AKS University, Satna (MP)
B.Sc. (IT) Hons.
SYLLABUS
(2017 Onwards)

Semester 1.

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>PAPER CODE</th>
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Programming Fundamentals using C

Unit-1
Introduction to C: History of C, Overview of Procedural 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(), Using Basic Header Files (stdio.h, conio.h etc).

Unit-2
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).

Functions: 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.

Unit-3
Array: 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 from functions, Structure with union as members, Union with structures as members.

Unit-4
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.

Derived Data Types (Structures and Unions): Understanding utility of structures and unions, Array of Structures, Individual data members as structures, Passing and returning structures.

Unit-5
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.

Text Books:
Reference Books:
1. Programming Language in 'C' Gotfried Tata MC Graw Hill.
2. Let Us C, Yashwant Kanitkar
Programming Fundamentals using C Lab

1. WAP to print the sum and product of digits of an integer.
2. WAP to reverse a number.
3. WAP to compute the sum of the first n terms of the following series \( S = 1+1/2+1/3+1/4+\ldots \).
4. WAP to compute the sum of the first n terms of the following series \( S = 1-2+3-4+5\ldots \).
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. WAP for call by value.
22. WAP for call by reference.
Computer System Architecture

Unit 1
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 2
Gates and Circuits: Logic gates, Boolean algebra, k-map (2,3,4 variable), circuit simplification, sequential circuits, flip-flops and combinational circuits decoders, multiplexers, registers, counters and memory units.

Unit 3
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 4
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.

Unit 5
Memory Organization: Memory hierarchy, Cache memory, Associative memory, mapping.

Recommended Books:
3. Digital Design, M.M. Mano, Pearson Education Asia

List of practical:
1. Study of AND, OR NOT Gates.
2. Study of NAND, NOR, XNOR Gates
3. To verify the truth table of XOR and XNOR Gates
4. To Verify operation of AND and Nor gates as Universal Gates.
5. To study Half Adder Circuit.
6. Configuring Hardware Profile.
8. Draw layout & understand sections of Motherboards & Add on Cards.
9. Configuring important parameters of CMOS Setup utility, BIOS update.
10. Identify different types of Drives (FDD, HDD, CDO, Zip, Pen, SCSI Drive).
11. Installation of SCSI Drive, Optical Drives (CDR, DVRW).
**Subject Name: Environmental Science**

**Unit I**
Definition, scope and importance, need for public awareness. Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, mining, dams and their effects on forest. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Land resources: Land as a resource, land degradation, soil erosion and desertification.

**Unit II**
Food resources: World food problems, effects of modern agriculture, fertilizer-pesticide problems, Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**Unit III**

**Unit IV**
Definition: Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.

**Unit V**

**Suggested Books:**
1. A text book of Environmental Studies, ErachBharucha, UGC Publication Delhi
3. A text book of Environmental Studies: Kaushi&Kaushik New age International Publication
4. ParyavaranAddhyan : MP Hindi Granth Academy
Computer Fundamentals

Unit 1
Introduction: Introduction to computer system, uses, types
Human Computer Interface: Types of software, Operating system as user-interface, utility programs

Unit 2
Devices: Input and output devices (with connections and practical demo), keyboard, mouse, joystick, scanner, OCR, OMR, bar code reader, web camera, monitor, printer, plotter
Memory: Primary, secondary, auxiliary memory, RAM, ROM, cache memory, hard disks, optical disks

Unit 3
Internal 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.

Unit 4
Networking and communication Technologies: LAN, MAN, WAN, Internet, WWW, Bluetooth, cloud computing, big data, data-mining, mobile computing and embedded systems

Unit 5
Office Automation: MS Word, MS Power-point, MS Excel

Reference Books:
Computer Fundamentals Lab:

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

**MS Word**

1. Prepare a grocery list having four columns (Serial number, The name of the product, quantity and price) for the month of April, 06.
   - Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
   - The headings of the columns should be in 12-point and bold.
   - The rest of the document should be in 10-point Times New Roman.
   - Leave a gap of 12-points after the title.

2. Create a telephone directory.
   - The heading should be 16-point Arial Font in bold
   - The rest of the document should use 10-point font size
   - Other headings should use 10-point Courier New Font.
   - The footer should show the page number as well as the date last updated.

3. Design a time-table form for your college.
   - The first line should mention the name of the college in 16-point Arial Font and should be bold.
   - The second line should give the course name/teacher’s name and the department in 14-point Arial.
   - Leave a gap of 12-points.
   - The rest of the document should use 10-point Times New Roman font.
   - The footer should contain your specifications as the designer and date of creation.

4. BPB Publications plans to release a new book designed as per your syllabus. Design the firstpage of the book as per the given specifications.
   - The title of the book should appear in bold using 20-point Arial font.
   - The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
   - At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
   - The details of the offices of the publisher (only location) should appear in the footer.

5. Create the following one page documents.
   a. Compose a note inviting friends to a get-together at your house, Including a list of things to bring with them.
   b. Design a certificate in landscape orientation with a border around the document.
   c. Design a Garage Sale sign.
   d. Make a sign outlining your rules for your bedroom at home, using a numbered list.

6. Create the following documents:
(a) A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
(b) Use a newsletter format to promote upcoming projects or events in your classroom or college.

7. Convert following text to a table, using comma as delimiter
   Type the following as shown (do not bold).
   **Color, Style, Item**
   Blue, A980, Van
   Red, X023, Car
   Green, YL724, Truck
   **Name, Age, Sex**
   Bob, 23, M
   Linda, 46, F
   Tom, 29, M

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

<table>
<thead>
<tr>
<th>Salesperson</th>
<th>Dolls</th>
<th>Trucks</th>
<th>Puzzles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kennedy, Sally</td>
<td>1327</td>
<td>1423</td>
<td>1193</td>
</tr>
<tr>
<td>White, Pete</td>
<td>1421</td>
<td>3863</td>
<td>2934</td>
</tr>
<tr>
<td>Pillar, James</td>
<td>5214</td>
<td>3247</td>
<td>5467</td>
</tr>
<tr>
<td>York, George</td>
<td>2190</td>
<td>1278</td>
<td>1928</td>
</tr>
<tr>
<td>Banks, Jennifer</td>
<td>1201</td>
<td>2528</td>
<td>1203</td>
</tr>
<tr>
<td>Atwater, Kelly</td>
<td>4098</td>
<td>3079</td>
<td>2067</td>
</tr>
</tbody>
</table>

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

9. Wrapping of text around the image.

10. Following features of menu option must be covered
1. Enter the Following data in Excel Sheet

**REGIONAL SALES PROJECTION**

<table>
<thead>
<tr>
<th>State</th>
<th>Qtr1</th>
<th>Qtr2</th>
<th>Qtr3</th>
<th>QTR4</th>
<th>Qtr Total</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi</td>
<td>2020</td>
<td>2400</td>
<td>2100</td>
<td>3000</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Punjab</td>
<td>1100</td>
<td>1300</td>
<td>1500</td>
<td>1400</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>U.P.</td>
<td>3000</td>
<td>3200</td>
<td>2600</td>
<td>2800</td>
<td>17</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Harayana</td>
<td>1800</td>
<td>2000</td>
<td>2200</td>
<td>2700</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Rajasthan</td>
<td>2100</td>
<td>2000</td>
<td>1800</td>
<td>2200</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL**

**AVERAGE**

(a) Apply Formatting as follow:

i. Title in TIMES NEW ROMAN

ii. Font Size - 14

iii. Remaining text - ARIAL, Font Size -10

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

v. Numbers in two decimal places.

vi. Qtr. Heading in center Alignment.

vii. Apply Border to whole data.

