PSCP Lab Assignment - II - Even Semester - 2017-18

1.	Write a function power(a,b) , to calculate the value of a raised to b.
2.	Consider the following process which can be applied to any positive integer: if the integer is odd multiply it by three and add one. If the integer is even divide it by 2. This process is repeated until integer remaining is 1. Ex. The following sequence is 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1 stop the process when 1 occurs. Write a function to determine how many steps are required to complete this process. Use functions.
3.	Write a function that simulates coin tossing. For each toss of the coin , the program should print heads or tails. Let the program toss the coin 100 times and count the number of times each side of the coin appears. Print the results. The program should call a separate function flip() that takes no arguments and returns 0 for tails and 1 for heads.
4.	Write a program that converts from 24-hour notation to 12-hour notation. For example , it should convert 14:25 to 2:25PM.The input is given as two integers. There should be at least three functions, one for input, one to do the conversion and one for output. Record the AM/PM information as a value of type char , 'A' for AM and char 'P' for PM . Thus the function for doing the conversions will have a call-by-reference formal parameter of type char to record whether it is AM or PM .
5.	Write a function to perform multiplication of two complex numbers. The value parameters to the function should be real1, imag1m reak2, imag2 and the reference parameters should be realpart and imagpart. The formula is (a+ib) X (c+id) = (ac-bd)+i(bc+ad)
6.	(i)Write a function nextday() to transform a given month day and a year into the after. (ii)Write a function prevday() to transform a given month day and a year into the before.
7.	Write a program to find all prime factors of a given number along with their exponents.
8.	Develop a recursive function for towers of Hanoi problem
9.	Write a function to calculate nth number in the Newman-Conway sequence defined by P(1) = P(2) = 1, and for n >= 3 P(n) = P(P(n-1))+ P(n-P(n-1))
10.	Write an algorithm and a program to sort an unsorted list of n elements. The program should also displays the number of swapping operations performed for a given list of elements. (Bubble sort, Selection sort and Insertion sort)
11.	Write a program to perform following operations on arrays (i) Inserting an element at specified position (ii) Deleting an element at specified position (iii) Replacing an element at specified position (iv) Searching
12.	Let A and B be two arrays. Write a function to create a new array C that contains elements alternately from A and B beginning with the first element of A. Use pointer to access the elements from the array C. If you run out of elements in one of the lists (arrays), then append the remaining elements of the other list (array) to C.
13.	Create an array called polynomial and perform the following operations: (i)Addition of two polynomials (ii) Subtraction of two polynomials (iii) Multiplication of two polynomials.

