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ASSAM UNIVERSITY, SILCHAR

SYLLABUS UNDER

CHOICE BASED CREDITSYSTEM

BACHELOR IN COMPUTER APPLICATION (BCA)

(General)

Course Structure

DETAILS OF COURSES FOR BACHELORCOMPUTER APPLICATION (Honours)

BCA Honours

Core Course	Credits	
	Theory+ Practical	Theory + Tutorial
I. Core Course		
Core Course Theory (14 papers)	14X4= 56	14X5=70
Core Course Practical / Tutorial* (14 papers)	14X2=28	14X1=14
II. Elective papers (8 papers)		
A.1. Discipline Specific Elective (4papers)	4X4=16	4X5=20
A.2Discipline Specific Elective Practical / Tutorial* (4papers)	4 X 2=8	4X1=4
B.1. Generic Elective (4papers) to be chosen from other discipline	4X4=16	4X5=20
B.2. Generic Elective Practical / Tutorial* (4papers)	4 X 2=8	4X1=4
III. Ability Enhancement Courses		
1. Ability Enhancement Compulsory (2 Papers)		
Environmental APPLICATION	1 X 4=4	1 X 4=4
English/MIL Communication	1 X 4=4	1 X 4=4
2. Ability Enhancement Elective (Skill Based) (2 Papers)	2 X 2=4	2 X 3=6
Ability Enhancement Elective (Skill Based) Practical / Tutorial* (2 Papers	2 X 2=4	2 X 1=2
Total Credit	148	148

• Each credit is equivalent to 1 hour of activity per week

TDC (CBCS) Course Structure
BCA Pass
Total Course = 24 Total Credits = 132, Total Marks = 2400

	Honours Subject			**Compulsory Subjects**		**Semester wise total**		
	CORE Credits = 6 Marks = 100	**DSE** Credits = 6 Marks = 100	**SEC** Credits = 4 Marks = 100	**AECC 1** Credits = 4 Marks = 100	**AECC 2** Credits = 4 Marks = 100	Papers	Credits	Marks
I	**C-1A:**Computer Fundamentals (4) **C-1A-Lab:**Practical on Computer Fundamentals (2) C-2A: C-3A:			Eng. Communication / MIL Communication		4	22	400
II	**C-1B:**Introduction to Programming (4) **C-1B-Lab:**Practical on Programming using C and C++ (2) C-2B: C-3B:				Environmental Studies	4	22	400
III	**C-1C:**Computer Networks (4) **C-1C-Lab:**Practical on Network Programming (2) C-2C: C-3C:		**SEC-1:**Open Source Software (2) **SEC-1-Lab:** Practical on Open Source Software (2)			4	28	500
IV	C-1D: Introduction to Database Systems (4) C-1D-Lab: Practical on Database Systems (2) C-2D: C-3D:		**SEC-2:** Programming in Python (2) **SEC-2-Lab:** Practical on Programming in Python (2)			4	28	500

V		**DSE-1A:** Internet Technologies (4) **DSE-1A-Lab:** Practical on Internet Technologies (2) DSE-2A: DSE-3A:	**SEC-3**: Programming in Java **(2)** **SEC-3-Lab**: Practical on Java **(2)**			4	24	400
VI		**DSE-1B:**Project work/ Dissertation (6) **DSE-2B:** **DSE-3B:**	**SEC-4:** PHP Programming **(2)** **SEC-4-Lab:** Practical on PHP Programming **(2)**			4	24	400
Total	**12**	**6**	**4**	**1**	**1**	**24**	**132**	**2400**

N.B. Compulsory papers:
i. AECC1 – English Communication/MIL
ii. AECC2 – Environment Studies

*Out of the 4 (Four) SEC papers, a student has to choose minimum 1 (One) paper and can choose a maximum 2 (Two) papers.

CCA – Continuous and Comprehensive Assessment (Internal Assessment), **ESE** – End Semester Examinations, **FM** – Full Marks, **PM** – Pass Marks

COMPUTER APPLICATION- C-1A

Computer Fundamentals

(Credits: 04**)**

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

Objective: Computer Fundamentals is a course that's designed specifically for those who are completely new to computers. This syllabus has been prepared for the beginners as well as advanced learners who want to deal with computers. After completing these contents you will find yourself at a moderate level of expertise in knowledge of computer basics from where you can take yourself to next levels.

Unit 1: Introduction: Introduction to computer system, uses, types. Data Representation: Number systems and character representation, binary arithmetic Human

Unit 2: Computer Interface: Types of software, Operating system as user interface, utility programs. Devices: Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter.

Unit 3: Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks.

Unit 4: Computer Organization and Architecture: C.P.U., registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors.Overview of Emerging Technologies: Bluetooth, cloud computing, big data, data mining, mobile computing and embedded systems.

Unit 5: Use of Computers in Education and Research: Data analysis, Heterogeneous storage, e-Library, Google Scholar, Domain specific packages such as SPSS, Mathematica etc.

Reference Books:

1. A. Goel, Computer Fundamentals, Pearson Education, 2010.
2. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006
3. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007

COMPUTER APPLICATION-C-1A-LAB

Practical on Computer Fundamentals

(Credits: 02**)**

Total marks: 30[**] (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**]*For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.*]

Practical:

Practical exercises based on Open Office tools using document preparation and spreadsheet handling packages.

The practical assignment must include connecting parts of a computer and assembling it to an extent, media formatting and installation of some software.

Practical exercises based on Open Office tools using document preparation and spreadsheet handling packages.

Text Editor

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

9. 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

Add a column Region (values: S, N, N,S,S,S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:

In this exercise, you will add a new row to your table, place the word "Total" at the bottom of the Salesperson column, and sum the Dolls, Trucks, and Puzzles columns.

10. Wrapping of text around the image.

11. Create your resume by incorporating most of the options learned till now.
12. 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

Spreadsheet

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	
Harayana	1800	2000	2200	2700	15	
Rajasthan	2100	2000	1800	2200	20	

TOTALAVERAGE

(a) Apply Formatting as follow:

I. Title in TIMES NEW ROMAN

ii. Font Size - 14

iii. Remaining text - ARIAL, Font Size -10

iv. State names and Qtr. Heading Bold, Italic with Gray Fill Color.

v. Numbers in two decimal places.

vi. Qtr. Heading in center Alignment.

vii. Apply Border to whole data.

(b) Calculate State and Qtr. Total

(c) Calculate Average for each quarter

(d) Calculate Amount = Rate * Total.

2. Given the following worksheet

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

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

If Marks	Then Grade
>= 80	A+
>= 60 < 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
  <=1000Rs. 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%
1	XX	XX	XX	XX	XX
2	XX	XX	XX	XX	XX
3	XX	XX	XX	XX	XX

4	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**
Rent600.00	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

(a) Calculate Quarter total and Quarter average.
(b) Calculate Monthly total.
(c) Surplus = Monthly income - Monthly total.
(d) What would be total surplus if monthly income is 1500.
(e) How much does telephone expense for March differ from quarter average.
(f) Create a 3D column graph for telephone and utilities.
(g) 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

COMPUTER APPLICATION- C-1B

INTRODUCTION TO PROGRAMMING

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)
Pass marks: 28 (ESE: 20; Sessional: 8)

Unit I

Introduction to C and C++

History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O

Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putcharetc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.hetc).

Unit II

Expressions, Conditional Statements and Iterative Statements: Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

Unit III

Functions and Arrays: Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.

Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

Unit IV

Derived Data Types (Structures and Unions): Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

File I/O, Preprocessor Directives

Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros.

Unit V

Using Classes in C++

Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables &Functions, Objects as parameters, specifying the Protected and Private Access, Copy Constructors, Overview of Template classes and their use.

Inheritance and Polymorphism
Introduction to Inheritance and Polymorphism

Reference Books:
1. HerbtzSchildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003
2. BjarneStroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley , 2013.
3. BjarneStroustroup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
4. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.
5. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
6. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
7. Andrew Koeni, Barbara, E. Moo, "Accelerated C++", Published by Addison-Wesley , 2000.
8. Scott Meyers, "Effective C++", 3rd Edition, Published by Addison-Wesley, 2005.
9. Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014
10. Walter Savitch, "Problem Solving with C++", Pearson Education, 2007.
11. Stanley B. Lippman, JoseeLajoie, Barbara E. Moo, "C++ Primer", Published by Addison-Wesley, 5th Edition, 2012

COMPUTER APPLICATION - C-1B- LAB
Practical on Introduction to C/C++ Programming
(Credits: 02)
Total marks: 30** (CCA + ESE = 30)
Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

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+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 or new operator.
16. Write a menu driven program to perform following operations on strings:13
    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. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the
    respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
23. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
24. Create a class Box containing length, breath and height. Include following methods in it:
    a) Calculate surface Area
    b) Calculate Volume
    c) Increment, Overload ++ operator (both prefix & postfix)
    d) Decrement, Overload -- operator (both prefix & postfix)
    e) Overload operator == (to check equality of two boxes), as a friend function

f) Overload Assignment operator

g) Check if it is a Cube or cuboid

Write a program which takes input from the user for length, breath and height to test the above class.

25. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.

26. Write a program to retrieve the student information from file created in previous question and print it in following format:

Roll No. Name Marks

27. Copy the contents of one text file to another file, after removing all whitespaces.

28. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.14

29. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.

COMPUTER APPLICATION- C-1C

Computer Networks

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the basic concepts of networks and functions of different OSI reference model.

UNIT I

Introduction to Computer Networks: Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

Data Communication Fundamentals and Techniques: Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

UNIT II

Networks Switching Techniques and Access mechanisms: Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

UNIT III

Data Link Layer Functions and Protocol: Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.

Multiple Access Protocol and Networks: CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways;

UNIT IV

Networks Layer Functions and Protocols: Routing; routing algorithms; network layer protocol of Internet- IP protocol, Internet control protocols.

UNIT V

Transport Layer Functions and Protocols : Transport services- error and flow control, Connection establishment and release- three way handshake;

Overview of Application layer protocol: Overview of DNS protocol; overview of WWW &HTTP protocol.

Reference Books

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, TMH ,2007.
2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI , 2002

COMPUTER APPLICATION- C-1C- LAB

Practical on Network Programming

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of network programming.

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
2. Simulate and implement stop and wait protocol for noisy channel.
3. Simulate and implement go back n sliding window protocol.
4. Simulate and implement selective repeat sliding window protocol.
5. Simulate and implement distance vector routing algorithm
6. Simulate and implement Dijkstra algorithm for shortest path routing.
7. WAP to find the address of the local machine
8. WAP A program that prints the address of www.youtube.com
9. WAP A program that prints all the addresses of www.youtube.com
10. Write a program to implement following methods:
    public String getHostName( )
    public byte[] getAddress( )
    public String getHostAddress( )

11. Describe the following methods in brief:
    public2ooleanisAnyLocalAddress( )
    public2ooleanisLoopbackAddress( )

12. Write a program to testing the characteristics of an IP address i.e. you have to check whether given address is AnyLocalAddress, LoopbackAddress, LinkLocalAddress, SiteLocalAddress or MulticastAddress.
13. Write a program to enter the IP address of any node and check whether a particular node is reachable from the current host.
14. Write a program of protocol tester .It is a simple program for determining which protocols a virtual machine supports. It attempts to construct a URL object for each of 10 URL given below. If the protocol is not supported. A MalformedURLException is thrown and you know the protocol is not supported.

Test protocols for following URL:

1. http://www.adc.org
2. https://www.amazon.com/exec/obidos/order2/
3. file:///etc/passwd

4. ftp://metalab.unc.edu/pub/languages/java/javafaq
5. mailto:elharo@metalab.unc.edu
6. telnet://dibner.poly.edu/
7. nfs://utopia.poly.edu/usr/tmp/
8. gopher://gopher.anc.org.za/
9. verbatim:http://www.adc.org/netdoc:/UsersGuide/release.html

COMPUTER APPLICATION-SEC-1

Open Source Software

(Credit: 02)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

Objective: This course provides an overview of the modern context and operation of free and open source software communities and associated software projects. The practical objective is to teach students how they can begin to participate in a FOSS project.

Unit I

Introduction to OSS: introduction, need for open source applications-advantages, disadvantages, history, meaning and extraction of the terms free software and OSS, security and reliability, application of OSS.

Unit II

Linux basics: introduction, setting up environment, simple c file and compilation, kernel, basic commands, process: types of process, process states, creation of process, process priorities, scheduling policies, signals - types, sending & receiving signal.

Unit III

Android: introduction, open source android platform, history, android architecture, features, Delvik Virtual Machine (DVM), Android Virtual Device or Emulator, File System hierarchy, sample android app.

Unit IV

PHP basics: introduction, identifier, variable, constant, data types, operators, statements, PHP loops, PHP script execution, interaction of web browser & web server.

Unit V

Open source Grid Computing: introduction, open grid service architecture (OGSA), OGSA definition, OGSA basic services. Open Source Cloud, FOSS Cloud Software: Eucalyptus, OpenNebula – purpose.

Text Book:

1. M. N. Rao, “Fundamentals of Open Source Software: A Developer's Perspective”, PHI, 2015.
2. Understanding Open Source and Free Software Licensing – O’Reilly Media, 2011

ONLINE READING / SUPPORTING MATERIAL:

1. https://www.tutorialspoint.com/android/index.htm.
2. https://developer.android.com/samples/index.html
3. http://docs.oracle.com/javase/tutorial/index.htm (Available in the form of free downloadable e-books also).

COMPUTER APPLICATION-SEC-1-LAB

Practical on Open Source Software

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

Software Lab Based on Android Programming:

1. Create ―Hello World‖ application. That will display ―Hello World‖ in the middle of the screen in the emulator. Also display ―Hello World‖ in the middle of the screen in the Android Phone.
2. Create an application with login module. (Check username and password).
3. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.
4. Create a menu with 5 options and and selected option should appear in text box.
5. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
6. Create an application with three option buttons, on selecting a button colour of the screen will change.
7. Create and Login application as above. On successful login, pop up the message.
8. Create an application to Create, Insert, update, Delete and retrieve operation on the database.

COMPUTER APPLICATION- C-1D

Introduction to Database Systems

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the concepts of database management, ER modeling, data model, database design, transaction processing, file structure & indexing.

UNIT I

Introduction: Characteristics of database approach, data models, database system architecture and data independence.

Entity Relationship(ER) Modeling: Entity types, relationships, constraints.

UNIT II

Relation data model: Relational model concepts, relational constraints, relational algebra, SQL queries

UNIT III

Database design: Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (upto BCNF).

UNIT IV

Transaction Processing: ACID properties, concurrency control

UNIT V

File Structure and Indexing: Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files (Primary index, secondary index, clustering index), Multilevel indexing using B and B+ trees.

Books Recommended:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill,
2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw
Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

COMPUTER APPLICATION- C-1D- LAB

Practical on Database Systems

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of Database Management Systems.

1. 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

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 unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than $2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.
8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.

10. Query to display Name and Job of all employees who don‘t have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission.
12. Sort the data in descending order of Salary and Commission.

13. Query to display Name of all the employees where the third letter of their name is _A‘.
14. 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.
15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
18. Query to display Name and calculate the number of months between today and the date each employee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
20. 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‘.
21. Query to display Name, Hire Date and Day of the week on which the employee started.
22. Query to display Name, Department Name and Department No for all the employees.
23. Query to display Unique Listing of all Jobs that are in Department # 30.
24. Query to display Name, Dept Name of all employees who have an _A‘ in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
26. 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.
27. 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.
28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies $100.
29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
30. Query to display the number of employees performing the same Job type functions.
31. Query to display the no. of managers without listing their names.
32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
33. Query to display Name and Hire Date for all employees in the same dept. as Blake.
34. Query to display the Employee No. And Name for all employees who earn more than the average salary.
35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a _T‘.
36. Query to display the names and salaries of all employees who report to King.
37. Query to display the department no, name and job for all employees in the Sales department.

COMPUTER APPLICATION-SEC-2

Programming with Python

(Credits: 02**)**

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

Objective: This course provides the basics of Python. The subject will help in learning the basic data types, variables, control flow statements, functions and classes of Python and also how to write a Python program.

Unit 1

Planning the Computer Program: Concept of problem solving, Problem definition,Program design, Debugging, Types of errors in programming, Documentation.
Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

Unit 2

Overview of Programming: Structure of a Python Program, Elements of Python.
Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator)

Unit 3

Creating Python Programs: Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Errors and Exceptions.Iteration and Recursion: Conditional execution, Alternative execution, Nested conditionals, the return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, the while statement, Tables, Two-dimensional tables.

Unit 4

Strings and Lists: String as a compound data type, Length, Traversal and the for loop,
String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists

Unit 5

Object Oriented Programming: Introduction to Classes, Objects and Methods, Standard Libraries.Data Structures: Arrays, list, set, stacks and queues.Searching and Sorting: Linear and Binary Search, Bubble, Selection and Insertion sorting.

References:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011.
2. Allen Downey, Jeffrey Elkner, Chris Meyers. How to think like a computer scientist: learning with Python / 1st Edition,2012 – Freely available online.
3. http://docs.python.org/3/tutorial/index.html

4. http://interactivepython.org/courselib/static/pythonds

COMPUTER APPLICATION-SEC-2-LAB

Practical on Programming with Python

(Credits: 02**)**

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

1. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature.
2. Using while loop, produce a table of sins, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x, print the value of sin(x), cos(x) and tan(x).
3. Write a program that reads an integer value and prints “leap year” or “not a leap year”.
4. Write a program that takes a positive integer n and then produces n lines of output shown as follows.
   For example enter a size: 5
   *
   **
   ***
   ****
   *****
5. Write a function that takes an integer ‘n’ as input and calculates the value of 1 + 1/1! + 1/2! + 1/3! + … + 1/n
6. Write a function that takes an integer input and calculates the factorial of that number.
7. Write a function that takes a string input and checks if it’s a palindrome or not.
8. Write a list function to convert a string into a list, as in list (‘abc’) gives [a, b, c].
9. Write a program to generate Fibonacci series.
10. Write a program to check whether the input number is even or odd.
11. Write a program to compare three numbers and print the largest one.
12. Write a program to print factors of a given number.
13. Write a method to calculate GCD of two numbers.
14. Write a program to sort a list using insertion sort and bubble sort and selection sort..

COMPUTER APPLICATION- DSE-1A

Internet Technologies

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the concepts of Internet technologies that are used to develop different interfaces through which user communicate and share information.

UNIT I

Internet, structure of internet, history of internet, Internet protocol: TCP/IP, SLIP, PPP, Network and network devices, Addressing in Internet - DNS, domain name and their organisation, understanding the Internet protocol address, Client-server concept- architecture and application.

Evolution of www, basic features, servers, http, URL, search engine, searching categories, hypertext.

UNIT II

Basic HTML, HTML tags, creating list in HTML, hyperlinks, multimedia, HTML forms, tables in HTML, frames in HTML, image maps, style sheets in HTML. DHTML, XML-Introduction, Need for XML, Advantages, simple XML programs, DTD.

UNIT III

Creating interactive and dynamic web pages with JavaScript: Client-side scripting languages, JavaScript overview; constants, variables, operators, expressions and statements; user-defined & built-in-functions; properties and methods of built-in objects, client-side form validation.

UNIT IV

Server side scripting: ASP, ASP variables, procedures, conditionals, looping, forms, cookies, session, ASP AJAX, ASP VB functions, Accessing a database from an ASP page, ADO connect, ADO recordset.

UNIT V

Servlet:overview, environment setup, life cycle, applet vs servlet, form data, client request, server response, http codes, writing filters, exceptions, database access.

Text/ Reference Books

1) The Internet – Complete M.L Young ; Tata McGraw Hill
2) Mastering JavaScript and Jscript by J. Jaworski ; BPB Publication
3) Dynamic HTML –the definitive references by D. Godman: Shroff Publishers
4) Understanding XHTML by D.P Nagpal: Wheeler Publishing.
5) Daniel Minoli. Internet and Internet Engineering Tata McGraw-Hill Edition (for Unit I & II)
6) Active Server pages, Keith & Jill, VIkas.
7) Java Script, Gosslin, Vikas
8) Core Java 2, VOl II, Addison Wesley
9) Java Servlets Developer's Guide, Karl Moss, McGraw-Hill/Osborne, 2002

COMPUTER APPLICATION- DSE-1A- LAB

Practical on Internet Technologies

(Credits: 02)

Total marks: 30[**] (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of network programming.

HTML

1. Create a HTML document consisting of HTML heading, paragraphs and images.
2. Create a HTML document and insert comments in the HTML source code and insert horizontal lines.
3. Construct HTML document to set the font of a text , size of the font, style of the font.
4. Create a HTML document to show how to create hyperlinks.
5. Create a HTML document to use an image as a link.
6. Create a HTML document to open link in a new browser window.
7. Create a HTML document to jump to another part of a document (on the same page).
8. Create a HTML document to insert images from another folder or another server.
9. Create an image-map, with clickable regions.
10. Create a HTML document with all table elements (Table, Caption, Table Row, Table Data element, Table Heading Element, THEAD, TFOOT, TBODY)
11. Create HTML document to make an unordered list, an ordered list, different types of ordered lists, different types of unordered lists, Nested list, Definition list.
12. Create HTML form with the all FORM elements (text fields, password field, Checkboxes, Radio buttons, Select elements, Drop-down list with a pre-selected value, Textarea (a multi-line text input field) and buttons.
13. Create HTML document with all Frame elements (FRAMESET, FRAME, NOFRAMES, and INLINE FRAME).
14. Create a HTML document to add AUDIO and VIDEO.
15. Create a HTML document to aligning images (Let the image float to the left/right of a paragraph).
16. Create a HTML document to jump to a specified section within a frame
17. Construct a HTML document with CSS to Set the background colour of a page.
18. Construct a HTML document with CSS to set an image as the background of a page
19. Construct HTML document with CSS to Set the text color of different elements and align the text.
20. Construct HTML document to set different colours to visited/unvisited links, Specify a background colour for links

XML

21. Construct an XML document that contain information about products of an organization.
22. Construct an XML document that contain information of 5 students (such as roll no., name , address, class).

