



MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

COURSE PLAN

Department	: COMPUTER APPLICATIONS
Course Name & code	: Database Management System Lab & MCA 4161
Semester & branch	: 1st Semester, M.C.A
Name of the faculty	: Vinayak Mantoor & Archana. H
No. of contact hours/week	: 3 hours/week

Continuous Evaluation	60%
<ul style="list-style-type: none">• Two Evaluations• Midterm Exam	Record(6)+Execution(7)+Quiz(7) 20 marks Max.Marks:60
Lab Examination	40%
	Examination of 3 hours duration that includes questions based on: SQL+PL/SQL Max.Marks:40

INSTRUCTIONS TO STUDENTS

1. Students should be regular and come prepared for the lab practice.
2. In case a student misses a class, it is his/her responsibility to complete that missed exercise(s).
3. Students should bring the observation book daily for the lab.
4. They should implement the given query/program individually.
5. Students should clearly listen to the instructions given by the faculty.
6. Once the query/program gets executed, they should show the query/program and results to the instructors and copy the same in their observation book.
7. When copying down the query in the observation book the template to be followed is:
 - a. Question No
 - b. Question
 - c. Query statement

- d. Output
- 8. When copying down the PL/SQL program in the observation book the template to be followed is:
 - a. Program No
 - b. Program title
 - c. Program Code
 - d. Output
- 9. Questions for lab tests and exam need not necessarily be limited to the questions in the manual, but could involve some variations and / or combinations of the questions.

CONTENTS

Week	Topics to be covered
1-2	SQL Basics – CREATE, ALTER, DROP
3	Populate and manipulate the database using INSERT, UPDATE, DELETE
4-6	SQL Simple and Advanced Queries
7	PL/SQL
8	Cursors
9	Exception Handling
10	Triggers
11	Procedures, Functions, Packages
12	End Term Practical Examination

Course Outcomes (COs)

At the end of this course, the student should be able to:

		No. of Contact Hours
C01:	Create and modify database objects	6
C02:	Manipulate the data in the database	3
C03:	Design queries to retrieve the data from database	9
C04:	Perform database operations by integrating procedural language constructs	9
C05:	Design stored programs	6

