# 1st Pre Board Examination 2016-17 Sub: Computer Science - I Class: XII

Time: 3 hrs.

str (s, N+1);

System.out.print (s.charAt (N));

M.M.: 70

Answer to this paper must be written on the paper provided separately. You will not be allowed to write during the first 15 minutes. This time is to spent in reading the question paper. The time given at the head of this paper is the time allowed for writing the answers.

Answer all questions in Part-I (compulsory) and six questions from part-II, Choosing two questions from section A and two questions from section B and two questions from section C.

All working, including rough work should be done on the same s

Minimage		The intended marks for questions or parts of questions are given in brackets [].	inswer.
		Part - I [20 marks] (Answer all questions)	
Qu	estio		
	a)	Simplify: $(A+C) \cdot (A+AD) + AC+C$ .	
	b)	Find the dual of : $yx + x' + 1 = 1$ .	[1]
	· c)	Verify the following proposition with the help of a truth table. $P \wedge (\sim P \wedge Q) = P \vee Q$	[1] [1]
	d)	State Idempotance law and verify it, using a truth table.	r + 7
	e)	Draw the logic circuit of a NOR gate using NAND gates only.	[1]
Ou	estior		[1]
~-	a)	If $x=1$ and $y=1$ , then find :	
	۵,		[2]
	b)	(") (\(\lambda \) \(\frac{1}{2}\)	
	D)	Convert the following infix notation to its prefix form:	[2]
	- 1	A-(B*(C-D)/H)+I	
	c C)	An array AB [-510, -4 8), stores elements in column Major wise, with the element AB [0] [0] as 4142. If each element requires 2 bytes of storage, find address of the array.	the base
	d)		[2]
4	e)	Write the difference between countTokens () and nextToken () methods. What is Big O notation.	[1]
	f)	What is an exception.	[1]
	g)	How can we override a method in inheritance.	[1]
^			[1]
Que	stion		
	wher	following function str ( ) is a part of some class. What will be the output of the func	tion str ( )
		n the value of s is MEMORY and the value of N is 1. Show the dry run / working. str (string s, int N)	[5]
	{ {	ou (string s, lift iv)	
	if (N:	>4)	
		em.out.print(" ");	
	else	smodelprine ),	
		v.	

## Part II [50 marks]

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

#### Section A

(Answer any **Two** questions).

#### Question: 4

- a) Given the Boolean Function :  $F(A, B, C, D) = \pi (1, 3, 5, 7, 8, 9, 10, 13, 14, 15)$ .
  - (i) Reduce the above expression by using 4 variable k-map, showing the various groups (i.e. octal, guads and pairs)
  - (ii) Draw the logic gate diagram for the reduced expression. Assume that the variable and their complements are available as input. [1]
- b) Given the Boolean Function:

P(A, B, C, D) = ABC'D + A'BC'D + A'BC'D + ABC'D + A'BCD + ABCD:

- (i) Reduce the above expression by using 4-varibales k-map, showing the various groups.

  (i.e. octals, guads and pairs).
- (ii) Draw the logic gate diagram for the reduced expression. Assume that the variable and their complements are available as input. [1]

# Questions: 5

- a) Verify using a truth table if :  $(A \circledast B \circledast C)' = A \oplus B \oplus C$ . [3]
- b) Verify if the following is valid:  $(a \Rightarrow b) \land (a \Rightarrow c) = a \Rightarrow (b \land c)$ . [3]
- c) What is a Decoder? Draw the truth table and logic circuit diagram for a 3:8 Decoder. [4]

# Questions: 6

- a) Define the term contingency, contradiction and Tautology. [3]
- b) Consider the following truth table where A and B are two inputs and x is the output : [2]
  - A B X
  - 0 0 0
  - 0 1 1
  - 1 0 1
  - 1 1 0
  - (i) Name and draw the logic gate for the given truth table.
  - (ii) Write the POS of x (A, B)
- c) An event organizing company to promote musical talent wants to organise a musical concert. It considers the participation of applicants on the following basis:
  - \* Applicant has cleared the screaning upto phase II and has undergone a musical training of at least 3 years.

OR

\* Applicate is recommended by an institute of repute and has undergone a musical training of at least 3 years.

OR

Applicant has won a state or national accept as

### Inputs:

R: recommended by an institute of repute

S: Cleared the screening up to phase II

T: Undergone musical training of 3 year or more

W: Won a state or a national level event of music

(In all above cases 1 indicates yes and 0 indicate no).

C: Denotes applicant is considered for participation [1 indicates yes and 0 indicates no].

Draw the truth table for the input and outputs given above and write POS expression.