23. Construct an XML document that contain details of 10 books.

JAVAScript

24. Write a program in javasrcript to accept a name from the user and display the same name in an alert box.
25. Write a program in javasrcript to display a message in a confirm box.
26. Write a program in javasrcript to display the message _time is running out‘ in the status bar.
27. Write a program in JavaScript to enter marks of a student and find his/her grade according to the following:
    if marks>=90 then grade A
    if marks>=80 then grade B
    if marks>=70 then grade C
    if marks>=60 then grade D
    else fail.
28. Write a program in JavaScript to create a button and when the button is clicked the message _Hello World‘ is displayed on an alert box.
29. Write a program in JavaScript to accept 2 nos from the user and show the working of all arithmetic operators.
30. Write a program in JavaScript to accept 2 strings and concatenate them.
31. Write a program in JavaScript to display the current date and time.
32. Write a program in JavaScript to find the length of an array.
33. Write a program in JavaScript to check whether a string is palindrome or not.
34. Write a program in JavaScript that responds to a mouse click anywhere on the page(using mouse click).
35. Write a program in JavaScript to display the contents of a check box in a alert box.
36. Write a program to validate a form in the user id and password forms.
37. Write a program in JavaScript to create a welcome cookie, Button animation, Image map with added JavaScript Simple timing, Timing event in an infinite loop

Servlet/ASP :

38. Develop a webpage with hypothetical data to do the following
    i. Connecting to database.
    ii. Insert Data To Database.
    iii. Retrieving Data From Database
    iv. Updating Data IntoDatabase.
    v. Deleting Data From Database –

COMPUTER APPLICATION- SEC-3

Programming in Java

(Credits: 02)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the programming concepts in Java.

Unit-I

Introduction to Java, Basic Features, Java Virtual Machine Concepts, A Simple Java Program, Primitive Data Type and Variables, Java Keywords, Integer and Floating Point Data Type, Character and Boolean Types, Declaring and Initialization Variables, Java Operators, Expressions, control statements, Arrays.

Unit-II

Class Fundamentals, Creating objects ,Assigning object reference variables ,Introducing Methods, Method overloading, Static methods, Constructors, overloading constructors, This Keyword, Using Objects as Parameters, Argument passing, Returning objects ,Method Overriding, Garbage Collection, The Finalize ( ) Method, Inheritance Basics, Access Control,Multilevel Inheritance, Abstract Classes ,Polymorphism ,Final Keyword, Package, Defining Package, CLASSPATH, Package naming, Accessibility of Packages, Using Package Members, Interfaces, Implementing Interfaces, Interface and Abstract Classes.

Unit-III

Exception Handling,Multithreaded Programming, I/O in Java ,Text Streams, Stream Tokenizer, Buffered Stream , Print Stream, Random Access File, The String Class, String Buffer Class, StringTokenizerand Methods.

Unit-IV

Applets Programming, Building User Interface with AWT, Swing-based GUI, Layouts and Layout Manager, Container.

Unit-V

Java Database Connectivity; Establishing a Connection; Transactions with Database .

Reference Books

1. Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4th Edition, 2005.
2. James Gosling, Bill Joy, Guy L Steele Jr, GiladBracha, Alex Buckley"The Java Language
Specification, Java SE 8 Edition (Java Series)", Published by Addison Wesley, 2014.
3. Joshua Bloch, "Effective Java" 2nd Edition,Publisher: Addison-Wesley, 2008.
4. Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1 ,9thEdition,Printice Hall.2012
5. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 2 - Advanced Features)", 9th Edition, Printice Hall.2013
6. Bruce Eckel, "Thinking in Java", 3rd Edition, PHI, 2002.
7. E. Balaguruswamy, "Programming with Java", 4th Edition, McGraw Hill.2009.
8. Paul Deitel, Harvey Deitel, "Java: How to Program", 10th Edition, Prentice Hall, 2011.

9. "Head First Java", Orielly Media Inc. 2nd Edition, 2005.
10. David J. Eck, "Introduction to Programming Using Java", Published by CreateSpace Independent Publishing Platform, 2009.
11. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2nd Edition, 2004.

COMPUTER APPLICATION- SEC-3- LAB

Practical on Programming in JAVA

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of programming in Java.

1. To find the sum of any number of integers entered as command line arguments
2. To find the factorial of a given number
3. To learn use of single dimensional array by defining the array dynamically.
4. To learn use of lenth in case of a two dimensional array
5. To convert a decimal to binary number
6. To check if a number is prime or not, by taking the number as input from the keyboard
7. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument
8. Write a program that show working of different functions of String and StringBufferclasss like setCharAt(), setLength(), append(), insert(), concat()and equals().
9. Write a program to create a ―distance‖ class with methods where distance is computed in terms of feet and inches, how to create objects of a class and to see the use of this pointer
10. Modify the ―distance‖ class by creating constructor for assigning values (feet and inches) to the distance object. Create another object and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object.
11. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions(from lower to higher data type).
12. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword.
13. Write a program to show the use of static functions and to pass variable length arguments in a function.
14. Write a program to demonstrate the concept of boxing and unboxing.
15. Create a multi-file program where in one file a string message is taken as input from the user
and the function to display the message on the screen is given in another file (make use of Scanner package in this program).
16. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate Fibonacci series is given in a different file belonging to the same package.

17. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages.
18. Write a program ―DivideByZerothat takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
19. Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.
20. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).
21. Write a program to demonstrate priorities among multiple threads.
22. Write a program to demonstrate multithread communication by implementing synchronization among threads (Hint: you can implement a simple producer and consumer problem).
23. Write a program to create URL object, create a URLConnection using the openConnection() method and then use it examine the different components of the URLand content.
24. Write a program to implement a simple datagram client and server in which a message that is typed into the server window is sent to the client side where it is displayed.
25. Write a program that creates a Banner and then creates a thread to scrolls the message in the banner from left to right across the applet‘s window.
26. Write a program to get the URL/location of code (i.e. java code) and document(i.e. html file).
27. Write a program to demonstrate different mouse handling events like mouseClicked(), mouseEntered(), mouseExited(), mousePressed, mouseReleased() and mouseDragged().
28. Write a program to demonstrate different keyboard handling events.
29. Write a program to generate a window without an applet window using main() function.
30. Write a program to demonstrate the use of push buttons.

COMPUTER APPLICATION-DSE-1B

Project work/ Dissertation

(Credits: 06)

Total marks: 100 (ESE: 70; CCA: 30)

Pass marks: 40 (ESE: 28; CCA: 12)

This option to be offered only in 6th Semester.

The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses.

The group size should be maximum of three (03) students.

Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes.

A maximum of Four (04) projects would be assigned to one teacher.

COMPUTER APPLICATION-SEC-4

PHP Programming

(Credits: 02**)**

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

Objective: This course will provide the basic knowledge of PHP. It will help to learn the PHP keywords and statements, database connectivity and will also help to get a job in software industry as web developer.

Unit I

PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.).PHP with other technologies, scope of PHP

Unit II

Design and write PHP programs – Basic PHP syntax, structure and coding techniques, variables, constants, expressions and operators.

Unit III

Use of arrays, string, numbers, built-in functions and global variables

Unit I

Handling HTML form with PHP:

- Capturing Form Data
- GET and POST form methods
- Dealing with multi value fields
- Redirecting a form after submission

Unit V

Use PHP to send email, upload files dynamically; MySQL Database- setup, connection, insert, update, delete, display records

References :

1. Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India), 2007.

2. Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited, 2008.

3. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition Paperback, O'reilly, 2014.

4. Luke Welling, Laura Thompson, PHP and MySQL Web Development", 4th Edition, Addition Paperback, Addison-Wesley Professional,2008.

5. David Sklar, Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers", 2014.

COMPUTER APPLICATION-SEC-4-LAB

Practical on PHP Programming

(Credits: 02**)**

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

1. Write a program to find greatest of three numbers.
2. Write a program to find gross salary of a person
3. Write a program to find grade of a student given his marks.
4. Write a program to find divisor or factorial of a given number.
5. Write a program to print first ten natural numbers.
6. Write a program to print first ten even and odd numbers.
7. Implement the PHP/MySQL concepts listed in theory.
8. Implement some exercises of semester using PHP as front end.

ASSAM UNIVERSITY, SILCHAR

SYLLABUS UNDER

CHOICE BASED CREDITSYSTEM

BACHELOR IN COMPUTER APPLICATION (BCA) (HONOURS)

Course Structure

DETAILS OF COURSES FOR BACHELORCOMPUTER APPLICATION (Honours)

BCA Honours

Core Course	Credits	
	Theory+ Practical	Theory + Tutorial
I. Core Course		
Core Course Theory (14 papers)	14X4= 56	14X5=70
Core Course Practical / Tutorial* (14 papers)	14X2=28	14X1=14
II. Elective papers (8 papers)		
A.1. Discipline Specific Elective (4papers)	4X4=16	4X5=20
A.2Discipline Specific Elective Practical / Tutorial* (4papers)	4 X 2=8	4X1=4
B.1. Generic Elective (4papers) to be chosen from other discipline	4X4=16	4X5=20
B.2. Generic Elective Practical / Tutorial* (4papers)	4 X 2=8	4X1=4
III. Ability Enhancement Courses		
1. Ability Enhancement Compulsory (2 Papers)		
Environmental APPLICATION	1 X 4=4	1 X 4=4
English/MIL Communication	1 X 4=4	1 X 4=4
2. Ability Enhancement Elective (Skill Based) (2 Papers)	2 X 2=4	2 X 3=6
Ability Enhancement Elective (Skill Based) Practical / Tutorial* (2 Papers	2 X 2=4	2 X 1=2
Total Credit	148	148

• Each credit is equivalent to 1 hour of activity per week

	Core Course (14)	Ability Enhancement Compulsory Course (AEEC) (2)	Ability Enhancement Elective Course (AECC) (2) (Skill Based)	Elective: Discipline Specific DSE (4)	Elective:Generic (GE) (4) To be taken from other discipline
I	COMPUTER APPLICATION-C-101	(English/MIL Communication) Environmental Science			GE-1
	COMPUTER APPLICATION-C-102				
II	COMPUTER APPLICATION-C-201	Environmental Science/ (English/MIL Communication)			GE-2
	COMPUTER APPLICATION-C-202				
III	COMPUTER APPLICATION-C-301		COMPUTER APPLICATION-SEC-301		GE-3
	COMPUTER APPLICATION-C-302				
	COMPUTER APPLICATION-C-303				
IV	COMPUTER APPLICATION-C-401		COMPUTER APPLICATION-SEC-401		GE-4
	COMPUTER APPLICATION-C-402				
	COMPUTER APPLICATION-C-403				
V	COMPUTER APPLICATION-C-501			COMPUTER APPLICATION-DSE-501	
	COMPUTER APPLICATION-C-502			COMPUTER APPLICATION-DSE-502	
VI	COMPUTER APPLICATION-C-601			COMPUTER APPLICATION-DSE-601	
	COMPUTER APPLICATION-C-602			COMPUTER APPLICATION-DSE-602	

TDC (CBCS) Course Structure
BCA Honours
Total Course = 26 Total Credits = 148, Total Marks = 2600

SEM	Semester-wise distribution of papers						Semester wise total		
	Honours Subject			Elective Subject	Compulsory Subjects				
	CORE Credits = 6 Marks = 100	**DSE** Credits = 6 Marks = 100	**SEC** Credits = 4 Marks = 100	**GE** Credits = 6 Marks = 100	**AECC 1** Credits = 4 Marks = 100	**AECC 2** Credits = 4 Marks = 100	Papers	Credits	Marks
I	**C-1:**Computer Fundamentals (4) **C-1-Lab:**Practical on Computer Fundamentals (2) **C-2:**Discrete Structures (6)			**GE-1:**Computer Fundamentals (4) **GE-1-Lab**: Practical on Computer Fundamentals (2)	Eng. Communication / MIL Communication		4	22	400
II	**C-3:**Introduction to Programming (4) **C-3-Lab:**Practical on Programming using C and C++ (2) **C-4:**Computer System Architecture (6)			**GE-2:**Introduction to Programming (4) **GE-2-Lab:**Practical on Programming using C and C++ (2)		Environmental Studies	4	22	400
III	**C-5:**Data Structures (4) **C-5-Lab:**Practical on Data Structures (2) **C-6:** Operating System (4) **C-6-Lab:** Practical on UNIX/LINUX (2) **C-7:**Computer Networks (4) **C-7-Lab:**Practical on Network Programming (2)		**SEC-1:**Open Source Software (2) **SEC-1-Lab:** Practical on Open Source Software (2)	**GE-3:**Computer Networks (4) **GE-3-Lab:**Practical on Network Programming (2)			5	28	500
IV	**C-8:**Design and Analysis of Algorithms (6) **C-9:**Computer Graphics (4) **C-9-Lab:**Practical on Graphics Programming (2) **C-10:** Introduction to		**SEC-2:**Programming in Python (2) **SEC-2-Lab:** Practical on Programming in	**GE-4:**Introduction to Database Systems (4) **GE-4-Lab:**Practical on			5	28	500

	Database Systems (4) **C-10-Lab:** Practical on Database Systems (2)		Python (2)	Database Systems (2)					
V	**C-11:**Programming in Java(4) **C-11-Lab:**Practical on Programming in Java (2)	**DSE-1:**Numerical & Statistical Methods (4) **DSE-1-Lab:**Practical on Numerical & Statistical Methods (2)					4	24	400
	C-12: Management Information System (6)	**DSE-2:**Internet Technologies (4) **DSE-2-Lab**: Practical on Internet Technologies (2)							
VI	**C-13:**Fundamentals of E-commerce (6) **C-14:**Software Engineering (6)	**DSE-3:**PHP Programming (4) **DSE-3-Lab:**Practical on PHP Programming (2)					4	24	400
		DSE-4: Project work/ Dissertation (6)							
Total	**14**	**4**	**2**	**4**	**1**	**1**	**26**	**148**	**2600**

N.B: Compulsory papers:

i. AECC1 – English Communication/MIL

ii. AECC2 – Environment Studies

BCA Honours students can opt for Four papers of any one discipline listed below (GE 1 to GE4)

i. Economics**ii**. BBA**iii**. Commerce**iv**. All Science subjects

CCA – Continuous and Comprehensive Assessment (Internal Assessment), **ESE** – End Semester Examinations, **FM** – Full Marks, **PM** – Pass Marks

COMPUTER APPLICATION- C-1

Computer Fundamentals

(Credits: 04**)**

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

Objective: Computer Fundamentals is a course that's designed specifically for those who are completely new to computers. This syllabus has been prepared for the beginners as well as advanced learners who want to deal with computers. After completing these contents you will find yourself at a moderate level of expertise in knowledge of computer basics from where you can take yourself to next levels.

Unit 1: Introduction: Introduction to computer system, uses, types. Data Representation: Number systems and character representation, binary arithmetic Human

Unit 2: Computer Interface: Types of software, Operating system as user interface, utility programs. Devices: Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter.

Unit 3: Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks.

Unit 4: Computer Organization and Architecture: C.P.U., registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors.Overview of Emerging Technologies: Bluetooth, cloud computing, big data, data mining, mobile computing and embedded systems.

Unit 5: Use of Computers in Education and Research: Data analysis, Heterogeneous storage, e-Library, Google Scholar, Domain specific packages such as SPSS, Mathematica etc.

Reference Books:

1. A. Goel, Computer Fundamentals, Pearson Education, 2010.
2. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006
3. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007

COMPUTER APPLICATION-C-1-LAB

Practical on Computer Fundamentals

(Credits: 02**)**

Total marks: 30[**] (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[[**]*For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02*.]

Practical:

Practical exercises based on Open Office tools using document preparation and spreadsheet handling packages.

The practical assignment must include connecting parts of a computer and assembling it to an extent, media formatting and installation of some software.

Practical exercises based on Open Office tools using document preparation and spreadsheet handling packages.

Text Editor

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

9. 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

Add a column Region (values: S, N, N,S,S,S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:

In this exercise, you will add a new row to your table, place the word "Total" at the bottom of the Salesperson column, and sum the Dolls, Trucks, and Puzzles columns.

10. Wrapping of text around the image.

11. Create your resume by incorporating most of the options learned till now.
12. 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

Spreadsheet

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
Harayana	1800	2000	2200	2700	15
Rajasthan	2100	2000	1800	2200	20

TOTALAVERAGE

(a) Apply Formatting as follow:

I. Title in TIMES NEW ROMAN

ii. Font Size - 14

iii. Remaining text - ARIAL, Font Size -10

iv. State names and Qtr. Heading Bold, Italic with Gray Fill Color.

v. Numbers in two decimal places.

vi. Qtr. Heading in center Alignment.

vii. Apply Border to whole data.

(b) Calculate State and Qtr. Total

(c) Calculate Average for each quarter

(d) Calculate Amount = Rate * Total.

2. Given the following worksheet

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

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

If Marks	Then Grade
>= 80	A+
>= 60 < 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
  <=1000Rs. 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%
1	XX	XX	XX	XX	XX
2	XX	XX	XX	XX	XX
3	XX	XX	XX	XX	XX
4	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**
Rent600.00	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					

(a) Calculate Quarter total and Quarter average.

(b) Calculate Monthly total.

(c) Surplus = Monthly income - Monthly total.

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

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

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

(g) 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

COMPUTER APPLICATION- C-2

Discrete Structures

(Credits: 06)

Total marks: 100 (ESE: 70; CCA: 30)

Pass marks: 40 (ESE: 28; CCA: 12)

Unit I

Mathematical Logic: Statements and Notations, Connectives, Normal forms, Theory of inference for the statement calculus, the Predicate calculus, Inference theory of the predicate calculus.

Unit II

Set Theory: Basic concept of set theory, Relations and ordering, function. Algebraic Structures: Grammars and languages, Polish Expressions and their Compilation.

Unit III

Lattices and Boolean algebra with applications: Lattices and Partially Ordered Sets, Boolean algebra, Boolean Functions, Representation and Minimization of Boolean functions, Design Examples using Boolean algebra.

Unit IV

Graph theory with applications: Basic concepts of Graph Theory Storage Representation and Manipulation of Graphs, Incidence and degree; Isomorphism; Sub graphs and Union of graphs; Connectedness; Walks, Paths and Circuits; Components and Connectedness algorithms; Shortest Path Algorithms, Eulerian graph, Hamiltonian graph - necessary and sufficient conditions; Traveling salesman; Bipartite graph.

Unit V

Tree : Properties of trees; Pedant vertices in a tree; Center of a tree; Rooted binary trees; Spanning trees - Spanning tree algorithms, minimum cost spanning tree; Fundamental circuits; Spanning trees of a weighted graph; cut-sets and cut-vertices; Fundamental cut-sets; Connectivity and separativity.

Text Books

1. Swapan K Sarkar, A Textbook of Discrete Mathematics, S. Chand Publication.
2. Deo, N., Graph Theory with Applications to Engineering and Computer Science.

Reference Books

1. C. L. Liu, Introduction to Discrete Mathematics.
2. JP Trembly and R. Manohar, Discrete Mathematical structures with with Applications. To Computer Science, McGraw-Hill Pub.
3. Lipschutz Seymour, Discrete Mathematics, Tata Mcgraw Hill Education Private Limited.
4. Harary, Graph Theory, PHI (EEE).

COMPUTER APPLICATION-GE-101

Computer Fundamentals

(Credits: 04**)**

Full marks: 100 (External: 70; Sessional: 30)

Pass marks: 40 (External: 28; Sessional: 12)

Objective: Computer Fundamentals is a course that's designed specifically for those who are completely new to computers. This syllabus has been prepared for the beginners as well as advanced learners who want to deal with computers. After completing these contents you will find yourself at a moderate level of expertise in knowledge of computer basics from where you can take yourself to next levels.

Unit 1: Introduction: Introduction to computer system, uses, types. Data Representation: Number systems and character representation, binary arithmetic Human

Unit 2: Computer Interface: Types of software, Operating system as user interface, utility programs. Devices: Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter .

Unit 3: Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks.

Unit 4: Computer Organization and Architecture: C.P.U., registers, system bus, main memory unit, cache memory, Inside a computer, SMPS, Motherboard, Ports and Interfaces, expansion cards, ribbon cables, memory chips, processors.Overview of Emerging Technologies: Bluetooth, cloud computing, big data, data mining, mobile computing and embedded systems.

Unit 5: Use of Computers in Education and Research: Data analysis, Heterogeneous storage, e-Library, Google Scholar, Domain specific packages such as SPSS, Mathematica etc.

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3. **P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007**

COMPUTER APPLICATION-GE-101-LAB

Practical on Computer Fundamentals

(Credits: 02**)**

Full marks: 50 (External: 35; Sessional: 15)

Pass marks: 20 (External:14 ; Sessional: 6)

Practical:

Practical exercises based on Open Office tools using document preparation and spreadsheet handling packages.

The practical assignment must include connecting parts of a computer and assembling it to an extent, media formatting and installation of some software.