(b) Calculate State and Qtr. Total

(c) Calculate Average for each quarter

(d) Calculate Amount = Rate * Total.

2. Given the following worksheet

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Roll No.</td>
<td>Name</td>
<td>Marks</td>
</tr>
<tr>
<td>1</td>
<td>1001</td>
<td>Sachin</td>
<td>99</td>
</tr>
<tr>
<td>2</td>
<td>1002</td>
<td>Sehwag</td>
<td>65</td>
</tr>
<tr>
<td>3</td>
<td>1003</td>
<td>Rahul</td>
<td>41</td>
</tr>
<tr>
<td>4</td>
<td>1004</td>
<td>Sourav</td>
<td>89</td>
</tr>
<tr>
<td>5</td>
<td>1005</td>
<td>HarBhajan</td>
<td>56</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Salesman</th>
<th>Sales in (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No.</td>
<td>Qtr1</td>
</tr>
<tr>
<td>3</td>
<td>S001</td>
<td>5000</td>
</tr>
<tr>
<td>4</td>
<td>S002</td>
<td>7000</td>
</tr>
<tr>
<td>5</td>
<td>S003</td>
<td>4000</td>
</tr>
<tr>
<td>6</td>
<td>S004</td>
<td>5500</td>
</tr>
<tr>
<td>7</td>
<td>S005</td>
<td>7400</td>
</tr>
<tr>
<td>8</td>
<td>S006</td>
<td>5300</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>If total Sales</th>
<th>Commission</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20000</td>
<td>0% of sales</td>
</tr>
<tr>
<td>&gt; 20000 and &lt; 25000</td>
<td>4% of sales</td>
</tr>
<tr>
<td>&gt; 25000 and &lt; 30000</td>
<td>5.5% of sales</td>
</tr>
<tr>
<td>&gt; 30000 and &lt; 35000</td>
<td>8% of sales</td>
</tr>
<tr>
<td>&gt;= 35000</td>
<td>11% of sales</td>
</tr>
</tbody>
</table>

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
  <=1000Rs. 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:

<table>
<thead>
<tr>
<th>No. of Instalments</th>
<th>5%</th>
<th>6%</th>
<th>7%</th>
<th>8%</th>
<th>9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td>4</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td>5</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td>6</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
</tr>
</tbody>
</table>

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
1000
18000
5200

Simple Interest
?
?
?

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

<table>
<thead>
<tr>
<th>Salesman</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>10000</td>
<td>12000</td>
<td>20000</td>
<td>50000</td>
</tr>
<tr>
<td>S2</td>
<td>15000</td>
<td>18000</td>
<td>50000</td>
<td>60000</td>
</tr>
<tr>
<td>S3</td>
<td>20000</td>
<td>22000</td>
<td>70000</td>
<td>70000</td>
</tr>
<tr>
<td>S4</td>
<td>30000</td>
<td>30000</td>
<td>100000</td>
<td>80000</td>
</tr>
<tr>
<td>S5</td>
<td>40000</td>
<td>45000</td>
<td>125000</td>
<td>90000</td>
</tr>
</tbody>
</table>

(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**

<table>
<thead>
<tr>
<th>EXPENSES</th>
<th>JAN</th>
<th>FEB</th>
<th>MARCH</th>
<th>TOTAL</th>
<th>QUARTER AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent</td>
<td>600.00</td>
<td>600.00</td>
<td></td>
<td>600.00</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>48.25</td>
<td>43.50</td>
<td>60.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilities</td>
<td>67.27</td>
<td>110.00</td>
<td>70.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit Card</td>
<td>200.00</td>
<td>110.00</td>
<td>70.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td>100.00</td>
<td>150.00</td>
<td>90.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AV to Insurance</td>
<td>150.00</td>
<td></td>
<td></td>
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<tr>
<td>Cable TV</td>
<td>40.75</td>
<td>40.75</td>
<td>40.75</td>
<td></td>
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</tr>
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</table>

**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**

<table>
<thead>
<tr>
<th>Publisher name</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>total</th>
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<tr>
<td>A</td>
<td>Rs. 1,000.00</td>
<td>Rs. 1100.00</td>
<td>Rs. 1,300.00</td>
<td>Rs. 800.00</td>
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</tr>
<tr>
<td>B</td>
<td>Rs. 1,500.00</td>
<td>Rs. 700.00</td>
<td>Rs. 1,000.00</td>
<td>Rs. 2,000.00</td>
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</tr>
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<td>Rs. 700.00</td>
<td>Rs. 900.00</td>
<td>Rs. 1,500.00</td>
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<tr>
<td>D</td>
<td>Rs. 1,200.00</td>
<td>Rs. 500.00</td>
<td>Rs. 200.00</td>
<td>Rs. 1,100.00</td>
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</tr>
<tr>
<td>E</td>
<td>Rs. 800.00</td>
<td>Rs. 1,000.00</td>
<td>Rs. 3,000.00</td>
<td>Rs. 560.00</td>
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</tr>
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</table>

(a) Compute the total revenue earned.
(b) Plot the line chart to compare the revenue of all publisher for 4 years.
(c) 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
Mathematics-I (Algebra)

Unit-1
Determinants:
Introduction of Determinant, Minor Cofactors and properties of Determinant, Factor Theorem, special types of Determinants, Application of Determinants, Solution of Simultaneous Linear Equation by Determinants(Cramer’s Rule).

Unit-2
Algebra of Matrices:
Definition, various types of matrices, Addition, Subtraction, Multiplication of matrices, Properties of matrix multiplication, Adjoint of Square matrix, Inverse of matrix, Rank of matrix, Normal form (Canonical form).

Unit-3
Consistency of linear system of equation and their solutions:
Solution of Simultaneous Equation, Types of Linear Equation, Homogeneous Equations, Cramer’s Rule, Linear Dependence and Independence of Vectors, Eigen values, Eigen Vector, Cayley-Hamilton Theorem, and Orthogonal Vectors.

Unit-4
Complex Number:
Introduction of Complex Numbers, Geometrical Representation of Imaginary Numbers, Argand Diagram, Equal Complex Number, Addition, Subtraction, Power of i, Multiplication, Conjugate of a complex Number, Division, Types of Complex Number, Square Roots of a Complex Number.

Unit-5
Vector Algebra:
Vectors, Additions of Vectors, Unit Vector, Position Vector of a Point, Ratio Formula, Product of two Vectors, Scalar, or Dot Product, Vector Product or Cross product, Scalar Triple Product, Vector product of three Vector, Area of Parallelogram.