Course Plan

L. No.	Topics	CO																																																								
L1, L2	<p>1.1 Create the tables with the following columns and constraints with given constraint names: <u>EMP</u></p> <table><tr><th>Attribute</th><th>Type</th><th>Constraint</th><th>Constraint Name</th></tr><tr><td>EMPNO</td><td>NUMBER(4)</td><td>Make this as primary key</td><td></td></tr><tr><td>ENAME</td><td>VARCHAR2(10)</td><td></td><td></td></tr><tr><td>JOB</td><td>VARCHAR2(9)</td><td>CLRK/MGR/A.MGR/GM/CEO,</td><td>JOB_CHK_Cons</td></tr><tr><td>MGRID</td><td>NUMBER(4)</td><td>References EMP</td><td>MGR_FK_EMPNO_Cons</td></tr><tr><td>DATE_BIRTH</td><td>DATE</td><td>Must be less than joining Date</td><td>DB_Less_DBJOIN_Cons</td></tr><tr><td>SAL</td><td>NUMBER(7,2)</td><td>More than 20000</td><td>SAL_20KMore_Cons</td></tr><tr><td>COMM</td><td>NUMBER(7,2)</td><td>DEFAULT 1000</td><td></td></tr><tr><td>DEPTNO</td><td>VARCHAR2(3)</td><td>References DEPT and ON DELETE CASCADE</td><td>DEPTNO_FK_DEPT_Cons</td></tr><tr><td>DATE_JOIN</td><td>DATE</td><td></td><td></td></tr></table> <p><u>DEPT</u></p> <table><tr><th>Attribute</th><th>Type</th><th>Constraint</th><th>Constraint Name</th></tr><tr><td>DNO</td><td>VARCHAR2(3)</td><td>UNIQUE and Starts from 'D'</td><td>DNO_UNQ_Cons and D-LikeDNO_Cons</td></tr><tr><td>DNAME</td><td>VARCHAR2(10)</td><td>Unique</td><td>DNAME_UNQ_Cons</td></tr><tr><td>LOCATION</td><td>VARCHAR2(9)</td><td>BNG/MNG/MUB/HYD/CHN</td><td>VALID_LOC_Cons</td></tr></table>	Attribute	Type	Constraint	Constraint Name	EMPNO	NUMBER(4)	Make this as primary key		ENAME	VARCHAR2(10)			JOB	VARCHAR2(9)	CLRK/MGR/A.MGR/GM/CEO,	JOB_CHK_Cons	MGRID	NUMBER(4)	References EMP	MGR_FK_EMPNO_Cons	DATE_BIRTH	DATE	Must be less than joining Date	DB_Less_DBJOIN_Cons	SAL	NUMBER(7,2)	More than 20000	SAL_20KMore_Cons	COMM	NUMBER(7,2)	DEFAULT 1000		DEPTNO	VARCHAR2(3)	References DEPT and ON DELETE CASCADE	DEPTNO_FK_DEPT_Cons	DATE_JOIN	DATE			Attribute	Type	Constraint	Constraint Name	DNO	VARCHAR2(3)	UNIQUE and Starts from 'D'	DNO_UNQ_Cons and D-LikeDNO_Cons	DNAME	VARCHAR2(10)	Unique	DNAME_UNQ_Cons	LOCATION	VARCHAR2(9)	BNG/MNG/MUB/HYD/CHN	VALID_LOC_Cons	CO1
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L3	<p>Note: Insert records into the following tables.</p> <ul style="list-style-type: none">Student can enter a valid value into the columns left blank, columns with <i>null</i> must be entered with NULL value only.If some records cannot be inserted because of violation of constraints, then write the reason for violation in the lab book and choose a data satisfying the constraint and insert them into the table.Insert 2 records of your own. <p>3.1 EMP table data.</p> <p>3.1.1 MgRID values can't be inserted using INSERT, write the reason and solution.</p> <table><tr><th>Empno</th><th>Ename</th><th>Job</th><th>MgRID</th><th>Date_Birth</th><th>Sal</th><th>comm</th><th>Deptno</th><th>Prj_Id</th><th>Date join</th></tr><tr><td>100</td><td>Ravi</td><td>MGR</td><td>111</td><td>10-10-1985</td><td>32000</td><td></td><td>D1</td><td>P1</td><td>2-10-2001</td></tr><tr><td>102</td><td>Raviraj</td><td>CLRK</td><td>106</td><td>10-12-1980</td><td>24000</td><td></td><td>D1</td><td>P3</td><td>12-11-2000</td></tr><tr><td>111</td><td>Raghu</td><td>GM</td><td>150</td><td>10-12-1974</td><td>45000</td><td>15000</td><td>null</td><td>null</td><td>3-12-1985</td></tr><tr><td>150</td><td></td><td>CEO</td><td>null</td><td>10-12-1970</td><td>60000</td><td>30000</td><td>null</td><td>null</td><td>3-12-1990</td></tr><tr><td>103</td><td></td><td>A.CLRK</td><td>111</td><td>10-12-1980</td><td></td><td></td><td>D1</td><td>P1</td><td>2-10-2001</td></tr><tr><td>103</td><td></td><td>CLRK</td><td>111</td><td>2-10-1980</td><td></td><td></td><td>D1</td><td>P3</td><td>2-10-2002</td></tr><tr><td>125</td><td>Manu</td><td>A.MGR</td><td>150</td><td>10-12-1980</td><td></td><td></td><td>D4</td><td>P2</td><td>2-10-2002</td></tr><tr><td>104</td><td></td><td>CLERK</td><td>125</td><td>2-10-1980</td><td></td><td></td><td>D2</td><td>P1</td><td>2-10-2005</td></tr><tr><td>106</td><td></td><td>MGR</td><td>111</td><td>2-10-1986</td><td></td><td></td><td>D2</td><td></td><td>2-10-1985</td></tr><tr><td>123</td><td>Mahesh</td><td>CLRK</td><td>150</td><td>10-12-1974</td><td>25000</td><td></td><td>D3</td><td>P2</td><td>2-10-2002</td></tr><tr><td>108</td><td></td><td>CLRK</td><td>106</td><td>10-12-1970</td><td></td><td></td><td>D9</td><td></td><td>2-10-1985</td></tr><tr><td>103</td><td></td><td>CLRK</td><td>111</td><td>10-12-1980</td><td></td><td></td><td>D1</td><td>P3</td><td>2-10-2001</td></tr><tr><td>null</td><td></td><td>CLRK</td><td>106</td><td>10-12-1980</td><td>18000</td><td></td><td>D5</td><td></td><td>10-12-1980</td></tr></table>	Empno	Ename	Job	MgRID	Date_Birth	Sal	comm	Deptno	Prj_Id	Date join	100	Ravi	MGR	111	10-10-1985	32000		D1	P1	2-10-2001	102	Raviraj	CLRK	106	10-12-1980	24000		D1	P3	12-11-2000	111	Raghu	GM	150	10-12-1974	45000	15000	null	null	3-12-1985	150		CEO	null	10-12-1970	60000	30000	null	null	3-12-1990	103		A.CLRK	111	10-12-1980			D1	P1	2-10-2001	103		CLRK	111	2-10-1980			D1	P3	2-10-2002	125	Manu	A.MGR	150	10-12-1980			D4	P2	2-10-2002	104		CLERK	125	2-10-1980			D2	P1	2-10-2005	106		MGR	111	2-10-1986			D2		2-10-1985	123	Mahesh	CLRK	150	10-12-1974	25000		D3	P2	2-10-2002	108		CLRK	106	10-12-1970			D9		2-10-1985	103		CLRK	111	10-12-1980			D1	P3	2-10-2001	null		CLRK	106	10-12-1980	18000		D5		10-12-1980	CO2
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	<p>3.2 DEPT table data.</p> <table><tr><th>DNO</th><th>DName</th><th>Location</th><th>Dept_Budget</th></tr><tr><td>D1</td><td>Marketing</td><td>CHN</td><td>500000</td></tr><tr><td>D2</td><td>Research</td><td>MNG</td><td>300000</td></tr><tr><td>D3</td><td>IT</td><td>BNG</td><td>400000</td></tr><tr><td>D4</td><td>HR</td><td>BGG</td><td>200000</td></tr><tr><td>D5</td><td>Accounts</td><td>BNG</td><td>500000</td></tr><tr><td>Null</td><td>Corporate</td><td>HYD</td><td>700000</td></tr></table> <p>3.3 PROJ table data.</p> <table><tr><th>Dno</th><th>Prj_No</th><th>Prj_Name</th><th>Prj_Credits</th><th>Prj_Fund</th></tr><tr><td>D1</td><td>P1</td><td></td><td>4</td><td>400000</td></tr><tr><td>D2</td><td>P1</td><td></td><td>2</td><td>200000</td></tr><tr><td>D3</td><td>P2</td><td></td><td>3</td><td>300000</td></tr><tr><td>D1</td><td>P3</td><td></td><td>5</td><td>500000</td></tr><tr><td>D4</td><td>P2</td><td></td><td>7</td><td>700000</td></tr></table> <p>Note: Perform following activity and write the observation.</p> <p>3.4 Run COMMIT command. Delete the employee records working on project P3 and confirm the result. Type ROLLBACK to restore the records back if records are deleted.</p> <p>3.5 Run COMMIT command. Delete <i>Accounts</i> department from the DEPT table and confirm the result with reason. Type ROLLBACK to restore the records back if records are deleted.</p> <p>3.6 Run COMMIT command. Delete records of employees with Empno 125 and working in project P2. Type ROLLBACK to restore the records back, if records are deleted.</p> <p>3.7 Update the DNO of first record in PROJ to D5.</p> <p>3.8 Update the Job of employee with Empno 123 to MGR, salary to 35000 and his manager as 111.</p> <p>3.9 Update the EMP table to set the default commission of all employees to Rs.10000/- who are working as managers</p>	DNO	DName	Location	Dept_Budget	D1	Marketing	CHN	500000	D2	Research	MNG	300000	D3	IT	BNG	400000	D4	HR	BGG	200000	D5	Accounts	BNG	500000	Null	Corporate	HYD	700000	Dno	Prj_No	Prj_Name	Prj_Credits	Prj_Fund	D1	P1		4	400000	D2	P1		2	200000	D3	P2		3	300000	D1	P3		5	500000	D4	P2		7	700000	
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L4	<p>4.1 Display all records from EMP, DEPT and PROJ table.</p> <p>4.2 Display records of Employees who have salary more than 25000 or working in department D1 .</p> <p>4.3 List all employee with their names as “Employee Name” and their salaries as “SALARY”, whose salary lies between 25200/- and 35200/- both inclusive.</p> <p>4.4 List the name of employees who is working at Locations (BNG,MUB,HYD) (using both OR , IN operator).</p> <p>4.5 Display <i>department number</i> from the table <i>EMP</i> avoiding the duplicated values.</p>	CO3																																																										

