

## Oracle 19c SQL using Apex 20

Section	Title	Page	
<b>One</b>	<b>Introduction to SQL</b>	2	
	– Definition of SQL	3	
	– Definition of a Database	4	
	– Application Express	5	
<b>Two</b>	<b>Using Application Express</b>	6	
	– Introduction	7	
	– Logging in	9	
	– Exiting the Session	13	
	– Timeout and Session Expiry	14	
	– Topography	16	
<b>Three</b>	<b>SQL Scripts</b>	21	
	– Introduction	29	
	– Topography	30	
	– Upload Script	33	
	– Script Editor	35	
	– Run Script	38	
	– Manage Results	41	
	– Import	49	
	– Export	54	
	– Show Quotas	61	
	– Create	67	
	– <i>Exercise One</i>	68	
	<b>Four</b>	<b>Database Objects</b>	70
		– Introduction	77
– Tables		78	
– Views		79	
– Materialized Views		80	
– Indexes		81	
– Sequences		82	
– Packages, Functions and Procedures		83	
– Synonyms and Schemas		84	
– The Schema		85	
<b>Five</b>	<b>Object Browser with Tables</b>	86	
	– Introduction	87	
	– Table	88	
	– Sample Queries	90	
	– Data	92	
	– Limitations of Query	96	
	– Insert Row	104	
	– Count Rows	105	
	– Indexes	107	
	– Model	108	
	– Constraints	109	
– <i>Exercise Two</i>	112		
<b>Six</b>	<b>SQL Commands</b>	120	
	– Introduction	121	
	– Find Tables	123	
	– Saving SQL	128	
	– Saved SQL	129	

## Oracle 19c SQL using Apex 20

Section	Title	Page
	- History	130
	- Download	131
	- Settings	132
	- Invalid SQL	133
	- Number of Rows returned	135
	- Explain	137
<b>Seven</b>	<b>Simple Queries</b>	142
	- Introduction	143
	- Oracle Metadata	145
	- SQL Syntax	150
	- Counting Records in an Oracle Table	153
	- Displaying Literals in a Select statement	155
	- Displaying Variables in a Select statement	158
	- Column Aliases	159
	- Column Manipulation with SQL Functions	162
	- Concatenating Columns in SQL	168
	- Performing Calculations in SQL	169
	- Ordering Data in SQL	170
	- Ordering More than One Column	172
	- Ordering with nulls first / nulls last	173
	- Manipulating Dates in SQL	174
	- Displaying Dates in SQL	175
	- <i>Exercise Three</i>	176
<b>Eight</b>	<b>Limiting Data Selected with Where Clauses</b>	183
	- Limiting Data in SQL	184
	- Structure of an SQL Where Clause	185
	- Different types of SQL Where Clauses	186
	- Handling Nulls in Where Clauses	194
	- Case Restrictions in SQL Where Clauses	195
	- Using Functions in Where Clauses	196
	- Rownum in SQL Tables	199
	- Using Rowid in SQL Tables	201
	- Fetch first rows of a Table (Top-N)	203
	- Using Percent with Fetch in Oracle 19c	204
	- Using Offset with Fetch in Oracle 19c	205
	- Using With Ties with Fetch in Oracle 19c	206
	- <i>Exercise Four</i>	207
<b>Nine</b>	<b>Oracle Datatypes</b>	212
	- Introduction	213
	- Varchar2	214
	- ORA-00910: specified length too long for its datatype	216
	- Varchar2 and Char	217
	- Number	218
	- Date	219
	- Float	220
	- Long	221
	- Large Objects	222
	- Bfile	226

