

2024

# MSCDS-106

## Programming Skills - I

Dr. Babasaheb Ambedkar Open University



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**Published by:** Dr. Babasaheb Ambedkar Open University, Ahmedabad



### **List of Practical based on Data Structure and Algorithms**

1. Develop a C program to print the binary storage of given integer.
2. Develop a C program that separates sign, exponent and mantissa of a given floating point number.
3. Develop a C program which accepts the string of digits and converts it into integer number.
4. Develop a C program which accepts and integer number and converts it into a string of digits
5. Write a menu driven program for stack of integers with the push() and pop() functions.
6. Develop a C program which implements a stack of characters with push and pop operation. Use it to accept a string from keyboard and print it in reverse.
7. Develop a C program to implement double stack. Double stack uses one array with two top pointers one moves from start towards end and second moves from end towards start. This is same as implementing two stacks. Push and pop can be performed in any one based on choice. Whenever both pointers are at adjacent location, stack is full.
8. Develop a C program having a recursive function to print first N Fibonacci numbers.
9. Develop a C function which prints given string in reverse using recursion. Use it in main to reverse a string enter from keyboard.
10. Develop a C program which implements a queue of student information like roll number, name and marks. New record is inserted at the end while records are taken from front to process them.
11. Develop a C program to implement the priority queue with 5 different priority levels.
12. Develop a C function count\_odd() to count only nodes having odd value as data in singly linked list. Use it in main() to show its working.
13. Develop a C function reverse\_list() to reverse a singly linked list. Use it in main() to show its working.
14. Develop a C function insert\_sort() to insert nodes in singly link list such that list remains in ascending order. Demonstrate its use with main().

15. Develop a C function `split()` to divide given singly linked list into two lists, one containing only nodes with odd values and second containing only nodes with even values from original list. Use it in `main()` to show its working.
16. Develop a C function `copy_list()` to create a duplicate copy of singly linked list. Use it in `main()` to show its working.
17. Develop a menu driven C program to insert and delete nodes at the end of circular list. Program should also provide option for displaying list.
18. Develop a menu driven C program to insert and delete the node from right most position in doubly linked list. Program should also provide option for displaying contents of doubly linked list.
19. Develop a C function to create the heap for a list of numbers. Use it to perform the heap sort.
20. Assume that we want to store student details roll number, name and marks using structure. Develop a program which accepts records of N students and sorts them in order of roll number using
  - Selection Sort
  - Bubble Sort
  - Quick Sort
  - Merge Sort
  - Radix Sort

Use sorted records to search the details of a student once the roll number is given using binary search method.

21. Sort the following data using bubble sort. 10,3,56,24,78,34,47,36
22. Sort the following data using radix sort. 24,89,34,6,123,56,234
23. Merge the following two tables using simple merge.

T1 : 34 68 200 456

T2 : 25 57 97 157

24. Assume that a system stores the transactions of a retail store including item number, item name, and price. Write a program to search a given item when item number is given using linear search.
25. Develop a program which accepts the names of the persons in alphabetical order. Use the binary search to verify whether given name is present in list or not.

26. Implement division hashing function so that given a key value, it returns a hash value.  
Use it in main() to demonstrate its use.
27. Develop a C function to count the number of nodes in a binary tree. Use it in main to demonstrate its use.
28. Develop a C function to create a duplicate copy of a given binary tree. Use it in main to demonstrate its use.
29. Develop a C function, which implements the delete operation on binary search tree. Use it in main to demonstrate its use.
30. Develop a C function to count leaf nodes in a given binary tree and use it in main to demonstrate its use.