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<tr><td>14.</td><td>Write a program to perform following matrix operations : (i) Addition (ii) Multiplication (iii) Transpose (iv) Inverse (vi) Matrix to lower triangle and upper triangle form (vii) Tri-diagonal elements (viii) Saddle point and also find how many saddle points in the given matrix(minimum in row and maximum in column)</td></tr>
<tr><td>15.</td><td>A square matrix is a matrix with the same number of rows and columns. Write a program to find the sum of diagonal elements of a square matrix A of size n x n. The program should also determine the given matrix is an upper triangular matrix or not.</td></tr>
<tr><td>16.</td><td>Write program for big number arithmetic. (Addition, Subtraction and Multiplication)</td></tr>
<tr><td>17.</td><td>A maze can be represented by a two dimensional Boolean array in which true elements represents walls and false one represents hall-ways. For Example write a program to move a mice through a maze so represented.
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<tr><td>18.</td><td>Write a program which calls a recursive function to determine the given string is palindrome or not and also write a recursive function to find the length the given string.</td></tr>
<tr><td></td><td>Implement your own string library functions : (i) strcpy (ii) strncpy (iii) strcmp (iv) strncmp (v) strlen (vi) strnlen (vii) strcat (viii) strncat (ix) atoi (x) itoa</td></tr>
<tr><td>19.</td><td>Write a program to sort the given names in lexicographical order(Alphabetical-order).
Ex:- abc , abcd, aba , abd
Result: aba , abc , abcd , abd</td></tr>
<tr><td>20.</td><td>Write a program to search for a given sub string inside a given string. If it is found in the string, then print the positions of all the occurrences.</td></tr>
<tr><td>21.</td><td>Write a program that reads multiple lines of text and finds the frequencies of characters and words.</td></tr>
<tr><td>22.</td><td>Write a program that inputs a telephone number as a string in the form (0870) 0870-311990. The program should use function string tokenizer(strtok()) to extract the area code as a token, the first four digits of the phone number as a token, and the last six digits of the phone number as a token. The ten digits of the token should be concatenated into one string. The program should convert the area code string to int and the convert the phone number string to long. Both the area code and the phone number should be printed.</td></tr>
<tr><td>23.</td><td>Write a program to read the content from a text file IN.TXT, count the number of alphabets, digits and special characters present in it and write these information into a text file OUT.TXT.</td></tr>
<tr><td>24.</td><td>Write a program that reads a text file and creates another file that is identical except that every sequence of consecutive blank spaces is replaced by a single space.</td></tr>
<tr><td>25.</td><td>Two files FILE1 and FILE2 contain sorted lists of integers. Write a program to produce a third file DATA which holds a single sorted, merged list of these two lists.</td></tr>
<tr><td>26.</td><td>Assuming that a text file named FIRST.TXT contains some text written into it, write a function named vowel words(), that reads the file FIRST.TXT and creates a new file</td></tr>
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	named SECOND.TXT, to contain only those words from the file FIRST.TXT which start with a lowercase vowel (i.e., with 'a', 'e', 'i', 'o', 'u'). For example, if the file FIRST.TXT contains “Carry umbrella and overcoat when it rains”.Then the file SECOND.TXT shall contain “umbrella and overcoat it”.

27.	A Point on the 2-D plane can be represented by two numbers: an X-coordinate and Y-Coordinate. For example, (2, 3) represents a point 2 units to the right of the origin along the x-axis and 3-units up the y-axis. The product of the two points can be defined as new point whose x-coordinate is the product of the X-coordinate of the two points, and whose y-coordinate is the product of their y-coordinates. Write a program that uses a structure called point to model a point. Define three points, and have the user input values to two of them. Then set the third point equal to the product of the other two, and display the value of the new point.
28.	Write a program to create a structure called BankDeposit. Structure members are amt (amount to deposit in bank), tenure (No. of years deposit to be maintained). Create another structure called Dates, structure members are int date, int month, int year. Enter DOB of person, Date of deposit using Dates structure variables. Calculate present age of the person. If the person is senior citizen (age >=60 yrs) then rate of interest is 9% else 8%. Calculate the total amount that person receives after date of maturity (date of deposit+ tenure).
29.	Write a program using structures to play cards game. System should shuffle all the cards and user should predict continuously next card to be shown. If user prediction is correct then user wins otherwise computer wins. This is repeated for all 52 cards, 52 times. Finally display the number of wins for both system and the user.
30.	Define a structure called cricket that will describe the following information: player name, team name, batting average. Using cricket, declare an array player with 50 elements and write a program to read the information about all the 50 players and print a team-wise list containing names of players with their batting average.
31.	Write a c++ program to create a structure student with the data fields; Name, rollno, address and marks in 3 subjects for 10 students and display all the students details
32.	Create a class complex for performing arithmetic with complex numbers. Write a driver program to test your class. Complex number have the form: real part + imaginary part * i. Where 'i' is sqrt(-1). Provide public member functions for each of the following addition, substraction, multiplication of two complex numbers and displaying the result
33	Create a date class with data members month, day and year. Provide a member function next day to increment the given day by one. The date object should always remain in consistant state. Write a program that tests the next day function in a loop that prints the date during each iteration of the loop to illustrate that the next function works correctly (i) incrementing into the next month (ii) Incrementing into the next year
34	Create a **SavingsAccount** class. Use a static member to contain the annual interest rate for each of the savers. Each member of the class contains a private data member savings balance indicating the amount the saver currently has on deposit. Provide a **calculatemonthlyinterest** member function that calculates the monthly interest by multiplying the balance by annual interest divided by 12; This interest should be added to saving balance. Provide a member function **modifyinterestrate** that sets the static annual interest rate a new value. Write a program to test the class **SavingsAccount**