GOVERNMENT POLYTECHNIC, NAGPUR.

(An Autonomous Institute of Govt. of Maharashtra)

COURSE CURRICULUM

PROGRAMME	:	**DIPLOMA IN CM/IT**
LEVEL NAME	:	**PROFESSIONAL COURSES**
COURSE CODE	:	**CM406E^5**
COURSE TITLE	:	**RELATIONAL DATABASE MANAGEMNT SYSTEM**
PREREQUISITE	:	**NIL**
TEACHING SCHEME	:	**TH: 03; TU: 00; PR: 04(CLOCK HRs.)**
TOTAL CREDITS	:	**05 (1 TH/TU CREDIT = 1 CLOCK HR., 1 PR CREDIT = 2 CLOCK HR.)**
TH.EEE EXAM	:	**03 HRS**
PR.EEE EXAM	:	**02 HRS (External)**
PT EXAM	:	**01 HRS**

❖ RATIONALE:

Database Management Systems (DBMS) are vital components of modern information systems. The course focuses on the fundamentals of knowledge base and relational database management systems. In this course the relational data model, relational query languages, relational database design are reviewed. The students will have theoretical foundation required for working with different types of relational database products, such as ORACLE.

❖ COURSE OUTCOMES:

After completing this course students will be able to–

1. Design database by using different models.
2. Design the normalized relational database for any given system, apply locks and partitions.
3. Identify basic keys in the designed database & apply different constraints.
4. Create, update and administer a relational database.
5. Retrieve data from database by using different clauses, operators & functions etc.
6. Write PL/SQL block, procedures, functions and exceptions.

❖ **COURSE DETAILS:**

A. THEORY :

Units	Specific Learning Outcomes (Cognitive Domain)	Topics and subtopics	Hrs.
1. Database System Concept	1. Define database and different Database terms. 2. Compare old file processing system and DBMS. 3. State the importance of DBMS tools. 4. Describe the overall structure & components of DBMS 5. Describe architecture of Client/ Server system. 6. State codd's law. 7. State the different functions of DBA. 8. Describe different types of users.	1.1 An Introduction to database. Data, database, DBMS, Disadvantages of file processing system, and advantages of DBMS over file processing system, Application of database. 1.2 What is RDBMS, Difference between DBMS and RDBMS, Names of various DBMS and RDBMS software 1.3 Data abstraction, Instance and schema, Data independence - Logical and Physical Independence, Data abstraction levels. 1.4 Components of DBMS and overall Structure of DBMS. Database Users, functions of Database Administrator. 1.5 Introduction to client server architecture. Two/Three tier Architecture. 1.6 The 12 Rules (Codd's laws) for fully functional RDBMS.	06
2. Relational Data Model, Security and Integrity Specification	1. Define different terms related to relational model. 2. Design E-R Model for given system. 3. State use of different components of ER Model. 4. State use of various data constraints. 5. State the need of data security. 6. Compare different data model. 7. Apply different constraints. 8. Design database by Using various data models.	2.1 Data Model: Structure of: Network Model, Hierarchical Model, Relational Model 2.2 Relational Model - Basic Concepts, Entity, Attributes, Tuple and Domains. Key Concepts-Primary key, Super key, Alternate key, Candidate key, Composite key and Foreign key. 2.3 E-R model- Components of ER Model, Types of attributes, weak & strong entity set. 2.4 Integrity Constraints: Domain Integrity Constraints, Entity integrity Constraints & Referential Integrity Constraints, on delete cascade. 2.5 Database Security: introduction, Data security requirements,	05