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	<p>4.6 Display the records in the EMP table in the ascending order of Deptno and descending order of salary.</p> <p>4.7 Create a table Manager with columns Empno, Ename, Job, Deptno, Salary with structure and data copied from the <i>EMP</i> table.</p> <p>4.8 List the Project Number, Project Name of all the projects handled by the department D2 and having project credits more than 5.</p> <p>4.9 List all employees reporting to manager with <i>empno</i> 111.</p> <p>4.10 List all employees whose name starts with either M or R and name length is 6.</p> <p>4.11 List the name of employees whose name do not start with S.</p> <p>4.12 Display name of employees whose 2nd & 3rd character is 'av' and ends with 'j'.</p> <p>4.13 List out the employees who are not receiving commission.</p>	
L5	<p>5.1 List the minimum, maximum and average salaries and rename the column as min_sal, max_sal, avg_sal, total salary of the employees.</p> <p>5.2 List the Project names undertaken by <i>Marketing</i> Department.</p> <p>5.3 Display the employees name in capital, lower, 1st character only capital, number of characters and 3 characters from 2nd position.</p> <p>5.4 List the name of employees who are working under the manager 'Raghu'.</p> <p>5.5 Display department name, Max salary and Min salary in each department.</p> <p>5.6 Display number of employees working in each department and their department name.</p> <p>5.7 List the employees whose experience is more than 5 years.</p> <p>5.8 List the Employees who are born in the month of December.</p> <p>5.9 List the Employees who are born in the year 2000.</p> <p>5.10 Display the DOB of all employees in the format "dd-mm-yy".</p> <p>5.11 Write SQL query to illustrate ceiling, floor, truncate and round functions on the value 2.83.</p> <p>5.12 List the projects which have duration more than 1 year.</p> <p>5.13 Update the COMM column of EMP table based on the SAL. Use <i>COMM=COMM+SAL*10/100</i>.</p>	CO3
L6	<p>6.1 List Job category and total salary paid for the each jobs category by the company.</p> <p>6.2 Display name of the department from which maximum number of employees are working on project P1.</p> <p>6.3 Select name and job of employees working either in 'Marketing' or 'Research' department.</p> <p>6.4 Display name and salary of employees whose salary is greater than minimum salary of the company.</p> <p>6.5 List all the departments having at least three employees.</p> <p>6.6 Display the Deptno of the department that has highest average salary of the company.</p> <p>6.7 List the name of departments which are working on more than 1 project.</p> <p>6.8 Display how many employees joined after 15th of all months.</p> <p>6.9 Write a query to list Employee number, name and Job of the employees who work in the same job as 'Mahesh'.</p>	CO3

