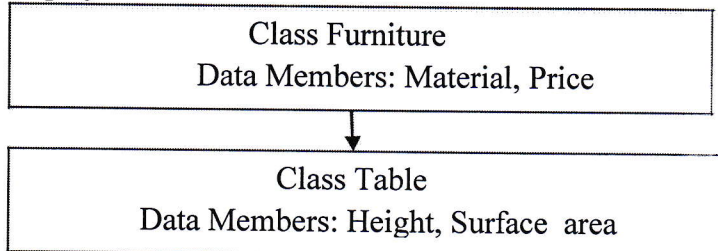
Practical No. : 09
Aim: Define a class 'salary" which will contain member variable Basic, TA, DA, HRA. Write a program using Constructor with default values for DA and HRA and calculate the salary of employee.

Practical No. : 10
Aim: Program to implement the following multiple inheritance using interface.

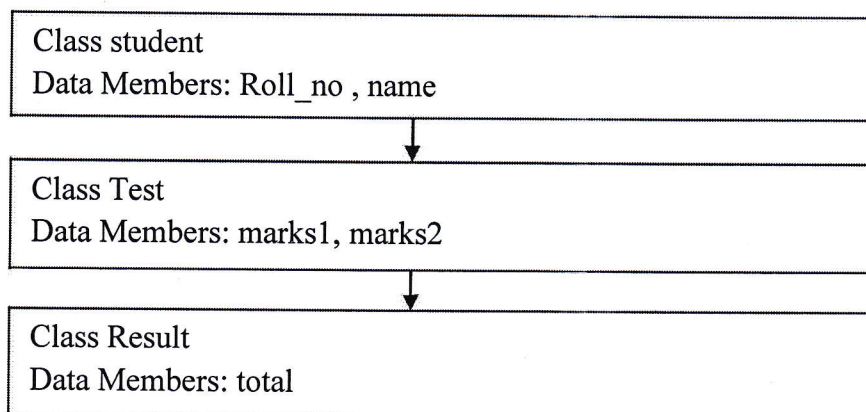| Interface: Gross |
| TA,DA ,Gross_sal() |

| Class : Employee |
| name, basic_sal() |

Practical No. : 11
Aim: Write a program for above class hierarchy for the Employee where the base class is Employee and derived class and Programmer and Manager. Here make display function virtual which is common for all and which will display information of Programmer and Manager interactively.

| Employee |

↓

| Programmer | | Manager |
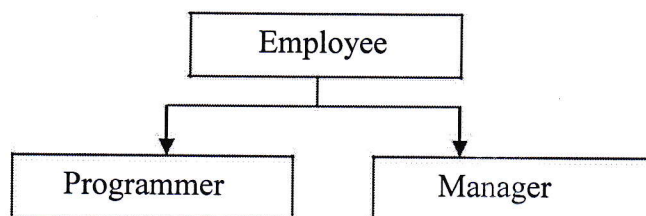
Practical no. : 12
Aim: Write a program to implement multilevel inheritance from following figure. Accept and display data for one student.

| Class student |
| Data Members: Roll_no , name |

↓

| Class Test |
| Data Members: marks1, marks2 |

↓

| Class Result |
| Data Members: total |

Practical no. : 13

Aim: Write a program to accept a number from the user and throw an exception if the number is not an even number.

Practical no. : 14

Aim: Create an application that allows the user to enter a number in the textbox named 'getnum'. Check whether the number in the textbox 'getnum' is palindrome or not. Print the message accordingly in the label control named lbldisplay when the user clicks on the button 'check".

Practical no. : 15

Aim: Create an application which will ask the user to input his name and a message, display the two items concatenated in a label, and change the format of the label using radio buttons and check boxes for selection, the user can make the label text bold, underlined or italic and change its color include buttons to display the message in the label, clear the text boxes and label and exit.

Practical no. : 16

Aim: List of employees is available in listbox. Write an application to add selected or all records from listbox (assume multi-line property of textbox is true).

Practical no. : 17

Aim: "How is the book ASP.NET with c# by Vipul Prakashan?" Give the user three choice : i) Good ii) Satisfactory iii) Bad. Provide a VOTE button. After user votes, present the result in percentage using labels next to the choices.

