

MARTHOMA RESIDENTIAL SCHOOL
FIRST TERMINAL EXAMINATION August 2017

STD: XII

COMPUTER

70 MARKS
Time: 3 HRS

PART-I (20 Marks)
Answer all questions

Question 1

- a) State the principle of duality [1]
- b) Find the complement of boolean expression $(b' + c) + a$ [2]
- c) Draw the logic gate diagram and truth table for a 2 input XOR gate [2]
- d) State the law represented by following proposition and prove it with the help of a truth table $p \vee \bar{p} = p$ [2]
- e) Convert the given infix expression into postfix expression
 $P * Q / R + (S + T)$ [2]

Question 2

- a) What is inheritance? Explain about different types of inheritance? [1]
- b) A matrix $P[15][10]$ is stored with each element requiring 8 bytes of storage. If the base address at $P[0][0]$ is 1400, determine the address at $P[10][7]$ when the matrix is stored in **Row major wise**
- c) Write the maxterm and minterm when the inputs are $A=0, B=1, C=1, D=1$
- d) State one advantage of using recursion over iteration
- e) What will the function **magicfun ()** return when the value of $n=7$? Show the dry work

```
int magicfun (int n)
{
    if (n == 0)
        return 0;
    else
        return magicfun(n/2) * 10 + (n%2);
}
```

PART-II (50 Marks)

Section-A (20 marks)

Answer any 2 questions

Question 3

(a) Given the Boolean function $F(A,B,C,D) = \Sigma (2,3,4,5,6,7,8,10,11)$

i. Reduce the above expression by using 4 variable K-map showing the various groups. [4]

ii. Draw the logic gate diagram for the reduced expression. Assume that the variables and their complements are available as inputs. [1]

(b) Given the Boolean function $F(P,Q,R,S) = \Pi (0,1,2,4,5,6,8,10)$

i) Reduce the above expression by using 4 variable K-map showing the various groups. [4]

ii) Draw the logic gate diagram for the reduced expression. Assume that the variables and their complements are available as inputs. [1]

Question 4

The past Pupil Association of RK University Computer Science Department is organising a reunion function at the campus. The invitation card is to be issued to a person if:

- The person is an ex-student of the department and had passed out in 1995.

OR

- The person is not an ex-student of the department but passed out from the same university in 1995 and has made a contribution of Rs 1000.

The inputs are:

E: The person is an ex-student of the department.

U: The person is not an ex-student of the department but a student of the same university.

P: The person passed out in 1995.

S: The person contributes Rs 1000.

Output:

I: denotes invitation card is issued. ['1' indicate Yes and '0' indicate No in all the cases]

(a) Draw the truth table for the inputs and outputs given above and write the SOP expression for I (E,U,P,S).

(b) Reduce I (E,U,P,S) using K-Map and draw the logic gate diagram for the reduced SOP Expression. Assume that the variables and their complements are available as inputs.

Question 5

[10 marks]

a) Using NOR gates only draw a logic diagram to construct NAND gates [2]

b) Draw the logic gate diagram and truth table for a half adder [3]

c) Write the dual of $(P+Q').R.1 = P.R+Q'.R$ [1]

d) Draw the truth table ,logic gate diagram and function expression of a 4 x 1 multiplexer [4]

Section B [30 marks]

Answer all questions

Question 6

Class **Palin** has been defined to check whether a positive number is a Palindrome number or not. **Class Name: Palin**

Data members/instance variables:

num: integer to store the number
revnum: integer to store the reverse of the number

Member functions/methods:

Palin() : **constructor** to initialise the variables to zero.
void accept() : to accept the number
int reverse (int y) : reverses the parameterized argument 'y' and stores it in 'revnum' using **recursive technique**
void check() : checks whether the number is a Palindrome by invoking the function **reverse()** and display the result with an appropriate message.

Specify the class **Palin** giving the details of the **constructor**, **void accept()** and **int reverse (int)** and **void check()**. Define a **main** function to create an object and call the functions accordingly to enable the task. [10]

Question 7

A class sort contains an array of 50 integers. The details of the class are given below.

Class Name: sort

Data members/instance variables:

arr[] : integer array to store 50 numbers

Member functions/methods:

void inpdata () : to input 50 integers(no duplicates numbers are to be entered)

void subsort () : to sort the array in ascending order using bubble sort technique.

void dispdata () : to display the sorted array.

Specify the class **sort** giving the details of the functions **void inpdata()** **void subsort()** and **void dispdata()**. Define a **main** function to invoke the methods accordingly to enable the task. [10 marks]

Question 8

A class **Employee** contains employee details and another class **Salary** calculates the employee's net salary. The details of the 2 classes are given below:

Class Name: Employee

Data members/instance variables:

empNo: to store the employee number
empName: to store the employee name
empDesig: to store the employee's designation

Member functions/methods:

Employee(): default constructor
Employee(.....): parameterised **constructor** to assign values to employee number, name and designation
void display(): to display the employee details

Class Name: Salary

Data members/instance variables:

basic: float variable to store the basic pay.

Member functions/methods:

Salary(...): **parameterised constructor** to assign values to data members of both the classes.

void calculate(): Calculate the employee's net salary according to the following rule

DA= 10% of basic, HRA= 15% of basic, salary = basic + DA

PF=8% of salary and **net salary= salary – PF**

void display(): to display the employee details and the net salary.

Specify the class **Employee** giving the details of **constructors** and method and **inheritance** specify the class **Salary** giving the details of **constructor** and method and main function needs to be written.