

COMPUTER PROJECT QUESTIONS (Class 12)

GENERAL INSTRUCTIONS:

1. Order of each program:

- I.** Program Specification.
- II.** Algorithm
- III.** Coding
- IV.** Output
- V.** Variable Listing.

- 2.** Also please include an acknowledgement at the end of the project, showing your gratitude towards all those who have supported and guided you throughout the completion of this project. Also give your thanks to the school, principal and computer teacher for providing you with the opportunity to do this project.
- 3.** Favourably, do a laser print, to avoid any chances of damage to the project due to moisture and water spills.
- 4.** For output, take a screenshot of the screen, clearly showing the output after running the program and attach the image to the project. Typed-out OUTPUTS will not be entertained.

Q1. Wap in Java to enter a number and check whether it is a prime number or not, using recursive function with method prototype: isPrime(int, int). Write main () method as well, to create an object and call all the required methods.

Q2. Wap in Java to display the sum of all the even numbers up to n, as follows: $S = 2 + 4 + 6 + 8 + \dots$ up to n. Use recursive function with method prototype: Sum_rate(int), for this purpose. Write main () method as well, to create an object and call all the required methods.

Q3. Wap to perform the following tasks on a text file “student.txt”.

(I) Input the name, class, section, roll number and percentage of 50 students in your class. Calculate the grade as follows:

| Percentage | Grade |
|------------|-------|
| 80 - 100 | A |
| 60 - < 80 | B |
| 40 - < 60 | C |
| < 40 | F |

(II) Create the file called “student.txt” and store all these details of each student in the file in tabular format.

(III) Copy the contents of “student.txt” into another text file called “result.txt”.

(IV) Read the contents of “result.txt” and display on the screen in tabular form.

Q4. Wap in Java to create a function Sum (int) to display sum of the given series recursively:

$$\text{Sum} = 1 + 8 + 27 + 64 + \dots + n.$$

Write main () method as well, to create an object and call all the required methods.

Q5. Wap in Java to input employee id, name and basic salary from the user, of n number of employees. Store these details of each employee in a binary file "Employee.dat".

Read the details of the employees from the file "Employee.dat".

Calculate his net pay as follows:

$$\text{da (Dearness Allowance)} = 12\% \text{ of basic}$$

$$\text{hra (House Rent Allowance)} = 5\% \text{ of basic}$$

$$\text{ta (Travel Allowance)} = 3\% \text{ of basic}$$

$$\text{Medical} = ₹ 500.$$

$$\text{gp (Gross Pay)} = \text{basic} + \text{da} + \text{hra} + \text{ta} + \text{Medical}.$$

$$\text{it (Income Tax)} = 10\% \text{ of basic}.$$

$$\text{np (Net Pay)} = \text{gp} - \text{it}.$$

Display the net pay of each employee along with all details on the screen.

Q6. Wap in Java to print the following pattern:

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

Q7. Consider the sequence of natural numbers:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25.

Removing every second number produces the sequence:

1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25.

Removing every third number produces the sequence:

1, 3, 7, 9, 13, 15, 19, 21, 25.

This process continues indefinitely. The numbers left in the sequence after this number elimination process has terminated, are called Lucky Numbers.

Wap in Java, asking the user to enter an upper bound. Check and display all the lucky numbers in that range. Also create the main () method to create an object of the class and to call the required methods.

Q 8. Wap in Java to find and display all twin prime numbers in a given range. Also create the main () method to create an object of the class and to call the required methods.

Q 9. Wap in Java which inputs a positive natural number N and prints the possible consecutive number combinations which when added give N.

E.g. :

Sample Input –

Enter a number = 27

Sample Output –

$2 + 3 + 4 + 5 + 6 + 7 = 27$

$8 + 9 + 10 = 27$

$13 + 14 = 27$

Also create the main () method to create an object of the class and to call the required methods.

Q 10. Wap in Java to input a number and check whether it is a Unique Number or NOT.

A Unique Number is a positive integer (without leading zeroes) with no duplicate digits.

E.g. :

125, 135 etc. are Unique Numbers.

1321, 121 are NOT Unique Numbers.

Also create the main () method to create an object of the class and to call the required methods

Q11. Wap in Java to check and print Smith Number.

A Smith Number is a composite number, the sum of whose digits is equal to the sum of the digits of its prime factors obtained as a result of prime factorisation.

Example: 666

Prime factors are 2, 3, 3, and 37.

Sum of all the digits is $(6+6+6) = 18$.

Sum of the digits of the factors is $(2 + 3 + 3 + (3+7)) = 18$.

666 is a Smith Number.

Q 12. Wap in Java that reads all the employee names and basic salaries from the text file “employee.txt.” Calculate and display net salary of each of them as follows:

DA = 20% of basic

HRA = 8% of basic

Medical = Rs 1000

IT = 8% of basic

Gross salary = basic + DA + HRA + Medical.

Net salary = Gross salary – IT.

