

Section	Title	Page	
One	<b>Introduction to SQL</b>	2	
	- What is SQL	3	
	- What is SQL user for / Who uses SQL	4	
Two	<b>Database Objects</b>	5	
	- What is a Database	6	
	- Introduction to Oracle Database Objects	7	
	- About Oracle Tables	8	
	- About Oracle Views	9	
	- About Oracle Materialized Views	10	
	- About Oracle Indexes	11	
	- About Oracle Sequences	12	
	- About Packages, Functions and Procedures	13	
	- About Synonyms and Schemas	14	
Three	<b>The SQL*Plus Interface</b>	15	
	- Introduction to SQL*Plus	16	
	- How to log into SQL*Plus	17	
	- Anatomy of SQL*Plus	21	
	- ORA-01017: invalid username/password; logon denied	22	
	- ORA-12154: TNS:could not resolve the connect identifier	23	
	- How to exit an SQL*Plus Session	24	
	- Using the DOS window with SQL*Plus	25	
	- Copying and Pasting in SQL*Plus	26	
	- Using the Function Keys in SQL*Plus	29	
	- Using the Line Editor in SQL*Plus	30	
	- SQL*Plus Environment Settings	32	
	- Opening files in SQL*Plus	33	
	- Saving SQL in SQL*Plus	34	
	- Using SQL*Plus to write the output to files	35	
	- Using the Spool Command	36	
	- Changing Passwords / Clearing the Screen in SQL*Plus	38	
	- Connecting to other Users within SQL*Plus	39	
	Four	<b>SQL Scripts</b>	40
		- Commenting SQL statements	45
- Running SQL in Batch Scripts		47	
- Passing Parameters with SQL Scripts		49	
Five	<b>Simple Queries</b>	51	
	- What is an SQL query ?	52	
	- The purpose of describe in Oracle SQL	56	
	- SQL Query Syntax	58	
	- Counting Records in an Oracle table	60	
	- Displaying Literals when selecting in SQL	62	
	- Oracle Variables from sys.dual	65	
	- NLS_DATE_FORMAT	66	
- Alternatives to SYSDATE in SQL	67		
- <i>Exercise One</i>	69		
Six	<b>Column Manipulation in Oracle</b>	73	
	- Introduction	74	
	- SQL Column Labels	75	
	- SQL Column Labels and Reserved Words	79	
	- Using Oracle SQL Functions	81	
	- Oracle Column Concatenation	88	
	- Using Oracle as a calculator	89	
	- Sorting SQL Output	90	
	- Ordering By More than One Column	92	
	- Ordering with nulls first / nulls last	93	

Section	Title	Page
	- Ordering with Aliases	94
	- Displaying Oracle Dates	95
	- Displaying Oracle Dates with to_char	96
	- Displaying Oracle Numbers with to_char	100
	- <i>Exercise Two</i>	102
<b>Seven</b>	<b>Filtering Oracle Data with a Where Clause</b>	107
	- Introduction to Oracle Where Clauses	108
	- Where Clause syntax	109
	- Examples of Oracle Where Clauses	110
	- Handling Null values in a Where Clause	118
	- Case restrictions in Where Clauses	119
	- Using Functions in Where Clauses	120
	- Where Clauses for Binary Datatypes	123
	- Fetch first rows of a Table in Oracle 19c (Top-N)	125
	- Using Percent with Fetch in Oracle 19c	127
	- Using Offset with Fetch in Oracle 19c	128
	- Using With Ties with Fetch in Oracle 19c	129
	- <i>Exercise Three</i>	130
<b>Eight</b>	<b>Oracle Datatypes</b>	136
	- Introduction	137
	- Oracle Varchar2	138
	- ORA-00910: specified length too long for its datatype	140
	- Varchar2 and Char in Oracle	141
	- Varchar2 and to_char in Oracle	142
	- Varchar2 and Char in Oracle	141
	- Varchar2 and Char in Oracle	142
	- Oracle Numbers	143
	- Dates in Oracle Databases	144
	- Float Datatypes in Oracle	145
	- Binary Float and Binary Double	146
	- Long Datatypes in Oracle	147
	- Blobs and Clobs in Oracle	148
	- Migrating Long columns in Oracle	152
<b>Nine</b>	<b>Aggregating Values in Oracle SQL</b>	155
	- Introduction	156
	- Using Group By to aggregate values	157
	- Using Having with Group By	160
	- Totaling Group By with Rollup	163
	- Using Partial Rollup with several non-aggregates	164
	- Using Full Rollup with several non-aggregates	165
	- Getting the Total to the Top	166
	- Using Cube with Group By	167
	- Using Grouping Sets with Group By	169
	- Using Grouping ID with Grouping Sets	171
	- Using Group ID with Group By	174
	- Nesting Group Functions	176
	- <i>Exercise Four</i>	181
<b>Ten</b>	<b>Substitution in Oracle SQL 19c</b>	187
	- Introduction	188
	- Using Ampersands to substitute values	189
	- Using Ampersands with Strings	190
	- Using the same value more than once ...	191
	- Persistent values (Using Undefine or Undef)	192
	- Persistent values (Using Define or Def)	194
	- Advanced Substitution for Advanced Users	197