Text Books

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<td>02</td>
<td>08</td>
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PROGRAMMING IN C++

Unit – 1

Unit – 2
Introduction to Objects and classes-Defining the class, defining data members and member functions, creating objects, access specifiers- private, public, protected. Nested classes, local classes, empty class. Friend function and friend class. Passing objects as function arguments, returning objects from functions, static members, this pointer, comparison of class with structure. Memory management-new and delete operator, pointer to object, pointer to class members, wild pointers, dangling pointers, smart pointers.

Unit – 3
Constructors and destructors-Purpose of constructors and destructors, default constructors, constructors with and without parameters, Constructor overloading, copy constructor, deep and shallow copy. Invoking constructor and destructor, dynamic constructors, constructors and destructors with static members. Overloading Concepts-Function Overloading, Unary and binary operator overloading, overloading new and delete operators, overloading special operators.

Unit – 4

Unit – 5
Templates-Generic functions, Generic classes, Template restrictions. Streams and manipulators. Unformatted I/O functions. Files-Opening, reading, writing, appending and closing files.

Text books:
1. Object Oriented Programming using C++, E. Balagurusamy

Reference books:
1. Object Oriented Programming in C++, Robert Lafore
2. UML in 21 Days, Tech Media
List of Practical

1. Write a C++ program that will ask for a temperature in Fahrenheit and display it in Celsius using a class called temp and member functions.
2. Create a class Distance, which accepts data in feet and inches, adds two distances and displays the members of the distance object in the appropriate form. Test the class in the main program by creating object d1 and d2 of type distance, accept data for each object and add them then display them.
3. An election is contested by five candidates. The candidates are numbered 1 to 5 and the voting is done by marking the candidate number on the ballot papers. Write a program to read the ballots and count the votes cast for each candidate using an array variable count. In case, a number read is outside the range 1 to 5, that ballot should be considered as a 'spoilt ballot', and the program should also count the number of spoilt ballots.
4. A Cricket team has the table of batting figures for a series of test matches. Write a program to read the data name, runs, innings, times not out into a class object and calculate the batting average, also display the result in the format as given below:

<table>
<thead>
<tr>
<th>Player's name</th>
<th>Runs</th>
<th>Innings</th>
<th>Times Not Out</th>
<th>Batting Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tendulkar</td>
<td>632</td>
<td>15</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Azharuddin</td>
<td>524</td>
<td>16</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

5. Write a program to implement the push and pop functions of a stack using a class Stack. Also make use of a private member function display() to display contents of the stack after every push and pop operations. Create a member function init() to initialize top of the stack.
6. Define a class to represent Bank account. Include the following members. Data members
   (1)       Name of depositor
   (2)       Account number
   (3)       Type of account
   (4)       Balance member functions
   (a)       To assign initial values
   (b)       To deposit an amount in a particular account
   (c)       To withdraw an amount after checking the balance
   (d)       To display name and balance
Write a main program to test the class for handling 10 customers
7. Write a program that calculates the value of m raised to the power n for both int and double data types. (Use the concept of function overloading)
8. Write a function, which will take two objects of Distance Class as arguments and returns the largest one. Include a main () program to implement this function of the distance class.
9. Write a class to represent a vector (a series of float values). Include member functions to perform the following tasks:
   (a) To create the vector
   (b) To modify the value of a given element
   (c) To multiply by a scalar value
   (d) To add a vector to another
   (e) To display the vector in the form (10, 20, 30)
10. Demonstrate the use of static variables and static function in a class by using it to count the number of objects created in the program, having a static function to display the count.
11. Imagine a check-post at a bridge. Car passing by the check-post are expected to pay Rs. 50 as tax. Most of the cars pay but sometimes a car goes without paying the tax. The check-post has to keep track of number of cars and amount collected. Create a class check to implement this problem. The data members of the class are no, to count number of class and amount to keep track of the amount collected. Write member function paying for cars which are paying the tax and another function nopay for cars not paying the tax, also write a function to display number of cars passed and amount collected.
12. Create a class `Date` which stores date in `dd-mm-yyyy` format. Include appropriate constructors to initialize the objects. Write a member function which gives the differences of given two dates as number of days. Another function to which days can be added so as to given the date after addition of days. Check the class by creating objects of the date class. Checking program should be menu driven.

13. Create a class that contains variables for storing feet and its equivalent value of inches. Pass to the class's constructor no. of feet and have the constructor display the no. of inches.

14. Create a function `sleep()` that pauses the computer for the number of seconds specified by its single argument. Overload `sleep()` so it can be called with either an integer or a string representation of an integer. (e.g. `sleep(10)` & `sleep("10")` both should be valid)

15. Write a class to represent a `Matrix`. Include member functions to perform the following tasks:
   - **Matrix**
   - **Data Members**
     - Integer array of 10X10 elements.
     - Integer row, column //dimensions.
   - **Member Functions**
     - To create the Matrix.
     - To add a Matrix to another.
     - To subtract a Matrix by another.
     - To multiply a Matrix to another.
     - To multiply a Matrix by a scalar.
     - To divide a Matrix by a scalar.
     - To transpose a Matrix.
     - To modify the value of a given element.
     - To display the Matrix.

16. Create a class `Matrix` with the following data members:
    - `int **p` and `int d1,d2`; include a parameterized constructor that takes two arguments and allocates the memory for a two dimension matrix with `d1` and `d2` dimensions.
    - Also include a destructor. Overload `+`, `-`, `*` on objects of `Matrix`.
    - Also overload `<<` and `>>` on objects of `Matrix`.

17. Given the following class specifications and using friend as a bridge, write a function to calculate the volume, assign it to member `vol` in class `Volume` and display the value of `vol`.
    - **class cylinder** { `intr,h;` }
    - **class volume** { `long vol;` }

18. Following are the class specifications:
    - **class A** { `int a;` };
    - **class B** { `int b;` };
    - Using a friend function, calculate the max of two objects and display it.

19. Write a class to represent a vector (a linear array). Include member functions.
    - default constructor to create vector dynamically of the size 1 and initialize its element to zero.
    - parameterized constructor
    - Overload the `+` operator to add two vectors
    - Overload the `*` operator to multiply by a scaler value (scalar * vector or vector * scalar)
    - Overload the `>>` operator to input a vector and the `<<` operator to display the vector in the form (10,20,...).

20. Write a menu driven program that can perform the following functions on strings. (Use overloaded operators where possible).
    1. Compare two strings for equality ( `==` operator )
    2. Check whether first string is smaller than the second ( `<=` operator )
    3. Copy the string to another.
    4. Extract a character from the string ( overload [ ] )
    5. Reverse the string.
    6. Concatenate two strings ( `+` operator )
21. Define two class Polar and Rectangle to represent points in the Polar and Rectangle systems. Use conversion routines to convert from one system to another.

22. Construct a class Distance having member variables float feets and float inches. Write a program to convert this class into the basic data type float, which will represent the total no. of inches of the class. Also include the code to accept the value of inches in a float variable and convert this basic data type into class Distance type having feets and inches as member variables.