Also create the main () method to create an object of the class and to call the required methods

Q 13. Wap in Java to declare a single dimensional array a[] and a square matrix b[][] of size N, where N>2 and N<10. Allow the user to input positive integers into the single-dimensional array. Perform the following task on the matrix:

a) Sort the elements of the single-dimensional array in ascending order using any sorting technique and display the sorted elements.

b) Fill the matrix b[][] in the following format.

If the array a[] = {5,2,8,1} then after sorting, a[] = {1,2,5,8} then the matrix b[][] would fill as below:

| | | | |
|---|---|---|---|
| 1 | 2 | 5 | 8 |
| 1 | 2 | 5 | 1 |
| 1 | 2 | 1 | 2 |
| 1 | 1 | 2 | 5 |

c) Display the filled matrix in the above format. Also, create the main() method to create the object of the class and to call the required methods.

Q 14. Wap in Java to input two binary numbers. Calculate the sum of these two binary numbers and display the output on the screen. Also, create the main() method to create the object of the class and to call the required methods.

Q 15. An Abundant number is a number for which the sum of its proper factors is greater than the number itself. Write a program to input a number and check and print whether it is an Abundant number or not.

Example:

Consider the number 12.

Factors of 12 = 1, 2, 3, 4, 6 Sum of factors = 1 + 2 + 3 + 4 + 6 = 16

As $16 > 12$ so 12 is an Abundant number.

Write a program in java to accept a number. Check and display whether it is a Rounney number or not. Also, create the main () method to create the object of the class and to call the required methods.

Q 16. A class Rearrange has been defined to modify a word by bringing all the vowels in the word at the beginning followed by the consonants.

Example:

ORIGINAL becomes OIHARGNL

Some of the members of the class are given below:

Class name: Rearrange

Data Member/instance variable:

wrd: to store a word

newwrd: to store the rearranged word

Member functions/methods:

Rearrange(): default constructor

void readword(): to accept the word in UPPER case

vow freq_vow_con(): finds the frequency of vowels and consonants in the word and displays them with an appropriate message

void arrange(); rearranges the word by bringing the vowels at the beginning followed by consonants

void display(): displays the original word along with the rearranged word

Specify the class Rearrange, giving the details of the constructor(), void readword(), void freq_vow_con(), void arrange() and void display(). Define the main() function to create an object and call the functions accordingly to enable the task.

Q 17. Write a program to declare a matrix A [][] of order (MN) where 'M' is the number of rows and 'N' is the number of columns such that the value of 'M' must be greater than 0 and less than 10 and the value of 'N' must be greater than 2 and less than 6. Allow the user to input digits (0-7) only at each location, such that each row represents an octal number.

Example:

2 3 1 (decimal equivalent of 1st row = 153 i.e. $2 \times 8^2 + 3 \times 8^1 + 1 \times 8^0$)

4 0 5 (decimal equivalent of 1st row = 261 i.e. $4 \times 8^2 + 0 \times 8^1 + 5 \times 8^0$)

1 5 6 (decimal equivalent of 1st row = 110 i.e. $1 \times 8^2 + 5 \times 8^1 + 6 \times 8^0$)

Perform the following tasks on the matrix:

1. Display the original matrix,
2. Calculate the decimal equivalent for each row and display it at the end row-wise.

Also, create the main() method to create the object of the class and to call the required methods.

Q 18. Write a program to find the reverse of all the numbers in the range A to B (A and B both are positive integers > 0, entered by the user) and store in the binary file "REVERSE.DAT" in a tabular form as follows:

Number: 123. Reverse: 321

Number: 124. Reverse: 421

Number: 125. Reverse: 521

...and so on.

Also, create the main() method to create the object of the class and to call the required methods.

Q 19. Write a Program in Java to input a number and check whether it is a Fascinating Number or not.

Fascinating Numbers: Some numbers of 3 digits or more exhibit a very interesting property. The property is such that, when the number is multiplied by 2 and 3, and both these products are concatenated with the original number, all digits from 1 to 9 are present exactly once, regardless of the number of zeroes.

Let's understand the concept of a Fascinating Number through the following example:

Consider the number 192

$192 \times 1 = 192$

$192 \times 2 = 384$

$192 \times 3 = 576$

Concatenating the results: 192 384 576

It could be observed that '192384576' consists of all digits from 1 to 9 exactly once. Hence, it could be concluded that 192 is a Fascinating Number. Some examples of fascinating Numbers are: 192, 219, 273 327, 1902, 1920, 2019 etc.

Q 20. The names of the teams participating in a competition should be displayed on a banner vertically, to accommodate as many teams as possible in a single banner. Design a program to accept the names of N teams, where $2 < N < 9$ and display them in vertical order, side by side with a horizontal tab (ie, eight spaces).