Section	Title	Page
	- Preventing prompting when Ampersands are encountered	199
	- Redefining the Prompt (Set Define)	200
	- Removing the Verification (Verify off)	201
	- Defining Session Variables	202
	- Using the Accept command in SQL*Plus	203
	- Within Insert statements	208
	- Within Scripts	209
	- <i>Exercise Five</i>	211
<b>Eleven</b>	<b>Advanced Features of SQL*Plus</b>	<b>214</b>
	- Using the Help facility	215
	- Using the Host command	217
	- Changing the SQL*Plus Prompt	218
	- Displaying the Time	219
	- Displaying all Environment Settings	220
	- Saving the Environment Settings using Store Set	221
	- Changing Environment Settings in glogin.sql	222
	- Creating HTML Pages	223
	- Renaming Columns for the Session	225
	- Formatting Columns (Varchar2)	228
	- Formatting Columns (Number)	229
	- Formatting Columns (Date)	230
	- Wrapping Columns	231
	- Justifying Column Headings	234
	- Suppressing Columns	235
	- Truncate Columns	236
	- Storing Values in Columns	237
	- Viewing Columns	238
	- Viewing All Columns	239
	- Temporarily Disabling Columns	240
	- Clearing Columns	241
	- Copying Columns with Like	242
	- Using Columns to deal with Nulls	243
	- Multi-Line Output	244
	- Using Break in the Output	245
	- Using Aliases with Break	247
	- Using Skip with Break	248
	- Using Skip Page with Break	249
	- Using Skip Row with Break	250
	- Displaying Duplicates with Break	251
	- Viewing/Clearing Breaks	252
	- Using Compute with Break	253
	- Using Compute Labels with Break	255
	- Using Compute Sub-totaling with Break	259
	- Combining Computes	261
	- Setting Titles for the Output	263
	- Using SQL.PNO in the Title	266
	- Using Variables in the Title	268
	- Using Btitle	270
	- Using Repheader and Repfooter	272
	- Reviewing the Title settings	273
	- Suppressing the Title settings	274
	- <i>Exercise Six</i>	275
<b>Twelve</b>	<b>Using Alternative Quoting Mechanism in SQL</b>	<b>280</b>
	- Introduction to AQM	281
	- Using Alternative Quoting Mechanism	282

Section	Title	Page	
Thirteen	<b>Joining Tables</b>	284	
	– Using Table Aliases	285	
	– Linking tables	289	
	– Cartesian Products	290	
	– Joining Tables	292	
	– Ansi SQL/86	293	
	– Ansi SQL/86 and Outer Joins	295	
	– Ansi SQL/99 Standards (Natural Joins)	298	
	– Ansi SQL/99 Standards (Cross Joins)	299	
	– Ansi SQL/99 Standards (Joins/Using)	300	
	– Ansi SQL/99 Standards (On)	301	
	– Ansi SQL/92 Standards (Multiple On)	302	
	– Ansi SQL/92 Standards (Left Outer Joins)	303	
	– Ansi SQL/92 Standards (Right Outer Joins)	304	
	– Ansi SQL/92 Standards (Full Outer Joins)	305	
	– Merging Tables	306	
	– Union Syntax	307	
	– Union	308	
	– Union All	309	
	– Intersect	310	
	– Minus	311	
	– Knowledge Check	312	
	– Knowledge Check – Union	313	
	– Knowledge Check – Union All	314	
	– Knowledge Check – Intersect	315	
	– Knowledge Check – Minus	316	
	– Tree Walks	317	
	– Use of Nocycle (ORA-01436)	325	
	– Use of Connect_by_iscycle	327	
	– Limiting Records using Connect_by_isleaf	328	
	– Showing the Root using Connect_by_root	330	
	– <i>Exercise Seven</i>	332	
	Fourteen	<b>Oracle Sub-Queries</b>	338
– Introduction		339	
– <b>Using Equals</b>		340	
– In		343	
– Exists		345	
– Any		347	
– Some		348	
– All		349	
– Correlated Sub-Queries		350	
– Inline Views		352	
– Sub-Queries in a Select Statement		354	
– Sub-Query Factoring (Using With)		356	
– Sub-Query Factoring Example with Aliases		358	
– Sub-Query Factoring Example with Joins		359	
– <i>Exercise Eight</i>		361	
Fifteen		<b>Advanced Queries</b>	366
		– Introduction	367
	– Pivot	368	
	– Changing the Pivot Headings of X Axis	374	
	– Unpivot	382	
	– Unpivot and Null values	386	
	– First/Last_Value functions	387	
	– Lead and Lag functions	392	