23. Assume that the bank maintains two kinds of accounts for customers, one called savings account and another called current account. The saving account provides interest and withdrawal facilities but no cheque book facility while current account provides no interest. Facilities but provides with cheque book, also the current a/c holder should maintain a minimum amount in a a/c else he has to pay service charges. Using inheritance concept create a base class account that stores account holder name, account no, and type of account, from this base class derive two classes sav_acc and cur_acc.

These classes should include members
   1) to accept deposit and update the balance
   2) display balance
   3) withdraw amount and update the balance
   4) compute interest
   5) check minimum balance and impose penalty.

24. Create two classes Grade and Student. The class Grade has data members Grade while student has data members such as roll no, name, and total marks of the student. Making use of data of both the Classes print the roll no, name, and grade of each student whose grade is set by the grade class.

25. Write a program that creates a base class called num. Have this class hold an integer value and contain a virtual function called shownum() 
Create two derived classes called outhex and outoct that inherit num. Have the derived classes override shownum() so that it displays the value in hexadecimal and octal respectively.

26. Make the use of the write function to display your name in the following fashion.

n
na
nam
name
nam
nan

27. Write a program to read a list containing item name, item code, and cost interactively and produce a three column output as shown below:

<table>
<thead>
<tr>
<th>NAME</th>
<th>CODE</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>C++</td>
<td>101</td>
<td>233.81</td>
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<tr>
<td>JAVA 2</td>
<td>32</td>
<td>456.34</td>
</tr>
<tr>
<td>HTML</td>
<td>31</td>
<td>99.00</td>
</tr>
</tbody>
</table>

28. Create a class phonebook having two data members to hold the name and phone number of that person. Define appropriate constructors and member functions to maintain a phonebook. Write a program to create this phonebook in a binary file and read it back from the same file. Also include the facility to update a phone number, given a name. Search that name into the file and update the phone number.

29. Write a program that reads a file and creates another file which is identical to the first one except that the consecutive spaces are replaced by one space. Use command line arguments to supply the input and output filenames at runtime.

30. Create a generic class Stack. Create push and pop member functions to perform push and pop operations.
DISCRETE STRUCTURES

UNIT-I:

Unit-II

Unit-III
Preposition: Preposition, First Order Logic, Basic Logic Operation, Logical Equivalence, Truth Table, Normal Forms, Predicates and Quantifiers, POSET, Boolean algebra and Logic Gates.

Unit-IV
Dimensional Geometry: Graph Theory, Concepts Graph, Sub graph, Bi-partite graph, Isomorphic Graph, Homo-morphic Graphs, Weighted Graphs, Shortest Paths in weighed graphs (Dijkstra's algorithm), Operations on Graphs, Directed Graph, Matrix Representation On Graphs, Cyclic Graphs, Tree, Rooted Tree, Labeled Graph, Weighted Graph, Decision trees or Sorting Tree, Spanning Tree, Binary Trees, Algorithms- Prim’s, Kruskal.

Unit-V
Algebraic Structures: Properties, Semi group, Monide, Group, Abelian Group, Properties of Group, Cyclic Group, Co-set Decomposition and Related Theorem.

Text Book:

Recommended Books:
ENGLISH COMMUNICATION

Preamble:

The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. One of the critical links among human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.

The present course hopes to address some of these aspects through an interactive mode of teaching-learning process and by focusing on various dimensions of communication skills. Some of these are:

Language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, note taking etc.

While, to an extent, the art of communication is natural to all living beings, in today’s world of complexities, it has also acquired some elements of science. It is hoped that after studying this course, students will find a difference in their personal and professional interactions.

The recommended readings given at the end are only suggestive; the students and teachers have the freedom to consult other materials on various units/topics given below. Similarly, the questions in the examination will be aimed towards assessing the skills learnt by the students rather than the textual content of the recommended books.

1. **Introduction**: Theory of Communication, Types and modes of Communication

2. **Language of Communication**:
   - Verbal and Non-verbal
   - (Spoken and Written)
   - Personal, Social and Business
   - Barriers and Strategies
   - Intra-personal, Inter-personal and Group communication
3. **Speaking Skills:**
   Monologue
   Dialogue
   Group Discussion
   Effective Communication/ Mis- Communication
   Interview
   Public Speech

4. **Reading and Understanding**
   Close Reading
   Comprehension
   Summary Paraphrasing
   Analysis and Interpretation
   Translation (from Indian language to English and vice-versa)
   Literary/Knowledge Texts

5. **Writing Skills**
   Documenting
   Report Writing
   Making notes
   Letter writing

**SUGGESTED READING**

4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas
APPLIED ELECTRONICS

UNIT I:
SEMICONDUCTOR DIODE: Metals, Insulators and Semiconductors, P-type and N-type semiconductor with energy level diagram, PN junction Barrier voltage, Forward biased & reversed biased junction, Diode symbol, circuit diagram for characteristics (forward & reversed) Characteristics, diode equation. Zener diode, Tunnel diode, photo diode, varactor diode.

UNIT II:
TRANSISTOR: Types of Transistor, Formation of a transistor P-N-P & N-P-N transistor working, symbol, Leakage current in a transistor, Relationship between alpha & beta Common Base configuration, Common Emitter configuration, Common collector configuration, input and output characteristics of CB, CE and CC configurations.

UNIT III:
LOGIC FAMILY: RTL, TTL, DTL, ECL, IIL, GTL, CMOS, PMOS, NMOS,

UNIT IV:
TRANSISTOR BIASING: D.C & A.C load line, procedure for drawing load line, operating point Biasing of a transistor, need for biasing (give reason), method of biasing, fixed battery method, emitter resistances method, potential divider method Biasing techniques, transistor as an amplifier.

UNIT V:
FIELD EFFECT TRANSISTOR: Field Effect Transistor (FET): Construction of JFET, idea of channel formation, pinch-off, voltage, Transfer and output characteristics. MOSFET: Basic construction of MOSFET and working, I-V characteristics, enhancement and depletion modes, Complimentary MOS (CMOS), BiCMOS.

Text Books:
1. Principle of Electronics by V K Mehta
Reference Books
2. Basic electronics B.L THAREJA
List of practical:
1. Study of resistor.
2. Study of capacitor.
3. Study of inductor.
4. Study of diode.
5. Study of transistors.
6. To study the V-I Characteristics of Diode – Ordinary and Zener.
7. To study the V-I Characteristics of the Common Base, Common Emitter, Common collector configuration of BJT.
8. To draw the V-I Characteristics of the FET configuration.
9. To familiarize the application of TTL and CMOS characteristics.
10. To study the V-I Characteristics of MOSFET.
INFORMATION SECURITY AND CYBER LAWS

Unit-1


Unit-2

Authentication and access control: Identification, Authentication, Authentication by passwords, Access control structures, Types of access control.


Unit-3


Legal and Ethical Issues: Protection of data and Information Laws, Employees rights, Software failure, Computer Crime, Privacy, and Ethics

Unit-4


Unit-5

Hacking: Introduction of hacking, criminal hacking vs. Ethical hacking.

