

**CMSA(PR)-VIII DAY-1**

**West Bengal State University**  
**B.Sc. ( Honours ) Practical Examinations, 2015**  
**Part - III**

**COMPUTER SCIENCE — HONOURS**  
**PRACTICAL**  
**Paper – VIII**  
**Day - 1**

Duration : 6 Hours ]

[ Full Marks : 100

*The figures in the margin indicate full marks.*

Answer any one question from each Group.

<b>Sessional</b>	10
<b>Viva-voce</b>	20
<b>Experiment</b>	70

**Group-A ( Object-oriented Programming )**

Algorithm / Flowchart	8
Source Code	12
Output	5

**Group - B ( Database Management Systems )**

Table creation & Data Insertion	10
Form design	7
Query	8

**Group - C ( Unix Shell Scripts )**

Algorithm / Flowchart	7
Source Code	10
Output	3

**P-III-15-PR-20078**

[ Turn over

**Group - A**  
**( Object-oriented Programming )**  
**( Marks : 25 )**

1. Write a C++ program to implement Bank-SB-Account Class with member functions to deposit, withdraw and show the balance. Assume appropriate data members.
2. Create two classes, dist1 (metres, centimetres) and dist2 (feet, inches). Accept two distances from the user, one in metres and centimetres and the other in feet and inches. Find the sum and difference in between the two distances. Display the result in metres and centimetres as well as feet and inches (use friend function).
3. Write a C++ program to define a class called time that has hours, minutes and seconds as integer. The class has the following member functions :
  - i) void settime(int, int, int) to set the specified value in object
  - ii) void showtime( ) to display time object
  - iii) time sum(time) to sum two time objects & return time.
    - A. Write the definitions for each of the above member functions.
    - B. Write main function to create three time objects. Set the value in two objects and call sum( ) to calculate sum and assign it in third object.
    - C. Display all time objects.
4. Write a C++ program to create a class called MyStack that includes functions to perform all operations on a stack as well as raises an exception whenever overflow/underflow error occurs.
5. Write a C++ program using class template to read two matrices of different data types such as integers & floating point values and finds the sum of the matrices of integers and floating point number separately and displays the total sums of these arrays individually.
6. Write a C++ program to design a class Polar which describes a point in the plane using polar coordinates radius and angle. Use the overloaded + operator to add two objects of Polar.

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Note : We cannot add polar values of two points directly. This requires first the conversion of points into rectangular coordinates, then adding the corresponding rectangular coordinates and finally converting the result back into polar coordinates.

You need to use the following trigonometric formulae :

$$x = r * \cos(a) ;$$

$$y = r * \sin(n) ;$$

$$a = \text{atan}(x/y) : // \text{ arc tangent}$$

$$r = \text{sqrt}(x * x + y * y)$$

7. Write a C++ program to define a class Date. Overload the operators << and >> for this class to shift a date by specific number of days.
8. Define a class Fraction having members numerator and denominator. Define parameterized and default constructors ( default values 0 and 1). Create two fraction objects and perform the following operations by defining member functions : Addition, Subtraction, Multiplication and Division.
9. Create a class Queue to implement queue data structure with constructors and destructors. Define suitable member functions for insertion & deletion of elements to & from the queue. Write a program for this, clearly specifying the overflow and underflow conditions.

### **Group - B**

#### **( Relational Database Management System )**

**( Marks : 25 )**

1. Consider the following schema of a relational database :

Aircraft (aid, type)

Flights (flno, aid, company)

[ Company must be among Jet, AI, Kingfisher or Spicejet ]

Employees (eid, ename, salary)

Certified (eid, aid)

Schedule (eid, flno, source\_city, destination\_city, date)

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[ Turn over

Create table through appropriate SQL commands. Define all integrity constraints and enter sufficient data through user friendly form design. (Design the form for any one of the tables)

Write SQL commands for the following queries :

- i) Give the employees names who have certification on exactly two types of aircrafts.
- ii) Give the company names which has no flight between 'Goa' and 'Bangalore'.