		authorization.	
3. Relational Database Design, Storage & File System	1. Describe the process of Normalization. 2. Apply various Normal forms to reduce or remove data redundancy. 3. Define different terms related to normalization. 4. State different techniques of record organization. 5. Define functional dependency and its types. 6. State properties of FD. 7. Apply different types of indexes on table data.	3.1 Introduction: Purpose of normalization, Data Redundancy, update anomalies, decomposition properties, Functional dependency (FD), Classification of Functional dependency, properties of FD. 3.2 Normalization using: 1NF, 2NF, 3NF and BCNF. Multi-valued dependencies. 3.3 File organization, organization of records in files. Basic concept of indexing & hashing, Index Types.	08
4. SQL and Database Languages	1. Design SQL queries to create Relational database and apply data constraints 2. State various DML commands. 3. Apply various operators & functions to retrieve data from database. 4. State the use of NULL value. 5. State the use of nested query, different types of join to retrieve data from more than one object. 6. Apply appropriate clauses to retrieve data. 7. Write relational algebra expression to retrieve data from database. 8. Translate relational algebra expression into relation calculus expression.	4.1 Data Types in SQL 4.2 Components of SQL: DDL- create alter rename drop, truncate, DESC, Use of constraints, DML- insert, update , delete, select TCL begin transaction, commit, rollback, save-point DCL- Grant & Revoke 4.3 Clauses: select, from, where, group by, having and order by 4.4 Operators: Arithmetic, relational, set, comparison, Functions: Aggregate, string, date-time & conversion functions. 4.5 Null Value, sub-query, Nested Sub-queries, break, compute command & compute functions. 4.6 Join Concept, types of join- Natural Join, Self join, Outer join types- left, right & Full outer join, View 4.7 Indexes: Creating Indexes, Dropping Indexes. 4.8 Creating users, locks and partitions, Sequences: Creating Sequences, Altering Sequences and Dropping Sequences. 4.9 Database languages-Procedure oriented- Relational algebra, Non-procedure oriented – Relational Calculus (Tuple and Domain calculus)	14

5. PL/SQL	1. State the features and components of the PL/SQL. 2. Write simple PL/SQL Code using control structure and handle various exceptions. 3. Create stored procedures and implement functions. 4. State the difference between simple PL/SQL program and same with cursor. 5. Create different cursor to store more than one record. 6. Design package to store different procedure and functions. 7. Plan database trigger. 8. Create database trigger using PL/SQL.	5.1 Introduction of PL/SQL, Advantages of PL/SQL ,The PL/SQL Block Structure, PL/SQL execution environment, PL/SQL data Types, Variables, Constants 5.2 Control Structure: Conditional Control, Iterative Control, Sequential Control. 5.3 Exception handling: Predefined Exception, User defined Exception. 5.4 Cursors: Implicit and Explicit Cursors, Declaring, Opening and Closing a Cursor, Fetching a Record from Cursor, Cursor for loops, Parameterized Cursors. 5.5 Procedures: Advantages, Creating, Executing and Deleting a Stored procedure. 5.6 Functions: Advantages, Creating & Deleting a Function, use of Package 5.7 Database Triggers: Use of Database Triggers, Types of Triggers, Syntax for Creating Trigger, Deleting Trigger.	10
6. Query Processing, Deadlock & Introduction to Warehousing	1. Define transaction. 2. Describe different States of Transaction. 3. Enlist and describe Transaction properties. 4. Describe the process of transaction evaluation. 5. Write equivalent expression for different operation. 6. Define serializability. 7. State use of different protocols. 8. State different functions used in data warehousing.	6.1 Query processing strategy, equivalence expression for selection & join operation. 6.2 Transaction Processing: The concept of Transaction, Definition in SQL, Transaction properties, States of Transaction, Concurrent execution of multiple transaction, Serializability, Recoverability. 6.3 Lock Based Protocols: share & Exclusive, 2 phase locking, time stamp based, validation based & Multiple Granularity 6.4 Deadlock Handling, prevention, detection & recovery 6.5 Introduction to Data Mining & Data Warehousing, functions used in Data Mining and Data Warehousing.	05
		Total Hours	**48**