IPR: Ethical Issues in intellectual property right, copy right and related rights, patent and related rights, Trade Marks and rights arising from Trademark registration, software piracy, plagiarism. Indian Legislations for the protection of various types of Intellectual Properties, Database, web and Mobile Security, Authentication in distributed systems

Text Books:

1. Cyber laws and syber security in developing and emerging economies, Zeinab Karake-Shalhoub, Luna Al Qasimi
2. Computer Security, Dicter gouman, John Wiley & Sons

Reference Books


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DATA STRUCTURE IN C

Objective: Assess how the choice of data structures and algorithm design methods impacts the performance of programs. Choose the appropriate data structure and algorithm design method for a specified application. Solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, tournament trees, binary search trees, and graphs and writing programs for these solutions.

Unit – 1
Introduction to Data structures and DMA:
Definition, Classification of data structures: primitive and non primitive, Operations on data structures, DMA-Meaning of static and dynamic memory allocation. Recursion: Definition, Writing Recursive programs.

Stack –Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations Conversion of an arithmetic expression from Infix to postfix, Applications of stacks.

Queue –Definition, Array representation of queue, Types of queue: Simple queue, circular queue, double ended queue (deque) priority queue, operations on all types of Queues.

Unit – 2
Linked List- Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list, Types of linked list: Singly linked list, doubly linked list, Circular linked list and circular doubly linked list. Operations on singly linked list: creation, insertion, deletion, search and display.

Unit – 3
Trees- Basic terminology, binary tree, binary tree representation, complete binary tree, Extended binary tree, Array and linked list representation of a binary tree, Traversing binary trees, Threaded binary tree, B-tree, AVL tree, Insertion and deletion in binary search tree, forest, conversion of forest into a tree, heap definition.

Unit – 4
Sorting- types of sorting, Bubble sort, selection sort, insertion sort, quick sort, merge sort, heap sort.

Basic Search Techniques:
Search algorithm searching techniques: sequential search, Binary search, Comparison between sequential and binary search.

Unit – 5
Graphs-Definition, graph representation-adjacency matrix, adjacency list, adjacency multilist, traversal DFS, BFS, minimum spanning tree, shortest path algorithm, Kruskal and prim’s algorithm.

Hashing Techniques: Hash function, Address calculation techniques, Common hashing functions, Collision resolution, Linear probing,

Text Books:
1. G.S. Baluja, Data structure and algorithm

Reference book
1. Peter Bras, Advanced Data structure
List of practicals:

1. STACKS DATA STRUCTURE PROGRAMS
2. QUEUES DATA STRUCTURES PROGRAMS
3. LINKED LISTS DATA STRUCTURE PROGRAMS
4. TREES DATA STRUCTURES PROGRAMS
5. GRAPHS DATA STRUCTURE PROGRAMS
6. SEARCH PROGRAMS
7. SORTING PROGRAMS
Operating Systems

**OBJECTIVE:** The student will learn what operating systems are, what they do, and how they are designed and constructed. The student will be introduced to what the common features of an operating system are, what an operating system does for the user, and what it does for the computer-system operator.

**Unit – 1**
Introduction-What is operating system? System calls, types of system calls, Operating system architecture, Operating System service. Simple batch systems, multi-programmed batches Systems, Time sharing systems, Personal computer systems, Parallel systems, distributed Systems, Real time Systems, multitasking, Client-server system, peer-to-peer systems

**Unit – 2**
Process-Process concept, process Scheduling, operation on processes, PCB, Inter-process Communication. Thread-Concept of thread, multithreading, context switching, Scheduling criteria, types of Scheduling, long term, short term and medium term scheduling, scheduling algorithms, multiple processor scheduling.

**Unit – 3**
Deadlock-definition, deadlock characterization, handling of deadlock, deadlock prevention, avoidance, detection and recovery.

**Unit – 4**

**Unit – 5**

**Advance Topics:** Network Operating System

**Text Books**

**Reference Books:**
OBJECTIVE: This course has been taught to the students to aware about the computer network, and communication. Students will know about the delivery to date from one end to other end.

Unit – 1
Introduction: Definition Internetwork, Intra-network, Extra-network, Brief History, ARPANET, OSI, ITU-T.

Unit – 2

Unit – 3

Unit – 4
Network Layer – Design Issues, Router, Routing, Types of Routing, Static and Dynamic Routing, Packets, IP packet, logical addressing, IPV4 vs. IPV6, IP addressing, CIDR, sub-netting.

Unit – 5
Transport Layer – Design Issues, end-to-end delivery, Error control, flow control, TCP protocol, UDP protocol, TCP packet, UDP datagram, Congestion control, Quality of service, Port Addressing, Segments & reassembly, Gateway, Protocol Convertor.

Advanced Topics: Network Cables

Text Books:

Reference Book:

LIST OF PRACTICALS
1. Design and study of Straight-Through Cable.
2. Design and study of Cross-over Cable.
3. Design and study of Roll-over Cable.
4. Study of network command in Windows operating system.
5. Study of CISCO Packet Tracer Software.
Java Programming

Objective:
1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
3. Be aware of the important topics and principles of software development.
4. Have the ability to write a computer program to solve specified problems.
5. Be able to use the Java JDK environment to create, debug and run simple Java programs.

Unit – 1
History and evolution of Java: Creation of Java, Java Byte Code, Java Virtual Machine, Difference between Java and C++, Java program structure, Java Tokens. Overview of Java: First simple program of Java, Implementing Java program. Data types, variables and constants: Primitive and non primitive data type, Type conversion and casting, Operators.

Unit – 2
Control Statements: Selection statements, Iteration Statements, Jump Statements. Introduction to object oriented programming: Defining a class, adding variables and methods, creating objects, accessing class members, constructors, method overloading, static members, Inheritance: extending a class, overriding methods, final variables and methods, final classes, finalize methods, abstract methods and visibility control.

Unit – 3
Arrays, strings and vectors: Arrays, one dimensional arrays, creating an array, two dimensional arrays, strings, vectors, wrapper classes. Interfaces: Introduction, Defining Interfaces, Implementing Interfaces. Packages: Java API Packages, Creating and accessing packages, Adding classes to package.

Unit – 4
Multithreading and Exception Handling: Basic idea of multithreaded programming, the life cycle of a thread, Creating thread with the thread class and runnable interface. Basic idea of exception handling: The try, catch and throw.

Unit – 5
Input/output: Exploring Java IO, file input stream, file output stream. Applets: Applet security restrictions, the class hierarchy for applets, Life cycle of applet, HTML Tags for applet. The AWT: The basic user interface components Label, Button, Check Box, Radio Button, Choice menu, Text area, Frame.

Text Books:
1. E. Balagurusamy, Fundamental of Java programming

Reference book:
1. Herbert Schildt, The Complete Reference for Java, TMH publication
LIST OF PRACTICALS:
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 length 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 StringBuffer classes 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 URL Connection using the openConnection() method and then use it examine the different components of the URL and 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.
Mathematics (Numerical Methods)

OBJECTIVE: The main objective of Math is to learn calculus concepts, techniques, and ideas that are useful in solving and understanding real life problems that arise in economics and business and Numerical methods for the solution of some of the main problems of the scientific computing are introduced (nonlinear systems, data approximation, numerical differentiation and integration, numerical solution of ODE); their implementation and analysis are given by using interactive environments for the computing and the scientific visualization.