Section	Title	Page
	- Window Specification	395
	- Breakdown of Window Specification	396
	- Window Specification – The Arguments	398
	- Window Specification – The Order By	401
	- Window Specification – The Windowing	403
	- Window Specification – Rows between	404
	- Window Specification – current row	405
	- Window Specification – unbounded preceding	408
	- Window Specification – bounded preceding	409
	- Window Specification – current row	410
	- Window Specification – between	411
	- Window Specification – Rows between	412
	- Difference between Range and Rows	413
	- Ranking function	414
	- Using Ntile Function in SQL	423
	- Using Listagg Function in SQL	425
	- Using Case in Select statements	429
	- Using Searched Case Function in SQL	434
	- Using Searched Case Function with Sub-queries	436
	- Using Sample in SQL	437
	- Using Width_Bucket in SQL	439
	- <i>Exercise Nine</i>	442
<b>Sixteen</b>	<b>Creating Database Objects</b>	450
	- Creating Tables in SQL	451
	- Mandatory Columns in SQL Tables	453
	- Creation Syntax for Tables in SQL	454
	- Rownum in SQL Tables	455
	- Using Rowid in SQL Tables	457
	- Creation Syntax for Tables in SQL	459
	- Virtual Columns in Oracle Tables	460
	- Creating Virtual Columns with new Table	461
	- Specifying Virtual Column Datatype and Size	462
	- Adding Virtual Columns to Existing Table	463
	- Using Virtual Columns in SQL ...	464
	- Using Virtual Columns with Functions	466
	- Limitations of Virtual Columns (ORA-54012)	468
	- Limitations of Virtual Columns (ORA-54015)	469
	- Limitations of Virtual Columns (ORA-54013)	470
	- Viewing Virtual Columns in USER_TAB_COLS	472
	- Invisible Columns in Oracle 19c	473
	- Commenting on Tables in SQL	476
	- Commenting on Columns in SQL	477
	- Creating Indexes in SQL	478
	- Index Creation Syntax in SQL	481
	- Disabling Indexes in SQL	483
	- Creating Views in SQL	484
	- Creating Sequences in SQL	486
	- Using Sequences in SQL	487
	- Altering Sequences in SQL	489
	- Using Default Value in SQL Tables	490
	- Using Default Value in Oracle 19c	491
	- Using Identity in Oracle 19c	492
	- Renaming Objects in an Oracle Database	493
	- Dropping Objects from an Oracle Database	496
	- Granting Access to other Schemas	497