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**List of Practical based on Relational Database Management System**

1. Create tables according to the following definition.

```
CREATE TABLE DEPOSIT (ACTNO VARCHAR2(5) ,CNAME VARCHAR2(18) ,  
BNAME VARCHAR2(18) , AMOUNT NUMBER(8,2) ,ADATE DATE);
```

```
CREATE TABLE BRANCH(BNAME VARCHAR2(18),CITY VARCHAR2(18));
```

```
CREATE TABLE CUSTOMERS(CNAME VARCHAR2(19) ,CITY VARCHAR2(18));
```

```
CREATE TABLE BORROW(LOANNO VARCHAR2(5), CNAME VARCHAR2(18),  
BNAME VARCHAR2(18), AMOUNT NUMBER (8,2));
```

2. Insert the data as shown below.

**DEPOSIT**

ACTNO	CNAME	BNAME	AMOUNT	ADATE
100	ANIL	VRCE	1000.00	1-MAR-95
101	SUNIL	AJNI	5000.00	4-JAN-96
102	MEHUL	KAROLBAGH	3500.00	17-NOV-95
104	MADHURI	CHANDI	1200.00	17-DEC-95
105	PRMOD	M.G.ROAD	3000.00	27-MAR-96
106	SANDIP	ANDHERI	2000.00	31-MAR-96
107	SHIVANI	VIRAR	1000.00	5-SEP-95
108	KRANTI	NEHRU PLACE	5000.00	2-JUL-95
109	MINU	POWAI	7000.00	10-AUG-95

**BRANCH**

VRCE	NAGPUR
AJNI	NAGPUR
KAROLBAGH	DELHI
CHANDI	DELHI
DHARAMPETH	NAGPUR
M.G.ROAD	BANGLORE
ANDHERI	BOMBAY
VIRAR	BOMBAY
NEHRU PLACE	DELHI
POWAI	BOMBAY

### CUSTOMERS

ANIL	CALCUTTA
SUNIL	DELHI
MEHUL	BARODA
MANDAR	PATNA
MADHURI	NAGPUR
PRAMOD	NAGPUR
SANDIP	SURAT
SHIVANI	BOMBAY
KRANTI	BOMBAY
NAREN	BOMBAY

### BORROW

LOANNO	CNAME	BNAME	AMOUNT
201	ANIL	VRCE	1000.00
206	MEHUL	AJNI	5000.00
311	SUNIL	DHARAMPETH	3000.00
321	MADHURI	ANDHERI	2000.00
375	PRMOD	VIRAR	8000.00
481	KRANTI	NEHRU PLACE	3000.00

3. From the above given tables perform the following queries:
- (1) Describe deposit, branch.
  - (2) Describe borrow, customers.
  - (3) List all data from table DEPOSIT.
  - (4) List all data from table BORROW.
  - (5) List all data from table CUSTOMERS.
  - (6) List all data from table BRANCH.
  - (7) Give account no and amount of depositors.
  - (8) Give name of depositors having amount greater than 4000.
  - (9) Give name of customers who opened account after date '1-12-96'
4. Create the below given table and insert the data accordingly

### JOB

COLUMN NAME	DATA TYPE
job_id	Varchar2(15)
job_title	Varchar2(30)
min_sal	Number(7,2)
max_sal	Number(7,2)

### EMPLOYEE

COLUMN NAME	DATA TYPE
emp_no	Number(3)
emp_name	Varchar2(30)
emp_sal	Number(8,2)
emp_comm	Number(6,1)
dept_no	Number(3)

### DEPOSIT

COLUMN NAME	DATA TYPE
a_no	Varchar2(5)
cname	Varchar2(15)
bname	Varchar2(10)
amount	Number(7,2)
a_date	Date



## BORROW

COLUMN NAME	DATA TYPE
loanno	Varchar2(5)
cname	Varchar2(15)
bname	Varchar2(10)
amount	Varchar2(7,2)

5. Insert following records in employee table created in Q-4

emp_n	emp_name	emp_sal	emp_comm	dept_no
101	Smith	800		20
102	Snehal	1600	300	25
103	Adama	1100	0	20
104	Aman	3000		15
105	Anita	5000	50,000	10
106	Sneha	2450	24,500	10
107	Anamika	2975		30