Unit-1

Unit-2

Unit-3
Interpolation: Some Operators and their properties, Finite difference table, Newton forward and backward Difference formulae, gauss forward and backward formulae, Stirling’s and Bessel formulae, Lagrange’s Interpolation Formulae, Newton Divided difference Interpolation Formulae. Advance Topic: In C Language Programming to find the value of Lagrange’s Interpolation Formulae.

Unit-4
Numerical Integration: A general quadrature formula for equidistance ordinates, Trapezoidal rule, Simpson’s one third rule, Simpson’s three eight rule, Weddle’s rule, Newton-Cote’s formula. Advance Topic: In C Language Programming to find the value of Simpson’s one third rule.

Unit-5

Text Books

References Book
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Elective 1:(Choose any one of these)

a. Artificial Intelligence 96CA404-A
b. Operational Research 96MT404-B
c. Calculus 96MS404-C
d. Introduction to Data Science 96CA404-D
e. Data Mining 96CA404-E
Design and Analysis of Algorithms

OBJECTIVE: This course is to teach the students the basics of algorithm and the different techniques to solve problems.

Unit-1
Introduction to Algorithm:
Definition, Criteria of Algorithm, Time and Space complexity, asymptotic notation: Big Oh, Omega and Theta, Worst, Average and Best case analysis, Recurrence relation: Master method, Substitution method, Analysis of algorithm, Design of Algorithm, Types of algorithm strategies, case study of insertion sort

Unit-2
Brute-force approach: Sequential search, Selection sort
Divide-and-Conquer: Binary search, Merge-sort, Quick-sort, Matrix multiplication using Strassen’s method.

Unit-3
Dynamic Programming:
Elements of dynamic programming, Matrix-chain multiplication, Longest common subsequence, Fibonacci Sequence, Floyd-Warshall Algorithm
Greedy Algorithms:
Elements of Greedy Algorithm, Minimal spanning tree Algorithm (Prim and Kruskal), Shortest distance Algorithm (Dijkstra), Huffman trees for optimal encoding.

Unit-4
Backtracking: Elements of Backtracking, Knapsack problem, 8-Queens Problem, Graph coloring, Travelling-Salesman Problem.
Graph Traversal Algorithm: A* algorithm, B* algorithm, BFS algorithm, DFS algorithm

Unit-5
Complexity classes: P, NP, NP-hard, NP-complete, P vs. NP Problem, Relation among P, NP, NPC and NPH.
Advance Topics: I/O Complexity computation

Text Books:
S.No. Name of Book Edition Authors’ Name Publication
1 Introduction to Algorithms 3rd Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Prentice Hall Publications

Reference Books:
S.No. Name of Book Edition Authors’ Name Publication
1 Fundamental of Computer Algorithms 2nd Ellis Horowitz, SartajSahni, SanguthevarRajasekaran W. H. Freeman Silicon Press
SOFTWARE ENGINEERING

OBJECTIVE: It aims to develop a broad understanding of the discipline of software engineering. It seeks to complement a familiarity with analysis and design with knowledge of the full range of techniques and processes associated with the development of complex software intensive systems. It aims to set these in an appropriate engineering and management context.

Unit – 1

Unit – 2
Process models: The process of software development, waterfall, Incremental, spiral, COCOMO, concurrent development. Software Project Management: Objectives, Resources and their estimation, LOC and FP estimation, effort estimation, COCOMO estimation model, risk analysis.

Unit – 3

Unit – 4
Testing: Testing Techniques: software testing, functional and non-functional testing: white box, black box testing, different types of testing: static, structural, desk checking, code walk through, beta, stress, code inspection, code coverage, code complexity, statement, path, condition, function coverage,

Unit – 5
Software Quality Assurance: Quality Concepts, software quality Assurance, Garvin’s Quality Dimensions, McCall’s Quality factors, Software Reviews, formal technical reviews, formal approaches to SQA, Software reliability,

Text Books:

Reference Books:
2. “Software Engineering:, Ian Somerville, Pearson Education
DATABASE MANAGEMENT SYSTEM

OBJECTIVE: This course will provide you with an understanding of the design, creation, maintenance and management of a relational database management system (RDBMS). You will learn how to create and access data using Structured Query Language (SQL), the programming language used by most large relational database management systems such as Oracle.

UNIT 1
DBMS INTRODUCTION: Purpose and advantages of DBMS, view of data, DBMS architecture and data independence, database languages. Classification of DBMS, schema and sub schema, database administrator and users, data dictionary, data modeling using ER model, Entities, attributes and relationships.

UNIT 2
KEYS: Domains, relations, kinds of relations, various types of keys, candidate, primary, alternate and foreign keys. Codd’s rule, Relational algebra:- relational algebra with extended operations, tuple relational calculus, domain relational calculus, set operation, aggregate functions, null values, join relations.

UNIT 3
RELATIONAL DATABASE DESIGN:- pitfalls in relational database design trivial and non-trivial dependencies, closure set of dependencies and of attributes, Introduction to normalization, non loss decomposition, FD diagram, 1st, 2nd, 3rd BCNF, 4NF, 5NF.

UNIT 4
Basic SQL:- DDL, DML and DCL commands, specifying constraints in SQL, select statement.

UNIT 5
Additional features of SQL, PL/SQL, cursor, trigger, view.

List of Practical’s in PL/SQL
1. program to perform all arithmetic operations.
2. program to find simple interest.
3. program to find area of square rectangle and circle.
4. program to print your name n times.
5. program to find whether an entered number is even or odd.
6. program to find whether an entered number is positive, negative or zero.
7. program to find whether an entered number is divisible by 11 or not.
8. program to print table of entered number.
9. program to print factorial of entered number.
10. program to find greatest of three numbers.
UNIT-1
**Introduction to AI**: Definitions, Goals of AI, AI Approaches, AI Techniques, Branches of AI, Applications of AI.

**Intelligent Agents**: Definition of a rational agent, reflex model based, utility based agents, The environment in which particular agent operates.

UNIT-2
**Problem Solving, Search and Control Strategies**: General problem solving, Search and control strategies, Exhaustive searches, Heuristic search techniques, Constraint satisfaction problems (CSPs), models


UNIT-3
**Reasoning System -Symbolic, Statistical**: Reasoning, Symbolic reasoning, Statistical reasoning, Uncertainty: Types, degree of belief, degree of truth, probability, conditional probability, Baye’s theorem, Dampster-Shafer Theory.

UNIT-4
**Heuristic Search techniques**: Hill climbing, branch and bound techniques, A* algorithm, AO* algorithms, AND/OR graphs, Problem reduction, Constraint satisfaction problem, Uniform Cost search.