Section	Title	Page
	- Accessing other Schemas	500
	- Creating Synonyms in Oracle	501
	- Oracle Directory	502
	- Directory Removing	503
	- Directory Problems	504
	- Directory Metadata	505
	- <i>Exercise Ten</i>	506
<b>Seventeen</b>	<b>Altering and Populating Tables</b>	<b>508</b>
	- Rules	509
	- Syntax	510
	- Unused Columns	512
	- Rules for Populating tables	515
	- Syntax for populating tables	516
	- Database Values	518
	- Using Default	519
	- General Comments	520
	- Updating Data in Oracle Tables	521
	- Deleting Data in an Oracle Table	523
	- Large Objects	524
	- Bfiles	526
	- Binary Float/Doubles	527
	- Using the Merge technique	528
	- Multiple Table Inserts	533
	- Unconditional Multiple Inserts	534
	- Conditional First Multiple Insert	536
	- Conditional All Multiple Insert	538
	- <b>Pivoting Multiple Insert</b>	<b>540</b>
<b>Eighteen</b>	<b>Committing Records</b>	<b>542</b>
	- Autocommit	546
	- Rollback	547
	- Savepoints	548
	- Exitcommit in SQL*Plus	550
	- For Update in SQL	552
	- For Update in SQL using 'where'	553
	- For Update in SQL naming Columns	554
	- <i>Exercise Eleven</i>	228
<b>Nineteen</b>	<b>Flashback Query in Oracle Databases</b>	<b>562</b>
	- Dbms_Flashback	569
	- Time Flashbacks	570
	- SCN Flashbacks	575
	- Flashback Example	576
	- Implicit Flashback	579
	- <i>Exercise Twelve</i>	582
<b>Twenty</b>	<b>Materialized Views</b>	<b>584</b>
	- Introduction	585
	- Syntax for MVs	587
	- Refreshing MVs	589
	- Building MVs	595
	- Removing MVs	597
	- Miscellaneous	598
	- Metadata	599
	- <i>Exercise Thirteen</i>	600



Section	Title	Page	
Twenty One	<b>Regular Expressions in Oracle SQL</b>	604	
	– Introduction	605	
	– Using REGEXP_LIKE in Where Clauses	608	
	– Case Sensitivity in Regex	610	
	– Line Anchors in Regex	612	
	– Using the Dot (Any Character)	614	
	– Counting Characters {Intervals}	618	
	– Character Lists in Regex	622	
	– Excluding Character Lists	628	
	– Alternatives to Character Lists	629	
	– Class Shorthands	633	
	– Or Patterns (Alternatives)	634	
	– Or Patterns with Character Lists	635	
	– Using the Question Mark (Optional)	636	
	– Using the Plus sign (Mandatory)	639	
	– Using the Star sign (Optional)	642	
	– Backreferencing in Regex	643	
	– POSIX	645	
	– Using POSIX in Oracle - [:upper] example	647	
	– Using POSIX in Oracle - [:digit] example	648	
	– Using POSIX in Oracle – Character equivalents	649	
	– Using Regexp_count in SQL	650	
	– Using Regexp_replace in SQL	654	
	– Using Regexp_instr in SQL	656	
	– Using Regexp_substr in SQL	658	
	– Using Regular Expressions in Oracle	660	
	– <i>Exercise Fourteen</i>	661	
	Twenty Two	<b>SQL Loader</b>	669
		– Introduction	670
		– Invoking SQLLDR	671
		– Integrated Control Files	672
		– Commenting in Control Files	675
		– Optionally Enclosed By '''	676
		– Badfile	677
– Dealing with Dates and Time in the Control File		679	
– Setting Datatypes in the Control File		683	
– Using the Filler Datatype		685	
– Inserting Values Not Found in the Data		686	
– Trailing Nullcols		687	
– Using Functions in Control Files		688	
– Using Functions with Filler in Control Files		689	
– Using Nullif in Control Files		690	
– Using Defaultif in Control Files		691	
– Variations in Data		693	
– Working with Multi-Line Records Using Continueif		695	
– Preserve Blanks		697	
– Skipping Records		698	
– Selecting Records with a 'When' Clause		699	
– Using Discard Files with When Clause		701	
– Working with Fixed Length Values		702	
– Using When with Fixed Length Values		704	
– Loading more than One Set of Data		707	
– Using External Infiles		708	
– Running SQLLDR		709	
– SQLLDR Switches	710		