Define the main() function to create an object and call the functions accordingly to enable the task. Test your program for the following data and some random data:

Example 1

INPUT:

N = 3

Team 1: Emus

Team 2: Road Rols

Team 3: Coyote

OUTPUT:

| | | |
|---|---|---|
| E | R | C |
| m | o | o |
| u | a | y |
| s | d | o |
| | | t |
| | R | e |
| | o | |
| | l | |
| | s | |

Example 2

INPUT:

N = 4

Team 1: Royal

Team 2: Mars

Team 3: De Rose

Team 4: Kings

OUTPUT:

| | | | |
|---|---|---|---|
| R | M | D | K |
| o | a | e | i |
| y | r | | n |
| a | s | R | g |
| l | | o | s |
| | | s | |
| | | e | |

Example 3

INPUT:

N = 10

OUTPUT:

INVALID INPUT

Q 21. The result of a quiz competition is to be prepared as follows:

The quiz has five questions with four multiple choices (A, B, C, D), with each question carrying 1 mark for the correct answer. Design a program to accept the number of participants N such that N must be greater than 3 and less than 11. Create a double-dimensional array of size (Nx5) to store the answers of each participant row-wise. Calculate the marks for each participant by matching the correct answer stored in a single-dimensional array of size 5. Display the scores for each participant and also the participant(s) having the highest score.

Example: If the value of N = 4 then the array would be:

| | Q1 | Q2 | Q3 | Q4 | Q5 |
|---------------|----|----|----|----|----|
| Participant 1 | A | B | B | C | A |
| Participant 2 | D | A | D | C | B |
| Participant 3 | A | A | B | A | C |
| Participant 4 | D | C | C | A | B |

Key to the question: D C C B A

Note: Array entries are line fed (i.e. one entry per line)

Test your program for the following data and some random data.

Example 1

INPUT:

Participant 1 D A B C C

Participant 2 A A D C B

Participant 3 B A C D B

Participant 4 D A D C B

Participant 5 B C A D D

Key: B C D A A

OUTPUT:

Scores:

Participant 1 = 0

Participant 2 = 1

Participant 3 = 1

Participant 4 = 1

Participant 5 = 2

Highest Score:

Participant 5

Example 2

INPUT:

N = 4

Participant 1 A C C B D

Participant 2 B C A A C

Participant 3 B C B A A

Participant 4 C C D D B

Key: A C D B B

OUTPUT:

Scores

Participant 1 = 3

Participant 2 = 1

Participant 3 = 1

Participant 4 = 3

Highest Score:

Participant 1

Participant 4

Example 3

INPUT:

N = 12

OUTPUT:

INPUT SIZE OUT OF RANGE.

Q22. Write a menu-driven program in Java to check whether a given string is a palindrome using recursion.

Define and use a recursive function:

String Reverse(String str) – This function should return the reverse of the string using recursion.

Menu Options (using switch-case):

1 → Input a string and check if it is a palindrome (ignoring case).

2 → Prompt the user: “Do you want to continue with another string?”

If the response is “Yes”, allow repetition. Otherwise, exit the program.

-
- A string is said to be a palindrome if it reads the same forward and backwards.
Example: "Madam", "RaceCar" are palindromes; "Java" is not.
 - Note: Do not use iterative constructs (for or while) in the Reverse function.
-

Q 23. A triangular number is formed by the addition of consecutive integers, starting from 1.

E.g. $3 = 1 + 2$

$6 = 1 + 2 + 3$

$10 = 1 + 2 + 3 + 4.$

Wap in Java to display all the triangular numbers starting from 3 to n (where n is user input).

Use the method: `int Triangle(int)`, which receives an integer and returns 1 if it is a triangular number otherwise 0 ,recursively.

Q 24. A class Shift in Java contains a 2D array of order (m*n), where the maximum values of both m and n are 5. Design the class Shift to shuffle the matrix.

[The first row becomes the last, the second row becomes the first, and so on. Or/and the first column becomes the last, the second column becomes the first, and so on.]

Class name: Shift

Data Members: int mat[][], m, n .

Member functions: _____

Shift(int mn, int nn): A constructor to initialise the data members m equals mn and n equals nn.

void input(): Enters the elements of the array.

void cyclic1(Shift P): Enables the matrix of the object P to shift each row upwards in a cyclic manner and store the resultant matrix in the current object.

void cyclic2(Shift Q): Enables the matrix of the object Q to shift each column leftwards in a cyclic manner and store the resultant matrix in the current object.

void display(): Displays the matrix elements.

Define the main method to create an object and call the method accordingly to enable the task of shifting the array elements.

LINKED LIST PROJECT (SIMPLE DATA STRUCTURES):

Question: Write a program in Java based on a single linked list that contains one integer as a data item in each of its nodes. The class details of each node are as follows:

```
class Node
{
    int item;
    Node next;
}
```

Perform the following operations based on the given LinkedList, below: -

- (1)** Create the linked list in ascending order of the elements.
- (2)** Delete a node from the linked list.
- (3)** Traverse the list.
- (4)** Search for a particular item in the list, and also display its position in the list, if found. Display an appropriate message if the element is NOT found.
- (5)** Reverse the list.

Create a menu with the given options. The program continues until the user wants to exit.

Write the Program Specification, Algorithm, Coding, Output, Variable Listing and Acknowledgement, in the order stated above.