2. Consider the following schema of a relational database :

Employee (empno, empname, city)

Project (pno, pname)

Part (partno, part\_name)

Use (pno, partno)

Works (empno, pno)

Create table through appropriate SQL commands. Define all integrity constraints and enter sufficient data through user friendly form design. (Design the form for any one of the tables)

Write SQL commands for the following queries :

- i) List the names of the employees who are working in both the projects "Heaven Estate" and "Garden Square".
- ii) Give the project name, which has used maximum parts.

3. Consider the following schema of a relational database :

Hotel (hotel\_no, hotel\_name, city) [city must be among KOLKATA, NEW DELHI, BANGALORE, MUMBAI]

Room (room\_no, hotel\_no, type, price\_per\_day)

[price\_per\_day should range between 10000 and 20000]

Guest (guest\_no, guest\_name, guest\_address)

Booking (hotel\_no, guest\_no, dataform, dateto, room\_no)

Create table through appropriate SQL commands. Define all integrity constraints and enter sufficient data through user friendly form design. ( Design the form for any one of the tables )

Write SQL commands for the following queries :

- i) Give the name of the guest who has booked room in "North Star" hotel in New Delhi, maximum number of times.
  - ii) Give the name of the city, in which there is no room above 19000.
4. Consider the following schema of a relational database :

Branch (branch\_name, branch\_city, assets)

Customer (customer\_name, street, city)

Loan ( branch\_name, loan\_no, amount)

[amount must be less than 15,00,000]

Borrower (customer\_name, amount\_no, balance)

Account (branch\_name, account\_no, balance)

Depositor (customer\_name, account\_no)

Create table through appropriate SQL commands. define all integrity constraints and enter sufficient data through user friendly form design. (Design the form for any one of the tables )

Write SQL commands for the following queries :

- i) Give the names and addresses of customers who have taken loan from "Shyambazar" branch.
  - ii) Give the customer names having loan in "Garia" branch and account in any other branch except "Garia".
5. Consider the following schema of a relational database :

Employee (empno, emp\_name, salary, hiredate) [salary defaults to 10,000]

Department (deptno, dname, city)

Manager (mgrno, deptno, managername, salary, hiredate)

Emp/mgr (empno, mgrno)

Create table through appropriate SQL commands. Define all integrity constraints and enter sufficient data through user friendly form design. (Design the form for any of the tables )

Write SQL commands for the following queries :

- i) Which department pays maximum salary ?
- ii) Give the name of the manager who is the manager of maximum number of employees.

6. Customer (cust\_id, f\_name, L\_name, area, ph\_no )

Movie (mv\_no, title, type, star, price )

Invoice (inv\_no, mv\_no, cust\_id, issue\_date, return\_date)

Create table through appropriate SQL commands. Define all integrity constraints and enter sufficient data through user friendly form design. (Design the form for any one of the tables)

Write SQL commands for the following queries :

- i) Find the title, type of the movies that has been issued to Sanjana.
- ii) Find the names of all customers who have been issued the movies of type action.

7. Marks (roll, name, sub, marks)

Student (roll, name, stream)

Acc (roll, name, fees\_paid)

Create table through appropriate SQL commands. Define all integrity constraints and enter sufficient data through user friendly form design. (Design the form for any one of the tables)

Write SQL commands for the following queries :

- i) Impose a constraint that fees\_paid column can only store two values — YES/NO
- ii) Find out the total marks obtained in the examination by Alin.