6. Insert following records in JOB table created in Q-4

job_id	job_name	min_sal	max_sal
IT_PROG	Programmer	4000	10000
MK_MGR	Marketing manager	9000	15000
FI_MGR	Finance manager	8200	12000
FI_ACC	Account	4200	9000
LEC	Lecturer	6000	17000
COMP_OP	Computer Operator	1500	3000

7. Insert following records in deposit table created in Q-4

A_no	cname	Bname	Amount	date
101	Anil	andheri	7000	01-jan-06
102	sunil	virar	5000	15-jul-06
103	jay	villeparle	6500	12-mar-06
104	vijay	andheri	8000	17-sep-06
105	keyur	dadar	7500	19-nov-06
106	mayur	borivali	5500	21-dec-06

### 8. Perform following queries on table created in Q-4

- (1) Retrieve all data from employee, jobs and deposit.
- (2) Give details of account no. and deposited rupees of customers having account opened between dates 01-01-06 and 25-07-06.
- (3) Display all jobs with minimum salary is greater than 4000.
- (4) Display name and salary of employee whose department no is 20. Give alias name to name of employee.
- (5) Display employee no,name and department details of those employee whose department lies in(10,20)
- (6) Display all employee whose name start with 'A' and third character is 'a'.
- (7) Display name, number and salary of those employees whose name is 5 characters long and first three characters are 'Ani'.
- (8) Display the non-null values of employees and also employee name second character should be 'n' and string should be 5 character long.
- (9) Display the null values of employee and also employee name's third character should be 'a'.
- (10) What will be output if you are giving LIKE predicate as '%\\_%' ESCAPE '\'

### 9. To Perform various data manipulation commands, aggregate functions and sorting concept on all created tables

- (11) List total deposit from deposit.
- (12) List total loan from karolbagh branch
- (13) Give maximum loan from branch vrce.
- (14) Count total number of customers
- (15) Count total number of customer's cities.
- (16) Create table supplier from employee with all the columns.
- (17) Create table sup1 from employee with first two columns.

- (18) Create table sup2 from employee with no data
- (19) Insert the data into sup2 from employee whose second character should be 'n' and string should be 5 characters long in employee name field.
- (20) Delete all the rows from sup1.
- (21) Delete the detail of supplier whose sup\_no is 103.
- (22) Rename the table sup2.
- (23) Destroy table sup1 with all the data.
- (24) Update the value dept\_no to 10 where second character of emp. name is 'm'.
- (25) Update the value of employee name whose employee number is 103.

### 10. To study Single-row functions.

- (26) Write a query to display the current date. Label the column Date
- (27) For each employee, display the employee number, job, salary, and salary increased by 15% and expressed as a whole number. Label the column New Salary
- (28) Modify your query no 4.(2) to add a column that subtracts the old salary from the new salary. Label the column Increase
- (29) Write a query that displays the employee's names with the first letter capitalized and all other letters lowercase, and the length of the names, for all employees whose name starts with J, A, or M. Give each column an appropriate label. Sort the results by the employees' last names.
- (30) Write a query that produces the following for each employee:  
<employee last name> earns <salary> monthly
- (31) Display the name, hire date, number of months employed and day of the week on which the employee has started. Order the results by the day of the week starting with Monday.
- (32) Display the hiredate of emp in a format that appears as Seventh of June 1994 12:00:00 AM.
- (33) Write a query to calculate the annual compensation of all employees (sal+comm.)

### 11. Displaying data from Multiple Tables (join)

- (1) Give details of customers ANIL.
- (2) Give name of customer who are borrowers and depositors and having living city nagpur
- (3) Give city as their city name of customers having same living branch.
- (4) Write a query to display the last name, department number, and department name for all employees.
- (5) Create a unique listing of all jobs that are in department 30. Include the location of the department in the output
- (6) Write a query to display the employee name, department number, and department name for all employees who work in NEW YORK.

- (7) Display the employee last name and employee number along with their manager's last name and manager number. Label the columns Employee, Emp#, Manager, and Mgr#, respectively.
- (8) Create a query to display the name and hire date of any employee hired after employee SCOTT.