L. No.	Topics	CO
	<p>6.10 Create a View EMP_PRJ_VW to display records of employees of 'marketing' department and project in which they are working.</p> <p>6.11 Display employee names and projects in which they are working using View EMP_PRJ_VW .</p> <p>6.12 List out the number of employees joined in every month in ascending order.</p> <p>6.13 Create an index on the columns (name and job) on EMP table.</p>	
L7	<p>7.1 Write a PL/SQL block to find the sum of the digits of a given number.</p> <p>7.2 Write a PL/SQL block to check an input string is palindrome or not palindrome.</p> <p>7.3 Write a PL/SQL block to accept employee number and display Employee Name, Department name, salary of employees in the format – 'RAVI works in <i>Marketing</i> department and draws 32000/- as salary'.</p> <p>7.4 Create a Table EMPSAL with fields-Empno, Empname, Sal, HRA, DA, Gross Salary, PF, Net Salary (assume appropriate datatype and size). Write a PL/SQL block to accept an employee number existing in EMP table and calculate HRA, DA, Gross Salary, PF, Net_Salary of that employee. Insert the empno, empname, Sal, HRA, DA, Gross Salary, PF, Net Salary into the table EMPSAL: Use the following formula to calculate salary components- HRA=50% of Sal DA=20% of Sal PF=12% of Sal. Gross_sal= Sal+ HRA+DA Net_Sal= Gross_sal-PF</p> <p>7.5 Write a PL/SQL block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the Radius and the corresponding values of calculated Area in an empty table named CIRCLE, consisting of two columns radius & area.</p>	CO4
L8	<p>8.1 Write a cursor to display ENAME and SAL of all employees drawing salary more than 30000/-.</p> <p>8.2 Write a cursor PL/SQL block to allocate incentives to employees and to the corresponding departments handling a project from the Prj_Fund reserved. According to the Prj_Credits a department is having on the Project, a portion of Prj_Fund is given to the department on that project. E.g. Credit is 2 , allocate 20%. Corresponding department has to share 70% of amount received among all employees who are working on that project equally. Remaining 30% is added to Dept_Budget.</p> <p>8.3 Write a parameterized cursor to display employee with the user given parameters- job and deptno (Using Cursor for loop)</p> <p>8.4 Write a parameterized cursor to display first two highest paid employees details (Name, Salary, Department Name) working on a project. The Prj_Id is the user given parameter.</p>	CO4
L9	<p>9.1 Write a PL/SQL program to demonstrate predefined exceptions- INVALID_NUMBER, TOO_MANY_ROWS, NO-DATA_FOUND. Do following</p>	CO4