B. LIST OF PRACTICALS/LABORATORY EXPERIENCES/ASSIGNMENTS:

Practicals	Specific Learning Outcomes (Psychomotor Domain)	Units	Hrs.
1	Design database by using Network Model, Hierarchical Model, Relational Model & E-R Model.	Relational Data Model, Security and Integrity Specification	02
2	Identify Entity, Attributes, Tuple, Domains & prime keys available in above created model.		02
3	Design a Normalized Database. Identify available dependencies in created database. Identify types of used normal form.	Relational Database Design, Storage & File System	02
4	Create & Execute DDL commands in SQL & Apply various Integrity constraints on above created table.	SQL and Database Languages	04
5	Create & Execute DML commands in SQL.		04
6	Write Queries using various operators Arithmetic, Set operator, Relational operator and Comparison Operator to retrieve data.		04
7	Use different Aggregate functions, String functions, Date-time functions, Data Conversion functions such as To char(), To Number() and To date(). Also display special date formats using To char() function.		04
8	a. Write sub query & Nested Sub queries to retrieve data from more than one table. b. Use break & compute command, apply different compute functions.		04
9	Execute Queries using the Select Command with Where, Having, Group by and order by clauses.		02
10	Execute the queries for implementation of Inner, Outer and Cross Join.		04
11	Execute DCL and TCL commands in SQL		02
12	Create Views. Retrieve data from view by using all six clauses.		02
13	Create table with four partitions for any database.		02
14	Write the basic PL/SQL Programs. Write a PL/SQL programs using control statements.	PL/SQL	02
15	Write PL/SQL Programs using Iterative Control statements.		04
16	Write a PL/SQL code to implement implicit and explicit cursors.		04
17	Write PL/SQL Programs based on Exceptions handling.(Predefined and user-defined exceptions)		02
18	Write PL/SQL code for creating Procedures, functions and package.		02
19	Create database triggers. Use DML operations to fire created trigger.		02
20	Mini project (based on any application)		06
		Skill Assessment	**04**
		Total Hrs	**64**

❖ SPECIFICATION TABLE FOR THEORY PAPER:

Unit No.	Units	Levels from Cognition Process Dimension			Total Marks
		R	U	A	
01	Database System Concept	02(00)	04(04)	00(00)	06(04)
02	Relational Data Model, Security and Integrity Specification	02(00)	08(04)	00(00)	10(04)
03	Relational Database Design, Storage & File System	02(02)	04(04)	06(00)	12(06)
04	SQL and Database Languages	02(00)	08(04)	12(06)	22(10)
05	PL/SQL	00(02)	08(04)	06(06)	14(12)
06	Query Processing, deadlock & Introduction to warehousing	02(00)	04(04)	00(00)	06(04)
	Total	**10(04)**	**36(24)**	**24 (12)**	**70 (40)**

R – Remember U – Understand A – Analyze / Apply

❖ QUESTION PAPER PROFILE FOR THEORY PAPER:

Q. No	Bit 1			Bit 2			Bit 3			Bit 4			Bit 5			Bit 6			option
	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	T	L	M	
01	1	R	2	2	R	2	3	R	2	4	R	2	6	R	2	3	R	2	5/7
	5	R	2																
02	1	U	4	2	U	4	2	U	4	2	U	4	1	U	4				3/5
03	3	U	4	4	U	4	4	U	4	3	U	4	4	U	4				3/5
04	5	U	4	5	U	4	6	U	4	5	U	4	6	U	4				3/5
05	3	A	6	4	A	6	4	A	6										2/3
06	4	A	6	5	A	6	6	A	6										2/3

T= Unit/Topic Number L= Level of Question M= Marks

R-Remember U-Understand A-Analyze/ Apply

❖ ASSESSMENT AND EVALUATION SCHEME:

	What		To Whom	Frequency	Max Marks	Min Marks	Evidence Collected	Course Outcomes
Direct Assessment Theory	CA (Continuous Assessment)	Progressive Test (PT)	Students	Two PT (average of two tests will be computed)	20	--	Test Answer Sheets	1, 2, 3
		Assignments		Continuous	10	--	Assignment Book / Sheet	1, 2, 3
	TEE (Term End Examination)	End Exam	Students	End Of the Course	**70**	**28**	Theory Answer Sheets	1, 2, 3
				Total	**100**	**40**		
Direct Assessment Practical	CA (Continuous Assessment)	Skill Assessment	Students	Continuous	20	--	Rubrics & Assessment Sheets	4,5,6
		Journal Writing		Continuous	05	--	Journal	4,5,6
				TOTAL	**25**	**10**		
	TEE (Term End Examination)	End Exam	Students	End Of the Course	**50**	**20**	Rubrics & Practical Answer Sheets	4,5,6
Indirect Assessment	Student Feedback on course		Students	After First Progressive Test	Student Feedback Form			1, 2, 3, 4,5,6
	End Of Course			End Of The Course	Questionnaires			