## **12. To apply the concept of Aggregating Data using Group functions.**

- (1) List total deposit of customer having account date after 1-jan-96.
- (2) List total deposit of customers living in city Nagpur.
- (3) List maximum deposit of customers living in bombay.
- (4) Display the highest, lowest, sum, and average salary of all employees. Label the columns
- (5) Maximum, Minimum, Sum, and Average, respectively. Round your results to the nearest whole number.
- (6) Write a query that displays the difference between the highest and lowest salaries. Label the column DIFFERENCE.
- (7) Create a query that will display the total number of employees and, of that total, the number of employees hired in 1995, 1996, 1997, and 1998
- (8) Find the average salaries for each department without displaying the respective department numbers.
- (9) Write a query to display the total salary being paid to each job title, within each department.
- (10) Find the average salaries > 2000 for each department without displaying the respective department numbers.
- (11) Display the job and total salary for each job with a total salary amount exceeding 3000, in which excludes president and sorts the list by the total salary
- (12) List the branches having sum of deposit more than 5000 and located in city bombay.

## **13. To solve queries using the concept of sub query**

- (1) Write a query to display the last name and hire date of any employee in the same department as SCOTT. Exclude SCOTT
- (2) Give name of customers who are depositors having same branch city of mr. sunil.
- (3) Give deposit details and loan details of customer in same city where pramod is living.
- (4) Create a query to display the employee numbers and last names of all employees who earn more than the average salary. Sort the results in ascending order of salary.
- (5) Give names of depositors having same living city as mr. anil and having deposit amount greater than 2000
- (6) Display the last name and salary of every employee who reports to ford.
- (7) Display the department number, name, and job for every employee in the Accounting department.

- (8) List the name of branch having highest number of depositors.
- (9) Give the name of cities where in which the maximum numbers of branches are located.
- (10) Give name of customers living in same city where maximum depositors are located

#### 14. Manipulating Data

- (1) Give 10% interest to all depositors.
- (2) Give 10% interest to all depositors having branch vrc
- (3) Give 10% interest to all depositors living in nagpur and having branch city bombay.
- (4) Write a query which changes the department number of all employees with empno
- (5) 7788's job to employee 7844's current department number.
- (6) Transfer 10 Rs from account of anil to sunil if both are having same branch.
- (7) Give 100 Rs more to all depositors if they are maximum depositors in their respective branch.
- (8) Delete depositors of branches having number of customers between 1 to 3.
- (9) Delete deposit of vijay.
- (10) Delete borrower of branches having average loan less than 1000.

#### 15. Do as directed

STUDENT (rollno, name, class, birthdate)

COURSE (courseno, coursename, max\_marks, pass\_marks)

SC (rollno, courseno, marks)

- (1) Create the above three tables along with key constraints.
- (2) Write an Insert script for insertion of rows with substitution variables and insert appropriate data.
- (3) Add a constraint that the marks entered should strictly be between 0 and 100.
- (4) While creating SC table, composite key constraint was forgotten. Add the composite keynow.
- (5) Display details of student who takes 'Database Management System' course.
- (6) Display the names of students who have scored more than 70% in Computer Networks and have not failed in any subject.
- (7) Display the average marks obtained by each student.
- (8) Select all courses where passing marks are more than 30% of average maximum mark.
- (9) Display details of students who are born in 1980 or 1982.
- (10) Create a view that displays student courseno and its corresponding marks.

#### 16. Do as directed

Create the database COMPANY and create given tables with all necessary constraints such as primary key, foreign key, unique key, not null and check constraints.

EMPLOYEE (emp\_id, emp\_name, birth\_date, gender, dept\_no, address, designation, salary, experience, email)  
DEPART (dept\_no, dept\_name, total\_employees, location)  
PROJECT (proj\_id, type\_of\_project, status, start\_date, emp\_id)

Insert proper data (at least 5 appropriate records) in all the tables.