Practical exercises based on Open Office tools using document preparation and spreadsheet handling packages.

Text Editor

1. Prepare **a grocery list** having four columns (Serial number, The name of the product, quantity and price) for the month of April, 06.

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    - 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
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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.
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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

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

Salesperson	Dolls	Trucks	Puzzles
Kennedy, Sally	1327	1423	1193
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Pillar, James	5214	3247	5467

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Banks, Jennifer	1201	2528	1203
Atwater, Kelly	4098	3079	2067

Add a column Region (values: S, N, N,S,S,S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:

In this exercise, you will add a new row to your table, place the word "Total" at the bottom of the Salesperson column, and sum the Dolls, Trucks, and Puzzles columns.

10. Wrapping of text around the image.

11. Create your resume by incorporating most of the options learned till now.
12. Following features of menu option must be covered

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FORMAT	Complete menu
TABLE	Complete menu
WINDOW	Complete menu
HELP	Complete menu
TOOLS	All options except Online collaboration, Tools on Macro, Templates

Spreadsheet

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	
Harayana	1800	2000	2200	2700	15	
Rajasthan	2100	2000	1800	2200	20	

TOTALAVERAGE

(a) Apply Formatting as follow:

I. Title in TIMES NEW ROMAN

ii. Font Size - 14

iii. Remaining text - ARIAL, Font Size -10

iv. State names and Qtr. Heading Bold, Italic with Gray Fill Color.

v. Numbers in two decimal places.

vi. Qtr. Heading in center Alignment.

vii. Apply Border to whole data.

(b) Calculate State and Qtr. Total

(c) Calculate Average for each quarter

(d) Calculate Amount = Rate * Total.

2. Given the following worksheet

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

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

If Marks	Then Grade
>= 80	A+
>= 60 < 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

  <=1000Rs. 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%
1	XX	XX	XX	XX	XX
2	XX	XX	XX	XX	XX
3	XX	XX	XX	XX	XX
4	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**
Rent600.00	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					

(a) Calculate Quarter total and Quarter average.

(b) Calculate Monthly total.

(c) Surplus = Monthly income - Monthly total.

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

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

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

(g) 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

COMPUTER APPLICATION-C-3
INTRODUCTION TO PROGRAMMING

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)
Pass marks: 28 (ESE: 20; Sessional: 8)

Unit I

Introduction to C and C++
History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O
Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putcharetc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.hetc).

Unit II

Expressions, Conditional Statements and Iterative Statements: Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

Unit III

Functions and Arrays: Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.
Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

Unit IV

Derived Data Types (Structures and Unions): Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

File I/O, Preprocessor Directives
Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros.

Unit V

Using Classes in C++
Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables &Functions, Objects as parameters, specifying the Protected and Private Access, Copy Constructors, Overview of Template classes and their use.
Inheritance and Polymorphism
Introduction to Inheritance and Polymorphism

Reference Books:
1. HerbtzSchildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003
2. BjarneStroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley , 2013.
3. BjarneStroustroup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
4. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.
5. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
6. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
7. Andrew Koeni, Barbara, E. Moo, "Accelerated C++", Published by Addison-Wesley , 2000.
8. Scott Meyers, "Effective C++", 3rd Edition, Published by Addison-Wesley, 2005.
9. Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014
10. Walter Savitch, "Problem Solving with C++", Pearson Education, 2007.
11. Stanley B. Lippman, JoseeLajoie, Barbara E. Moo, "C++ Primer", Published by Addison-Wesley, 5th Edition, 2012

COMPUTER APPLICATION-C-3-LAB
Practical on Introduction to C/C++ Programming

(Credits: 02)
Total marks: 30** (CCA + ESE = 30)
Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

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+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 or new operator.
16. Write a menu driven program to perform following operations on strings:13
    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. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
23. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.

24. Create a class Box containing length, breath and height. Include following methods in it:
    a) Calculate surface Area
    b) Calculate Volume
    c) Increment, Overload ++ operator (both prefix & postfix)
    d) Decrement, Overload -- operator (both prefix & postfix)
    e) Overload operator == (to check equality of two boxes), as a friend function
    f) Overload Assignment operator
    g) Check if it is a Cube or cuboid
    Write a program which takes input from the user for length, breath and height to test the above class.
25. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
26. Write a program to retrieve the student information from file created in previous question and print it in following format:
    Roll No. Name Marks
27. Copy the contents of one text file to another file, after removing all whitespaces.
28. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.14
29. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.

COMPUTER APPLICATION- C-4

Computer System Architecture

(Credits: 06)

Total marks: 100 (ESE: 70; CCA: 30)

Pass marks: 40 (ESE: 28; CCA: 12)

This paper provides the concepts system architecture, organization of a computer & design, memory organization, input-output organization.

UNIT I

Introduction: Logic gates, boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

UNIT II

Data Representation and Basic Computer Arithmetic: Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, multiplication and division algorithms for integers

UNIT III

Basic Computer Organization and Design: Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

UNIT IV

Central Processing Unit: Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures, pipelining and parallel architecture.

Memory Organization Cache memory, Associative memory, mapping.

UNIT V

Input-Output Organization: Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

Recommended Books:

1. M. Mano, Computer System Architecture, Pearson Education 1992
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004th
3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8 Edition, Prentice Hall of India,2009
4. M.M. Mano , Digital Design, Pearson Education Asia,2013.
5. Carl Hamacher, Computer Organization, Fifth edition, McGrawHill, 2012.

COMPUTER APPLICATION-GE-201
INTRODUCTION TO PROGRAMMING
(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)
Pass marks: 28 (ESE: 20; Sessional: 8)

Unit I

Introduction to C and C++

History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O

Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putcharetc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.hetc).

Unit II

Expressions, Conditional Statements and Iterative Statements: Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

Unit III

Functions and Arrays: Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments.

Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays

Unit IV

Derived Data Types (Structures and Unions): Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures from functions, Structure with union as members, Union with structures as members.

File I/O, Preprocessor Directives

Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros.

Unit V

Using Classes in C++

Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables &Functions, Objects

as parameters, specifying the Protected and Private Access, Copy Constructors, Overview of Template classes and their use.

Inheritance and Polymorphism

Introduction to Inheritance and Polymorphism

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1. HerbtzSchildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003
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3. BjarneStroustroup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
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9. Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014
10. Walter Savitch, "Problem Solving with C++", Pearson Education, 2007.
11. Stanley B. Lippman, JoseeLajoie, Barbara E. Moo, "C++ Primer", Published by Addison-Wesley, 5th Edition, 2012

COMPUTER APPLICATION-GE-201-LAB

Practical on Introduction to C/C++ Programming

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

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+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
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    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.
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    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. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the
    respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
23. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
24. Create a class Box containing length, breath and height. Include following methods in it:
    a) Calculate surface Area
    b) Calculate Volume

c) Increment, Overload ++ operator (both prefix & postfix)
d) Decrement, Overload -- operator (both prefix & postfix)
e) Overload operator == (to check equality of two boxes), as a friend function
f) Overload Assignment operator
g) Check if it is a Cube or cuboid
Write a program which takes input from the user for length, breath and height to test the above class.

25. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
26. Write a program to retrieve the student information from file created in previous question and print it in following format:
Roll No. Name Marks
27. Copy the contents of one text file to another file, after removing all whitespaces.
28. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.14
29. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers. The program will print the array elements in ascending and descending order.

COMPUTER APPLICATION- C-5

Data Structures

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the concepts of arrays, stacks, linked lists, queues, recursion, trees, hashing, searching & sorting and their representation in computer memory.

UNIT I

Arrays: Single and Multi-dimensional Arrays, Sparse Matrices (Array and Linked Representation).

Stacks: Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack.

UNIT II

Linked Lists: Singly, Doubly and Circular Lists (Array and Linked representation); Normal and Circular representation of Stack in Lists; Self Organizing Lists; Skip Lists.

Queues: Array and Linked representation of Queue, De-queue, Priority Queues

UNIT III

Recursion: Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack Implementation)

Trees: Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion , Recursive and Iterative Traversals on Binary Search Trees); Threaded Binary Trees (Insertion, Deletion, Traversals); Height-Balanced Trees (Various operations on AVL Trees).

UNIT IV

Searching and Sorting: Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Insertion Sort, Shell Sort, Comparison of Sorting Techniques.

UNIT V

Hashing: Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash Table Reordering, Resolving collusion by Open Addressing, Coalesced Hashing, Separate
Chaining, Dynamic and Extendible Hashing, Choosing a Hash Function, Perfect HashingFunction.

Reference Books:

1. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning,
2012.
2. SartajSahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
3. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C
and C++:, Second edition, PHI, 2009.
4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson, 1999.

5. D.S Malik, Data Structure using C++,Second edition, Cengage Learning, 2010.
6. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson Education,
3rd edition, 2011
7. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using
Java, 2003.
8. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub,2003
9. John Hubbard, "Data Structures with JAVA", McGraw Hill Education (India) Private Limited; 2 edition, 2009
10. Goodrich, M. and Tamassia, R. "Data Structures and Algorithms Analysis in Java", 4th Edition, Wiley,2013
11. Herbert Schildt, "Java The Complete Reference (English) 9th Edition Paperback", Tata McGraw Hill, 2014.
12. D. S. Malik, P.S. Nair, "Data Structures Using Java", Course Technology, 2003.

COMPUTER APPLICATION- C-5- LAB

Practical on Data Structures

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of data structure.

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. Create and perform different operations on Double-ended Queues using Linked List implementation.

10. WAP to scan a polynomial using linked list and add two polynomial.
11. WAP to calculate factorial and to compute the factors of a given no. (i)using recursion, (ii) using iteration
12.WAP to display fibonacci series (i)using recursion, (ii) using iteration
13. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
14. WAP to create a Binary Search Tree and include following operations in tree: (a) Insertion (Recursive and Iterative Implementation) (b) Deletion by copying (c) Deletion by Merging (d) Search a no. in BST
(e) Display its preorder, postorder and inorder traversals Recursively (f) Display its preorder, postorder and inorder traversals Iteratively (g) Display its level-by-level traversals (h) Count the non-leaf nodes and leaf nodes (i) Display height of tree (j) Create a mirror image of tree (k) Check whether two BSTs are equal or not
15. WAP to convert the Sparse Matrix into non-zero form and vice-versa.
16. WAP to reverse the order of the elements in the stack using additional stack.
17. WAP to reverse the order of the elements in the stack using additional Queue.
18. WAP to implement Diagonal Matrix using one-dimensional array.
19. WAP to implement Lower Triangular Matrix using one-dimensional array.
20. WAP to implement Upper Triangular Matrix using one-dimensional array.
21. WAP to implement Symmetric Matrix using one-dimensional array.
22. WAP to create a Threaded Binary Tree as per inorder traversal, and implement operations like finding the successor / predecessor of an element, insert an element, inorder traversal.
23. WAP to implement various operations on AVL Tree.

COMPUTER APPLICATION- C-6

Operating Systems

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the basic concepts of operating system and its functions.

UNIT-I

Operating System overview: Operating System as an extended machine and resource manager, operating system classification; Operating system architecture:Operating system mode and system calls

Processor Management Functions: Process model, Hierarchies and implementation; Process states and transitions, Multiprogramming, Multitasking, Multithreading, Levels of Schedulers and scheduling algorithms; micro-kernel architecture.

UNIT-II

Memory Management Functions: Memory management of single user operating system memory management for multi-user, Operating system, partition, swapping, paging, segmentation, virtual memory.

UNIT-III

Device Management Functions: I/O devices and controllers, interrupt handlers device independent I/O software, user level I/O software; Disk scheduling , clock hardware software; Terminal input output software.

UNIT-IV

File Management Functions: naming structure, types, access mechanism, attributes and operations; Hierarchical directory systems, Directory structure and directory operation; File space allocations; File sharing file locking; Symbolic links, Files protection and security, Distributed file system.

UNIT-V

Concurrent Programming, sequential and concurrent process, precedence graph, Bernstein Conditions, time dependency, critical node section, mutual exclusion problem, classical coordination problem, Deadlock handling, Inter-Process communication.

Recommended Books:

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

Edition, Prentice.

5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

COMPUTER APPLICATION- C-6- LAB

Practical on UNIX/LINUX Programming

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

1. Installation of Linux Operating System and partitioning the disk.
2. Installing software packages in linux OS using GUI as well as command line.
3. Changing the default run level of a system
4. Mounting and un mounting a removable media.
5. Finding the list of all running processes and redirect the output in a file.
6. Use of different kill signals to kill a running process.
7. Bringing a process from back ground to fore ground and vice-versa.
8. Adding and managing user accounts.
9. Monitoring disk space quota and memory usage and redirect the output in a file.
10. Backup and restoring a file.
11. Compression and extracting a file. Use command line.
12. Configuring a network interface and assigning a default route.
13. Scheduling job using crontab.
14. Changing the ownership and access permission of file or directory. Use command line.
15. Copy, move and rename a file.
16. Configuring a ftp server
17. Assigning address of DNS.
18. Use of ssh, telnet, netstat, ping, route commands.
19. Use grep, awk, sed commands.
20. Use of redirection and piping.
21. Monitoring and managing system log infomation.
22. Basics of firewall using iptables.
23. Basics of configuring http server.
24. Managing different services in linux.
25. Monitoring the traffic going through a network interface.
26. Write shell script to
    i. Find factorial of a given number
    ii. Convert a decimal number to hexadecimal number

COMPUTER APPLICATION- C-7

Computer Networks

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the basic concepts of networks and functions of different OSI reference model.

UNIT I

Introduction to Computer Networks: Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

Data Communication Fundamentals and Techniques: Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

UNIT II

Networks Switching Techniques and Access mechanisms: Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

UNIT III

Data Link Layer Functions and Protocol: Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.

Multiple Access Protocol and Networks: CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways;

UNIT IV

Networks Layer Functions and Protocols: Routing; routing algorithms; network layer protocol of Internet- IP protocol, Internet control protocols.

UNIT V

Transport Layer Functions and Protocols : Transport services- error and flow control, Connection establishment and release- three way handshake;

Overview of Application layer protocol: Overview of DNS protocol; overview of WWW &HTTP protocol.

Reference Books

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM ,2007.
2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI , 2002

COMPUTER APPLICATION- C-7- LAB

Practical on Network Programming

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of network programming.

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
2. Simulate and implement stop and wait protocol for noisy channel.
3. Simulate and implement go back n sliding window protocol.
4. Simulate and implement selective repeat sliding window protocol.
5. Simulate and implement distance vector routing algorithm
6. Simulate and implement Dijkstra algorithm for shortest path routing.
7. WAP to find the address of the local machine
8. WAP A program that prints the address of www.youtube.com
9. WAP A program that prints all the addresses of www.youtube.com
10. Write a program to implement following methods:

    public String getHostName( )
    public byte[] getAddress( )
    public String getHostAddress( )

11. Describe the following methods in brief:

    publicbooleanisAnyLocalAddress( )
    publicbooleanisLoopbackAddress( )

12. Write a program to testing the characteristics of an IP address i.e. you have to check whether given address is AnyLocalAddress, LoopbackAddress, LinkLocalAddress, SiteLocalAddress or MulticastAddress.
13. Write a program to enter the IP address of any node and check whether a particular node is reachable from the current host.
14. Write a program of protocol tester .It is a simple program for determining which protocols a virtual machine supports. It attempts to construct a URL object for each of 10 URL given below. If the protocol is not supported. aMalformedURLException is thrown and you know the protocol is not supported.

Test protocols for following URL:

1. http://www.adc.org
2. https://www.amazon.com/exec/obidos/order2/
3. file:///etc/passwd

4. ftp://metalab.unc.edu/pub/languages/java/javafaq
5. mailto:elharo@metalab.unc.edu
6. telnet://dibner.poly.edu/
7. nfs://utopia.poly.edu/usr/tmp/
8. gopher://gopher.anc.org.za/
9. verbatim:http://www.adc.org/
10. netdoc:/UsersGuide/release.html

COMPUTER APPLICATION-GE-301

Computer Networks

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the basic concepts of networks and functions of different OSI reference model.

UNIT I

Introduction to Computer Networks: Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

Data Communication Fundamentals and Techniques: Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

UNIT II

Networks Switching Techniques and Access mechanisms: Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

UNIT III

Data Link Layer Functions and Protocol: Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.

Multiple Access Protocol and Networks: CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways;

UNIT IV

Networks Layer Functions and Protocols: Routing; routing algorithms; network layer protocol of Internet- IP protocol, Internet control protocols.

UNIT V

Transport Layer Functions and Protocols : Transport services- error and flow control, Connection establishment and release- three way handshake;

Overview of Application layer protocol: Overview of DNS protocol; overview of WWW &HTTP protocol.

Reference Books

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM ,2007.
2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI , 2002

COMPUTER APPLICATION-GE-301-LAB

Practical on Network Programming

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of network programming.

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
2. Simulate and implement stop and wait protocol for noisy channel.
3. Simulate and implement go back n sliding window protocol.
4. Simulate and implement selective repeat sliding window protocol.
5. Simulate and implement distance vector routing algorithm
6. Simulate and implement Dijkstra algorithm for shortest path routing.
7. WAP to find the address of the local machine
8. WAP A program that prints the address of www.youtube.com
9. WAP A program that prints all the addresses of www.youtube.com
10. Write a program to implement following methods:
    public String getHostName( )
    public byte[] getAddress( )
    public String getHostAddress( )

11. Describe the following methods in brief:
    publicbooleanisAnyLocalAddress( )
    publicbooleanisLoopbackAddress( )

12. Write a program to testing the characteristics of an IP address i.e. you have to check whether given address is AnyLocalAddress, LoopbackAddress, LinkLocalAddress, SiteLocalAddress or MulticastAddress.
13. Write a program to enter the IP address of any node and check whether a particular node is reachable from the current host.
14. Write a program of protocol tester .It is a simple program for determining which protocols a virtual machine supports. It attempts to construct a URL object for each of 10 URL given below. If the protocol is not supported. aMalformedURLException is thrown and you know the protocol is not supported.

Test protocols for following URL:

1. http://www.adc.org
2. https://www.amazon.com/exec/obidos/order2/
3. file:///etc/passwd
4. ftp://metalab.unc.edu/pub/languages/java/javafaq
5. mailto:elharo@metalab.unc.edu
6. telnet://dibner.poly.edu/
7. nfs://utopia.poly.edu/usr/tmp/
8. gopher://gopher.anc.org.za/
9. verbatim:http://www.adc.org/
10. netdoc:/UsersGuide/release.html

COMPUTER APPLICATION-SEC-1

Open Source Software

(Credit: 02)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

Objective: This course provides an overview of the modern context and operation of free and open source software communities and associated software projects. The practical objective is to teach students how they can begin to participate in a FOSS project.

Unit I

Introduction to OSS: introduction, need for open source applications-advantages, disadvantages, history, meaning and extraction of the terms free software and OSS, security and releiability, application of OSS.

Unit II

Linux basics: introduction, setting up environment, simple c file and compilation, kernel, basic commands, process: types of process, process states, creation of process, process priorities, scheduling policies, signals - types, sending & receiving signal.

Unit III

Android: introduction, open source android platform, history, android architecture, features, Delvik Virtual Machine (DVM), Android Virtual Device or Emulator, File System hierarchy, sample android app.

Unit IV

PHP basics: introduction, identifier, variable, constant, data types, operators, statements, PHP loops, PHP script execution, interaction of web browser & web server.

Unit V

Open source Grid Computing: introduction, open grid service architecture (OGSA), OGSA definition, OGSA basic services. Open Source Cloud, FOSS Cloud Software: Eucalyptus, OpenNebula – purpose.

Text Book:

1. M. N. Rao, “Fundamentals of Open Source Software: A Developer's Perspective”, PHI, 2015.
2. Understanding Open Source and Free Software Licensing – O’Reilly Media, 2011

ONLINE READING / SUPPORTING MATERIAL:

1. https://www.tutorialspoint.com/android/index.htm.
2. https://developer.android.com/samples/index.html
3. http://docs.oracle.com/javase/tutorial/index.htm (Available in the form of free downloadable e-books also).

COMPUTER APPLICATION-SEC-1-LAB

Practical on Open Source Software

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

Software Lab Based on Android Programming:

1. Create ―Hello World‖ application. That will display ―Hello World‖ in the middle of the screen in the emulator. Also display ―Hello World‖ in the middle of the screen in the Android Phone.
2. Create an application with login module. (Check username and password).
3. Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.
4. Create a menu with 5 options and and selected option should appear in text box.
5. Create a list of all courses in your college and on selecting a particular course teacher-in-charge of that course should appear at the bottom of the screen.
6. Create an application with three option buttons, on selecting a button colour of the screen will change.
7. Create and Login application as above. On successful login, pop up the message.
8. Create an application to Create, Insert, update, Delete and retrieve operation on the database.

COMPUTER APPLICATION- C-8

Design and Analysis of Algorithms

(Credits: 06)

Total marks: 100 (ESE: 70; CCA: 30)

Pass marks: 40 (ESE: 28; CCA: 12)

This paper provides the concepts of algorithm design techniques, sorting and searching techniques, lower bound techniques, balance trees, graphs, dynamic programming and backtracking techniques.

UNIT-I

Introduction: Writing Structured programs, Analyzing Algorithms, Stacks and Queues, Trees, Heaps and Heap sort, Graphs, Hashing.

UNIT-II

Divide and Conquer: The general concept, Binary Search, Finding the maximum and minimum, Merge sort, Quick sort, Selection sort, Strassen's matrix manipulation, Greedy methods, Minimum spanning trees.