## Oracle 19c SQL using Apex 20

Section	Title	Page	
Ten	<b>Aggregating Values</b>	227	
	– Introduction	228	
	– Using Group By	229	
	– Using Having with Group By	232	
	– Using Rollup to Total Grouping	234	
Eleven	<b>Tree Walking Tables in SQL</b>	235	
	– Introduction	236	
	– Syntax for Tree Walking in SQL	238	
	– Advanced Ordering of Siblings in Tree Walks	239	
	– Sys_Connect_By_Path	241	
Twelve	<i>Exercise Five</i>	243	
	<b>Query Builder</b>	247	
	– Introduction	248	
	– Topography	251	
	– The Selection Pane	252	
	– Conditions	253	
	– Conditions – Alias	254	
	– Conditions – Condition	255	
	– Conditions – Sorting	256	
	– Conditions – Show	257	
	– Conditions – Function / Group By	258	
	– Conditions – Sequencing Columns	262	
	– Copying the SQL	263	
	– Saving SQL	264	
	– Summation	266	
	– <i>Exercise Six</i>	267	
	Thirteen	<b>Joining Tables in an SQL Statement</b>	277
		– Using Table Aliases in SQL	278
		– Linking Tables in an SQL statement	280
		– Using Query Builder to link Tables	283
– Linking Tables in Query Builder Manually		289	
– Linking Multiple Tables in Query Builder		290	
– Linking Tables in an SQL statement		293	
– Problems with Joining Tables in SQL		295	
– Methods of Joining Tables in SQL		298	
– Using Ansi SQL/86 to Join Tables		299	
– Ansi SQL/86 and Outer Joins		300	
– Ansi SQL/99 Standards (Natural Joins)		303	
– Ansi SQL/99 Standards (Cross Joins)		304	
– Ansi SQL/99 Standards (Joins/Using)		305	
– Ansi SQL/99 Standards (On)		306	
– Ansi SQL/99 Standards (Multiple On)		307	
– Ansi SQL/99 Standards (Left Outer Joins)		308	
– Ansi SQL/99 Standards (Right Outer Joins)		309	
– Ansi SQL/99 Standards (Full Outer Joins)		310	
– Merging Tables in SQL		311	
– Using Union to Merge Tables in SQL		312	
– Using Union All to Merge Tables in SQL	313		
– Using Intersect to Merge Tables in SQL	314		
– Using Minus to Merge Tables in SQL	315		
– Knowledge Check	316		

## Oracle 19c SQL using Apex 20

Section	Title	Page
	- Knowledge Check – Union	317
	- Knowledge Check – Union All	318
	- Knowledge Check – Intersect	319
	- Knowledge Check – Minus	320
	- Using the Merge Syntax in SQL	321
	- <i>Exercise Seven</i>	322
<b>Fourteen</b>	<b>Oracle Sub-Queries</b>	327
	- Introduction	328
	- Using Equals	330
	- Using In	332
	- Using Exists	334
	- Using Any	336
	- Using Some	337
	- Using All	338
	- Correlated Sub-Queries	339
	- Inline Views	341
	- Sub-Queries in a Select Statement	343
	- Sub-Query Factoring (Using With)	345
	- Sub-Query Factoring Example with Aliases	347
	- <i>Exercise Eight</i>	350
<b>Fifteen</b>	<b>Using Alternative Quoting Mechanism in SQL</b>	355
	- <b>Introduction to AQM</b>	356
	- <b>Using Alternative Quoting Mechanism</b>	357
<b>Sixteen</b>	<b>Regular Expressions in Oracle SQL</b>	359
	- Introduction	360
	- Using REGEXP_LIKE in Where Clauses	363
	- Case Sensitivity in Regex	365
	- Line Anchors in Regex	367
	- Using the Dot (Any Character)	369
	- Counting Characters {Intervals}	373
	- Character Lists in Regex	377
	- Excluding Character Lists	383
	- Alternatives to Character Lists	384
	- Class Shorthands	388
	- Or Patterns (Alternatives)	389
	- Or Patterns with Character Lists	390
	- Using the Question Mark (Optional)	391
	- Using the Plus sign (Mandatory)	394
	- Using the Star sign (Optional)	397
	- Backreferencing in Regex	398
	- POSIX	400
	- Using POSIX in Oracle – [:upper] example	402
	- Using POSIX in Oracle – [:digit] example	403
	- Using POSIX in Oracle – Character equivalents	404
	- Using Regexp_count in SQL	405
	- Using Regexp_replace in SQL	409
	- Using Regexp_instr in SQL	411
	- Using Regexp_substr in SQL	413
	- Using Regular Expressions in Oracle	415
	- <i>Exercise Nine</i>	416