**Group - C**  
**( Unix Shell Scripts )**  
**( Marks : 20 )**

1. Write a shell script that will generate all the prime factors for a given number.
2. Write a shell script to read an integer ( $N$ , say) as a command line argument. Write appropriate shell-script to find the  $N$ -th Fibonacci number.
3. Write a shell script to print the following pattern ;

1  
2 2  
3 3 3  
4 4 4 4  
5 5 5 5 5

4. Write a shell script to simulate the DOS command "TYPE" in unix environment.
  5. Write a shell script to count the number of words, spaces, characters and vowels in a body of text. Also indicate repeated words, if any, in the text.
  6. Write a shell script which reads a string and checks whether it is palindrome or not.
  7. Write a shell script that renames a group of files. For example, rename all files where file names end with 'htm' so that they end with 'html'.
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**West Bengal State University  
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**P-III-15-PR-20079**

[ Turn over

**Group - A**  
**( Object-oriented Programming )**  
**( Marks : 25 )**

1. Write a program to create a binary search tree. The binary search tree node class must be of template type. Perform the following operations :
  - i) Insertion of a node
  - ii) Deletion of a node.
2. Write a program that instantiates a function template that implements the merge sort on an array of objects.
3. Write a program to add two complex numbers. Each complex number object, an instance of class complex is having dynamic allocation of its data members.
4. Write a program to carry out polynomial addition using linked list. The linked list class must be of template type.
5. Write a program to generate postfix form of an expression from its fully parenthesized infix form.
6. Write a program to create a linear linked list. The linked list must be of the template type. The program supports the following operations :
  - i) Addition of a node after the  $i$ -th node
  - ii) Deletion of even number nodes
  - iii) Reversal of the list.
7. Write a program having employee as an abstract class and create many derived classes such as manager, supervisor and project leader from the employee class. Create their objects and process them.

8. Write an interactive operator overloaded program for manipulating strings.  
Overload operators are :

`<<, >>, ==, +, !=`

9. Write a program that reads a text file and creates another file that is identical except that every sequence of consecutive blank spaces is replaced by a single space.

### **Group - B**

#### **( Relational Database Management System )**

**( Marks : 25 )**

1. Student (roll, name, stream, year)

Hostel (roll, hostel\_name, room\_no)

Create table through appropriate SQL commands. Define all integrity constraints and enter sufficient data through user friendly form design. (Design the form for any one of the table)

Write SQL commands for the following queries :

- i) Impose a constraint that hostel\_name column can only store two values — VIDYASAGAR and RAMMOHAN and stream column can receive two of the values — MSc or MCA.
- ii) Find out the name and stream of the student who lives in room 2 at VIDYASAGAR hostel.

2. Consider the following schema of a relational database :

Product (maker, model, type)

PC (model, speed, RAM, hd, cd, price)

Laptop (model, speed, RAM, hd, screen, price)

Printer (model, color, type, price)

Create table through appropriate SQL commands. Define all integrity constraints and enter sufficient data through user friendly form design. (Design the form for any one of the tables)

Write SQL commands for the following queries :

- i) Find the laptops whose speed is slower than that of any PC.
- ii) Find average hard disk size of a PC for all these manufacturers that make printers.

3. Consider the following schema of a relational database :

Run (jersy\_no, player\_name, against\_team, run)

Player (jersy\_no, player\_name, team)

Create table through appropriate SQL commands. Define all integrity constraints and enter sufficient data through user friendly form design. (Design the form for any one of the tables)

- i) Find out the total runs scored in the tournament by Tendulkar.
- ii) Who scored the 2nd highest run against India ? Display jersy\_no, player\_name and run.

4. Consider the following schema of a Relational database :

HOTEL (HOTELNO, HOTELNAME, CITY) CITY MUST BE KOLKATA, DELHI, BANGALORE, MUMBAI

GUEST (GUESTNO, GUESTNAME, GUEST\_ADD)

BOOKING (HOTELNO, GUESTNO, DATEFROM, DATETO, ROOM\_NO)

HOTELNAME IS UNIQUE GUESTNO STARTS WITH "G". A HOTEL HAS BRANCHES IN VARIOUS CITIES WITH SAME NAME.