Practical no. : 18

Aim: Create a project that calculates the total of fat, carbohydrate and protein. Allow the user to enter into text boxes. The grams of fat, grams of carbohydrate and grams of protein. Each gram of fat is 9 calories and protein or carbohydrate is 4 calories. Display the total calories of the current food item in a label. Use to other labels to display and accumulated some of calories and the count of items entered. The form food have 3 text boxes for the user to enter the grams for each category include label next to each text box indicating what the user is enter.

Practical no. : 19

Aim: Set the label border color of rollno to red using css.

Practical no. : 20

Aim: Set the font-Arial, font style-bond, font size-18px of different controls (ie. Label, textbox, button) using css.

Practical no. : 21

Aim: Change the font family and color of all heading of above webpage using css.

Practical no. : 22

Aim: Use pseudo classes and display link, visited link and active link of contact us differently.

Practical no. : 23

Aim: Programs using ASP.NET Server controls.
Create the application that accepts name, password, age, email id, and user id. All the information entry is compulsory. Password should be reconfirmed. Age should be within 21

to 30. Email id should be valid. User id should have at least a capital letter and digit as well as length should be between 7 and 20 characters.

Practical no. : 24
Aim: Programs using ASP.NET Server controls.
Create a website for a bank and include types of navigation.

Practical no. : 25
Aim: Database programs with ASP.NET and ADO.NET.
Create a Web App to display all the Empname and Deptid of the employee from the database using SQL source control and bind it to GridView. Database fields are (DeptId, DeptName, EmpName, Salary).

Practical no. : 26
Aim: Database programs with ASP.NET and ADO.NET
Create a Login Module which adds Username and Password in the database. Username in the database should be a primary key.

Practical no. : 27
Aim: Database programs with ASP.NET and ADO.NET
Create a web application to insert 3 records inside the SQL database table having following fields (DeptId, DeptName, EmpName, Salary). Update the salary for any one employee and increment it to 15% of the present salary. Perform delete operation on 1 row of the database table.

Practical no. : 28
Aim: Programs using Language Integrated query. Create the table with the given fields.
FIELD NAME DATA TYPE EmpNo number EmpName varchar EmpSal number EmpJob varchar EmpDeptNo number

For the given table design a web page to display the employee information from table to grid control. Use LINQ TO ADO.NET.

Practical no. : 29
Aim: Programs using Language Integrated query. Create the table with the given fields.
FIELD NAME DATA TYPE SRollno int SName string SAddress string SFees int

For the given table design a web page to display the employee information from table to grid control. Use LINQ TO XML.

Practical no. : 30
Aim: Programs using Language Integrated query. Create the table with the given fields .
FIELD NAME DATA TYPE PID string PName
string PPrice int PWeight int

For the given table design a web page to display the employee information from table to grid control. Use LINQ TO Objects.

Practical no. : 31
Aim: (A) For the web page created for the display OF Employee data change the authentication mode to Windows

Aim: (B) For the webpage created for the display of Student data change the authorization mode so that only users who have logged in as VSIT will have the authority to aces the page

Practical no: 32
Aim: Create a web page to display the news from the news table(id, news_dtl). Use AJAX.

Practical no: 33
Aim: Create a web page to display the cricket score from the table event(id, name, score). Refresh the website automatically after every 30 seconds.
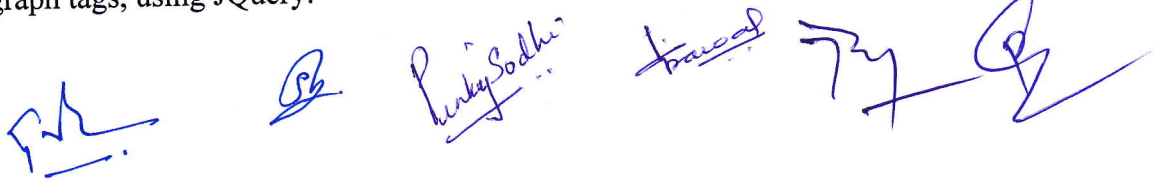
Practical no: 34
Aim: Create a web page to give different color effects for paragraph tags, heading tags and complete web page using JQuery.