❖ **SCHEME OF PRACTICAL EVALUATION:**

S.N.	Description	Max. Marks
1	Design normalized database, apply proper constraints, make use of operators etc.	20
2	Performance	10
3	Selection of proper clauses and functions, writing PL/SQL programs to retrieve data etc.	10
4	Viva voce	10
	TOTAL	**50**

❖ **MAPPING COURSE OUTCOMES WITH PROGRAM OUTCOMES:**

❖ **Computer Engineering :-**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	1	-	-	-	-	3	3	3
2	-	3	-	-	-	-	-	-	-	3	3	3
3	-	3	-	-	-	-	-	-	-	3	3	3
4	-	3	3	3	-	-	-	3	3	3	3	3
5	-	3	3	3	-	-	-	3	3	3	3	3
6	-	3	3	3	-	-	-	3	3	3	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **Information Technology :-**

Course Outcomes	Program Outcomes (POs)										PSOs	
	1	2	3	4	5	6	7	8	9	10	1	2
1	-	3	-	-	1	-	-	-	-	3	1	3
2	-	3	-	-	-	-	-	-	-	3	-	3
3	-	3	-	-	-	-	-	-	-	3	-	3
4	-	3	3	3	-	-	-	3	3	3	1	3
5	-	3	3	3	-	-	-	3	3	3	-	3
6	-	3	3	3	-	-	-	3	3	3	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

❖ **REFERENCE & TEXT BOOKS:**

S.N.	Title	Author, Publisher, Edition and Year Of publication	ISBN Number
1.	Database System Concepts	Abraham Silberschatz, Henry F. Korth And S. Sudarshan, Mcgraw hill Education, 6th Edition, 2013	9789332901384
2.	Introduction to Database Management Systems	2006 ISRD Group, Tata McGraw Hill Education, 2005.	9780070591196
3.	An Introduction to Database System	Bipin Desai, West Publishing Company, 1997	13: 9780314667717
4.	Database Systems The Complete Book	Hector Garcia-Molina Jeffrey D.Ullman Jennifer Widom, Pearson Education Inc, 2,2002	0-13-606701-8 978-0-13-606701-6

❖ **E-REFERENCES:**

- http://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm , assessed on 29th July 2016
- http://www.studytonight.com/dbms/rdbms-concept.php, assessed on 29th July 2016
- https://www.youtube.com/watch?v=0mn7wIAdu98, assessed on 29th July 2016

❖ **LIST OF MAJOR EQUIPMENTS/INSTRUMENTS WITH SPECIFICATION**

1. Personal Computer with Operating system (XP, Windows etc)
2. Open Source Database Tools (Oracle/ Mysql)

❖ **LIST OF EXPERTS & TEACHERS WHO CONTRIBUTED FOR THIS CURRICULUM:**

S.N.	Name	Designation	Institute / Industry
1.	Mr. S. P. Lambhade	HOD, Computer Engineering	Government Polytechnic, Nagpur.
2	Dr. Mrs. A.R. Mahajan	Head of Information Technology	Government Polytechnic, Nagpur.
3	Ms. S. N. Chaudhari	Lecturer in Computer Engineering	Government Polytechnic, Nagpur.
4	Ms. D. M. Shirkey	Lecturer in Computer Engineering	Government Polytechnic, Nagpur.
5	Ms. G. B. Chavan	Lecturer in Computer Engineering	Government Polytechnic, Nagpur.
6	Prof. Manoj Jethawa	HOD Computer Science	Shri. Datta Meghe Polytechnic, Nagpur
7	Prof. N. V. Chaudhari	Asst. Professor (CSE)	DBACEO, Wanadongari, Nagpur
8	Mr. Atul Upadhay	CEO	Vista Computers, Ram Nagar, Nagur

(Member Secretary PBOS) **(Chairman PBOS)**