UNIT-III Dynamic Programming: The General method, Multi stage graphs, All pairs shortest paths, Optimal binary search trees, Reliability design, The Travelling sales person Problem, Flow shop scheduling.

UNIT-IV

Basic search and traversal techniques: The techniques, Code generation, AND/OR graphs, Game trees, Biconnected components, Depth first search and Breadth first search

UNIT-V

Backtracking: the Queens problems, Introduction to NP- Hard and NP- Complete problems.

Text Books:

1.S. Sahni, and Horowitz, Rajasekaran, Computer Algorithm, Galgotia Publications.

2.Horowitz and Sahni, Fundamentals of Computer Algorithm,Galgotia Publications.

3.Aho, Hopcroft and Ullman ,Design and Analysis of Computer Algorithm, Addison-Wesley

4.S.E Good man and S. T Hedet,Introduction to the Design and Analysis of Algorithm

Reference Books:

1.S.KBasu, Design Methods and Analysis of Algorithms, PHI

2 Gilles Brassard and Paul Brantley, Algorithmic theory and Practices, PH1

3. Knuth, Fundamental Algorithms, the Art of computer programming, Vol-1

4.S. Sahni Analysis of Algorithms through C++, Tata McGraw Hill

COMPUTER APPLICATION- C-9

Computer Graphics

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the basic concepts of computer graphics.

UNIT I

Basic of Computer Graphics: Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards.

Graphics Primitives: Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, Fill area primitives including scan-line polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers.

UNIT II

2D transformation and viewing: Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (cohen-sutherland, liang- bersky), polygon clipping.

UNIT III

3D concepts and object representation: 3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bazier curves and surfaces, B-spline curves and surfaces

UNIT IV

3D transformation and viewing: 3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations

UNIT V

Visible surface detection concepts, back-face detection, depth buffer method, illumination, light sources, illumination methods (ambient, diffuse reflection, specular reflection), Color models: properties of light, XYZ, RGB, YIQ and CMY color models.

Concept of Animation and Morphing.

Books Recommended:

1. J.D.Foley, A.Van Dan, Feiner, Hughes Computer Graphics Principles & Practice 2nd edition Publication Addison Wesley 1990.
2. D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.
3. D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.
4. D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill 2nd edition 1989.

COMPUTER APPLICATION- C-9- LAB

Practical on Computer Graphics

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of computer graphics.

1. Write a C/C++ program to implement 2D transformation.
2. Write a C/C++ program to implement the mid-point ellipse drawing algorithm.
3. Write a C/C++ program to implement Brasenham's Circle drawing algorithm.
4. Write a C/C++ program to implement Brasenham's line drawing algorithm.
5. Write a C/C++ program to implement Cohen Sutherland Line Clipping algorithm.
6. Write a program using OpenGL to draw a circle of red colour inside of a rectangle of blue colour on a background of green colour.
7. Write a program in C or C++ to implement Scan-Line Polygon Filling Algorithm.

Write a program using OpenGL to perform a 3-Dimensional transformation, such as translation, rotation and reflection, on a given triangle.

COMPUTER APPLICATION- C-10

Introduction to Database Systems

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the concepts of database management, ER modeling, data model, database design, transaction processing, file structure & indexing.

UNIT I

Introduction: Characteristics of database approach, data models, database system architecture and data independence.

Entity Relationship(ER) Modeling: Entity types, relationships, constraints.

UNIT II

Relation data model: Relational model concepts, relational constraints, relational algebra, SQL queries

UNIT III

Database design: Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (upto BCNF).

UNIT IV

Transaction Processing: ACID properties, concurrency control

UNIT V

File Structure and Indexing: Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files (Primary index, secondary index, clustering index), Multilevel indexing using B and B+ trees.

Books Recommended:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill,
2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw
Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

COMPUTER APPLICATION- C-10- LAB

Practical onDatabase Systems

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of Database Management Systems.

1. 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

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 unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than $2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.
7. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.
8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.

10. Query to display Name and Job of all employees who don‘t have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission.
12. Sort the data in descending order of Salary and Commission.

13. Query to display Name of all the employees where the third letter of their name is _A‘.
14. 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.
15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
18. Query to display Name and calculate the number of months between today and the date each employee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
20. 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‘.
21. Query to display Name, Hire Date and Day of the week on which the employee started.
22. Query to display Name, Department Name and Department No for all the employees.
23. Query to display Unique Listing of all Jobs that are in Department # 30.
24. Query to display Name, Dept Name of all employees who have an _A‘ in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
26. 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.
27. 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.
28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies $100.
29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
30. Query to display the number of employees performing the same Job type functions.
31. Query to display the no. of managers without listing their names.
32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
33. Query to display Name and Hire Date for all employees in the same dept. as Blake.
34. Query to display the Employee No. And Name for all employees who earn more than the average salary.
35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a _T‘.
36. Query to display the names and salaries of all employees who report to King.
37. Query to display the department no, name and job for all employees in the Sales department.

COMPUTER APPLICATION- GE-4

Introduction to Database Systems
(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)
Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the concepts of database management, ER modeling, data model, database design, transaction processing, file structure & indexing.

UNIT I

Introduction: Characteristics of database approach, data models, database system architecture and data independence.
Entity Relationship(ER) Modeling: Entity types, relationships, constraints.

UNIT II

Relation data model: Relational model concepts, relational constraints, relational algebra, SQL queries

UNIT III

Database design: Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (upto BCNF).

UNIT IV

Transaction Processing: ACID properties, concurrency control

UNIT V

File Structure and Indexing: Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files (Primary index, secondary index, clustering index), Multilevel indexing using B and B+ trees.

Books Recommended:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill,
2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw
Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

COMPUTER APPLICATION- GE-4- LAB

Practical on Database Systems
(Credits: 02)

Total marks: 30** (CCA + ESE = 30)
Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of Database Management Systems.

1. 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

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 unique Jobs from the Employee Table.
3. Query to display the Employee Name concatenated by a Job separated by a comma.
4. Query to display all the data from the Employee Table. Separate each Column by a comma and name the said column as THE_OUTPUT.
5. Query to display the Employee Name and Salary of all the employees earning more than $2850.
6. Query to display Employee Name and Department Number for the Employee No= 7900.

7. Query to display Employee Name and Salary for all employees whose salary is not in the range of $1500 and $2850.
8. Query to display Employee Name and Department No. of all the employees in Dept 10 and Dept 30 in the alphabetical order by name.
9. Query to display Name and Hire Date of every Employee who was hired in 1981.
10. Query to display Name and Job of all employees who don‘t have a current Manager.
11. Query to display the Name, Salary and Commission for all the employees who earn commission.
12. Sort the data in descending order of Salary and Commission.

13. Query to display Name of all the employees where the third letter of their name is _A‘.
14. 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.
15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
18. Query to display Name and calculate the number of months between today and the date each employee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
20. 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‘.
21. Query to display Name, Hire Date and Day of the week on which the employee started.
22. Query to display Name, Department Name and Department No for all the employees.
23. Query to display Unique Listing of all Jobs that are in Department # 30.
24. Query to display Name, Dept Name of all employees who have an _A‘ in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
26. 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.
27. 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.
28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies $100.
29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
30. Query to display the number of employees performing the same Job type functions.
31. Query to display the no. of managers without listing their names.
32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
33. Query to display Name and Hire Date for all employees in the same dept. as Blake.
34. Query to display the Employee No. And Name for all employees who earn more than the average salary.
35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a _T‘.
36. Query to display the names and salaries of all employees who report to King.
37. Query to display the department no, name and job for all employees in the Sales department.

COMPUTER APPLICATION-SEC-2

Programming with Python

(Credits: 02**)**

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

Objective: This course provides the basics of Python. The subject will help in learning the basic data types, variables, control flow statements, functions and classes of Python and also how to write a Python program.

Unit 1

Planning the Computer Program: Concept of problem solving, Problem definition,Program design, Debugging, Types of errors in programming, Documentation.
Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

Unit 2

Overview of Programming: Structure of a Python Program, Elements of Python.
Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator)

Unit 3

Creating Python Programs: Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Errors and Exceptions.Iteration and Recursion: Conditional execution, Alternative execution, Nested conditionals, the return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, the while statement, Tables, Two-dimensional tables.

Unit 4

Strings and Lists: String as a compound data type, Length, Traversal and the for loop,
String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists

Unit 5

Object Oriented Programming: Introduction to Classes, Objects and Methods, Standard Libraries.Data Structures: Arrays, list, set, stacks and queues.Searching and Sorting: Linear and Binary Search, Bubble, Selection and Insertion sorting.

References:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011.
2. Allen Downey, Jeffrey Elkner, Chris Meyers. How to think like a computer scientist: learning with Python / 1st Edition,2012 – Freely available online.
3. http://docs.python.org/3/tutorial/index.html

4. http://interactivepython.org/courselib/static/pythonds

COMPUTER APPLICATION-SEC-2-LAB

Practical on Programming with Python

(Credits: 02**)**

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

1. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature.
2. Using while loop, produce a table of sins, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x, print the value of sin(x), cos(x) and tan(x).
3. Write a program that reads an integer value and prints “leap year” or “not a leap year”.
4. Write a program that takes a positive integer n and then produces n lines of output shown as follows.
   For example enter a size: 5
   *
   **
   ***
   ****
   *****
5. Write a function that takes an integer ‘n’ as input and calculates the value of 1 + 1/1! + 1/2! + 1/3! + … + 1/n
6. Write a function that takes an integer input and calculates the factorial of that number.
7. Write a function that takes a string input and checks if it’s a palindrome or not.
8. Write a list function to convert a string into a list, as in list (‘abc’) gives [a, b, c].
9. Write a program to generate Fibonacci series.
10. Write a program to check whether the input number is even or odd.
11. Write a program to compare three numbers and print the largest one.
12. Write a program to print factors of a given number.
13. Write a method to calculate GCD of two numbers.
14. Write a program to sort a list using insertion sort and bubble sort and selection sort..

COMPUTER APPLICATION- C-11

Programming in Java

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the programming concepts in Java.

Unit-I

Introduction to Java, Basic Features, Java Virtual Machine Concepts, A Simple Java Program, Primitive Data Type and Variables, Java Keywords, Integer and Floating Point Data Type, Character and Boolean Types, Declaring and Initialization Variables, Java Operators, Expressions, control statements, Arrays.

Unit-II

Class Fundamentals, Creating objects ,Assigning object reference variables ,Introducing Methods, Method overloading, Static methods, Constructors, overloading constructors, This Keyword, Using Objects as Parameters, Argument passing, Returning objects ,Method Overriding, Garbage Collection, The Finalize ( ) Method, Inheritance Basics, Access Control,Multilevel Inheritance, Abstract Classes ,Polymorphism ,Final Keyword, Package, Defining Package, CLASSPATH, Package naming, Accessibility of Packages, Using Package Members, Interfaces, Implementing Interfaces, Interface and Abstract Classes.

Unit-III

Exception Handling,Multithreaded Programming, I/O in Java,Text Streams, Stream Tokenizer, Buffered Stream , Print Stream, Random Access File, The String Class, String Buffer Class, StringTokenizerand Methods.

Unit-IV

Applets Programming, Building User Interface with AWT, Swing-based GUI, Layouts and Layout Manager, Container.

Unit-V

Java Database Connectivity; Establishing a Connection; Transactions with Database.

Reference Books

1. Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4th Edition, 2005.
2. James Gosling, Bill Joy, Guy L Steele Jr, GiladBracha, Alex Buckley"The Java Language
Specification, Java SE 8 Edition (Java Series)", Published by Addison Wesley, 2014.
3. Joshua Bloch, "Effective Java" 2nd Edition,Publisher: Addison-Wesley, 2008.
4. Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1 ,9thEdition,Printice Hall.2012
5. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 2 - Advanced Features)", 9th Edition, Printice Hall.2013
6. Bruce Eckel, "Thinking in Java", 3rd Edition, PHI, 2002.
7. E. Balaguruswamy, "Programming with Java", 4th Edition, McGraw Hill.2009.
8. Paul Deitel, Harvey Deitel, "Java: How to Program", 10th Edition, Prentice Hall, 2011.
9. "Head First Java", Orielly Media Inc. 2nd Edition, 2005.
10. David J. Eck, "Introduction to Programming Using Java", Published by CreateSpace Independent Publishing Platform, 2009.
11. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2nd Edition, 2004.

COMPUTER SCIENCE- C-11- LAB

Practical on Programming in JAVA

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

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This paper provides the practical knowledge of programming in Java.

1. To find the sum of any number of integers entered as command line arguments
2. To find the factorial of a given number
3. To learn use of single dimensional array by defining the array dynamically.
4. To learn use of lenth in case of a two dimensional array
5. To convert a decimal to binary number
6. To check if a number is prime or not, by taking the number as input from the keyboard
7. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument
8. Write a program that show working of different functions of String and StringBufferclasss like setCharAt(), setLength(), append(), insert(), concat()and equals().
9. Write a program to create a ―distance‖ class with methods where distance is computed in terms of feet and inches, how to create objects of a class and to see the use of this pointer
10. Modify the ―distance‖ class by creating constructor for assigning values (feet and inches) to the distance object. Create another object and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object.
11. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions(from lower to higher data type).
12. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword.
13. Write a program to show the use of static functions and to pass variable length arguments in a function.
14. Write a program to demonstrate the concept of boxing and unboxing.
15. Create a multi-file program where in one file a string message is taken as input from the user
and the function to display the message on the screen is given in another file (make use of Scanner package in this program).
16. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate Fibonacci series is given in a different file belonging to the same package.
17. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages.
18. Write a program ―DivideByZerothat takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
19. Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.

20. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).
21. Write a program to demonstrate priorities among multiple threads.
22. Write a program to demonstrate multithread communication by implementing synchronization among threads (Hint: you can implement a simple producer and consumer problem).
23. Write a program to create URL object, create a URLConnection using the openConnection() method and then use it examine the different components of the URLand content.
24. Write a program to implement a simple datagram client and server in which a message that is typed into the server window is sent to the client side where it is displayed.
25. Write a program that creates a Banner and then creates a thread to scrolls the message in the banner from left to right across the applet‘s window.
26. Write a program to get the URL/location of code (i.e. java code) and document(i.e. html file).
27. Write a program to demonstrate different mouse handling events like mouseClicked(), mouseEntered(), mouseExited(), mousePressed, mouseReleased() and mouseDragged().
28. Write a program to demonstrate different keyboard handling events.
29. Write a program to generate a window without an applet window using main() function.
30. Write a program to demonstrate the use of push buttons.

COMPUTER APPLICATION- C-12

Management Information System

(Credits: 06)

Total marks: 100 (ESE: 70; CCA: 30)

Pass marks: 40 (ESE: 28; CCA: 12)

UNIT I

Foundation of Information Systems: Introduction to Information system in business, fundamentals of information systems, solving business problems with information system, concept of balanced MIS, effectiveness & efficiency criteria.

UNIT II

Information Technology- A manager's overview, managerial overview of computer hardware and software, telecommunication, Database management.

UNIT III

Business Application of Information Technology Internet & electronic commerce, internet, extranet & enterprise solution, information system for business operations, information system for management decision support, information for strategic advantage.

UNIT IV

Managing Information Technology Enterprise & global management, security & ethical challenges planning & implement ting changes.

UNIT V

Advanced Concepts in Information Systems, Enterprise Resource Planning Supply Chain management, CRM procurement management System.

TEXT BOOKS

1. O Brian," management Information System", TMH
2. Murdick.: information System for Modern management", PHI

COMPUTER APPLICATION-DSE-1

Numerical & Statistical Methods

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the basic concepts of numerical & statistical methods.

UNIT – I

Numerical methods – errors in numerical calculations – transcendental equation – introduction – Bisection method – iteration method – Method of false position – Newton – raphson method.

UNIT – II

Interpolation – Newton's formulae (forward & backward) for interpolation – Lagrenge's interpolation formula – simultaneous linear equations – Gauss Elimination and Gauss Jordan methods – Gauss Seidal method.

UNIT – III

Numerical integration – Trapezoidal and Simpson's rule – differential equation – euler, runge-kutta and predictor and corrector methods.

UNIT – IV

Mathematical expectation – variance – covariance – moment generating functions – theoretical distributions – binomial, poisson, normal and exponential distributions – MGFS of these distribution – additive properties – recurrence relations for the moment.

UNIT – V

Linear correlation and regression – properties of correlation and regression coefficients – numerical problems for finding the correlation and regression coefficients.

Text Books:

1. S.S.Sastry, Introductory methods of numerical analysis, PHI, New Delhi 1982.
2. M.K.Jain, S.R.K.Iyengar and R.K.Jain "Numerical methods for science and Engineering computation", Wiley Eastern Limited – 2nd edition –1995.
3. Gupta S.C.andKapoor V.K.-Fundamentals of Statistics – Sultan Chand and Sons – New Delhi (1994).
4. BajpatA.C.CalI.M.andFairdyJ.A.Statistical methods for Engineering and Scientists – John Wiley and Sons

Reference Books

1. Rajaraman,Computer oriented Numerical Methods, PHI

2.Venkataraman, Numerical Computations
3.Stoer, Bullrich, Computer Oriented Numerical Methods, Springer Verlag
4..Krishnamurthy, E.V. Sen, Computer based Numerical Algorithm, Ease West Press.

COMPUTER APPLICATION -DSE-1-LAB

Practical on Numerical Methods

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of numerical methods.

1. Write a program to find the root of an equation by successive approximation.
2. Write a program to solve a system of equations by Gauss Elimination method.
3. Write a program to find the value of a function by Lagrange's interpolation method.
4. Fit a straight line $y = mx + c$ to the following data by the least squares method:

X:	7	9	13	15	20	22
Y:	3	7	8	12	13	18

   Write a general program for a straight line, least squares, curve fitting.
5. Write a program for the evaluation of an integration value of a function by Trapezoidal rule.
6. Write a program to solve an equation by Newton – Raphson method.
7. Write a program to solve a set of first order simultaneous differential equations using Runga – Kutta second order method.
8. Write a program to evaluate the definite integral $\int_0^1 e^{\cos x}$ by using the Simpson's rule.

COMPUTER APPLICATION- DSE-2

Internet Technologies

(Credits: 04)

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

This paper provides the concepts of Internet technologies that are used to develop different interfaces through which user communicate and share information.

UNIT I

Internet, structure of internet, history of internet, Internet protocol: TCP/IP, SLIP, PPP, Network and network devices, Addressing in Internet - DNS, domain name and their organisation, understanding the Internet protocol address, Client-server concept- architecture and application.

Evolution of www, basic features, servers, http, URL, search engine, searching categories, hypertext.

UNIT II

Basic HTML, HTML tags, creating list in HTML, hyperlinks, multimedia, HTML forms, tables in HTML, frames in HTML, image maps, style sheets in HTML. DHTML, XML-Introduction, Need for XML, Advantages, simple XML programs, DTD.

UNIT III

Creating interactive and dynamic web pages with JavaScript: Client-side scripting languages, JavaScript overview; constants, variables, operators, expressions and statements; user-defined & built-in-functions; properties and methods of built-in objects, client-side form validation.

UNIT IV

Server side scripting: ASP, ASP variables, procedures, conditionals, looping, forms, cookies, session, ASP AJAX, ASP VB functions, Accessing a database from an ASP page, ADO connect, ADO recordset.

UNIT V

Servlet:overview, environment setup, life cycle, applet vs servlet, form data, client request, server response, http codes, writing filters, exceptions, database access.

Text/ Reference Books

1) The Internet – Complete M.L Young ; Tata McGraw Hill
2) Mastering JavaScript and Jscript by J. Jaworski ; BPB Publication
3) Dynamic HTML –the definitive references by D. Godman: Shroff Publishers
4) Understanding XHTML by D.P Nagpal: Wheeler Publishing.
5) Daniel Minoli. Internet and Internet Engineering Tata McGraw-Hill Edition (for Unit I & II)
6) Active Server pages, Keith & Jill, VIkas.
7) Java Script, Gosslin, Vikas
8) Core Java 2, VOl II, Addison Wesley
9) Java Servlets Developer's Guide, Karl Moss, McGraw-Hill/Osborne, 2002

COMPUTER APPLICATION- DSE-2- LAB

Practical on Internet Technologies

(Credits: 02)

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

This paper provides the practical knowledge of network programming.

HTML

1. Create a HTML document consisting of HTML heading, paragraphs and images.
2. Create a HTML document and insert comments in the HTML source code and insert horizontal lines.
3. Construct HTML document to set the font of a text , size of the font, style of the font.
4. Create a HTML document to show how to create hyperlinks.
5. Create a HTML document to use an image as a link.
6. Create a HTML document to open link in a new browser window.
7. Create a HTML document to jump to another part of a document (on the same page).
8. Create a HTML document to insert images from another folder or another server.
9. Create an image-map, with clickable regions.
10. Create a HTML document with all table elements (Table, Caption, Table Row, Table Data element, Table Heading Element, THEAD, TFOOT, TBODY)
11. Create HTML document to make an unordered list, an ordered list, different types of ordered lists, different types of unordered lists, Nested list, Definition list.
12. Create HTML form with the all FORM elements (text fields, password field, Checkboxes, Radio buttons, Select elements, Drop-down list with a pre-selected value, Textarea (a multi-line text input field) and buttons.
13. Create HTML document with all Frame elements (FRAMESET, FRAME, NOFRAMES, and INLINE FRAME).
14. Create a HTML document to add AUDIO and VIDEO.
15. Create a HTML document to aligning images (Let the image float to the left/right of a paragraph).
16. Create a HTML document to jump to a specified section within a frame
17. Construct a HTML document with CSS to Set the background colour of a page.
18. Construct a HTML document with CSS to set an image as the background of a page
19. Construct HTML document with CSS to Set the text color of different elements and align the text.
20. Construct HTML document to set different colours to visited/unvisited links, Specify a background colour for links

XML

21. Construct an XML document that contain information about products of an organization.
22. Construct an XML document that contain information of 5 students (such as roll no., name , address, class).
23. Construct an XML document that contain details of 10 books.