Section	Title	Page
	- SQLLDR Switches – Specifying Files	711
	- SQLLDR Switches – Specifying Load Numbers	713
	- SQLLDR Switches – Long Commands in DOS	714
	- SQLLDR Parameter File	715
	- <i>Exercise Fifteen</i>	716
<b>Twenty Three</b>	<b>External Tables</b>	719
	- Introduction	720
	- Syntax for External Tables	721
	- Create Oracle Directories	722
	- Viewing Existing Directories	723
	- Creating External Tables with Comma Separated Files	724
	- Creating External Tables	725
	- Access Parameters	727
	- Access Parameters (Comma Separated)	728
	- Access Parameters (Tab Separated)	729
	- Access Parameters – Defining Fields	730
	- Access Parameters (Missing Field Values are Null)	723
	- Access Parameters (Reject Rows With all Null Fields)	733
	- Access Parameters (Load When)	734
	- Access Parameters (Skip)	736
	- Access Parameters (Audit Tables)	737
	- Access Parameters (Logfile)	738
	- Access Parameters (Badfile)	741
	- Access Parameters (Discardfile)	743
	- Access Parameters (Reject Limit)	744
	- Access Parameters for Fixed Length Files	745
	- Using Load When with Position	751
	- Using Alter Table with External Tables	752
	- Metadata for External Tables	753
	- Using Oracle Datapump	754
	- Losing the External File	756
	- <i>Exercise Sixteen</i>	757
<b>Twenty Four</b>	<b>Exporting &amp; Importing Data into Oracle</b>	758
	- Introduction	759
	- Exporting	760
	- EXP-00091: Exporting questionable statistics.	768
	- Exporting using the Command Line	769
	- Exporting using a Parameter File	770
	- Naming Tables using a Parameter File	771
	- Command Line Options	772
	- Importing	773
	- Importing using the Command Line	780
	- Importing using a Parameter File	781
	- Command Line Options	782
<b>Twenty Five</b>	<b>Exporting with Data Pump</b>	783
	- Introduction	784
	- Exporting using Expdp	785
	- Replacing Existing Files	787
	- Exporting Specific Tables using Expdp	788
	- Using Expdp with a Parameter File	792
	- Importing using Impdp	793
	- <i>Exercise Seventeen</i>	794
<b>Twenty Six</b>	<b>Advanced Date Datatypes</b>	795
	- Date Datatypes	796
	- Database Timezone	798



Section	Title	Page
	- Timestamp	804
	- Timestamp and Sysdate	805
	- Extract	809
	- To_Timestamp	810
	- Timestamp with Time Zone	812
	- Time Zone and Extract	815
	- TZ_Offset	816
	- Time Zones and UTC	817
	- To_Timestamp_TZ	819
	- From_TZ	820
	- Timestamp with Local Time Zone	821
	- Intervals	822
	- Assigning Year Intervals	825
	- Assigning values to Day Intervals	827
	- Using Intervals	829
	- Intervals and Extract	835
	- <i>Exercise Eighteen</i>	836
<b>Twenty Seven</b>	<b>Basic Administration</b>	<b>844</b>
	- Passwords	844
	- Sqlprompt	845
	- Creating Users/Roles	846
<b>Twenty Eight</b>	<b>DBMS_METADATA</b>	<b>849</b>
	- Generating Database Object Scripts	850
	- List of Object Types	851
	- Example of Using Dbms_Metadata	852
	- <i>Exercise Nineteen</i>	854
<b>Twenty Nine</b>	<b>Object Oriented Programming</b>	<b>855</b>
	- Introduction	856
	- Definition of Objects	857
<b>Thirty</b>	<b>Row Objects</b>	<b>862</b>
	- Introduction	863
	- Creating	864
	- Metadata	866
	- Data	867
	- Indexes	868
	- Views	870
	- Removing	871
	- OIDs	873
<b>Thirty One</b>	<b>Column Objects</b>	<b>881</b>
	- Introduction	882
	- Describing	883
	- Inserting into	886
	- Selecting from	888
	- Updating	894
	- Object Views	895
<b>Thirty Two</b>	<b>Collections (Varying Arrays)</b>	<b>897</b>
	- <b>Introduction</b>	<b>898</b>
	- <b>Defining a single element</b>	<b>900</b>
	- <b>Inserting</b>	<b>901</b>
	- <b>Selecting</b>	<b>903</b>
	- <b>Updating</b>	<b>905</b>
	- <b>Deleting</b>	<b>906</b>
	- <b>Defining using an Abstract datatype</b>	<b>907</b>
	- <b>Inserting an Abstract datatype</b>	<b>908</b>
	- <b>Selecting an Abstract datatype</b>	<b>909</b>

<b>Section</b>	<b>Title</b>	<b>Page</b>
Thirty Three	Collections (Nested Tables)	910
	- Introduction	911
	- Defining	912
	- Inserting	917
	- Selecting	920
	- Updating	923
	- Deleting	924
	- Exercise Twenty	925

**Appendices:**

- Appendix S1 – SQL Functions**
- Appendix S2 – SQL Line Editor Commands**
- Appendix S3 – SQL Environment Settings**
- Appendix S4 – SQL Syntax**
- Appendix S5 – SQL Number Formats**
- Appendix S6 – SQL Date Formats**

**Delegate Questionnaire**