## II PRE BOARD EXAMINATION COMPUTER SCIENCE

### Paper 1 (THEORY)

#### Three hours

(Candidates are allowed additional 15 minutes for only reading the paper. They must NOT start writing during this time.)

Answer all questions in Part I (Compulsory) and six questions from Part II, choosing two questions from Section A, two questions from Section B, two questions from Section C.

All working including rough work, should be done on the same sheet as the rest of the answers.

The intended marks for questions or parts are given in brackets [ ].

#### PART - I

Attempt all questions.

While answering questions in this Part, indicate briefly your working and reasoning, wherever required.

ersti) State any one purpose of using the keyy and extends in lave prog

Convert the following infix notation to posifir form

XISHTI when the merrix is stored in column majorwise.

What do you mean by Base Case?

12 # (Q / R + S) / (T - U / W)

### Question 1

- The law which states (A' + B')'' = (A' + B') is: [1] (i)
  - (a) Complement Law
  - (b) De Morgan's Law
  - (c) Involution Law
  - (d) Commutative Law
- $P \rightarrow PQ$  is equals to: (ii)
  - A marrix X[-5, ... + 15][2 ... 10] is stored in the memory with each etcline(a)
  - requiring 4 byres of storage ut the base address is 8000, find the adoles (d).
  - (c) P'Q
  - (d) P' + Q

This paper consists of 10 printed pages.

Question 2

[1]

The Conjunction

(c) Implication

[1] (iii) The complement of the Boolean expression  $P \rightarrow Q$  is: (a) P' + O(b) P + Q'. (c) P.Q (d) P. Q' If  $(-x \rightarrow y)$  then, its contrapositive will be: [1] (a)  $x \rightarrow y$ (d)  $\sim x \rightarrow y$ The propositional operator → represents: [1] (v) (a) Disjunction (b) Conjunction (c) Implication (d) Equivalence Write the cardinal POS form of the the function y(A, B) = (A + B)(A' + B'). [1] (vi) [1] (vii) Draw NOR gate using NAND gate only. (viii) State any one purpose of using the keyword extends in Java programming. [1] [1] Define interface inheritance. (ix) [1] What do you mean by Base Case? (x) ALL Manines Aberta Tak Question 2 Convert the following infix notation to postfix form. [2] (i) P\*(O/R+S)/(T-U/W)A matrix X[-5...+15][2...10] is stored in the memory with each element [11 (ii) requiring 4 bytes of storage. If the base address is 8000, find the address of

X[5][7] when the matrix is stored in column majorwise.

```
(iii) With reference to the code given below answer the questions that follow:
          int Solve(int n)
                    and two questions from Section B and two from Section
          int i - 2, s = 0;
          while (n!=1)
          Given the Boolean Muchon F(A. B. C. O) = 2 (0, 2, 3, 4, 5, 6, 7, 8, 10, 1)
          (a) Reduce the above expression by using 4-variable Karn (0 == i % n)ii
                                 the various groups (i.e. octai, quads and pairs).
        (b) Draw the logic gate diagram for the reduced expression using NAND gate
      only. Assume that the variables and their complements are evallable as inputs
             (b) ( Given the Boolean function F(A, B, C, D) = \pi (0, 2, 3, 7, 10, 11, 14, 15)
      (i) Reduce the above expression by using 4-variable Karnaugh man, showing
          else i++;
                                the various groups (i.e. octal, quaer and pairs).
       (ii) Draw the logic gate diagram for the reduced expression using NOR fate
          only Assume that the variables and their complements are; a muter
     (a) What will the function Solve() return when the value of n = 30? [2]
      (b) What is the method Solve() computing? I said to not one the number of the
                                                                                      [1]
     The following function quiz() is a part of some class. Assume 'n' is a positive
(iv)
      integer, greater than 0, Answer the given questions along with dry run / working.
                                         The person is an employee of the 17711
      int quiz(int n)
                                                10 years of working expense
   The can be a here as by union macanine of the and comments to the fairless
      if(n <= ) return 0; 10 that the town and to be worker as a normal add
      organization either at the managerial level or with more than 10 years of
      return print(n-2) + 2 * n - 1;
      (a) What will the function quiz() return when the value of n = 6?
                                                                                       [2]
      (b) State in one line what does the function quiz() do, apart from recursion?
                                                                                       [1]
```

### PART - II [50 MARKS]

Answer six questions in this part, choosing two questions from Section A and two questions from Section B and two from Section C.