JAVAScript

24. Write a program in javasrcript to accept a name from the user and display the same name in an alert box.
25. Write a program in javasrcript to display a message in a confirm box.
26. Write a program in javasrcript to display the message _time is running out' in the status bar.
27. Write a program in JavaScript to enter marks of a student and find his/her grade according to the following:
    if marks>=90 then grade A
    if marks>=80 then grade B
    if marks>=70 then grade C
    if marks>=60 then grade D
    else fail.
28. Write a program in JavaScript to create a button and when the button is clicked the message _Hello World' is displayed on an alert box.
29. Write a program in JavaScript to accept 2 nos from the user and show the working of all arithmetic operators.
30. Write a program in JavaScript to accept 2 strings and concatenate them.
31. Write a program in JavaScript to display the current date and time.
32. Write a program in JavaScript to find the length of an array.
33. Write a program in JavaScript to check whether a string is palindrome or not.
34. Write a program in JavaScript that responds to a mouse click anywhere on the page(using mouse click).
35. Write a program in JavaScript to display the contents of a check box in a alert box.
36. Write a program to validate a form in the user id and password forms.
37. Write a program in JavaScript to create a welcome cookie, Button animation, Image map with added JavaScript Simple timing, Timing event in an infinite loop

Servlet/ASP :

38. Develop a webpage with hypothetical data to do the following
    i. Connecting to database.
    ii. Insert Data To Database.
    iii. Retrieving Data From Database
    iv. Updating Data IntoDatabase.
    v. Deleting Data From Database –

COMPUTER APPLICATION- C-13

FUNDAMENTALS OF E-COMMERCE

(Credits: 06)

Total marks: 100 (ESE: 70; CCA: 30)
Pass marks: 40 (ESE: 28; CCA: 12)

UNIT I

Introduction to E-Commerce forces behind E Commerce Industry Framework, Brief history of E commerce, Inter organizational E commerce, intra organizational E commerce, consumer to Business Electronic commerce Architectural frame work.

Network Infrastructure for E commerce, Market forces behind I-Way, Component of I- Way, access Equipment, Global Information Distribution Network Broad band Telecommunication.

UNIT II

Mobile Commerce:Introduction to mobile commerce, Mobile computing Applications, Wireless Application protocols, WAP technology, Mobile information devices.

Web Security: Introduction to Web security, Firewalls & Transaction security, client Server Network, Emerging client server security threats, firewalls & Network Security.

UNIT III

Encryption: World Wide Web & Security, Encryption, Transaction security, secret Key Encryption, Public Key Encryption, Virtual Private Networks (VPM),Implementation & Management issues.

UNIT IV

Electronic Payments: Overview of Electronic Payments, Digital Token base Electronic payment system, Smart cards, credit card/ Debit card base EPS, emerging financial Instruments. Home Banking, Online Baking.

UNIT V

Net Commerce: EDI, EDI Application in Business, legal requirement in E commerce, Introduction to Supply Chain management, CRM, issues in Customer Relationship management.

TEXT BOOKS:

1. Ravi Kalakota& Andrew Whinston," Fronticrs of Electronic Commerce", Addison Wesly
2. Debial Amor, "The e business revolution", Addison Wesly.
3. Sokol, " From EDI to Electronic Commerce: A business Initiative", TMH

REFERENCE BOOKS:

1. Diwan& Sharma, “E commerce”, Excel.
2. Bajaj & nag “E Commerce: The Cutting”.

COMPUTER APPLICATION- C-14

Software Engineering

(Credits: 06)

Total marks: 100 (ESE: 70; CCA: 30)

Pass marks: 40 (ESE: 28; CCA: 12)

This paper provides the concepts software engineering theory.

UNIT I

Introduction: The Evolving Role of Software, Software Characteristics, Changing Nature of Software, Software Engineering as a Layered Technology, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI).

UNIT II

Requirement Analysis: Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS.

Software Project Management: Estimation in Project Planning Process, Project Scheduling.

UNIT III

Risk Management: Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM Plan.

Quality Management: Quality Concepts, Software Quality Assurance, Software Reviews, Metrics for Process and Projects.

UNIT IV

Design Engineering: Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level, Mapping of Data Flow into Software Architecture, Modeling Component Level Design.

UNIT V

Testing Strategies & Tactics: Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing and their type, Basis Path Testing.

Recommended Books:

1. R.S. Pressman, Software Engineering: A Practitioner‘s Approach (7th Edition), McGraw-
Hill, 2009.
2. P. Jalote, An Integrated Approach to Software Engineering (2nd Edition), Narosa Publishing House, 2003.
3. K.K. Aggarwal and Y. Singh, Software Engineering (2nd Edition), New Age International
Publishers, 2008.
4. I. Sommerville, Software Engineering (8th edition), Addison Wesley, 2006.
5. D. Bell, Software Engineering for Students (4th Edition), Addison-Wesley, 2005.
6. R. Mall, Fundamentals of Software Engineering (2nd Edition), Prentice-Hall of India, 2004.

COMPUTER APPLICATION-DSE-3

PHP Programming

(Credits: 04**)**

Total marks: 70 (ESE: 50; CCA: 20)

Pass marks: 28 (ESE: 20; CCA: 8)

Objective: This course will provide the basic knowledge of PHP. It will help to learn the PHP keywords and statements, database connectivity and will also help to get a job in software industry as web developer.

Unit I

PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.).PHP with other technologies, scope of PHP

Unit II

Design and write PHP programs – Basic PHP syntax, structure and coding techniques, variables, constants, expressions and operators.

Unit III

Use of arrays, string, numbers, built-in functions and global variables

Unit IV

Handling HTML form with PHP:

- Capturing Form Data
- GET and POST form methods
- Dealing with multi value fields
- Redirecting a form after submission

Unit V

Use PHP to send email, upload files dynamically; MySQL Database- setup, connection, insert, update, delete, display records

References :

1. Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India), 2007.

2. Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited, 2008.

3. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition Paperback, O'reilly, 2014.

4. Luke Welling, Laura Thompson, PHP and MySQL Web Development", 4th Edition, Addition Paperback, Addison-Wesley Professional,2008.

5. David Sklar, Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers", 2014.

COMPUTER APPLICATION-DSE-3-LAB

Practical on PHP Programming

(Credits: 02**)**

Total marks: 30** (CCA + ESE = 30)

Pass marks: 12 (CCA + ESE = 12)

[**For each practical course, CCA component of total marks may be included in ESE in the following items along with practical experiments etc.: Practical experiments etc. max. marks = 21; Attendance max. marks = 05; Regularity in maintenance of laboratory note book max. marks = 02 and viva-voce max. marks = 02.]

1. Write a program to find greatest of three numbers.
2. Write a program to find gross salary of a person
3. Write a program to find grade of a student given his marks.
4. Write a program to find divisor or factorial of a given number.
5. Write a program to print first ten natural numbers.
6. Write a program to print first ten even and odd numbers.
7. Implement the PHP/MySQL concepts listed in theory.
8. Implement some exercises of semester using PHP as front end.

COMPUTER APPLICATION-DSE-4

Project work/ Dissertation

(Credits: 06)

Total marks: 100 (ESE: 70; CCA: 30)

Pass marks: 40 (ESE: 28; CCA: 12)

This option to be offered only in 6th Semester.

The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses.

The group size should be maximum of three (03) students.

Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes.

A maximum of Four (04) projects would be assigned to one teacher.

ASSAM UNIVERSITY, SILCHAR

SYLLABUS UNDER

CHOICE BASED CREDIT SYSTEM

COMPUTER SCIENCE

(HONOURS)

TDC (CBCS) COURSE STRUCTURES
B.Sc. Computer Science (Honours)

Total Courses: - 26 Total Credits: - 148 Total Marks: - 2600

SEM	COURSES	CREDIT	L-T-P (Per Week)	CCA		ESE		TOTAL	
				FM	PM	FM	PM	FM	PM
I	CSC-C-101: Programming Fundamentals Using C/C++	4	4-0-0	20	8	50	20	70	28
	CSC-C-101-LAB: Programming Fundamentals Using C/C++	2	0-0-4	-	-	30	12	30	12
	CSC-C-102: Discrete Structures	6	5-1-0	30	12	70	28	100	40
	CSC-GE/DSC-101: Programming Fundamentals Using C/C++	4	4-0-0	20	8	50	20	70	28
	CSC-GE/DSC-101-LAB: Programming Fundamentals Using C/C++	2	0-0-4	-	-	30	12	30	12
II	CSC-C-201: Computer System Architecture	6	5-1-0	30	12	70	28	100	40
	CSC-C-202: Data Structures	4	4-0-0	20	8	50	20	70	28
	CSC-C-202-LAB: Data Structures	2	0-0-4	-	-	30	12	30	12
	CSC-GE/DSC-201: Computer System Architecture	6	5-1-0	30	12	70	28	100	40

SEM	COURSES	CREDIT	L-T-P (Per Week)	CCA		ESE		TOTAL	
				FM	PM	FM	PM	FM	PM
III	CSC-C-301: Programming in JAVA	4	4-0-0	20	8	50	20	70	28
	CSC-C-301-LAB: Programming in JAVA	2	0-0-4	-	-	30	12	30	12
	CSC-C-302: Computer Graphics	4	4-0-0	20	8	50	20	70	28
	CSC-C-302-LAB: Computer Graphics	2	0-0-4	-	-	30	12	30	12
	CSC-C-303: Operating Systems	6	5-1-0	30	12	70	28	100	40
	CSC-GE/DSC-301: Operating Systems	6	5-1-0	30	12	70	28	100	40
	CSC-SEC-301: UNIX/LINUX Programming	2	2-0-0	20	8	50	20	70	28
	CSC-SEC-301-LAB: UNIX/LINUX Programming	2	0-0-4	-	-	30	12	30	12
IV	CSC-C-401: Computer Networks	6	5-1-0	30	12	70	28	100	40
	CSC-C-402: Database Management Systems	4	4-0-0	20	8	50	20	70	28
	CSC-C-402-LAB: Database Management Systems	2	0-0-4	-	-	30	12	30	12
	CSC-C-403: Design and Analysis of Computer Algorithms	6	5-1-0	30	12	70	28	100	40
	CSC-GE/DSC-401: Database Management Systems	4	4-0-0	20	8	50	20	70	28
	CSC-GE/DSC-401-LAB: Database Management Systems	2	0-0-4	-	-	30	12	30	12
	CSC-SEC-401: Programming in Python	2	2-0-0	20	8	50	20	70	28
	CSC-SEC-301-LAB: Programming in Python	2	0-0-4	-	-	30	12	30	12

SEM	COURSES	CREDIT	L-T-P (Per Week)	CCA		ESE		TOTAL	
				FM	PM	FM	PM	FM	PM
V	CSC-C-501: Theory of Computation	6	5-1-0	30	12	70	28	100	40
	CSC-C-502: Internet Technologies	4	4-0-0	20	8	50	20	70	28
	CSC-C-502-LAB: Internet Technologies	2	0-0-4	-	-	30	12	30	12
	CSC-DSE-501: Numerical Methods	4	4-0-0	20	8	50	20	70	28
	CSC-DSE-501-LAB: Numerical Methods	2	0-0-4	-	-	30	12	30	12
	CSC-DSE-502: Network Programming	4	4-0-0	20	8	50	20	70	28
	CSC-DSE-502-LAB: Network Programming	2	0-0-4	-	-	30	12	30	12
VI	CSC-C-601: Artificial Intelligence	4	4-0-0	20	8	50	20	70	28
	CSC-C-601-LAB: Artificial Intelligence	2	0-0-4	-	-	30	12	30	12
	CSC-C-602: Software Engineering	6	5-1-0	30	12	70	28	100	40
	CSC-DSE-601: Information Security and Cyber Law	6	5-1-0	30	12	70	28	100	40
	CSC-DSE-602: Project/Dissertation	6	0-0-12	30	12	70	28	100	40

N.B: Compulsory papers:

i. AECC1 – English Communication/MIL

ii. AECC2 – Environment Studies

Computer Science Honours students can opt for Four papers of any one discipline listed below (GE 1 to GE4)

i. Mathematics **ii**. Physics **iii**. Statistics **iv**. Biotechnology

CCA – Continuous and Comprehensive Assessment (Internal Assessment), **ESE** – End Semester Examinations, **FM** – Full Marks, **PM** – Pass Marks

CSC- C-101
Programming Fundamentals using C/C++
(Credits: 04)
Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the fundamental concepts of programming using C/C++.

UNIT - I

Introduction to C and C++: History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O: Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.h etc).

Expressions, Conditional Statements and Iterative Statements: Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative).

UNIT - II

Functions and Arrays: Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments. Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays.

Derived Data Types (Structures and Unions): Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions.

UNIT-III

Pointers and References in C++: Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, Problems with Pointers, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs. References, Declaring and initializing references, Using references as function arguments and function return values.

Memory Allocation in C++: Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation.

File I/O, Preprocessor Directives: Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros.

UNIT-IV

Using Classes in C++: Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables &Functions, Objects as parameters, specifying the Protected and Private Access, Copy Constructors

UNIT-V

Overview of Function Overloading and Operator Overloading: Need of Overloading functions and operators, Overloading functions by number and type of arguments, Looking at an operator as a function call, Overloading Operators (including assignment operators, unary operators).

Inheritance, Polymorphism and Exception Handling: Introduction to Inheritance (Multi-Level Inheritance, Multiple Inheritance), Polymorphism (Virtual Functions, Pure Virtual Functions), Basics Exceptional Handling (using catch and throw, multiple catch statements), Catching all exceptions, Restricting exceptions, Rethrowing exceptions.

Reference Books:-

1. Herbtz Schildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003.
2. Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley , 2013.
3. Bjarne Stroustroup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
4. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.
5. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
6. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
7. Andrew Koeni, Barbara, E. Moo, "Accelerated C++", Published by Addison-Wesley , 2000.
8 Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014

CSC- C-101- LAB
Programming Fundamentals using C/C++
(Credits: 02)
Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of programming using c/c++.

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+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 or new operator.
16. Write a menu driven program to perform following operations on strings:13

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. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
23. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
24. Create a class Box containing length, breath and height. Include following methods in it:
    a) Calculate surface Area
    b) Calculate Volume
    c) Increment, Overload ++ operator (both prefix & postfix)
    d) Decrement, Overload -- operator (both prefix & postfix)
    e) Overload operator == (to check equality of two boxes), as a friend function
    f) Overload Assignment operator
    g) Check if it is a Cube or cuboid

    Write a program which takes input from the user for length, breath and height to test the above class.
25. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
26. Write a program to retrieve the student information from file created in previous question and print it in following format:

    Roll No. Name Marks
27. Copy the contents of one text file to another file, after removing all whitespaces.
28. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.14

CSC- C-102

Discrete Structures
(Credits: 06)

Full marks: 100 (External: 70; Sessional: 30)
Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the concepts of set, growth of function, recurrence, graph theory and propositional logic.

UNIT I

Introduction: Sets - finite and Infinite sets, uncountably Infinite Sets; functions, relations, Properties of Binary Relations, Closure, Partial Ordering Relations; counting - Pigeonhole Principle,

UNIT II

Growth of Functions: Asymptotic Notations, Summation approximation by Integrals formulas and properties, Bounding Summations,

UNIT III

Recurrences: Recurrence Relations, generating functions, Linear Recurrence Relations with constant coefficients and their solution, Substitution Method, Recurrence Trees, Master Theorem

UNIT IV

Graph Theory: Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees.

UNIT V

Prepositional Logic: Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Inference Theory.

Reference Books:-

1. C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985,
2. Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition, McGraw Hill 2006
3. T.H. Coremen, C.E. Leiserson, R. L. Rivest, Introduction to algorithms, 3rd edition Prentice Hall on India, 2009
4. M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988
5. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
6. D.J. Hunter, Essentials of Discrete Mathematics, Jones and Bartlett Publishers, 2008

CSC- C-201
Computer System Architecture
(Credits: 06)

Full marks: 100 (External: 70; Sessional:30)
Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the concepts of system architecture, organization of a computer & design, memory organization, input-output organization.

UNIT I

Introduction: Logic gates, boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

UNIT II

Data Representation and Basic Computer Arithmetic: Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, multiplication and division algorithms for integers

UNIT III

Basic Computer Organization and Design: Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

UNIT IV

Central Processing Unit: Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures.

Memory Organization Cache memory, Associative memory, mapping.

UNIT V

Input-Output Organization: Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

Recommended Books:

1. M. Mano, Computer System Architecture, Pearson Education 1992
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004th
3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8 Edition, Prentice Hall of India,2009
4. M.M. Mano , Digital Design, Pearson Education Asia,2013.
5. Carl Hamacher, Computer Organization, Fifth edition, McGrawHill, 2012.

CSC- C-202
Data Structures
(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of arrays, stacks, linked lists, queues, recursion, trees, hashing, searching & sorting and their representation in computer memory.

UNIT I

Arrays: Single and Multi-dimensional Arrays, Sparse Matrices (Array and Linked Representation).

Stacks: Implementing single / multiple stack/s in an Array; Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from one to another; Applications of stack; Limitations of Array representation of stack.

UNIT II

Linked Lists: Singly, Doubly and Circular Lists (Array and Linked representation); Normal and Circular representation of Stack and Linked Lists.

Queues: Array and Linked representation of Queue, De-queue, Priority Queues

UNIT III

Recursion: Developing Recursive Definition of Simple Problems and their implementation; Advantages and Limitations of Recursion; Understanding what goes behind Recursion (Internal Stack Implementation)

Trees: Introduction to Tree as a data structure; Binary Trees (Insertion, Deletion, Recursive and Iterative Traversals on Binary Search Trees); Threaded Binary Trees (Insertion, Deletion, Traversals); Height-Balanced Trees (Various operations on AVL Trees).

UNIT IV

Searching and Sorting: Linear Search, Binary Search, Comparison of Linear and Binary Search, Selection Sort, Insertion Sort, Insertion Sort, Shell Sort, and Comparison of Sorting Techniques.

UNIT V

Hashing: Introduction to Hashing, Deleting from Hash Table, Efficiency of Rehash Methods, Hash Table Reordering, Resolving collusion by Open Addressing,

Reference Books:

1. Adam Drozdek, "Data Structures and algorithm in C++", Third Edition, Cengage Learning, 2012.
2. SartajSahni, Data Structures, "Algorithms and applications in C++", Second Edition, Universities Press, 2011.
3. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using C and C++:, Second edition, PHI, 2009.

4. Robert L. Kruse, "Data Structures and Program Design in C++", Pearson, 1999.
5. D.S Malik, Data Structure using C++,Second edition, Cengage Learning, 2010.
6. Mark Allen Weiss, "Data Structures and Algorithms Analysis in Java", Pearson Education, 3rd edition, 2011
7. Aaron M. Tenenbaum, Moshe J. Augenstein, YedidyahLangsam, "Data Structures Using Java, 2003.
8. Robert Lafore, "Data Structures and Algorithms in Java, 2/E", Pearson/ Macmillan Computer Pub,2003
9. John Hubbard, "Data Structures with JAVA", McGraw Hill Education (India) Private Limited; 2 edition, 2009
10. Goodrich, M. and Tamassia, R. "Data Structures and Algorithms Analysis in Java", 4th Edition, Wiley,2013
11. Herbert Schildt, "Java The Complete Reference (English) 9th Edition Paperback", Tata McGraw Hill, 2014.
12. D. S. Malik, P.S. Nair, "Data Structures Using Java", Course Technology, 2003.

CSC- C-202- LAB
Data Structures
(Credits: 02)

Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of different operations of Data Structures.

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. Create and perform different operations on Double-ended Queues using Linked List implementation.
10. WAP to scan a polynomial using linked list and add two polynomial.
11. WAP to calculate factorial and to compute the factors of a given no. (i)using recursion, (ii) using iteration
12. (ii) WAP to display fibonacci series (i)using recursion, (ii) using iteration
13. WAP to calculate GCD of 2 number (i) with recursion (ii) without recursion
14. WAP to create a Binary Search Tree and include following operations in tree: (a) Insertion (Recursive and Iterative Implementation)
(b) Deletion by copying (c) Deletion by Merging

(d) Search a no. in BST
(e) Display its preorder, postorder and inorder traversals Recursively
(f) Display its preorder, postorder and inorder traversals Iteratively
(g) Display its level-by-level traversals
(h) Count the non-leaf nodes and leaf nodes
(i) Display height of tree
(j) Create a mirror image of tree
(k) Check whether two BSTs are equal or not
15. WAP to convert the Sparse Matrix into non-zero form and vice-versa.
16. WAP to reverse the order of the elements in the stack using additional stack.
17. WAP to reverse the order of the elements in the stack using additional Queue.
18. WAP to implement Diagonal Matrix using one-dimensional array.
19. WAP to implement Lower Triangular Matrix using one-dimensional array.
20. WAP to implement Upper Triangular Matrix using one-dimensional array.
21. WAP to implement Symmetric Matrix using one-dimensional array.
22. WAP to create a Threaded Binary Tree as per inorder traversal, and implement operations like finding the successor / predecessor of an element, insert an element, inorder traversal.
23. WAP to implement various operations on AVL Tree.

