**COMPUTER SCIENCE QUESTION PAPER**

TIME – 2 Hour 30 Minutes FULL MARKS – 70

PART – A(Answer all the questions 20 Marks)

1. (a) Draw the truth table to represent a two input XOR gate. [1]

(b) Verify if, (~P V P) Λ 1 = 1 [1]

(c) Differentiate between ASCII code and UNICODE. [1]

(d) Minimize: F = PQ + (PR)′ +PQ′R using Boolean laws. [1]

(e) If A denotes “it is cloudy” and B denotes “it will rain”, then express the following statements [1]

in symbolic form:

(i) If it does not rain then it is not cloudy

(ii) If it is raining then it is cloudy

2. (a) Define ‘Base’ of number system? Give one example. [2]

(b) Convert the following arithmetic expression into Java statement x = (a⁸ + b⁴ )/ √ab [2]

(c) Define the term ‘wff’ in propositional logic. Give one example. [2]

d) Name the File Stream Class to perform the following operations: [2]

(i) to write data into a binary file

(ii) to read data from a text file

(e) Differentiate between static variable and non-static variable. [2]

3. The following is a method/function of some class. Give the output of the function perform( ) when the value of ‘n’ is 6579. Show the dry run/ working. [5]

void perform( int n ) {

int s=0, g;

while( n>0) {

if (n%2==1)

n/=10;

g=n%10;

System.out.print(“\n g = \t” + g);

s=s+g;

n/= 5;

}

System.out.print(“\n s = \t” + s);

}

PART – B (50 Marks)

[Answer 6 questions in this part, choosing 2 questions from Section A, 2 from Section B and 2 from Section C]

SECTION - A (Answer any two questions)

4. Perform the following conversions / operations: [5 x 2 = 10]

(i) (1011001.010)₂ = ( ? )₁₀

(ii) (473)₈ = ( ? )₂

(iii) (111011.11)₂ = ( ? )₁₆

(iv) 1101 – 11 ( using 1’s complement)

(v) 1101 x 111

5. (a) The Planning Committee of a particular town consists of a President, Secretary and a Treasurer. Any decision taken on development plans of the town can be implemented only if : [5]

• The President and either Secretary or Treasurer agrees

OR

• All three agree

The inputs are:

P - Denotes the President’s vote

S - Denotes the Secretary’s vote

T - Denotes the Treasurer’s vote

Output: X - Denotes development plan [1 indicates agreed and 0 indicates refused in all cases ]

Draw the truth table for the inputs and outputs. Also, write the Boolean expression with conjunctive operators for each of the true values (1’s) from the output column of the truth table.

(b) Prove the following Boolean expression with the help of a truth table: [3]

(A’ + B’) . (A + B) = A’.B + A.B’

(c) What are Universal gates? Draw the AND gate using universal gate. [2]

6. (a) Define Half Adder. Write the expression and draw the logic diagram for a half adder. [5]

(b) Solve the following Boolean expression algebraically. [3]

XY + YZ + YZ’ = Y

(c) Draw the logic circuit for the following Boolean expression: X = (A′ + B) . (C + D′) [2]

SECTION – B (Answer any two questions)

Question 7 Design a class WordWise to separate words from a sentence and find the frequency of the vowels in each word. [10]

Some of the members of the class are given below:

Class name : WordWise

Data members/instance variables:

str : to store a sentence

Member functions/methods:

WordWise( ) : default constructor

void readsent( ) : to accept a sentence

int freq\_vowel(String w) : returns the frequency of vowels in the parameterized string w void arrange( ) : displays each word of the sentence in a separate line along with the frequency of vowels for each word by invoking the function freq\_vowel( ).

Define the class WordWise giving details of the constructor( ), void readsent(), int freq\_vowel(String) and void arrange(). Define the main( ) function to create an object and call the functions accordingly to enable the task.

8. Design a class PrimePalinGen to generate prime palindrome numbers. [ A number is said to be prime palindrome if the number is a prime as well as a palindrome number ] [10]

[ Prime number: A number having only two factors i.e. 1 and itself ]

[ Palindrome number: A number which is same as its reverse ]

Example: 11(where 11 is a prime number and a palindrome number)

Some of the members of the class are given below:

Class name : PrimePalinGen

Data members/instance variables:

start : to store the start of range

end : to store the end of range

Methods/Member functions:

PrimePalinGen (int a, int b) : parameterized constructor to initialize the data members start=a and end=b int isPrime(int i) : returns 1 if the number is prime otherwise returns 0

int isPalin(int i) : returns 1 if the number is a palindrome otherwise returns 0

void generate( ) : generates all prime palindrome numbers between start and end by invoking the functions isPrime() and isPalin().

Specify the class PrimePalinGen giving details of the constructor( ),int isPrime(int), int isPalin(int) and void generate( ). Define a main( ) function to create an object and call the functions accordingly to enable the task.

9. A class ArrayMax contains a square matrix which finds the largest element in each row. Some of the members of the class are given below: [10]

Class name : ArrayMax

Data member/instance variable:

arr[ ][ ] : array to store integer elements

m : to store the order of the matrix

Member functions/methods:

ArrayMax( int mm) : parameterized constructor to initialize the data member m=mm and to declare the array

void readarray() : to accept the array elements

void large( ) : finds and displays the largest element in each row with an appropriate message

void display() : displays the array elements in matrix form

Specify the class ArrayMax, giving the details of the constructor( ), void readarray( ), void large( ) and void display( ). Define the main( ) function to create an object and call the functions accordingly to enable the task.

SECTION – C (Answer any two questions)

10. (a) Write a Method to calculate and return the sum of the square of the digits of a number ‘n’ using recursive technique. The method declaration is as follows: int sumSq( int n ) [4]

(b) State any one difference between recursion and iteration. [1]

11. (a) A binary file named “ABC.DAT” contains the product code (pc), unit price (up) and quantity(q) for number of items. Write a Method to accept a product code ‘p’ and check the availability of the product and display with an appropriate message. The method declaration is as follows: void findpro( int p ). [4]

(b) State any one difference between binary file and text file. [1]

12. Answer the following questions given below: - [5 x 1 = 5]

(i) Name the package which is imported by default.

(ii) Which statement comes automatically in each class of a user defined package?

(iii) What is prolog in artificial intelligence?

(iv) What is infringement?

(v) What is public domain software?