#### **SECTION - A**

Answer any two questions.

#### **Question 3**

- (i) Given the Boolean function  $F(A, B, C, D) = \Sigma (0, 2, 3, 4, 5, 6, 7, 8, 10, 11, 15)$ 
  - (a) Reduce the above expression by using 4-variable Karnaugh map, showing [4] the various groups (i.e. octal, quads and pairs).
  - (b) Draw the logic gate diagram for the reduced expression using NAND gate only. Assume that the variables and their complements are available as inputs.
- (b) Given the Boolean function  $F(A, B, C, D) = \pi (0, 2, 3, 7, 10, 11, 14, 15)$ .
  - (i) Reduce the above expression by using 4-variable Karnaugh map, showing [4] the various groups (i.e. octal, quads and pairs),
  - (ii) Draw the logic gate diagram for the reduced expression using NOR gate [1] only. Assume that the variables and their complements are available as inputs.

# Question 4 105 = a to suler sit bedween the following which will the function Solver (a)

- (i) The inaugural function of the newly constructed flyover has been organized by the Public Works Department. Apart from a few special invitees, entry is permitted only if:
  - The person is an employee of the PWD of Class I category with more than
     10 years of working experience.

#### OR

• The person is an employee of any other government or authorized private organization either at the managerial level or with more than 10 years of working experience.

### The inputs are:

- A: The person is a Class 1 employee of PWD.
- B: The person is an employee of any other government or authorized private organization.

PLIFORE

C: The person has more than 10 years of working experience.	Some of the men
D: The person is holding a managerial post.	Class name
Output: According to the land to the land.	Data members
X: Denote eligibility (1 indicate yes in all cases and 0 denote	no in all
cases) amol strops store of	pg
Draw the truth table for X(A, B, C, D) and write the SOP expre	ession, for
	mi)oinqiomolar
(ii) What is a HALF adder? Draw the POS expression of SUM using	NOR gate
only. To redmun or on the sautomorphoic number or ylno	[3]
(iii) Write the Canonical POS for : $F(P, Q, R) = \pi(0, 2, 4, 6, 7)$	_ [2]
the state of the displays datas members also print notes.	( ) ( ) ( ) blow
Question 5 log to admin admortance	
(i) What is a Multiplexer? Draw the logic circuit for a 8 × 1 Logic	Diagram.
Explain its working. I ment religionable oal A. Ovatquib brov bas (ini. i.	
(ii) What is difference between Encoder and Decoder? Write the truth	Table for
3 × 8 Decoder.	[3]
(iii) Simplify using Boolean laws $F(A, B, C) = (A + B') + (A + C')(A' + B')$	B' + C'), [2]
ntains an square matrix of nit m size, comains the following functions.	
SECTION - BXTDEM	Suss Name
Answer any two questions	Data members
Each program should be written in such a way that its clea	rly
depicts the logic of the problem.	W
This can be achieved by using mnemonic name and comments in the	ne program.
(Flowcharts and Algorithms are not required)	Mattin(int mt)
The programs must be written in Java.	
Question 6 An algraphic advisors of the state of the stat	(10) (10)
Design a class to check a number is automorphic number or not. An au	为在2000年的美国企业中国企业发展的企业企业企业企业企业企业企业企业企业企业企业企业企业企业企业企业企业企业企业
number is number that's square contain the same digits at the end as number	
Example 6 (square of 6 is 36 contains 6 at the end) 5, 25 etc.	( ) yaiqain biov

5

Some of the members of the class are given below:

Class name : automorphic & guiblod et noeres cell

Data members

n the most stone to the cose: the integer type number, thought stoned

Sq : to store square form.

Member functions

automorphic(int n) : constructor to assign n value.

booleanisAuto(int n1, int sq1) : Accept n value and square of n and return

true/false if n is automorhoic number or not

Ouestion 5

(11)

Draw the cruth table for X(X; B. C, D) and

using recursion. 101 209holino had strill

void display() : to display data members also print n is

automorhic number or not.

Specify the class automorphic giving the details of the constructor and the functions booleanisAuto(int,int)and void display(). Also define the main function to create an object and call the methods accordingly to enable the task.

Answer any two questions

A class Matrix contains an square matrix of m\*m size, contains the following functions

Class Name : Matrix = MOYFO 42

Data members

ary[] chasts an integer matrix at the blanche markety house

M : size of the matrix

Member functions/methods on bus one of incomment guest ve beverlessed use and

Matrix(int m1) : parameterized constructor to assign the data

members and initialize matrix

voidinput() : to accept the matrix elements

Matrix swap(Matrix A) : Swap the elements of both the diagonals of A object

Design a class to check a minder is at in nutring a class to check a minder is a class to check a minde

void display() : displays the array elements in matrix format.