CSC- C-301
Programming in Java
(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the programming concepts of Java.

UNIT I

Introduction to Java : Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods),

UNIT II

Arrays, Strings and I/O: Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.

Object-Oriented Programming Overview: Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

UNIT III

Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata: Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net),Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

UNIT IV

Exception Handling, Threading, Networking and Database Connectivity: Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread, Accessing and manipulating databases using JDBC.

UNIT V

Applets and Event Handling: Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, textfields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets.

Reference Books

1. Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4th Edition, 2005.
2. James Gosling, Bill Joy, Guy L Steele Jr, GiladBracha, Alex Buckley"The Java Language Specification, Java SE 8 Edition (Java Series)", Published by Addison Wesley, 2014.
3. Joshua Bloch, "Effective Java" 2nd Edition,Publisher: Addison-Wesley, 2008.
4. Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1 ,9th Edition,Printice Hall.2012
5. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 2 - Advanced Features)", 9th Edition, Printice Hall.2013
6. Bruce Eckel, "Thinking in Java", 3rd Edition, PHI, 2002.
7. E. Balaguruswamy, "Programming with Java", 4th Edition, McGraw Hill.2009.
8. Paul Deitel, Harvey Deitel, "Java: How to Program", 10th Edition, Prentice Hall, 2011.
9. "Head First Java", Orielly Media Inc. 2nd Edition, 2005.
10. David J. Eck, "Introduction to Programming Using Java", Published by CreateSpace Independent Publishing Platform, 2009.
11. John R. Hubbard, "Programming with JAVA", Schaum's Series, 2nd Edition, 2004.

CSC- C-301- LAB
Programming in JAVA
(Credits: 02)
Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of programming in Java.

1. To find the sum of any number of integers entered as command line arguments
2. To find the factorial of a given number
3. To learn use of single dimensional array by defining the array dynamically.
4. To learn use of lenth in case of a two dimensional array
5. To convert a decimal to binary number
6. To check if a number is prime or not, by taking the number as input from the keyboard
7. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument
8. Write a program that show working of different functions of String and StringBufferclasss like setCharAt(, setLength(), append(), insert(), concat()and equals().
9. Write a program to create a ―distance‖ class with methods where distance is computed in terms of feet and inches, how to create objects of a class and to see the use of this pointer
10. Modify the ―distance‖ class by creating constructor for assigning values (feet and inches) to the distance object. Create another object and assign second object as reference variable to another object reference variable. Further create a third object which is a clone of the first object.
11. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions(from lower to higher data type).
12. Write a program to show the difference between public and private access specifiers. The program should also show that primitive data types are passed by value and objects are passed by reference and to learn use of final keyword.
13. Write a program to show the use of static functions and to pass variable length arguments in a function.
14. Write a program to demonstrate the concept of boxing and unboxing.
15. Create a multi-file program where in one file a string message is taken as input from the user and the function to display the message on the screen is given in another file (make use of Scanner package in this program).
16. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate Fibonacci series is given in a different file belonging to the same package.
17. Write a program that creates illustrates different levels of protection in classes/subclasses belonging to same package or different packages.
18. Write a program ―DivideByZero‖ that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
19. Write a program to show the use of nested try statements that emphasizes the sequence of checking for catch handler statements.
20. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).
21. Write a program to demonstrate priorities among multiple threads.

22. Write a program to demonstrate multithread communication by implementing synchronization among threads (Hint: you can implement a simple producer and consumer problem).
23. Write a program to create URL object, create a URLConnection using the openConnection() method and then use it examine the different components of the URLand content.
24. Write a program to implement a simple datagram client and server in which a message that is typed into the server window is sent to the client side where it is displayed.
25. Write a program that creates a Banner and then creates a thread to scrolls the message in the banner from left to right across the applet‘s window.
26. Write a program to get the URL/location of code (i.e. java code) and document(i.e. html file).
27. Write a program to demonstrate different mouse handling events like mouseClicked(), mouseEntered(), mouseExited(), mousePressed, mouseReleased() and mouseDragged().
28. Write a program to demonstrate different keyboard handling events.
29. Write a program to generate a window without an applet window using main() function.
30. Write a program to demonstrate the use of push buttons.

CSC- C-302
Computer Graphics
(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the basic concepts of Computer Graphics.

UNIT I

Introduction: Basic elements of Computer graphics, Applications of Computer Graphics.
Graphics Hardware: Architecture of Raster and Random scan display devices, input/output devices.

UNIT II

Fundamental Techniques in Graphics: Raster scan line, circle and ellipse drawing, thick primitives, Polygon filling, line and polygon clipping algorithms,

UNIT III

Transformation & Projection: 2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations (Projections- Parallel and Perspective),.

UNIT IV

Geometric Modeling: Representing curves & Surfaces.
Visible Surface determination: Hidden surface elimination.

UNIT V

Surface rendering: Illumination and shading models. Basic color models and Computer Animation.

Books Recommended:

1. J.D.Foley, A.Van Dan, Feiner, Hughes Computer Graphics Principles & Practice 2nd edition Publication Addison Wesley 1990.
2. D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.
3. D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.
4. D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill 2nd edition 1989.

CSC- C-302- LAB:
Computer Graphics
(Credits: 02)

Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of Computer Graphics.

1. Write a program to implement Bresenham‘s line drawing algorithm.
2. Write a program to implement mid-point circle drawing algorithm.
3. Write a program to clip a line using Cohen and Sutherland line clipping algorithm.
4. Write a program to clip a polygon using Sutherland Hodgeman algorithm.
5. Write a program to apply various 2D transformations on a 2D object (use homogenous coordinates).
6. Write a program to apply various 3D transformations on a 3D object and then apply parallel and perspective projection on it.
7. Write a program to draw Hermite/Bezier curve.

CSC- C-303:
Operating Systems
(Credits: 06)

Full marks: 100 (External: 70; Sessional: 30)
Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the basic concepts of Operating System and its different functions.

UNIT I

Introduction: Basic OS functions, resource abstraction, types of operating systems– multiprogramming systems, batch systems , time sharing systems; operating systems for personal computers &workstations, process control & real time systems.
Operating System Organization: Processor and user modes, kernels, system calls and system programs.

UNIT II

Process Management: System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms.

UNIT III

Process Coordination: Synchronization, concurrent processes, critical section, semaphores, methods for inter-process communication; deadlocks.

UNIT IV

Memory Management: Physical and virtual address space; memory allocation strategies -fixed and variable partitions, paging, segmentation, virtual memory

UNIT V

File and I/O Management: Directory structures, file operations, file allocation methods, device management.

Protection and Security: Policy mechanism, Authentication, Internal access Authorization.

Recommended Books:

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

CSC-SEC-301

UNIX/ LINUX Programming

(Credit: 02)

Full marks: 70 (External: 50; Sessional: 20)

Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of UNIX/LINUX programming.

UNIT I

Introduction:

What are Linux/Unix Operating Systems?
Difference between Linux/Unix and other operating systems, Features and Architecture
Various Distributions available in the market, Installation, Booting and shutdown process

UNIT II

Introduction: System processes (an overview), External and internal commands
Creation of partitions in OS

Processes and its creation phases – Fork, Exec, wait

UNIT III

User Management and the File System

Types of Users, Creating users, Granting rights, User management commands
File quota and various file systems available
File System Management and Layout, File permissions
Login process, Managing Disk Quotas, Links (hard links, symbolic links)

UNIT IV

Shell: introduction & Shell Scripting

What is shell and various type of shell, Various editors present in linux , Different modes of operation in vi editor
What is shell script, Writing and executing the shell script
Shell variable (user defined and system variables)

UNIT V

Shell Scripting

System calls, Using system calls, Pipes and Filters
Decision making in Shell Scripts (If else, switch), Loops in shell, Functions
Utility programs (cut, paste, join, tr , uniq utilities), Pattern matching utility (grep)

Reference Books:

1. Sumitabha, Das, Unix Concepts And Applications, Tata McGraw-Hill Education, 2006.
2. Michael Jang RHCSA/ RHCE Red Hat Linux Certification: Exams (Ex200 & Ex300) (Certification Press), 2011.
3. Nemeth Synder & Hein, Linux Administration Handbook, Pearson Education, 2nd Edition ,2010.
4. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming, The sockets Networking API, Vol. 1, 3rd Edition,2014

CSC-SEC-301-LAB

UNIX/ LINUX Programming

(Credit: 02)
Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of UNIX/LINUX programming.

1. Write a shell script to check if the number entered at the command line is prime or not.
2. Write a shell script to modify ―cal‖ command to display calendars of the specified months.
3. Write a shell script to modify ―cal‖ command to display calendars of the specified range of months.
4. Write a shell script to accept a login name. If not a valid login name display message – ―Entered login name is invalid‖.
5. Write a shell script to display date in the mm/dd/yy format.

6. Write a shell script to display on the screen sorted output of ―who‖ command along with the total number of users.
7. Write a shell script to display the multiplication table any number,
8. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
9. Write a shell script to find the sum of digits of a given number.
10. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
11. Write a shell script to find the LCD(least common divisor) of two numbers.
12. Write a shell script to perform the tasks of basic calculator.
13. Write a shell script to find the power of a given number.
14. Write a shell script to find the binomial coefficient C(n , x).
15. Write a shell script to find the permutation P(n,x).
16. Write a shell script to find the greatest number among the three numbers.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.

CSC- C-401
Computer Networks
(Credits: 06)

Full marks: 100 (External: 70; Sessional: 30)
Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the basic concepts of networks and functions of different OSI reference model.

UNIT I

Introduction to Computer Networks: Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

Data Communication Fundamentals and Techniques: Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

UNIT II

Networks Switching Techniques and Access mechanisms: Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.

UNIT III

Data Link Layer Functions and Protocol: Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.

Multiple Access Protocol and Networks: CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways;

UNIT IV

Networks Layer Functions and Protocols: Routing; routing algorithms; network layer protocol of Internet- IP protocol, Internet control protocols.

UNIT V

Transport Layer Functions and Protocols : Transport services- error and flow control, Connection establishment and release- three way handshake;

Overview of Application layer protocol: Overview of DNS protocol; overview of WWW &HTTP protocol.

Reference Books

1. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM ,2007.
2. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI , 2002

CSC- C-402
Database Management Systems
(Credits: 04)
Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of database management, ER modeling, data model, database design, transaction processing, file structure & indexing.

UNIT I

Introduction: Characteristics of database approach, data models, database system architecture and data independence.

Entity Relationship(ER) Modeling: Entity types, relationships, constraints.

UNIT II

Relation data model: Relational model concepts, relational constraints, relational algebra, SQL queries

UNIT III

Database design: Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (upto BCNF).

UNIT IV

Transaction Processing: ACID properties, concurrency control

UNIT V

File Structure and Indexing: Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files (Primary index, secondary index, clustering index), Multilevel indexing using B and B+ trees.

Books Recommended:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

CSC- C-403- LAB
Database Management Systems
(Credits: 02)
Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of Database Management Systems.

1. 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

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

13. Query to display Name of all the employees where the third letter of their name is _A‘.
14. 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.
15. Query to display Name, Salary and Commission for all employees whose Commission Amount is 14 greater than their Salary increased by 5%.
16. Query to display the Current Date.
17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after six months of employment.
18. Query to display Name and calculate the number of months between today and the date each employee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly but wants < 3 * Current Salary >. Label the Column as Dream Salary.
20. 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‘.
21. Query to display Name, Hire Date and Day of the week on which the employee started.
22. Query to display Name, Department Name and Department No for all the employees.
23. Query to display Unique Listing of all Jobs that are in Department # 30.
24. Query to display Name, Dept Name of all employees who have an _A‘ in their name.
25. Query to display Name, Job, Department No. And Department Name for all the employees working at the Dallas location.
26. 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.
27. 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.

28. Query to display Name and Salaries represented by asterisks, where each asterisk (*) signifies $100.
29. Query to display the Highest, Lowest, Sum and Average Salaries of all the employees
30. Query to display the number of employees performing the same Job type functions.
31. Query to display the no. of managers without listing their names.
32. Query to display the Department Name, Location Name, No. of Employees and the average salary for all employees in that department.
33. Query to display Name and Hire Date for all employees in the same dept. as Blake.
34. Query to display the Employee No. And Name for all employees who earn more than the average salary.
35. Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a _T‘.
36. Query to display the names and salaries of all employees who report to King.
37. Query to display the department no, name and job for all employees in the Sales department.

CSC- C-403
Design and Analysis of Algorithms
(Credits: 06)
Full marks: 100 (External: 70; Sessional: 30)
Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the concepts of algorithm design techniques, sorting and searching techniques, lower bound techniques, balance trees, graphs and string processing techniques.

UNIT I

Introduction: Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm.
Algorithm Design Techniques: Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms.

UNIT II

Sorting and Searching Techniques: Elementary sorting techniques–Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques - Heap Sort, Quick Sort, Sorting in Linear Time - Bucket Sort, Radix Sort and Count Sort, Searching Techniques, Medians & Order Statistics, complexity analysis;

UNIT III

Lower Bounding Techniques: Decision Trees
Balanced Trees: Red-Black Trees

UNIT IV

Advanced Analysis Technique: Amortized analysis
String Processing: String Matching, KMP Technique

UNIT V

Graphs: Graph Algorithms–Breadth First Search, Depth First Search and its Applications, Minimum Spanning Trees.

Recommended Books:

1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithms, PHI, 3rd Edition 2009
2. Sarabasse& A.V. Gelder Computer Algorithm – Introduction to Design and Analysis, Publisher – Pearson 3rd Edition 1999

CSC-SEC-401

Python Programming

(Credit: 02)

Full marks: 70 (External: 50; Sessional: 20)

Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of Python Programming.

UNIT I

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

Overview of Programming: Structure of a Python Program, Elements of Python

UNIT II

Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).

UNIT III

Creating Python Programs: Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Errors and Exceptions

UNIT IV

Iteration and Recursion: Conditional execution, Alternative execution, Nested conditionals, The return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, The while statement, Tables, Two-dimensional tables Strings and Lists: String as a compound

data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists

UNIT V

Object Oriented Programming: Introduction to Classes, Objects and Methods, Standard Libraries.

Data Structures: Arrays, list, set, stacks and queues.

Searching and Sorting: Linear and Binary Search, Bubble, Selection and Insertion Sorting

Reference Books :-

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation www.python.or 2015
3. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012
4. http://docs.python.org/3/tutorial/index.html
5. http://interactivepython.org/courselib/static/pythonds
6. http://www.ibiblio.org/g2swap/byteofpython/read/

CSC-SEC-401-LAB
Python Programming
(Credit: 02)
Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of python & visual python.

Practical: Software Lab using Python

Section: A (Simple programs)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :

Grade A: Percentage >=80
Grade B: Percentage>=70 and <80
Grade C: Percentage>=60 and <70
Grade D: Percentage>=40 and <60
Grade E: Percentage<40

3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first n terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to find sum of the following series for n terms: 1 – 2/2! + 3/3! - - - - - n/n!

7. WAP to calculate the sum and product of two compatible matrices.

Section: B (Visual Python):
All the programs should be written using user defined functions, wherever possible.
1. Write a menu-driven program to create mathematical 3D objects
I. curve II. Sphere
III. Cone IV. Arrow
V. ring VI. Cylinder.
2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.
4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula m=60/(t+2), where t is the time in hours. Sketch a graph for t vs. m, where t>=0.
6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:
P(t) = (15000(1+t))/(15+ *e)*
where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.
7. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
I. velocity wrt time (v=u+at)
II. distance wrt time (s=u*t+0.5*a*t*t) III. distance wrt velocity (s=(v*v-u*u)/2*a)

CSC- C-501
Theory of Computation
(Credits: 06)

Full marks: 100 (External: 70; Sessional: 30)
Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the concepts of languages, finite automata, regular languages, context free languages, Turing machine & models of computation.

UNIT I

Languages: Alphabets, string, language, Basic Operations on language, Concatenation, KleeneStar

UNIT II

Finite Automata and Regular Languages: Regular Expressions, Transition Graphs, Deterministic and non-deterministic finite automata, NFA to DFA Conversion, Regular languages and their relationship with finite automata, Pumping lemma and closure properties of regular languages.

UNIT III

Context Free Languages: Context free grammars, parse trees, ambiguities in grammars and languages,

UNIT IV

Pushdown automata: Pushdown automata (Deterministic and Non-deterministic), Pumping Lemma, Properties of context free languages, normal forms.

UNIT V

Turing Machines and Models of Computation: Turing Machine as a model of computation, Universal Turing Machine, Language acceptability, decidability, halting problem, Recursively enumerable and recursive languages, unsolvability problems.

Reference Books:

1. Daniel I.A.Cohen, Introduction to computer theory, John Wiley,1996
2. Lewis & Papadimitriou, Elements of the theory of computation , PHI 1997.
3. Hoperoft, Aho, Ullman, Introduction to Automata theory, Language & Computation **–3rd** Edition,

Pearson Education. 2006

4. P. Linz, An Introduction to Formal Language and Automata 4th edition Publication Jones Bartlett, 2006

CSC- C-502
Internet Technologies
(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of different web authorating tools & internet technologies.

UNIT I

Java: Use of Objects, Array and ArrayList class

UNIT II

JavaScript: Data types, operators, functions, control structures, events and event handling.

UNIT III

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

UNIT IV

JSP: Introduction to JavaServer Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an

expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

UNIT V

Java Beans: Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

Reference Books:

1. Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml,javascript, Perl Cgi , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
4. Jim Keogh ,The Complete Reference J2EE, TMH, , 2002.
5. O'Reilly , Java Server Pages, Hans Bergsten, Third Edition, 2003.

CSC- C-502- LAB
Internet Technologies
(Credits: 02)

Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of different internet technologies.

Create event driven program for following:

1. Print a table of numbers from 5 to 15 and their squares and cubes using alert.
2. Print the largest of three numbers.
3. Find the factorial of a number n.
4. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.
5. A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.
6. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.

CSC- DSE-501
Numerical Methods
(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of numerical methods.

UNIT I

Floating point representation and computer arithmetic, Significant digits, Errors: Round-off error, Local truncation error, Global truncation error, Order of a method, Convergence and terminal conditions, Efficient computations

UNIT II

Bisection method, Secant method, Regula−Falsi method, Newton−Raphson method, Newton‘s method for solving nonlinear systems Gauss elimination method (with row pivoting) and Gauss−Jordan method, Gauss Thomas method for tridiagonal systems

UNIT III

Iterative methods: Jacobi and Gauss-Seidel iterative methods, Interpolation: Lagrange‘s form and Newton‘s form Finite difference operators, Gregory Newton forward and backward differences Interpolation Piecewise polynomial interpolation: Linear interpolation, Cubic spline interpolation (only method)

UNIT IV

Numerical differentiation: First derivatives and second order derivatives, Richardson extrapolation

Numerical integration: Trapezoid rule, Simpson‘s rule (only method), Newton−Cotes open formulas

Extrapolation methods: Romberg integration, Gaussian quadrature, Ordinary differential equation: Euler‘s method

UNIT V

Modified Euler‘s methods: Heun method and Mid-point method, Runge-Kutta second methods: Heun method without iteration, Mid-point method and Ralston‘s method, Classical 4th order Runge-Kutta method, Finite difference method for linear ODE

REFERNCE BOOKS:

1. Laurence V. Fausett, Applied Numerical Analysis, Using MATLAB, Pearson, 2/e (2012)
2. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publisher, 6/e (2012)
3. Steven C Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, Tata McGraw Hill, 2/e (2010)

CSC- DSE-501- LAB
Numerical Methods
(Credits: 02)

Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of numerical methods.

1. Find the roots of the equation by bisection method.
2. Find the roots of the equation by secant/Regula−Falsi method.
3. Find the roots of the equation by Newton‘s method.
4. Find the solution of a system of nonlinear equation using Newton‘s method.

5. Find the solution of tridiagonal system using Gauss Thomas method.
6. Find the solution of system of equations using Jacobi/Gauss-Seidel method.
7. Find the cubic spline interpolating function.
8. Evaluate the approximate value of finite integrals using Gaussian/Romberg integration.
9. Solve the boundary value problem using finite difference method.

Note: Programming is to be done in any one of Computer Algebra Systems: MATLAB / MATHEMATICA / MAPLE.

CSC- DSE-502
Network Programming
(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the basic concepts of network programming.

UNIT I

Transport Layer Protocols: TCP, UDP, SCTP protocol.

UNIT II

Socket Programming: Socket Introduction; TCP Sockets; TCP Client/Server Example ; signal handling;

UNIT III

I/O multiplexing using sockets; Socket Options; UDP Sockets; UDP client server example; Address lookup using sockets.

UNIT IV

Network Applications: Remote logging; Email; WWW and HTTP. LAN administration: Linux

UNIT V

TCP/IP networking: Network Management and Debugging.

Reference Books:

1. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming, The sockets Networking API, Vol. 1, 3rd Edition, PHI.2003
2. B. A. Forouzan**:** Data Communications and Networking, Fourth edition**,** THM Publishing Company Ltd., 2003
3. Nemeth Synder & Hein, Linux Administration Handbook, Pearson Education, 2nd Edition,2010
4. R. Stevens, Unix Network Programming, PHI 2nd Edition,1990

CSC- DSE-502- LAB
Network Programming
(Credits: 02)

Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of network programming.