## Oracle 19c SQL using Apex 20

Section	Title	Page	
Seventeen	<b>Advanced SQL Query Techniques</b>	424	
	– Introduction	425	
	– Pivot	426	
	– Adding a Total to a Pivot	431	
	– Changing the Pivot Headings of X Axis	432	
	– Rotating the Axis of the Pivot	434	
	– Unpivot	435	
	– Unpivot and Null values	438	
	– Using First_Value/Last_Value in SQL	439	
	– Ignoring Nulls with First/Last_Value	441	
	– Window Specification	442	
	– Breakdown of Window Specification	443	
	– Window Specification – The Arguments	445	
	– Window Specification – Query Partition	446	
	– Window Specification – The Order By	448	
	– Window Specification – The Windowing	450	
	– Window Specification – Rows between	452	
	– Window Specification – Shortcuts	456	
	– Difference between Range and Rows	457	
	– Using Lead and Lag in SQL	460	
	– Using Rank Function in SQL	464	
	– Using Ntile Function in SQL	471	
	– Using Width_Bucket Function in SQL	473	
	– Using Listagg Function in SQL	476	
	– Using Case Function in SQL	478	
	– <i>Exercise Ten</i>	482	
	Eighteen	<b>Creating SQL Database Objects</b>	488
		– Creating Tables in SQL	489
		– Mandatory Columns in SQL Tables	491
		– Using Application Express	492
		– Create Table	496
		– Create Columns	500
– Table Indexing		506	
– Primary Keys		507	
– Sequences		509	
– Identity		511	
– Sys_guid		512	
– Primary Keys in Apex		513	
– Primary Keys – Populated from a new sequence		514	
– Primary Keys – Populated from an existing sequence		515	
– Primary Keys – Not populated		516	
– Primary Keys – Populated by Identity column		517	
– Foreign Keys		518	
– Foreign Keys and Cascading		521	
– Constraints		523	
– Unique Keys		526	
– Confirm		528	
– Creation Syntax for Tables in SQL	529		
– Virtual Columns	532		

## Oracle 19c SQL using Apex 20

Section	Title	Page
	- Creating Virtual Columns with new Table	533
	- Specifying Virtual Column Datatype and Size	534
	- Adding Virtual Columns to Existing Table	535
	- Using Virtual Columns in SQL ...	536
	- Using Virtual Columns with Functions	537
	- Limitations of Virtual Columns (ORA-54012)	538
	- Limitations of Virtual Columns (ORA-54015)	539
	- Limitations of Virtual Columns (ORA-54013)	540
	- Viewing Virtual Columns in USER_TAB_COLS	541
	- Invisible Columns in Oracle 19c	542
	- Commenting on Tables in SQL	545
	- Commenting on Columns in SQL	546
	- Using Default Value in SQL Tables	547
	- Using Default Value in Oracle 19c	548
	- Using Identity in Oracle 19c	549
	- Using Sys_guid in Oracle 19c	551
	- Index Creation in SQL	552
	- Disabling Indexes in SQL	554
	- Views	555
	- SQL Syntax for Views	557
	- Views in Object Browser	558
	- Dropping Views in Object Browser	563
	- Views Code in Object Browser	564
	- Views Data in Object Browser	565
	- Views Query in Object Browser	566
	- Views Count Rows in Object Browser	567
	- Views Insert Rows in Object Browser	568
	- Views Grants in Object Browser	570
	- Views UI Defaults in Object Browser	571
	- Views Dependencies in Object Browser	572
	- Views SQL in Object Browser	573
	- Creating Sequences in SQL	574
	- Using Sequences in SQL	575
	- Altering Sequences in SQL	577
	- Renaming Objects in an Oracle Database	578
	- Dropping Objects from an Oracle Database	581
	- Granting Access to other Schemas	582
	- Granting Access to other Schemas with Query Builder	583
	- Granting Access to other Schemas	586
	- Accessing other Schemas	588
	- Creating Synonyms in Object Browser	589
	- <i>Exercise Eleven</i>	593
<b>Nineteen</b>	<b>Altering the structure of Oracle Tables/Views</b>	<b>597</b>
	- Introduction	598
	- Some Rules When Altering Tables	599
	- Syntax for Altering Tables	600
	- Using Object Browser	601
	- Using Object Browser – Add Column	602
	- Using Object Browser – Modify Column	604