#### Section B

(Answer any **two** questions)

#### The programs must be written in Java

### Questions: 7

Design a class vowel\_word to accept a sentence and calculate the frequency of words that begin and end with vowel. The words in the input string are separated by a single blank space and terminated by a full stop. The description of the class is given below:

[10]

Class name : vowel\_word

Data members /Instance variables -

str : to store a string

C : to store the frequency

Member function:

vowel\_word ( ) : to store the default values in the data members.

void input ( ) : to read the value of str

void countfrequency ( ) : to count the frequency of words starting and ending

with vowels also display those words.

void display ( ) : to display the original string as well as frequency stored

in c.

#### Questions: 8

A class split contains an array of integers which splits an array into two arrays one of odd numbers and other of even numbers and sorts them. Some of the members of the class are as follows: [10]

Class name : split

Data members/instance variables -

spl [ ] : integer array size : size of the array

Member functions -

split (int x) : parameterized constructor to assign size = x.

void input ( ) : to accept array elements.

void sort () : sorts the elements of the array after splitting, in

ascending order using slection sort technique.

split breakit (split A) : Splits the array contained in the split object A into two

separate arrays (as descrised in the question) and stores them in the current split object. Returns the

new split object.

Specify the class split giving details of the constructor (int), void input ( ), void sort ( ), and split breakit (split). Also define the main ( ) function to create objects and call the methods accordingly to

#### Questions: 9

Define a class Palindrome to check whether the word is palindrome or not. Palindrome words are the words which reads same from forwards and reverse. [10]

Class name

Palindrome

Data members/instance variables -

txt

: store a word

revtxt

to store the reverse of the text stored in int.

len

to store the length of string text

Member functions -

Palindrome ()

default constructor

void input (String s)

assigns the parameter value to the variable txt.

void reverse (int I)

to reverse the string txt and store it in variable revtxt considering the initial value of I as 0. Using recursive

technique

void display ( )

to print the value of txt and revtxt

void check ( )

to check whether the string is palindrome or not and

display proper message

Also define a main ( ) function to create an object and call the methods.

#### Section C

(Answer any two questions)

### Question: 10

Link is an entity which can hold a maximum of 100 integers. Link, enables the user to add element from the top and remove integer from the top of the entity. Define a class link with the following details:

[5]

Class Name

Link

Data Members / instance variables :

Ink[]

entity to hold the integer elements.

max

stores the maximum capacity of the entity.

top

to point to the index of the top.

Member function:

Link (int m)

Constructor to intialize max = m and top = -1

void addlink (int v)

to add an element at the top index if possible otherwise

display the message "Out of size".

int dellink ( )

to remové and return an element from top index, if

possible otherwise display the message "Empty ..."

and return -9999.

void display ()

to display the elements of the entity.

#### Questions: 11

A line on a plane can be represented by coordinates of the two end points p1 and p2 as p1 (x1, y1) and p2 (x2, y2). A super class plane is defined to represent a line and a sub class circle to find the length of the radius and the area of circle by using the required data members of super class some of the members of both the classes are given below:

[5]

Class Name

Plane

Data members / instance variables :

x1

V1

to store the  $\boldsymbol{x}$  – coordinate of the first end point

to store the v - coordinate of the first end point

Parameterized constructor to assign the data Plane (int nx, int ny)

members x1 = nx and y1 = ny.

Class name . to display the coordinates ( ) works biov

Circle

ZX Data Members/instance variables -

double variable to store the radius of circle radius to store the y-coordinate of second end. 72 to store the x-coordinate of second end.

double variable to store the area of circle 916

Member functions / methods -

parameterized constructor to assign values to data Circle (....)

members of both the classes,

to calculate the length of radius using the formula: void findRadius ()

$$\left(\sqrt{(x^2-x^2)^2+(y^2-x^2)^2}\right)$$

to find the area of circle using formula  $\pi r^2$ . The Pie void findArea ( )

to display both the coordinate along with the length () works biov

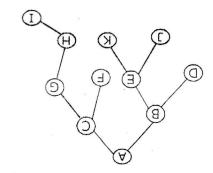
of the radius and area of the circle.

[1]

class. Circle giving details of the constructor (----), void findradius ( ), void show ( ). Assume that the super class. Plane has been defined. Using the concept of inheritance specify the

# Questions: 12

Answer the following questions from the diagram of a binary tree given below:



Write the inorder travel of the above tree structure. (i)

Name the leaves of the right sub tree. [1] Name the parent of the node B and G. (!!)

[1]

A linked list is formed from the objects by the class Node. The class structure of the Node is

[2] : wolad navig

class Node

Yode next; String name;

The method of declaration is given follow. Write an Algorthm OR a method to search for a given name in the linked list.

boolean searchName (Node start, String v).