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
2. Simulate and implement stop and wait protocol for noisy channel.
3. Simulate and implement go back n sliding window protocol.
4. Simulate and implement selective repeat sliding window protocol.
5. Simulate and implement distance vector routing algorithm
6. Simulate and implement Dijkstra algorithm for shortest path routing.
7. WAP to find the address of the local machine
8. WAP A program that prints the address of www.youtube.com
9. WAP A program that prints all the addresses of www.youtube.com
10. Write a program to implement following methods:
    public String getHostName( )
    public byte[] getAddress( )
    public String getHostAddress( )

11. Describe the following methods in brief:
    public boolean isAnyLocalAddress( )
    public boolean isLoopbackAddress( )

12. Write a program to testing the characteristics of an IP address i.e. you have to check whether given address is AnyLocalAddress, LoopbackAddress, LinkLocalAddress, SiteLocalAddress or MulticastAddress.
13. Write a program to enter the IP address of any node and check whether a particular node is reachable from the current host.
14. Write a program of protocol tester .It is a simple program for determining which protocols a virtual machine supports. It attempts to construct a URL object for each of 10 URL given below. If the protocol is not supported. a MalformedURLException is thrown and you know the protocol is not supported.

Test protocols for following URL:

1. http://www.adc.org
2. https://www.amazon.com/exec/obidos/order2/
3. file:///etc/passwd
4. ftp://metalab.unc.edu/pub/languages/java/javafaq

5. mailto:elharo@metalab.unc.edu
6. telnet://dibner.poly.edu/
7. nfs://utopia.poly.edu/usr/tmp/
8. gopher://gopher.anc.org.za/
9. verbatim:http://www.adc.org/
10. netdoc:/UsersGuide/release.html

CSC- C-601
Artificial Intelligence
(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of artificial intelligence & natural languages processing.

UNIT I

Introduction: Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

UNIT II

Problem Solving and Searching Techniques
Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

UNIT III

Knowledge Representation: Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs. Programming in Logic (PROLOG)

UNIT IV

Dealing with Uncertainty and Inconsistencies: Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.

UNIT V

Understanding Natural Languages: Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.

Reference Books:

1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.
2. Russell & Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall,

2nd edition, 2005.
3. Rich & Knight, Artificial Intelligence – Tata McGraw 2nd Hill,
4. W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing edition, 1991. House, 3rd edition, 2001.
5. Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, Pearson Education, 3rd edition, 2000.

CSC- C-601- LAB
Artificial Intelligence
(Credits: 02)

Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of Artificial Intelligence.

1. Write a prolog program to calculate the sum of two numbers.
2. Write a prolog program to find the maximum of two numbers.
3. Write a prolog program to calculate the factorial of a given number.
4. Write a prolog program to calculate the nth Fibonacci number.
5. Write a prolog program, insert_nth(item, n, into_list, result) that asserts that result is the list into_list with item inserted as the n'th element into every list at all levels.
6. Write a Prolog program to remove the Nth item from a list.
7. Write a Prolog program, remove-nth(Before, After) that asserts the After list is the Before list with the removal of every n'th item from every list at all levels.
8. Write a Prolog program to implement append for two lists.
9. Write a Prolog program to implement palindrome(List).
10. Write a Prolog program to implement max(X,Y,Max) so that Max is the greater of two numbers X and Y.
11. Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List.
12. Write a Prolog program to implement sumlist(List,Sum) so that Sum is the sum of a given list of numbers List.
13. Write a Prolog program to implement two predicates evenlength(List) and oddlength(List) so that they are true if their argument is a list of even or odd length respectively.
14. Write a Prolog program to implement reverse(List,ReversedList) that reverses lists.
15. Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List using cut predicate.
16. Write a Prolog program to implement GCD of two numbers.
17. Write a prolog program that implements Semantic Networks/Frame Structures.

CSC- C-602
Software Engineering
(Credits: 06)
Full marks: 100 (External: 70; Sessional: 30)
Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the concepts of software engineering theory.

UNIT I

Introduction: The Evolving Role of Software, Software Characteristics, Changing Nature of Software, Software Engineering as a Layered Technology, Software Process Framework, Framework and Umbrella Activities, Process Models, Capability Maturity Model Integration (CMMI).

UNIT II

Requirement Analysis: Software Requirement Analysis, Initiating Requirement Engineering Process, Requirement Analysis and Modeling Techniques, Flow Oriented Modeling, Need for SRS, Characteristics and Components of SRS.

Software Project Management: Estimation in Project Planning Process, Project Scheduling.

UNIT III

Risk Management: Software Risks, Risk Identification, Risk Projection and Risk Refinement, RMMM Plan.

Quality Management: Quality Concepts, Software Quality Assurance, Software Reviews, Metrics for Process and Projects.

UNIT IV

Design Engineering: Design Concepts, Architectural Design Elements, Software Architecture, Data Design at the Architectural Level and Component Level, Mapping of Data Flow into Software Architecture, Modeling Component Level Design.

UNIT V

Testing Strategies & Tactics: Software Testing Fundamentals, Strategic Approach to Software Testing, Test Strategies for Conventional Software, Validation Testing, System testing, Black-Box Testing, White-Box Testing and their type, Basis Path Testing.

Reference Books:

1. R.S. Pressman, Software Engineering: A Practitioner‘s Approach (7th Edition), McGraw-Hill, 2009.
2. P. Jalote, An Integrated Approach to Software Engineering (2nd Edition), Narosa Publishing House, 2003.
3. K.K. Aggarwal and Y. Singh, Software Engineering (2nd Edition), New Age International Publishers, 2008.
4. I. Sommerville, Software Engineering (8th edition), Addison Wesley, 2006.
5. D. Bell, Software Engineering for Students (4th Edition), Addison-Wesley, 2005.
6. R. Mall, Fundamentals of Software Engineering (2nd Edition), Prentice-Hall of India, 2004.

CSC- DSE-601
Information Security and Cyber Laws
(Credits: 06)

Full marks: 100 (External: 70; Sessional: 30)
Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the Information Security, Cyber Laws, Cryptography & its applications.

UNIT I

Course Introduction: Computer network as a threat, hardware vulnerability, software vulnerability, importance of data security.
Digital Crime: Overview of digital crime, criminology of computer crime.

UNIT II

Information Gathering Techniques: Tools of the attacker, information and cyber warfare, scanning and spoofing, password cracking, malicious software, session hijacking.

UNIT III

Risk Analysis and Threat: Risk analysis, process, key principles of conventional computer security, security policies, authentication, data protection, access control, internal vs external threat, security assurance, passwords, authentication, and access, control, computer forensics and incident response

UNIT IV

Introduction to Cryptography and Applications : Important terms, Threat, Flaw, Vulnerability, Exploit, Attack, Ciphers, Codes, Caeser Cipher, Rail-Fence Cipher, Public key cryptography (Definitions only), Private key cryptography (Definition and Example).

UNIT V

Safety Tools and Issues : Firewalls, logging and intrusion detection systems, Windows and windows XP / NT security, Unix/Linux security, ethics of hacking and cracking
Cyber laws to be covered as per IT 2008:
• Chapter 1: Definitions
• Chapter 2: Digital Signature And Electronic Signature
• [Section 43] Penalty and Compensation for damage to computer, computer system, etc.
• [Section 65] Tampering with Computer Source Documents
• [Section 66 A] Punishment for sending offensive messages through communication service, etc.
• [Section 66 B] Punishments for dishonestly receiving stolen computer resource or communication device
• [Section 66C] Punishment for identity theft
• [Section 66D] Punishment for cheating by personation by using computer resource
• [Section 66E] Punishment for violation of privacy
• [Section 66F] Punishment for cyber terrorism
• [Section 67] Punishment for publishing or transmitting obscene material in electronic form

• [Section 67A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form
• [Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form
• [Section 72] Breach of confidentiality and privacy

Reference Books:

1. M. Merkow, J. Breithaupt, Information Security Principles and Practices, Pearson Education.2005
2. G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning, 2010
3. A. Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India, 2008

CSC-DSE-602
Project work/ Dissertation
(Credits: 06)

Full marks: 100 (External: 70; Sessional: 30)
Pass marks: 40 (External: 28; Sessional: 12)

- This option to be offered only in 6th Semester.
- The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses.
- The group size should be maximum of three (03) students.
- Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes.
- A maximum of Four (04) projects would be assigned to one teacher.

CSC-GE/DSC-101
Programming Fundamentals using C/C++
(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the fundamental concepts of programming using C/C++.

UNIT - I

Introduction to C and C++: History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O: Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.h etc).

Expressions, Conditional Statements and Iterative Statements: Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative).

UNIT - II

Functions and Arrays: Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments. Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays.

Derived Data Types (Structures and Unions): Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions.

UNIT-III

Pointers and References in C++: Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, Problems with Pointers, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs. References, Declaring and initializing references, Using references as function arguments and function return values.

Memory Allocation in C++: Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation.

File I/O, Preprocessor Directives: Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros.

UNIT-IV

Using Classes in C++: Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables &Functions, Objects as parameters, specifying the Protected and Private Access, Copy Constructors

UNIT-V

Overview of Function Overloading and Operator Overloading: Need of Overloading functions and operators, Overloading functions by number and type of arguments, Looking at an operator as a function call, Overloading Operators (including assignment operators, unary operators).

Inheritance, Polymorphism and Exception Handling: Introduction to Inheritance (Multi-Level Inheritance, Multiple Inheritance), Polymorphism (Virtual Functions, Pure Virtual Functions), Basics Exceptional Handling (using catch and throw, multiple catch statements), Catching all exceptions, Restricting exceptions, Rethrowing exceptions.

Reference Books:-

1. Herbtz Schildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003.
2. Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley , 2013.
3. Bjarne Stroustroup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
4. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.
5. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
6. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
7. Andrew Koeni, Barbara, E. Moo, "Accelerated C++", Published by Addison-Wesley , 2000.
8 Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014

CSC-GE/DSC-101- LAB

Programming Fundamentals using C/C++

(Credits: 02)

Full marks: 30

Pass marks: 12

This paper provides the practical knowledge of programming using c/c++.

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+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 or new operator.
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. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the

respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).

23. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
24. Create a class Box containing length, breath and height. Include following methods in it:
    a) Calculate surface Area
    b) Calculate Volume
    c) Increment, Overload ++ operator (both prefix & postfix)
    d) Decrement, Overload -- operator (both prefix & postfix)
    e) Overload operator == (to check equality of two boxes), as a friend function
    f) Overload Assignment operator
    g) Check if it is a Cube or cuboid

    Write a program which takes input from the user for length, breath and height to test the above class.
25. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
26. Write a program to retrieve the student information from file created in previous question and print it in following format:

    Roll No. Name Marks
27. Copy the contents of one text file to another file, after removing all whitespaces.
28. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.14

CSC-GE/DSC-201

Computer System Architecture

(Credits: 06)

Full marks: 100 (External: 70; Sessional:30)
Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the concepts of system architecture, organization of a computer & design, memory organization, input-output organization.

UNIT I

Introduction: Logic gates, boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

UNIT II

Data Representation and Basic Computer Arithmetic: Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, multiplication and division algorithms for integers

UNIT III

Basic Computer Organization and Design: Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

UNIT IV

Central Processing Unit: Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures.

Memory Organization Cache memory, Associative memory, mapping.

UNIT V

Input-Output Organization: Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

Recommended Books:

1. M. Mano, Computer System Architecture, Pearson Education 1992
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004th
3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8 Edition, Prentice Hall of India,2009
4. M.M. Mano , Digital Design, Pearson Education Asia,2013.
5. Carl Hamacher, Computer Organization, Fifth edition, McGrawHill, 2012.

CSC-GE/DSC-301

Operating Systems

(Credits: 06)

Full marks: 100 (External: 70; Sessional: 30)

Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the basic concepts of Operating System and its different functions.

UNIT I

Introduction: Basic OS functions, resource abstraction, types of operating systems– multiprogramming systems, batch systems , time sharing systems; operating systems for personal computers &workstations, process control & real time systems.

Operating System Organization: Processor and user modes, kernels, system calls and system programs.

UNIT II

Process Management: System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms.

UNIT III

Process Coordination: Synchronization, concurrent processes, critical section, semaphores, methods for inter-process communication; deadlocks.

UNIT IV

Memory Management: Physical and virtual address space; memory allocation strategies -fixed and variable partitions, paging, segmentation, virtual memory

UNIT V

File and I/O Management: Directory structures, file operations, file allocation methods, device management.

Protection and Security: Policy mechanism, Authentication, Internal access Authorization.

Recommended Books:

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

CSC-GE/DSC-401

Database Management Systems

(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)

Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of database management systems, ER & Enhanced ER modeling, Relational Data Model, database design.

UNIT I

Introduction to Database Management Systems: Characteristics of database approach, data models, DBMS architecture and data independence.

UNIT II

Entity Relationship and Enhanced ER Modeling: Entity types, relationships, SQL-99: Schema Definition, constraints, and object modeling.

UNIT III

Relational Data Model: Basic concepts, relational constraints, relational algebra, SQL queries.

UNIT IV

Database design: ER and EER to relational mapping, functional dependencies, normal forms up to third normal form.

UNIT V

Transaction Processing: ACID properties, concurrency control

Reference Books:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

CSC-GE/DSC-401-LAB
Database Management Systems
(Credits: 02)

Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of Database Management Systems.

Practical: Database Management Systems
Note: MyAccess/MySQL may be used.

The following concepts must be introduced to the students:

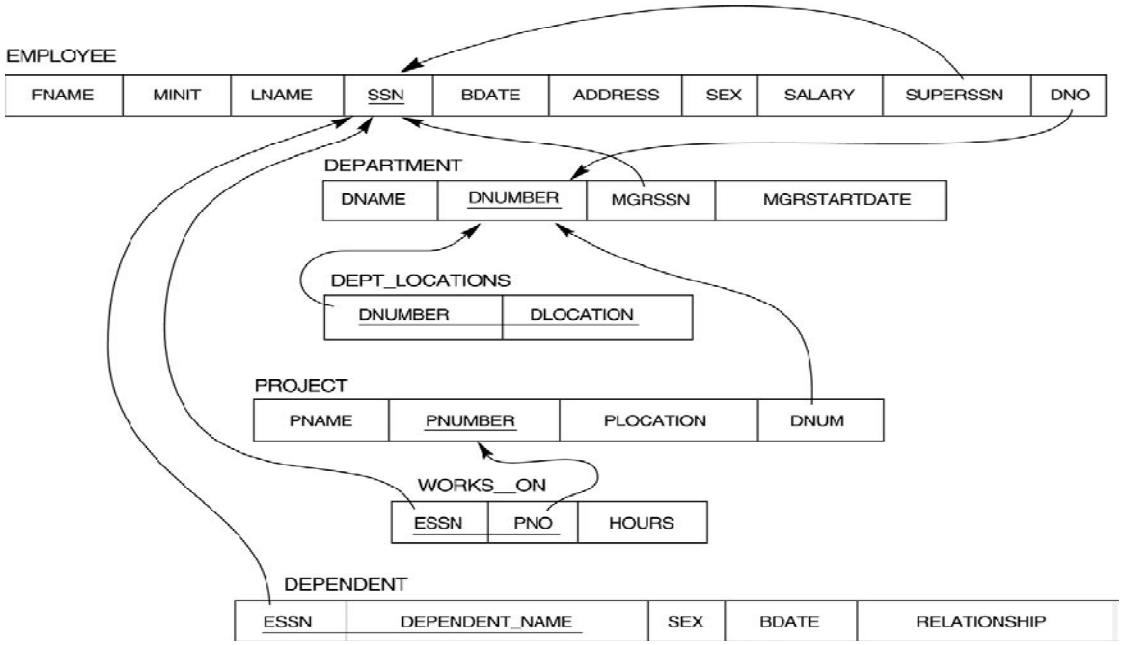
DDL Commands

• Create table, alter table, drop table

DML Commands

• Select , update, delete, insert statements
• Condition specification using Boolean and comparison operators (and, or, not,=,<>,>,<,>=,<=)
• Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max)
• Multiple table queries (join on different and same tables)
• Nested select statements
• Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
• Categorization using group by……..having
• Arranging using order by

Relational Database Schema - COMPANY



Questions to be performed on above schema

1. Create tables with relevant foreign key constraints
2. Populate the tables with data
3. Perform the following queries on the database :

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

18. Select the names of employees whose salary does not match with salary of any employee in department 10.
19. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
20. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
21. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
22. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
23. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
24. For each department, retrieve the department number, the number of employees in the department, and their average salary.
25. For each project, retrieve the project number, the project name, and the number of employees who work on that project.
26. Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively.
27. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.
28. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.
29. Delete all dependents of employee whose ssn is '123456789'.
30. Delete an employee from Employee table with ssn = '12345'(make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL
31. Perform a query using alter command to drop/add field and a constraint in Employee Table

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ASSAM UNIVERSITY, SILCHAR

SYLLABUS UNDER

CHOICE BASED CREDIT SYSTEM

COMPUTER SCIENCE

(PASS)

TDC (CBCS) COURSE STRUCTURE

B.Sc. Computer Science (Pass)

Total Courses: 24 - Total Credits: - 132 Total Marks: - 2400

SEM	COURSES	CREDIT	L-T-P (Per Week)	CCA		ESE		TOTAL	
				FM	PM	FM	PM	FM	PM
I	CSC-GE/DSC-101: Programming Fundamentals Using C/C++	4	4-0-0	20	8	50	20	70	28
	CSC-GE/DSC-101-LAB: Programming Fundamentals Using C/C++	2	2-0-0	20	8	50	20	70	28
II	CSC-GE/DSC-201: Computer System Architecture	6	5-1-0	30	12	70	28	100	40
III	CSC-GE/DSC-301: Operating Systems	6	5-1-0	30	12	70	28	100	40
	CSC-SEC-301: UNIX/LINUX Programming	2	2-0-0	20	8	50	20	70	28
	CSC-SEC-301-LAB: UNIX/LINUX Programming	2	0-0-4	-	-	30	12	30	12
IV	CSC-GE/DSC-401: Database Management Systems	4	4-0-0	20	8	50	20	70	28
	CSC-GE/DSC-401-LAB: Database Management Systems	2	0-0-4	-	-	30	12	30	12
	CSC-SEC-401: Programming in Python	2	2-0-0	20	8	50	20	70	28
	CSC-SEC-401-LAB: Programming in Python	2	0-0-4	-	-	30	12	30	12
V	CSC-DSE-501: Internet Technologies	4	4-0-0	20	8	50	20	70	28
	CSC-DSE-501-LAB: Internet Technologies	2	0-0-4	-	-	30	12	30	12
	CSC-SEC-501: Programming in MATLAB	2	2-0-0	20	8	50	20	70	28
	CSC-SEC-501-LAB: Programming in MATLAB	2	0-0-4	-	-	30	12	30	12

SEM	COURSES	CREDIT	L-T-P (Per Week)	CCA		ESE		TOTAL	
				FM	PM	FM	PM	FM	PM
VI	CSC-DSE-601: Project/Dissertation	6	0-0-12	30	12	70	28	100	40
	CSC-SEC-601: Programming in PHP	2	2-0-0	20	8	50	20	70	28
	CSC-SEC-601-LAB: Programming in PHP	2	0-0-4	-	-	30	12	30	12

N.B. Compulsory papers:
i. AECC1 – English Communication/MIL
ii. AECC2 – Environment Studies

*Out of the 4 (Four) SEC papers, a student has to choose minimum 1 (One) paper and can choose a maximum 2 (Two) papers.

CCA – Continuous and Comprehensive Assessment (Internal Assessment), **ESE** – End Semester Examinations, **FM** – Full Marks, **PM** – Pass Marks

CSC-GE/DSC-101
Programming Fundamentals using C/C++
(Credits: 04)
Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the fundamental concepts of programming using C/C++.

UNIT - I

Introduction to C and C++: History of C and C++, Overview of Procedural Programming and Object-Orientation Programming, Using main() function, Compiling and Executing Simple Programs in C++.

Data Types, Variables, Constants, Operators and Basic I/O: Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc), Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.h etc).

Expressions, Conditional Statements and Iterative Statements: Simple Expressions in C++ (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative).

UNIT - II

Functions and Arrays: Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Inline Functions, Return data type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Command Line Arguments/Parameters in Functions, Functions with variable number of Arguments. Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns), Introduction to Multi-dimensional arrays.

Derived Data Types (Structures and Unions): Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions.

UNIT-III

Pointers and References in C++: Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables), Pointers to Pointers, Pointers to structures, Problems with Pointers, Passing pointers as function arguments, Returning a pointer from a function, using arrays as pointers, Passing arrays to functions. Pointers vs. References, Declaring and initializing references, Using references as function arguments and function return values.

Memory Allocation in C++: Differentiating between static and dynamic memory allocation, use of malloc, calloc and free functions, use of new and delete operators, storage of variables in static and dynamic memory allocation.

File I/O, Preprocessor Directives: Opening and closing a file (use of fstream header file, ifstream, ofstream and fstream classes), Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files, Understanding the Preprocessor Directives (#include, #define, #error, #if, #else, #elif, #endif, #ifdef, #ifndef and #undef), Macros.

UNIT-IV

Using Classes in C++: Principles of Object-Oriented Programming, Defining & Using Classes, Class Constructors, Constructor Overloading, Function overloading in classes, Class Variables &Functions, Objects as parameters, specifying the Protected and Private Access, Copy Constructors

UNIT-V

Overview of Function Overloading and Operator Overloading: Need of Overloading functions and operators, Overloading functions by number and type of arguments, Looking at an operator as a function call, Overloading Operators (including assignment operators, unary operators).