## Oracle 19c SQL using Apex 20

Section	Title	Page
	– Using Object Browser – Rename Column	606
	– Using Object Browser – Drop Column	607
	– Using Object Browser – Rename (Table)	608
	– Using Object Browser – Copy (Table)	609
	– Using Object Browser – Drop	613
	– Using Object Browser – Truncate (Table)	614
	– Using Object Browser – Create Lookup Table	615
<b>Twenty</b>	<b>Populating Tables with Object Browser</b>	<b>622</b>
	– Introduction	623
	– Rules When Populating Tables in SQL	624
	– Using Object Browser	625
	– Syntax for Populating Tables	633
	– Using Variables To Populate Tables	638
	– General Comments	639
	– Updating Data in Oracle Tables	640
	– Deleting Data from Oracle Tables	642
	– Handling Large Objects in SQL Plus	643
	– Handling BFiles in SQL Plus	645
<b>Twenty One</b>	<b>Committing Records</b>	<b>646</b>
	– The Difference Between DDL & DML	647
	– <i>Exercise Twelve</i>	650
<b>Twenty Two</b>	<b>Materialized Views</b>	<b>663</b>
	– Introduction	664
	– Object Browser	666
	– Drop	667
	– Data	668
	– Query	669
	– Count Rows	670
	– Details	671
	– Grants	672
	– Dependencies	673
	– SQL	674
	– Creating in Object Browser	675
	– Syntax for Creating Materialized Views	677
	– Refreshing Materialized Views	680
	– Building Materialized Views	686
	– Dropping Materialized Views	688
	– <i>Exercise Thirteen</i>	689
<b>Twenty Three</b>	<b>Advanced Date Datatypes</b>	<b>692</b>
	– Introduction	693
	– Database Timezone	694
	– Date Datatypes	696
	– Timestamp	700
	– Extract	705
	– To_Timestamp	706
	– Timestamp with Time Zone	708
	– Time Zone and Extract	711
	– TZ_Offset	712
	– Time Zones and UTC	713
	– To_Timestamp_TZ	715
	– From_TZ	716

## Oracle 19c SQL using Apex 20

Section	Title	Page
	- Timestamp with Local Time Zone	717
	- Intervals	718
	- Assigning Year Intervals	721
	- Assigning values to Day Intervals	723
	- Using Intervals	725
	- Intervals and Extract	731
	- <i>Exercise Fourteen</i>	732
<b>Twenty Four</b>	<b>Flashback</b>	738
	- Introduction	739
	- Flashback Query	740
	- Using the Dbms_Flashback package	744
	- Using Time Flashbacks	745
	- Disabling Flashbacks	749
	- Using SCN Flashbacks	750
	- Implicit Flashback using AS OF	752
	- Flashback using Versions Between	754
	- Using the Flashback_transaction_query View	759
<b>Twenty Five</b>	<b>Application Express Utilities</b>	762
	- Introduction	763
	- Data Workshop	765
	- Data Load	766
	- Loading CSV files	767
	- Loading CSV into a new Table	769
	- Loading CSV into existing Table	777
	- Loading XLSX	784
	- Loading XLSX into a new Table	785
	- Loading XLSX into existing Table	793
	- XML Data	800
	- Loading XML into a new Table	802
	- Loading XML into existing Table	808
	- JSON Data	814
	- Loading JSON into a new Table	815
	- Loading JSON into existing Table	821
	- Data Unload	827
	- Unload to Text	828
	- Unload to XML	835
	- Sample Datasets	841
	- Generate DDL	848
	- <i>Exercise Fifteen</i>	855
	- User Interface Defaults	864
	- Schema Comparison	874
	- Recycle Bin	878
	- Object Reports	883
	- General Comments	884
	- Table Reports	929
	- Security Reports	935
	- PL/SQL Reports	940
	- All Object Reports	943
	- Exception Reports	950
	- <i>Exercise Sixteen</i>	954