Perform the following queries :

- i) GIVE THE NAMES OF THE HOTEL(S) HAVING NO BOOKING FROM 20TH MARCH TO 23RD MARCH, 2014 (CONSIDERING ALL OF ITS BRANCHES)
- ii) GIVE THE NAME OF THE HOTEL HAVING MAXIMUM NUMBER OF BOOKING FROM 20TH FEBRUARY TO 23RD FEBRUARY, 2014, CONSIDERING ALL OF ITS BRANCHES.

5. Consider the following schema of a Relational database :

TRAIN (TRAIN\_NO, FROM, TO, DISTANCE, DEPARTS\_SOURCE, ARRIVES\_DESTINATION)

FARE (CLASS, DISTANCE, FARE)

EMPLOYEES (EID, ENAME, SALARY, POSITION)

TRAIN-STAFF (TRAIN\_NO, EID)

CLASS IS SL, 2AC, 1AC, POSITION IS DRIVER, GUARD. TRAIN\_NO STARTS WITH 1 OR 2.

Perform the following queries :

- i) FIND THE NUMBER OF TRAINS LEAVING HOWRAH BETWEEN 7:00 TO 9:00 AND ACCCOMPANIED BY NO STAFFS WITH SALARY LESS THAN 20000.
- ii) FIND THE NUMBER OF DRIVERS WHO HAS NOT ALLOTED IN ANY TRAIN TRAVELLING MORE THAN 1000 KM.

6. Consider the following schema of a Relational database :

BOOK (BOOK\_ID, TITLE, AUTHOR, SUBJECT, PRICE, AVAILABILITY)

BORROWER (B\_ID, B\_NAME, B\_PHONE, B\_COURSE)

BORROWS (BOOK\_ID, B\_ID, DATE\_OF\_ISSUE, DATE\_OF\_RETURN, FINE)

CONSTRAINTS : BOOK\_ID STARTS WITH "BK". A BOOK HAS MULTIPLE COPIES, FOR WHICH BOOK\_ID IS DIFFERENT, BUT TITLE, AUTHOR, PRICE ETC. ARE SAME

DATE\_OF\_RETURN IS BLANK FOR THE BOOK ALREADY IN POSSESSION OF BORROWER

Perform the following queries :

- i) FIND THE BOOK (TITLE AND AUTHOR) BORROWED HIGHEST NUMBER OF TIMES, CONSIDERING ALL OF ITS COPIES, IN FEBRUARY, 2015
  - ii) LIST ALL THE BOOKS WRITTEN BY "A. CHAKRABORTY" THAT HAS BEEN BORROWED BY "S.SOM" IN THE MONTH OF FEBRUARY, 2015 AND THE TOTAL PRICE OF THESE BOOKS.
7. Consider the following schema of a Relational database :

**EMPLOYEE (EMP\_NAME, STREET, CITY)**

**WORKS (EMP\_NAME, COMPANY\_NAME, SALARY)** SALARY MUST BE MORE THAN 30,000 AND UNDER 70,000 WITH DEFAULTS TO 35,000

**COMPANY (COMPANY\_NAME, CITY)**

**MANAGES (EMP\_NAME, MANAGER\_NAME)**

**Constraints :** company\_name starts with 'c' and is unique. Emp\_name is unique. As manager is also an employee, so his data (Name, City etc.) is also included in Employee Table.

Perform the following queries :

- i) Display the name of those employees who lives in the same cities as their managers
- ii) Display the name of those employees who are not serving as managers.

**Group - C**  
**( Unix Shell Programming )**  
**( Marks : 20 )**

1. Write a shell script to find out the GCD of two given numbers supplied as command line arguments.
2. Write a shell script to find out the minimum and maximum elements from a list of given numbers.
3. Write a shell script to implement the bubble sort.

4. Write a shell script to find the roots of a quadratic equation  $ax^2 + bx + c = 0$ .
  5. Write a shell script for binary search on given set of data.
  6. Write a shell script that receives an integer range and prints the prime numbers within the range.
  7. Write a shell script which reversibly displays a visual version of a directory.
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