Inheritance, Polymorphism and Exception Handling: Introduction to Inheritance (Multi-Level Inheritance, Multiple Inheritance), Polymorphism (Virtual Functions, Pure Virtual Functions), Basics Exceptional Handling (using catch and throw, multiple catch statements), Catching all exceptions, Restricting exceptions, Rethrowing exceptions.

Reference Books:-

1. Herbtz Schildt, "C++: The Complete Reference", Fourth Edition, McGraw Hill.2003.
2. Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley , 2013.
3. Bjarne Stroustroup, "Programming -- Principles and Practice using C++", 2nd Edition, Addison-Wesley 2014.
4. E Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Education, 2008.
5. Paul Deitel, Harvey Deitel, "C++ How to Program", 8th Edition, Prentice Hall, 2011.
6. John R. Hubbard, "Programming with C++", Schaum's Series, 2nd Edition, 2000.
7. Andrew Koeni, Barbara, E. Moo, "Accelerated C++", Published by Addison-Wesley , 2000.
8 Harry, H. Chaudhary, "Head First C++ Programming: The Definitive Beginner's Guide", First Create space Inc, O-D Publishing, LLC USA.2014

CSC-GE/DSC-101- LAB

Programming Fundamentals using C/C++

(Credits: 02)

Full marks: 30

Pass marks: 12

This paper provides the practical knowledge of programming using c/c++.

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+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 or new operator.

16. Write a menu driven program to perform following operations on strings:13
    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. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
23. Create a class Triangle. Include overloaded functions for calculating area. Overload assignment operator and equality operator.
24. Create a class Box containing length, breath and height. Include following methods in it:
    a) Calculate surface Area
    b) Calculate Volume
    c) Increment, Overload ++ operator (both prefix & postfix)
    d) Decrement, Overload -- operator (both prefix & postfix)
    e) Overload operator == (to check equality of two boxes), as a friend function
    f) Overload Assignment operator
    g) Check if it is a Cube or cuboid
    Write a program which takes input from the user for length, breath and height to test the above class.
25. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.
26. Write a program to retrieve the student information from file created in previous question and print it in following format:
    Roll No. Name Marks
27. Copy the contents of one text file to another file, after removing all whitespaces.
    28. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.14

CSC-GE/DSC-201

Computer System Architecture
(Credits: 06)

Full marks: 100 (External: 70; Sessional:30)
Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the concepts of system architecture, organization of a computer & design, memory organization, input-output organization.

UNIT I

Introduction: Logic gates, boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

UNIT II

Data Representation and Basic Computer Arithmetic: Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, multiplication and division algorithms for integers

UNIT III

Basic Computer Organization and Design: Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer.

UNIT IV

Central Processing Unit: Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures.

Memory Organization Cache memory, Associative memory, mapping.

UNIT V

Input-Output Organization: Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, I/O Channels.

Reference Books:-

1. M. Mano, Computer System Architecture, Pearson Education 1992
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004th
3. W. Stallings, Computer Organization and Architecture Designing for Performance, 8 Edition, Prentice Hall of India,2009
4. M.M. Mano , Digital Design, Pearson Education Asia,2013.
5. Carl Hamacher, Computer Organization, Fifth edition, McGrawHill, 2012.

CSC-GE/DSC-301

Operating Systems

(Credits: 06)

Full marks: 100 (External: 70; Sessional: 30)

Pass marks: 40 (External: 28; Sessional: 12)

This paper provides the basic concepts of Operating System and its different functions.

UNIT I

Introduction: Basic OS functions, resource abstraction, types of operating systems– multiprogramming systems, batch systems , time sharing systems; operating systems for personal computers &workstations, process control & real time systems.

Operating System Organization: Processor and user modes, kernels, system calls and system programs.

UNIT II

Process Management: System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and pre-emptive scheduling algorithms.

UNIT III

Process Coordination: Synchronization, concurrent processes, critical section, semaphores, methods for inter-process communication; deadlocks.

UNIT IV

Memory Management: Physical and virtual address space; memory allocation strategies -fixed and variable partitions, paging, segmentation, virtual memory

UNIT V

File and I/O Management: Directory structures, file operations, file allocation methods, device management.

Protection and Security: Policy mechanism, Authentication, Internal access Authorization.

Reference Books:-

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

CSC-SEC-301

UNIX/ LINUX Programming

(Credit: 02)

Full marks: 70 (External: 50; Sessional: 20)

Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of UNIX/LINUX programming.

UNIT I

Introduction:

What are Linux/Unix Operating Systems?

Difference between Linux/Unix and other operating systems, Features and Architecture

Various Distributions available in the market, Installation, Booting and shutdown process

UNIT II

Introduction: System processes (an overview), External and internal commands

Creation of partitions in OS

Processes and its creation phases – Fork, Exec, wait

UNIT III

User Management and the File System

Types of Users, Creating users, Granting rights, User management commands

File quota and various file systems available

File System Management and Layout, File permissions

Login process, Managing Disk Quotas, Links (hard links, symbolic links)

UNIT IV

Shell: introduction & Shell Scripting

What is shell and various type of shell, Various editors present in linux , Different modes of operation in vi editor

What is shell script, Writing and executing the shell script

Shell variable (user defined and system variables)

UNIT V

Shell Scripting

System calls, Using system calls, Pipes and Filters

Decision making in Shell Scripts (If else, switch), Loops in shell, Functions

Utility programs (cut, paste, join, tr , uniq utilities), Pattern matching utility (grep)

Reference Books:-

1. Sumitabha, Das, Unix Concepts And Applications, Tata McGraw-Hill Education, 2006.
2. Michael Jang RHCSA/ RHCE Red Hat Linux Certification: Exams (Ex200 & Ex300) (Certification Press), 2011.
3. Nemeth Synder & Hein, Linux Administration Handbook, Pearson Education, 2nd Edition ,2010.
4. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming, The sockets Networking API, Vol. 1, 3rd Edition,2014

CSC-SEC-301-LAB

UNIX/ LINUX Programming

(Credit: 02)

Full marks: 30

Pass marks: 12

This paper provides the practical knowledge of UNIX/LINUX programming.

1. Write a shell script to check if the number entered at the command line is prime or not.
2. Write a shell script to modify ―cal‖ command to display calendars of the specified months.
3. Write a shell script to modify ―cal‖ command to display calendars of the specified range of months.
4. Write a shell script to accept a login name. If not a valid login name display message – ―Entered login name is invalid‖.
5. Write a shell script to display date in the mm/dd/yy format.
6. Write a shell script to display on the screen sorted output of ―who‖ command along with the total number of users.

7. Write a shell script to display the multiplication table any number,
8. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
9. Write a shell script to find the sum of digits of a given number.
10. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
11. Write a shell script to find the LCD(least common divisor) of two numbers.
12. Write a shell script to perform the tasks of basic calculator.
13. Write a shell script to find the power of a given number.
14. Write a shell script to find the binomial coefficient C(n , x).
15. Write a shell script to find the permutation P(n,x).
16. Write a shell script to find the greatest number among the three numbers.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.

CSC-GE/DSC-401

Database Management Systems

(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)

Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of database management systems, ER & Enhanced ER modeling, Relational Data Model, database design.

UNIT I

Introduction to Database Management Systems: Characteristics of database approach, data models, DBMS architecture and data independence.

UNIT II

Entity Relationship and Enhanced ER Modeling: Entity types, relationships, SQL-99: Schema Definition, constraints, and object modeling.

UNIT III

Relational Data Model: Basic concepts, relational constraints, relational algebra, SQL queries.

UNIT IV

Database design: ER and EER to relational mapping, functional dependencies, normal forms up to third normal form.

UNIT V

Transaction Processing: ACID properties, concurrency control

Reference Books:-

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

CSC-GE/DSC-401-LAB

Database Management Systems

(Credits: 02)

Full marks: 30

Pass marks: 12

This paper provides the practical knowledge of Database Management Systems.

Practical: Database Management Systems
Note: MyAccess/MySQL may be used.

The following concepts must be introduced to the students:

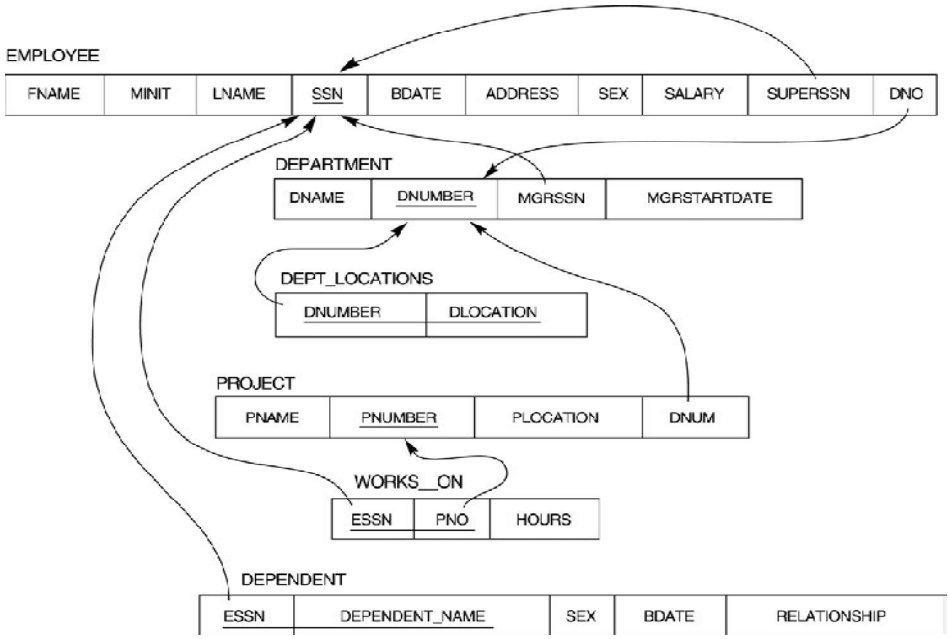
DDL Commands

• Create table, alter table, drop table

DML Commands

• Select , update, delete, insert statements
• Condition specification using Boolean and comparison operators (and, or, not,=,<>,>,<,>=,<=)
• Arithmetic operators and aggregate functions(Count, sum, avg, Min, Max)
• Multiple table queries (join on different and same tables)
• Nested select statements
• Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
• Categorization using group by……..having
• Arranging using order by

Relational Database Schema - COMPANY



Questions to be performed on above schema

1. Create tables with relevant foreign key constraints
2. Populate the tables with data
3. Perform the following queries on the database :

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

18. Select the names of employees whose salary does not match with salary of any employee in department 10.
19. Retrieve the name of each employee who has a dependent with the same first name and same sex as the employee.
20. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
21. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
22. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
23. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
24. For each department, retrieve the department number, the number of employees in the department, and their average salary.
25. For each project, retrieve the project number, the project name, and the number of employees who work on that project.
26. Change the location and controlling department number for all projects having more than 5 employees to 'Bellaire' and 6 respectively.
27. For each department having more than 10 employees, retrieve the department no, no of employees drawing more than 40,000 as salary.
28. Insert a record in Project table which violates referential integrity constraint with respect to Department number. Now remove the violation by making necessary insertion in the Department table.
29. Delete all dependents of employee whose ssn is '123456789'.
30. Delete an employee from Employee table with ssn = '12345'(make sure that this employee has some dependents, is working on some project, is a manager of some department and is supervising some employees). Check and display the cascading effect on Dependent and Works on table. In Department table MGRSSN should be set to default value and in Employee table SUPERSSN should be set to NULL
31. Perform a query using alter command to drop/add field and a constraint in Employee Table

CSC-SEC-401

Python Programming

(Credit: 02)

Full marks: 70 (External: 50; Sessional: 20)

Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of Python Programming

UNIT I

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.
Overview of Programming: Structure of a Python Program, Elements of Python

UNIT II

Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).

UNIT III

Creating Python Programs: Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Errors and Exceptions

UNIT IV

Iteration and Recursion: Conditional execution, Alternative execution, Nested conditionals, The return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, The while statement, Tables, Two-dimensional tables Strings and Lists: String as a compound data type, Length, Traversal and the for loop, String slices, String comparison, A find function, Looping and counting, List values, Accessing elements, List length, List membership, Lists and for loops, List operations, List deletion. Cloning lists, Nested lists

UNIT V

Object Oriented Programming: Introduction to Classes, Objects and Methods, Standard Libraries.
Data Structures: Arrays, list, set, stacks and queues.
Searching and Sorting: Linear and Binary Search, Bubble, Selection and Insertion Sorting

Reference Books :-

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation www.python.or 2015
3. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012
4. http://docs.python.org/3/tutorial/index.html
5. http://interactivepython.org/courselib/static/pythonds
6. http://www.ibiblio.org/g2swap/byteofpython/read/

CSC-SEC-401-LAB

Python Programming

(Credit: 02)

Full marks: 30

Pass marks: 12

This paper provides the practical knowledge of python & visual python.

Practical : Software Lab using Python

Section: A (Simple programs)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :

Grade A: Percentage >=80
Grade B: Percentage>=70 and <80
Grade C: Percentage>=60 and <70
Grade D: Percentage>=40 and <60
Grade E: Percentage<40

3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first n terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to find sum of the following series for n terms: 1 – 2/2! + 3/3! - - - - - n/n!
7. WAP to calculate the sum and product of two compatible matrices.

Section: B (Visual Python):

All the programs should be written using user defined functions, wherever possible.

1. Write a menu-driven program to create mathematical 3D objects

I. curve II. sphere
III. cone IV. arrow
V. ring VI. Cylinder.

2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.
4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula m=60/(t+2), where t is the time in hours. Sketch a graph for t vs. m, where t>=0.
6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:

$P(t) = (15000(1+t))/(15+ e)$

where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.

7. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:

I. velocity wrt time (v=u+at)
II. distance wrt time (s=u*t+0.5*a*t*t) III. distance wrt velocity (s=(v*v-u*u)/2*a)

CSC- DSE-501
Internet Technologies
(Credits: 04)

Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of different web authorating tools & internet technologies.

UNIT I

Java: Use of Objects, Array and ArrayList class

UNIT II

JavaScript: Data types, operators, functions, control structures, events and event handling.

UNIT III

JDBC: JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

UNIT IV

JSP: Introduction to JavaServer Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

UNIT V

Java Beans: Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

Reference Books:-

1. Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml,javascript, Perl Cgi , BPB Publications, 2009.
2. Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
3. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
4. Jim Keogh ,The Complete Reference J2EE, TMH, , 2002.
5. O'Reilly , Java Server Pages, Hans Bergsten, Third Edition, 2003.

CSC- DSE-501- LAB
Internet Technologies
(Credits: 02)

Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of different internet technologies.

Create event driven program for following:
1. Print a table of numbers from 5 to 15 and their squares and cubes using alert.
2. Print the largest of three numbers.
3. Find the factorial of a number n.
4. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.
5. A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.
6. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.

CSC-SEC-501
Programming in MATLAB
(Credit: 02)

Full marks: 70 (External: 50; Sessional: 20)
Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of programming in MATLAB.

UNIT I

Introduction to Programming: Components of a computer, working with numbers, Machine code, Software hierarchy.
Programming Environment: MATLAB Windows, A First Program, Expressions, Constants, Variables and assignment statement, Arrays

UNIT II

Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save.

UNIT III

Procedures and Functions: Arguments and return values, M-files, Formatted console input-output, String handling.
Control Statements: Conditional statements: If, Else, Else-if, Repetition statements: While, for loop.

UNIT IV

Manipulating Text: Writing to a text file, Reading from a text file, Randomizing and sorting a list, searching a list.

UNIT V

GUI Interface: Attaching buttons to actions, Getting Input, Setting Output.

Reference Books:

1. MATLAB: An Introduction with Applications, by Amos Gilat, 2nd edition, Wiley, 2004,
2. C.B. Moler, Numerical Computing with MATLAB, SIAM, 2004.

CSC-SEC-501-LAB
Programming in MATLAB
(Credit: 02)
Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of programming in MATLAB.

1. Write a program to assign the following expressions to a variable A and then to print out the value of A.
a. (3+4)/(5+6)
b. $2\pi^2$
c. $(0.0000123 + 5.67\times10^{-3}) \times 0.4567\times10^{-4}$

2. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32. Assign a variable called C the value 37, and implement this formula to assign a variable F the Fahrenheit equivalent of 37 Celsius.

3. Set up a vector called N with five elements having the values: 1, 2, 3, 4, 5. Using N, create assignment statements for a vector X which will result in X having these values:
a. 2, 4, 6, 8, 10
b. 1/2, 1, 3/2, 2, 5/2
c. 1, 1/2, 1/3, 1/4, 1/5
d. 1, 1/4, 1/9, 1/16, 1/25

4. A supermarket conveyor belt holds an array of groceries. The price of each product (in pounds) is [0.6, 1.2 ,0.5, 1.3] ; while the numbers of each product are [3, 2 ,1 ,5]. Use MATLAB to calculate the total bill.
5. The sortrows(x) function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order.
6. The ―identity‖ matrix is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with the eye() function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix A=[1 2; -1 0] the identity matrix I=[1 0; 0 1] is generated. That is A*B=I.

7. Create an array of N numbers. Now find a single MATLAB statement that picks out from that array the 1,4,9,16,…,√Nth entries, i.e. those numbers which have indices that are square numbers.
8. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5,-2).
9. The seeds on a sunflower are distributed according to the formula below. Plot a small circle at each of the first 1000 co-ordinates :
10. Calculate 10 approximate points from the function y=2x by using the formulae:
i. $x_n = n$
ii. $y_n = 2n + rand - 0.5$
Fit a line of best fit to these points using the function polyfit() with degree=1, and generate co-ordinates from the line of best fit using polyval(). Use the on-line help to find out how to use these functions. Plot the raw data and the line of best fit.
11. Calculate and replay 1 second of a sinewave at 500Hz with a sampling rate of 11025Hz. Save the sound to a file called "ex35.wav". Plot the first 100 samples.

12. Calculate and replay a 2 second chirp. That is, a sinusoid that steadily increases in frequency with time, from say 250Hz at the start to 1000Hz at the end.
13. Build a square wave by adding together 10 odd harmonics: 1f, 3f, 5f, etc. The amplitude of the nth harmonic should be 1/n. Display a graph of one cycle of the result superimposed on the individual harmonics.
14. Write a function called FtoC (ftoc.m) to convert Fahrenheit temperatures into Celsius. Make sure the program has a title comment and a help page. Test from the command window with:
i. FtoC(96)
ii. lookfor Fahrenheit
iii. help FtoC
15. Write a program to input 2 strings from the user and to print out (i) the concatenation of the two strings with a space between them, (ii) a line of asterisks the same length as the concatenated strings, and (iii) the reversed concatenation. For example: i. Enter string 1: Mark
ii. Enter string 2: Huckvale
iii. Mark Huckvale
iv. **********
v. elavkcuH kraM

CSC-DSE-602

Project work/ Dissertation

(Credits: 06)

Full marks: 100 (External: 70; Sessional: 30)

Pass marks: 40 (External: 28; Sessional: 12)

- This option to be offered only in 6th Semester.
- The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses.
- The group size should be maximum of three (03) students.

- ❖ Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes.
- ❖ A maximum of Four (04) projects would be assigned to one teacher.

CSC-SEC-601

Programming in PHP

(Credit: 02)

Full marks: 70 (External: 50; Sessional: 20)

Pass marks: 28 (External: 20; Sessional: 8)

This paper provides the concepts of programming in PHP.

UNIT I

Introduction to PHP:

- ➢ 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

UNIT II

Handling HTML form with PHP:

- ➢ Capturing Form Data
- ➢ GET and POST form methods
- ➢ Dealing with multi value fields
- ➢ Redirecting a form after submission

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

UNIT III

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

UNIT IV

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

UNIT V

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

Reference Books:-

1. Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India), 2007.
2. Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited, 2008.
3. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition Paperback, O'reilly, 2014.
4. Luke Welling, Laura Thompson, PHP and MySQL Web Development", 4th Edition, Addition Paperback, Addison-Wesley Professsional,2008.
5. David Sklar, Adam Trachtenberg, "PHP Cookbook: Solutions & Examples for PHP Programmers", 2014.

CSC-SEC-601-LAB
Programming in PHP
(Credit: 02)
Full marks: 30
Pass marks: 12

This paper provides the practical knowledge of programming in PHP.

1. Create a PHP page using functions for comparing three integers and print the largest number.
2. Write a function to calculate the factorial of a number (non-negative integer). The function accept the number as an argument.

3. WAP to check whether the given number is prime or not.
4. Create a PHP page which accepts string from user. After submission that page displays the reverse of provided string
5. Write a PHP function that checks if a string is all lower case.
6. 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)
7. WAP to sort an array.
8. Write a PHP script that removes the whitespaces from a string.
Sample string : 'The quick " " brown fox' Expected Output : Thequick""brownfox
9. Write a PHP script that finds out the sum of first n odd numbers.
10. 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.
11. Write a PHP script that checks if a string contains another string.
12. Create a simple 'birthday countdown' script, the script will count the number of days between current day and birth day.
13. Create a script to construct the following pattern, using nested for loop.

*
* *
* * *
* * * *
* * * * *
14. Write a simple PHP program to check that emails are valid.
15. WAP to print first n even numbers.
16. $color = array('white', 'green', 'red")

Write a PHP script which will display the colors in the following way
: Output :
white, green, red,
•green
• red
• white
17. Using switch case and dropdown list display a ―Hello‖ message depending on the language selected in drop down list.

18. Write a PHP program to print Fibonacci series using recursion.
19. Write a PHP script to replace the first 'the' of the following string with 'That'.

Sample : 'the quick brown fox jumps over the lazy dog.'
Expected Result : That quick brown fox jumps over the lazy dog.

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