Practical no: 35
Aim: Create a web page to display animation using JQuery.

Practical no: 36
Aim: Create a web page to display hide, show, slidedown, slideup and Toggle effects for paragraph tags, using JQuery.

BCA – 602   Mobile Application Development

Course Objectives: The goal of this subject is to understand the different types of command use for different purpose in Linux. Understanding the mobile application technology using Android and develop the mobile apps by Android Studio.

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

CO-1: Understand Linux features & their Architecture.

CO-2: Use of different commands (Related to Files, Directory, Disk, etc.)

CO-3: Comparison of Mobile Operating System like Android, IOS & Windows.

CO-4: Knowledge about Android API level and different version, features and architecture.

CO-5: Use of Android Studio for developing mobile apps.

CO-6: Android Components and use of Java and XML file for developing apps.

CO-7: Develop and execute on real physical mobile.

Course Contents:

Unit-I
Linux introduction and file system - Basic Features, Advantages, Installing requirement, Basic Architecture of Unix/Linux system, Kernel, Shell., Linux standard directories. Commands for files and directories cd, ls, cp, md, rm, mkdir, rmdir, pwd, file, more, less, creating and viewing files using cat, file comparisons – cmp & comm, View files, disk related commands, Filters, Redirection Operator and File permission command.

Unit-II
An Introduction to Mobile Computing- mobile Application Programming, Different Platforms. Operating systems-Architecture and working of Android, iOS and Windows phone, Comparison of Android, iOS and Windows phone, Android Development Environment -Advantages and Future of Android, Android Origin, Version and API level, Use of Android Studio.

Unit-III
Android Software Development Platform - Understanding Java SE and the Dalvik Virtual Machine, The Directory Structure of an Android Project, Common Default Resources Folders, The Values Folder Leveraging Android XML, Screen Sizes, Launching Your Application, Configure Virtual Device/Real Device for execute Android Apps.

Unit-IV
Android Framework Overview- The Foundation of OOP: The APK File, Android Application Components, And Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications, Activity Life Cycle, Fragment and Intents.

Unit-V
Working with the User Interface Using Views and ViewGroups, Different Layouts, Handling UI Events, Handling Pictures and Menu with Views, Storing the Data Persistently.

Suggested Text Books:
1. Cinar O. *Beginning Android 4*. Apress Publication.
2. Meier R. *Professional Android 4 Application Development*. Wrox Publication.

Reference Books:
1. Kothari P. *Android Application Development*. Black Book. Dream Tech Publication.
2. Novák I., Arvai Z., Balássy G., Fulop D. *Beginning Windows 8 Application Development*. Wrox Publication.

BCA – 606   Mobile Application Development Lab

1. Develop android application to print welcome message on a screen?
2. Develop android application to show the output of activity life cycle?
3. Develop android application to calculate simple Arithmetic Operation on Android?
4. Develop android application to show the fragment?
5. Develop android application to pass parameter from one activity into another activity?
6. Develop android application to perform operation through intent object?
   (i) Open Google website
   (ii) Dial a number
   (iii) Sending message
7. Develop SMS APPLICATION on Android?
8. Develop android application to show the different layout?
9. Develop android application to create menus?
10. Develop android application for image gallery?
11. Develop android application to perform following operation?
    (i) Display of progress bar
    (ii) Use of dialogue box
    (iii) Set the time
    (iv) Set the date
12. Develop android application for Creating Dialog box?
13. Develop android application for login Screen?

BCA – 603   Software Testing

Course Objectives: The Objective of this course is to learn and apply basic skills needed to create and automate the test plan of a software project, to know how to plan, develop, and execute an automated test plan. Students should learn testing concepts, Test planning, Creating a test plan in Test Director , Breaking the test plan into manageable components, Designing test cases and test steps, Analyzing the test plan, understanding of Automation testing, Creating a script through recording.