**Game Playing**: Overview, Mini-Max search procedure, Game playing with Mini-Max, Alpha-Beta pruning.

UNIT-5
**Learning**: What is learning, Rote learning, Learning from example: Induction, Explanation Based Learning (EBL), Discovery, Clustering, Analogy, Neural net and genetic learning, Reinforcement learning.

**Expert System**: Introduction, Knowledge acquisition, Knowledge base, working memory, Inference engine, Expert system shells, Explanation, Application of expert systems.

**Text Books**:

**Reference Books**:
SUBJECT NAME: OPERATIONAL RESEARCH (Elective1-b)

Unit-1

Unit -2

Unit -3

Unit -4
Sequencing models: Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines – Processing n Jobs through m Machines.

Unit -5

Text books:

Reference Books:
.getObjective: The main objective of Math 10250 is to learn calculus concepts, techniques, and ideas that are useful in solving and understanding real life problems that arise in economics and business.

UNIT-I:

Unit-2
Curvature: Definition, Radius of curvature in intrinsic form, Cartesian form, parametric form, Polar form, Radius of curvature at origin. Test for Concavity and Convexity.

Unit-3
Definite Integrals: Integration of Irrational Algebraic Functions and Transcendental functions, Rectification, Volumes and Surfaces of Solids of Revolution.

Unit-4
Differential equation of first Order and first Degree: Linear Equations, Bernoulli’s equation, Exact differential Equations.
Differential equation of first Order and Higher Degree: First Order Higher Degree Equations Solvable for x, y, p. Clairaut’s form and Singular Solutions.

Unit-5
Linear Differential Equations of Higher order with Constant Coefficients: Auxiliary equation, Auxiliary equation having equal roots, Auxiliary equation having Imaginary roots, Particular Integral by general method, Particular Integral By special method, Homogeneous Linear ordinary Differential Equations,
Advance Topics: Linear Differential Equation of Second Order, Method of Variation of Parameters,

Text Books:
1. Elements of Calculus 3rd edition by B. R. Thakur, Ram Prasad and sans publications
2. Elements of Calculus 3rd edition by H. K. Pathak, Ram Prasad and sans publications

References Book:
Introduction to Data Science (Elective1-d)

Unit-1
Data Scientist’s Tool Box: Turning data into actionable knowledge, introduction to the tools that will be used in building data analysis software: version control, markdown, git, GitHub, R, and R Studio.

Unit-2
R Programming Basics: Overview of R, R data types and objects, reading and writing data, Control structures, functions, scoping rules, dates and times, Loop functions, debugging tools, Simulation, code profiling

Unit-3
Getting and Cleaning Data: Obtaining data from the web, from APIs, from databases and from colleagues in various formats. basics of data cleaning and making data —tidy.

Unit-4
Exploratory Data Analysis: Essential exploratory techniques for summarizing data, applied before formal modeling commences, eliminating or sharpening potential hypotheses about the world that can be addressed by the data, common multivariate statistical techniques used to visualize high-dimensional data.

Unit-5
Reproducible Research: Concepts and tools behind reporting modern data analyses in a reproducible manner, To write a document using R markdown, integrate live R code into a literate statistical program, compile R markdown documents using knitr and related tools, and organize a data analysis so that it is reproducible and accessible to others.

Reference Books
1. Rachel Schutt, Cathy O'Neil, "Doing Data Science: Straight Talk from the Frontline" by Schroff/O'Reilly, 2013.
2. Foster Provost, Tom Fawcett, "Data Science for Business" What You Need to Know About Data Mining and Data-Analytic Thinking" by O'Reilly, 2013.
Data Mining

OBJECTIVE: This syllabus makes you aware of need of data warehouses (DW), involves data cleaning and data integration, preprocessing step for data mining (DM). And will make you aware of different data mining techniques.

Unit – 1
Overview and Concepts: Need for Data Warehousing, Basic elements of Data Warehousing, differences between Database Systems and Data Warehouse. Planning and Requirements: Project planning and management, collecting the requirements.

Unit -2
Architecture and Infrastructure: Data Warehouse Architecture and its components, Infrastructure and metadata. Data Design and Data Representation: Principles of dimensional modeling, advanced topics- data extraction, transformation and loading, data quality. Information Access and Delivery: OLAP in Data Warehouse, Data warehousing and the web.

Unit – 3
Data Mining Introduction: Basics of data mining, Different definitions of Data Mining and related concepts, Data mining process- Data preparation, data cleaning and data visualization. KDD process

Unit – 4
Data Mining techniques: Clustering, Association rules and Decision trees.

Unit – 5
Web Mining: Web content Mining, Web Usage Mining.

Advanced Topic: Spatial Mining, temporal Mining, trends in Data Mining.

Text Books
1. J. Han and M. Kamber. Data Mining: Concepts and Techniques.

Reference Books:
1. A. K. Puzari, Data Mining Techniques, University Press.
## B.Sc. (H) Scheme - Semester 5

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**Elective 2: (Choose any one of these)**
- a. Computer Hardware and Maintenance
- b. Data Warehouse and Mining

**Elective 3: (Choose any one of these)**
- a. E-Commerce and E-Governance
- b. Enterprise Resource Planning
- c. Management Information System
B.Sc.(H) Syllabus - Semester 5
Linux and Shell Programming

Unit-I
Introduction: What is LINUX, basic architecture of UNIX, different flavor, CUI and GUI, LINUX vs windows File system: boot block, data block, super block, Inode block &inode table, Linux file access. basic utilities.

Unit-II
File Related Commands: cat, cp, wc, ls, rm, mv, etc. Directory related command: pwd, cd, mkdir, rmdir, etc, File Permission: Security levels, Users, group and ownership of files, chmod command, editing with vi, back ground jobs, mounting and un mounting, link and unlink, Mathematical commands: bc, expr.

Unit-III
Text manipulation: grep, egrep, sed, cut, paste, sort, split, tr, cmp, comm, diff, head, tail
User to user communication: write, mail, mesg, wall, Printing File with lp and pr

Unit-IV
Process: structure of process and process control, process states and transition, process context
Process command: ps, kill, nice etc, scheduling commands: at and crontab, sleep, wait

Unit-V
Shell programming: shell, different types of shell, default assigned shell. Shell variable, key words, environment variable, shell script, Parameter passing, for loop, while loop, until loop, if statement, case statement.

Reference Books
1. M J Bach “Design of Unix OS”
3. Y Kanetkar “Unix shell programming” BPB Pub

List of Practical
1. Installation of Linux
2. Working with user login and passwd
3. Working with file related commands
4. Working with directory commands
5. Mailing and messaging in Linux
6. Implementation of job scheduling
7. Shell script program to find largest of three numbers.
8. Shell script program to print the factorial of two numbers.
9. Shell script program to find whether an entered number is even or odd.
10. Shell script program to implement positional parameter passing
Web Technologies

UNIT-1

UNIT-2

UNIT-3

UNIT-4
PHP: Introduction to Scripting Language PHP, Installation and Configuration of PHP, Data types in PHP, PHP Syntax, Comments, Variables and Constants, Embedding PHP in HTML. PHP Functions: user defined functions, Strings Concatenation, Strings functions. Arrays: Creating Array and Accessing Array Elements, Control statements, Loops, form validation.