- (1) Delete the department whose total number of employees less than 1.
- (2) Display the names and the designation of all female employee in descending order.
- (3) Display the names of all the employees who names starts with 'A' ends with 'A'.
- (4) Find the name of employee and salary for those who had obtain minimum salary.
- (5) Add 10% raise in salary of all employees whose department is 'CIVIL'.
- (6) Count total number of employees of 'MCA' department.
- (7) List all employees who born in the current month.
- (8) Print the record of employee and dept table as "Employee works in department 'CE'".
- (9) List names of employees who are fresher's (less than 1 year of experience).
- (10) List department wise names of employees who has more than 5 years of experience.
- (11) Write a function which will display total number of projects based on status (pass status as parameter).
- (12) Write a procedure that will display list of projects which is going to start today.
- (13) Write a trigger which do not allow insertion/updation/deletion into Project table if status type is 'pending'

## 17. Do as Directed

Create the database HOSPITAL and create given tables with all necessary constraints such as primary key, foreign key, unique key, not null and check constraints.

DOCTOR (DNO, DNAME, SPECIALIZATION, CLINIC\_ADDR)  
MEDICINE (MNO, MNAME, TYPE, CONTENT, MANUFACTURER)  
DISEASE (DISEASE\_NAME, SYMPTOM1, SYMPTOM2, SYMPTOM3)  
TREATMENT (TNO, DNO, DISEASE\_NAME, MNO, DOSAGE, AVG\_CURE\_TIME)

Insert proper data (at least 5 appropriate records) in all the tables.

- (1) Display records of each table in ascending order.
- (2) Count total number of doctors which has not given any treatment.
- (3) Display all Chennai doctors who treat cancer.
- (4) Remove disease "polio" from disease table as well as treatment table.
- (5) Delete all those treatment related to liver of Dr.Shah.
- (6) Create index on dno, Disease name in the treatment table.
- (7) Display details of doctors who treat migraines.

- (8) What is the maximum dosage of “penicillin” prescribe by the doctor for the treatment oany disease?
- (9) Display total number of disease treated by every doctor.
- (10) Which doctor have no treatment for “depression”?
- (11) Create a view which contains the treatment and doctors details. Make sure that no body is allowed to modify any detail in the view.
- (12) Write a PL/SQL block to print the following report ( Symptoms wise print total number of medicine given )

### 18. Do as Directed

Create the database THEATRE and create given tables with all necessary constraints such as primary key, foreign key, unique key, not null and check constraints.

```
SCREEN (SCREEN_ID, LOCATION, SEATING_CAP)
MOVIE (MOVIE_ID, MOVIE_NAME, DATE_OF_RELEASE)
CURRENT (SCREEN_ID, MOVIE_ID, DATE_OF_ARRIVAL,DATE_OF_CLOSURE)
```

Check Constraints:

Value of screen\_id must start with letters ‘S’.

Attribute location can be any one of ‘FF’, ‘SF’, or ‘TF’.

- (1) Get the name of movie which has run the longest in the multiplex so far.
- (2) Get the average duration of a movie on screen number ‘S4’.
- (3) Get the details of movie that closed on date 24-november-2004.
- (4) Movie ‘star wars III ‘was released in the 7th week of 2005. Find out the date of its release considering that a movie releases only on Friday.
- (5) Get the full outer join of the relations screen and current.
- (6) Write a PL/SQL function which will count total number of day’s horror movie last longer.
- (7) Write a PL/SQL procedure that will display movie which is going to release today.
- (8) Write a trigger which will not allow to insert/update in current table if Date\_of\_arrival is less than date\_of\_closure.