Course Outcomes: At the end of the course, students will be able to
CO-1. Apply various test processes and continuous quality improvement
CO-2. Understand and define the types of errors and fault models
CO-3. Using methods of test generation from requirements

Course Contents:

Unit-I
Introduction: Testing as an Engineering Activity, Testing as a process, testing axioms, basic Definitions Software Testing Principles, The Tester's Role in a software Development organization, The Defect Repository and Test Design, Developer/Tester Support for Developing a Defect Repository. Defect Prevention Strategies.

Unit-II
Test Case Design : Test Case Design Strategies, Using Black Box Approach to Test case design, Random Testing, Requirements based testing, Boundary Value Analysis, Decision tables, Equivalence class partitioning, State-based testing, Cause-effect graphing, Error guessing, Compatibility Testing.

Unit-III
Using White Box Approach to Test design, Test Adequacy Criteria, static testing vs. structural testing, code functional testing, Coverage and Control flow Graphs. Covering Code Logic, paths, their role in White box Based Test Design, Evaluating Test Adequacy Criteria.

Unit-IV
Levels Of Testing : The Need for Levels of Testing, Unit Test, Unit Test planning, Designing the Unit tests, The Test harness, Running the unit tests and Recording results, Integration tests, Designing integration Tests, Integration Test Planning, scenario testing, Defect bash elimination. System Testing, Acceptance testing, Performance testing, Regression testing, testing OO systems, testing the documentation.

Unit-V
Introduction to automatic testing & tools: Drawback of manual testing, Benefits of automatic testing, demerits of automatic testing, functional testing tools. Performance testing tools. Overview of automatic tool QTP : history, benefits, anatomy, main parts of QTP.

Suggested Text Books:
1. Srinivasan Desikan and Gopalaswamy Ramesh, Software Testing ' Principles and Practices', Pearson education.
2. Renu Rajani, Pradeep Oak, Software Testing - Effective Methods, Tools and Techniques, TataMcGraw Hill.

Reference Books:
1. Boris Beizer, Software Testing Techniques, Second Edition, Dreamtech.
2. Elfriede Dustin, Effective Software Testing, First Edition, Pearson Education.

BCA – 604   Data Mining

Course Objectives:
1. Be familiar with mathematical foundations of data mining tools.
2. Understand and implement classical models and algorithms in data warehouses and data mining.
3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
4. Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcomes: At the end of the course, students will be able to
CO-1. Understand the functionality of the various data mining and data warehousing component.
CO-2. Appreciate the strengths and limitations of various data mining and data warehousing models.
CO-3. Explain the analyzing techniques of various data.

Course Contents:

Unit-I
Introduction: Data Mining – Motivation, Importance of DM Functionalities, Basic Data Mining Tasks, DM Applications, and Social Implications

Unit-II
Data Warehousing: Differences between Operational Database and Data Warehouse – Multidimensional Data Model - From Tables to Data Cubes. Schemas, Measures, DW Implementation – Efficient Computation of Data Cubes.

Unit-III
Data Reprocessing, Data Mining Primitives, Languages: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and concept of Hierarchy Generation, Task relevant Data, Background Knowledge, Presentation and Visualization of Discovered Patterns.

Unit-IV
Data Mining Algorithms: Association Rule Mining, Classification and Prediction – Decision Tree, Bayesian Classification Back Propagation, Cluster Analysis, Outlier Analysis.

Unit-V
Web, Temporal and Spatial Data Mining: Web Content Mining, Web Structure Mining, Web Usages Mining, Spatial Mining, Generalization and specialization, Spatial Rules, Spatial Classification and Clustering Algorithms, Temporal Mining, Modeling Temporal Events, Times Series, Pattern Detection, Sequences.

Reference Text Books:
1. Jiawei I-lan & Micheline Kambler, "Data Mining: Concepts and Techniques", Harcourt India Pvt. Ltd., First Indian Reprint, 2001
2. Margaret H. Dunham, "Data Mining : Introduction and Advance Topics", Pearson Education, First Indian Reprint, 2003
3. Arun K. Pujari, "Data Mining Techniques", University Press (India) Limited, First edition, 2001 4. Efrem O, Mallach, "Decision Support and Data Warehousing Systems", Mcgraw-Hill International Edition, 2000