UNIT-5
Working with forms: CRUD – Select statements, Creating Database tables, inserting values, Updating and Deleting, PHP with MYSQL, Creating Connections, Selecting Database, Perform Database (Query). XML: Introduction, XML Fundamentals, XML Syntax, Accessing Data from XML Documents.

References
Practical List:
1. Create a web page by use of the following tags: Head, Body, bgcolor, text and submit.
2. Write a html program applying inline CSS.
3. Write a html program using class based external style sheet
4. Write a java script program to design the simple Calculator
5. Write a java script program to find the factorial of given number
6. Write a javascript program to form validation in html.
7. Create a web form using PHP for login page.
8. Create a simple XML document with following details: Rollno, Sname, Contact, Email and Address.
9. Write a simple PHP script to perform crud operations.
10. Create a web form using PHP for enquiry details.
Computer Hardware and Maintenance (Elective-2(a))

Unit-1
Computer Assembling and Installation Information on PC & how it works, Architecture of the System, BPC Assembling, trouble shooting and managing Systems, Installations of operating systems & configuring PC network, Installation of service packs, applications such as MS Office, MS Outlook, Anti-virus software, Seagull CBT's etc., Trouble shooting of Windows XP & MS Office.

Unit-2
Mother Board & Components Types, Form factor, Different Components of Mother Boards (I/O slots, I/O connectors, CMOS battery, RTC, Memory Socket, BIOS, Front Panel Connectors), Types of Buses, compatibility with the processor, SATA interface

Unit-3
System Resources IRQ, DMA, Memory Address, I/O address, Resource Conflict, Plug & Play Concept. CMOS Utility Concept, CMOS RAM, CMOS Battery, backup, CMOS Utility Program menu, clearing CMOS.

Unit-4
Add on Cards, Cables & Connectors Different latest Add on Cards – (Identification in terms of I/O slot and connectors) AGP, PCI Express, TV Tuner Card, DVR card, Video Capture, SCSI. USB, NIC, Fire wire, Internal Modem, Sound Card. Display Systems Types of VDU, (CRT, LCD, TFT), Terms like Resolution, Dot Pitch, Interlaced &Non-Interlaced Power Consumption, Durability, Specification, Installation

Unit-5
Hard Disk Drive Hard Disk Drive: Types, capacity, Hard Disk Drive Component (Media, R/W Head, Spindle Motor Head Actuator) Connectors, configuration of HDD in, CMOS, BIOS setup, Jumper setting,partitioning, Formatting, Preventive Maintenance (S/W, H/W), trouble Shooting (H/W, S/W Recovery, Zero fill)

Advanced Topic
Administering Users and Groups, Administering Printers, Monitoring Performance and System Events, Optical Disk Drive(ROM, R/W, DVROM, DVD R/W), Backup Drive (Pen Drive U3 format, Zip Drive, Tape Drive, USB External Drive -HDD, CD/DVD writer), Introduction of Magneto-Optical Drive

References
1. V.R. Mehta, Principal of Electronics, S.Chand & Co
2. Malvino& Leach, Digital Principals & Applications
3. Maintaining & Repairing PC’s, TataMcGraw Hill
5. SD. Balasubramaniam, Computer Installation & Servicing Pearson Education
Data Warehousing and Data Mining (Elective-2(b))

Unit – 1
**Overview and Concepts:** Need for Data Warehousing, Basic elements of Data Warehousing, differences between Database Systems and Data Warehouse. Planning and Requirements: Project planning and management, collecting the requirements.

Unit -2
**Architecture and Infrastructure:** Data Warehouse Architecture and its components, Infrastructure and metadata. Data Design and Data Representation: Principles of dimensional modeling, advanced topics- data extraction, transformation and loading, data quality. Information Access and Delivery: OLAP in Data Warehouse, Data warehousing and the web.

Unit – 3
**Data Mining Introduction:** Basics of data mining, Different definitions of Data Mining and related concepts, Data mining process- Data preparation, data cleaning and data visualization. KDD process

Unit – 4
**Data Mining techniques:** Clustering, Association rules and Decision trees.

Unit – 5
**Web Mining:** Web content Mining, Web Usage Mining. 
**Advanced Topic:** Spatial Mining, temporal Mining, trends in Data Mining.

References
1. J. Han and M. Kamber. Data Mining: Concepts and Techniques.
2. A.K. Puzari, Data Mining Techniques, University Press.
E-Commerce & E-Governance (Elective-3(a))

Unit I:

Unit II:
Electronic Payment Systems: Credit cards, debit cards, smart cards, e-credit accounts, e-money, Marketing on the web, marketing strategies, advertising on the web, customer service and support, introduction to m-commerce, case study: e-commerce in passenger air transport.

Unit III:
E-Government, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, its scope and content, benefits and reasons for the introduction of e-governance, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

Unit IV:

Unit V:

References:

4. David Whiteley, “E-commerce study, technology and applications”, TMH.
Enterprise Resource Planning (Elective-3(b))

Objective: This course is taught to know about resource planning in organization and how it works.

UNIT I

UNIT II
ERP Modules and Vendors Finance Production Planning, Control and Management, Sales and Distribution Human Resource Management Inventory Control System, Quality Management, ERP market, Comparison of Current ERP Packages and Vendors, like SAP, Oracle, PeopleSoft, BAAN etc, Disadvantages of non-ERP sys, Importance of ERP, vice versa In-house applications Benefits of integration Standardization of data code.

UNIT III

UNIT IV
ERP Case Studies, Post Implementation review of ERP, packages in manufacturing, Services and Other Organizations, Customization of ERP for different types of Industries.

UNIT V
Security and Ethical Challenges Ethical responsibilities of Business Professionals – Business, technology; Computer crime – Hacking, cyber theft, unauthorized use at work; Piracy – software and intellectual property; Privacy – Issues and the Internet Privacy; Challenges – working condition, individuals; Health and Social Issues, Ergonomics and cyber terrorism.

References

1. ERP, Leon Alexis, TMH
2. Enterprise Resource Planning & Management of Information System, CSV Murthy, HPH.
Management Information System Elective-3(c)

Objectives: The course provides students a fundamental understanding of management information systems concepts and their role in contemporary business. At the end of this course students should be able to participate in information systems development as an informed person.

Unit – 1
Management Information Systems - Need, Purpose and Objectives -Contemporary Approaches to MIS - Information as a strategic resource - Use of information for competitive advantage - MIS as an instrument for the organizational change Information, Management and Decision Making - Models of Decision Making-Classical, Administrative and Herbert Simon's Models - Attributes of information and its relevance to Decision Making - Types of information

Unit – 2
Information Technology - Definition, IT Capabilities and their organizational impact - Telecommunication and Networks - Types and Topologies of Networks - IT enabled services such as Call Centers, Geographical Information Systems etc. FIS, Mis, HRIC, HRA

Unit – 3

Unit – 4

Unit – 5

References:
1. Management information system, Pearson Publication
2. Management information system, TMH publications
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