### 19. Do as Directed

Create the database EXAM and create given tables with all necessary constraints such as primary key, foreign key, unique key, not null and check constraints.

```
APPLICANT (AID, ANAME, ADDR, ABIRTH_DT)
ENTRANCE_TEST (ETID, ETNAME, MAX_SCORE, CUT_SCORE)
ETEST_CENTRE (ETCID, LOCATION, INCHARGE, CAPACITY)
ETEST_DETAILS (AID, ETID, ETCID, ETEST_DT, SCORE)
```

(This database is for a common entrance test which is being conducted at a number of centers and can be taken by an applicant on any day except holidays)

- (1) Modify the APPLICANT table so that every applicant id has an 'A' before its value. E.g. if value is '1123', it should become 'A1123'.
- (2) Display test center details where no tests were conducted.
- (3) Display details about applicants who have the same score as that of Ajaykumar in 'ORACLE FUNDAMENTALS'.
- (4) Display details of applicants who appeared for all tests.
- (5) Display those tests where no applicant has failed.
- (6) Display details of entrance test centers which had full attendance between 1st Oct 15
- (7) and 15th Oct 16.
- (8) Display details of the applicants who scored more than the cut score in the tests they appeared in.
- (9) Display average and maximum score test wise of tests conducted at Mumbai.
- (10) Display the number of applicants who have appeared for each test, test center wise.
- (11) Display details about test centers where no tests have been conducted.
- (12) For tests, which have been conducted between 2-3-17 and 23-4-17, show details of the tests as well as the test centre.
- (13) How many applicants appeared in the 'ORACLE FUNDAMENTALS' test at Chennai in the month of February?
- (14) Display details about applicants who appeared for tests in the same month as the month in which they were born.
- (15) Display the details about APPLICANTS who have scored the highest in each test, test centre wise.
- (16) Design a read only view, which has details about applicants and the tests that he has appeared for.
- (17) Write a procedure which will print maximum score centre wise.
- (18) Write a procedure which will print details of entrance test.
- (19) Write a trigger which do not allow insertion / updation / deletion of Entrance test details on Sunday.

## 20. Do as Directed

- (1) Write a PLSQL block which will print Employee list (Empno and Name)  
EMP (empno, empnm, empadd, salary, date\_birth, joindt, deptno)
- (2) Write a function that returns total number of incomplete jobs, using table  
JOB (jobid, type\_of\_job, status)
- (3) Write a function which displays the number of items whose weight fall between a given ranges for a particular color using table ITEM (itemno, name, color, weight)
- (4) Write a procedure to display top five highest paid workers who are specialized in 'PAINTING" using table WORKER (workerid, name, wage\_per\_hour, specialized\_in, manager\_id)



## 21. Do as Directed

EMP (empno, empnm, empadd, salary, date\_birth, joindt, deptno) DEPT (deptno, deptnm)

Write a PL/SQL block (table above EMP-DEPT table) which takes as input Department name and displays all the employees of this department who has been working since last five years

## 22. Do as Directed

Employee (eid, fname, lname, salary)

1. Use a Cursor for Loop inside a function to calculate and return total paid salary to all employees by the company.
2. Modify the function created above to become a procedure and display the total paid salary from the procedure itself. Instead of calculating for all employees, calculate only for those employees whose name starts from a character passed as parameter to the procedure and hence to the cursor.

## 23. Do as Directed

BRANCH (branch\_no, area, city)

MEMBERS (mno, name branch\_no, salary, manager\_no)

Note: Manager can be from one of the members.

Write a procedure which list the name of members who earns more than that of his managers.  
Write a procedure which gives details of employee having maximum salary branch wise.

## 24. Do as Directed

Consider the Bank schema as

ACCOUNT (AC\_NO, NAME, AC\_TYPE, BALANCE\_AMT, BALANCE\_DATE)

TRANSACTION (AC\_NO, DATE, TR\_TYPE, AMOUNT, PREV\_BALANCE,REMARK)

AC\_type may be S for saving or C for current, 2. TR\_type may be D for deposit or W for withdrawal. Write a procedure to print the Bank Transaction details by passing from and to dates

## 25. Do as Directed

EMPMAST (empno, name, pfno, empbasic, deptno, designation)

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DEPT (DNO, DNAME)

Rules: HRA = 15% of basic

DA = 50% of basic

Medical = 100

PF = 8.33% of basic

Print Salary slip. Design your own format