Specify the class Matrix giving details of the constructor(int), void input(), void swap() and void display(). Also define the main function to create an object and call the methods accordingly to enable the task.

Input Matrix	Output Matrix ( after diagonals swap)
4567	as managered 7564 minimum anizar yellow
8793	8973
2365	dopar by 2635 of Bupania Ariang ni
1239	(bei 9231a um atrado molta)

Question 8 do. vino got out most sanomals oth and ab to meent mso doldw without its a

A class Mystring has been defined to count the words which starts from an vowel in a text.

Memole recently to believe the bull period

Define the class Mystring using following methods:

Class name : Mystring

Data members

Sent : to store a string

Count : To count words starts from an vowel.

Member functions

Mystring() : Default Constructor

void read() : reads the given string from input.

int check(String w) : Return 1 if 'w' word is starting with an vowels otherwise

TIME System O stock server the stocking in

void display() : Display the string and also count the numbers of words

starts from an vowels and print it.

Specify the class Mystring giving details of the constructor and void read(), int check(String w) and void display() only. Write the main function to create objects and call the function accordingly.

7

This can also be achie

# they ( Magne they that) and SECTION 'C' good aniver ximely sents add though

# The bon portrans the Answer only two questions. The Consequent Brown bis Course

Each program should be written in such a way that its clearly depicts the logic of the problem stepwise.

This can also be achieved by using comments in the program and mnemonic names or pseudocodes for algorithms. The program must be written in Java and the algorithms must be written in general/standard form, wherever required/ specified.

(Flowcharts are not required)

**Question 9** 

[5]

(') yside biov

List is an entity which can insert or delete the elements from the top only .classList with the following detail. The many above and inspect of bentlet need and analysis A

Class Name

: List

Data members

names[] : entity to hold the names of books.

top : stores the index value of topmost element.

max : to store the size of the array stole of

Member functions

List(int mm) : constructor to initialize max = mm, top = 0.

void add(int v) : to insert the elements at the top if possible

otherwise display the message "OUT OF SIZE".

String del() : to remove and return an element from the top index,

if possible otherwise display the message "EMPTY LIST"

Define the class Mystring using following methods:

Display the string of \$\$" nrubers of words

void display() : displays the elements of the names [].

a) Specify the class List giving details of the constructor (int), void add (int), String del(). The main function and algorithm need not to be written.

(\*)

Question 10

A class Employee contains employee details and another class Salary calculates the

employee's net salary. The details of the two classes are given below:

Class name : Employee

Data members

empNo : stores the employee number.

empName : stores the employee name

Member functions:

Employee(...) : parameterized constructor to assign values to data

members.

void display() : display the employee details.

Class name : Salary

Data members

basic : double variable to store the basic pay.

Member functions

Salary(...) : parameterized constructor to assign values to of

both classes data members

doublecalculateNetSalary() : calculates the employee's net salary according to

the ollowing rules:

DA = 10% of basic

HRA = 15% of basic

Salary = basic + DA + HRA

PF = 8% of Salary

Net Salary = Salary - PF

void display() : display all the data members of both classes with

net salary.

Specify the class Salary giving details of the constructor and the member functions void calculate() and void display(). Assume Employee class has been already defined. The main function need not be written.

(a) A linked list is formed from the objects of the class, class Node

int item; Node next;

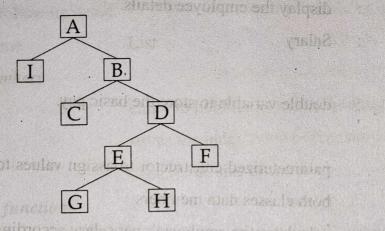
Write an algorithm or a method to delete last node from the list. The method declaration is given below:

int count(Node startPtr)

[5]

The second second second

(b) Answer the following questions from the diagram of the binary tree given:



(i) Postorder traversal of tree

[2]

(ii) External Nodes of left subtree

[2]

(iii) Sibling of B, and degree of H

[1]

39 - Wallet - ####

treditioning class. Salary giving details of and constructor and the member

emerions void activities Figure vont display? It Assume Employee class has been

AHH+AG+ need = tubbe 1000

when the state of the company of the state o

10