L. No.	Topics	CO
	<p>operations in the PL/SQL block and handle pre-defined exceptions correspondingly by displaying proper messages.</p> <ul style="list-style-type: none"> - Convert ename into number using to_number() function - Display ename of employee corresponding to user entered empno. Handle exception if entered empno does not exists. - Display ename of employee corresponding to user entered deptno. Handle exception. <p>9.2 Write a PL/SQL block to accept, Principle, Interest rate and duration (in years) to calculate Interest to be paid. Handle the exceptions if Principle <=1000, interest rate <5, year <1 and display proper error message for each.</p> <p>9.3 Write a PL/SQL block to accept employee number from user and display employee details such as Empno, Name, and Sal. Handle the exception raised through user defined messages –</p> <p>(i) If user entered a non-existing employee number.</p> <p>(ii) If the salary more than 25000/-</p> <p>If employee exists and salary is less than 25000/- then update that salary to 25000/-</p>	
L10	<p>10.1 Write a PL/SQL trigger to fire when there is an updation of salary of any employee and record the Empno, Dept. Name and Old Salary, date on which salary is modified and user who modified information in the table SAL_MOD (Empno, Dname, Old_Sal, Mod_Date, Modifier).</p> <p>10.2 Write a trigger to be invoked when a department on a project updates Prj_fund by adding additional fund. Depending on project duration lapsed, display the message for additional fund for which department is eligible on that project. The project duration lapsed is calculated as difference between current_date (user entered) and start_date. Additional fund eligible is calculated according to the following criteria: If project duration lapsed is less than 50% then display- You are eligible for Rs. xxxx(xxxx is 70% of additional fund requested) else display- You are eligible for Rs.xxxx (xxxx is40% of additional fund requested).</p> <p>10.3 Write a PL/SQL block trigger to do INSERT/UPDATE/DELETE operation only during week days. Raise an exception if the day is SAT or SUN and also display user who initiated operation</p>	CO5
L11	<p>11.1 Write a procedure to calculate simple interest, taking principle, rate and year as inputs.</p> <p>11.2 Write a procedure to take department name as input to display project being handled by the department and name of the employees working under those projects belonging to the department.</p> <p>11.3 Write two functions to calculate age and service experience of all employees and return these values to calling PL/SQL block and display.</p> <p>11.4 Write a function to find total project fund on different projects that every department has received. In main program call function for every deptno fetched from Dept. Display following message format for every deptno in main program- (use cursor)</p> <p style="text-align: center;">Marketing department has received Rs. 1600000/-</p>	CO5

L. No.	Topics	CO
	11.5 Write a package containing procedure to find sum of salary of employees working in a given Department Name and a function to find number of employees working under a given Project Name.	
L12	END SEMESTER LAB EXAM	

References

1. Ivan Bayross, “SQL, PL/SQL-The Programming Language of ORACLE”, 4 th Edition, BPB Publications,.
2. Satish Asnani, “Oracle Database 11g”, PHI, 2010.
3. Scott Urman, “ORACLE – PL/SQL Programming”, Oracle Press.

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