Vikram University, Ujjain

Board of studies in Computer science (Faculty of Engineering Science)

Syllabus of

PG Diploma in Database Administration

Exclusively for University Teaching Department (ICS, VUU)

One Year PG Diploma in Database Administration of UTD (ICS, VUU)

(Effective from Academic Session 2020-21)

[Modified as according to the provision of "Ordinance 14"]

COURSE STRUCTURE

PG Diploma in Database Administration

First Semester

SN	Course code	Title	End term sem Exam	Internal	Max Marks
1	DBA-101	Fundamental of Information Technology	60	40	100
2	DBA-102	PC-Packages	60	40	100
3	DBA-103	Programming in C	60	40	100
4	DBA- 104	Digital Computer Organization	60	40	100
5	DBA-105	Modern IT Technologies	60	40	100
		Total			500

COURSE STRUCTURE

PG Diploma in Database Administration

Second Semester

SN	Course code	Title	End term sem Exam	Internal	Max Marks
1	DBA-201	DATABASE MANAGEMENT SYSTEM	60	40	100
2	DBA-202	RDBMS USING MYSQL	60	40	100
3	DBA-203	ORACLE	60	40	100
4	DBA-204	MS ACCESS	60	40	100
5	DBA-205	BIG DATA ANALYTICS	60	40	100
		Total			500

PG Diploma in Database Administration

Objective Of Course

Diploma in Database Administration is a unique six months programme offered by Institute of Computer Science, Vikram University, Ujjain is an excellent blend of knowledge and practice in the field of Database and its industrial applications. The program is targeted for creating qualified Database Professionals. A database administrator (DBA) is the information technician responsible for directing or performing all activities related to maintaining a successful database environment. A DBA makes sure an organization's database and its related applications operate functionally and efficiently.

Outcome of the Course:

On completion of the course the participants will learn the concept of Database Administration using open source statistical tools like Oracle, SQ L and some other tools and techniques. The participants will be able to implement industry-oriented Database Project.

DBA 101- I: Fundamental of Information Technology

UNIT-1

Computer Fundamental: Characteristics of Computers, History of Computer, Evolution of Computers, Computer Generations and Types of Computer. **Components of a Computer:** Registers, instruction Set, Bus Architecture. **Computer Hardware:** Input Devices, Output Devices. **Storage Devices:** Primary Storage capacity, Memory Types, Memory Measuring Units, Secondary Storage. Software & Software Types, Computer Languages, Compiler, Interpreter.

UNIT-2

Introduction of Programming: Procedure Oriented Programming, Object oriented programming, Concepts used in OOP, Benefits of OOP, Main advantages and disadvantage of OOP, Applications of OOP, OOP vs. POP.

UNIT-3

Operating System Overview: Computer System Startup, Computer System Structure, computer system components, operating System classifications, operating System Services, Major Functions of operating system, Process Management, CPU Scheduling, Scheduling Criteria. **Memory and File Management:** Memory Management Requirements, Swapping, Memory Management Techniques.

UNIT-4

Introduction to DBMS: File System, Traditional File Oriented Approach, DBMS Advantages and Disadvantage, Role of DBMS, Three views of data, DBMS Architecture. Data Models, Data Independence, Major components of DBMS, Data Dictionary, Types of Users, DBMS applications, Keys in Databases, Database Languages.

UNIT-5

Introduction to computer Networks: computer Network Definition, Importance of Networking, Types of Networks, Network Topology, Advantages and Disadvantage of computer Networks, Applications of computer networks, Reference Model, Internet, introduction to Internet Technology, Electronic Mail, World Wide Web.

References:

1. Operating Systems Concepts, A. Silbrschaz, P.Galvin, G.Gagne, John Wiley & Sons
2. Object Oriented Programming in C++, Robert Lafore, Galgotia Publication.
3. Data base management systems vol. 1., Date C.J.
4. Fundamental of Computer Science & IT, Singh Umesh Kumar, Jain S., Maheshwari A., SSDN publications New Delhi,
5. Data Communications and Networks, Godbole A, Tata Mccraw-Hill Publications.

DBA- 102: PC-Packages

UNIT-1

MS windows: Introduction to MS windows; Features of windows; working with windows; My computer & Recycle bin; Desktop, Icons and windows Explorer; Screen description & working styles of windows; Dialog Boxes & Toolbar; working with files & Folders, Simple operations like copy, delete, moving of files and folders from one drive to another; Accessories and. windows settings using control panel-setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & program lists ;Installing and uninstalling new Hardware & software program on your computer.

UNIT-2

MS word Basics - Introduction to MS office; introduction to MS- word; Features & area of use, working with MS- word; Menus & commands; Toolbars & Buttons; shortcut Menus, wizards & Templates, creating a New Document; Different page views and Layouts; Applying various Text Enhancements; working with - Styles, Text. Attributes; paragraph and Page. Formatting; Text Editing using various features; Bullets, Numbering, Auto formatting, Printing & various print options.

UNIT-3

Advanced Features of MS- word- Spell check, Thesaurus, Find & Replace; Headers & Footers: Inserting- Page Number, Pictures, Files, Auto texts, Symbols etc.; working with columns, Creation and working with Tables including conversion to and from text; Margins and Space management in Documents.

UNIT- 4

MS Excel: Introduction and area of use; working with MS Excel: concept of workbook and worksheet; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different views of Worksheet; Column Freezing, Labels, Hiding, Splitting etc.; Using different features of Data and Text; Use of Formulas, Calculation & Functions; Cell formatting including Borders and Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with Various options.

UNIT-5

MS PowerPoint: Introduction and area of use; Working with MS PowerPoint; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & its Different Views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts; Columns and Lists; Adding Graphics, Sounds and Movies to a slide; Working with PowerPoint Objects; Designing and Presentation of a Slide Show; Printing presentations; Notes, Handouts with print options.

References:

1. Windows XP Complete Reference. BPB publications
2. MS Office XP complete BPB Publication.

DBA-103-Programming and Problem Solving in C

UNIT - 1

Problem identification analysis, design, coding, testing & debugging, implementation, modification & maintenance, algorithms & flowcharts, Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; documentation, naming variables; Top down design; Bottom-up design.

UNIT 2

History of C, Structure of a C program, Data types, Constant & Variable, Operators & expressions, **Control Constructs** - if-else, for, while, do-while, Case statement, Arrays, Type modifiers & Storage classes, Ternary operator, Type conversion & type casting.

UNIT -3

Functions, Arguments, return value, Parameter passing - call by value, call by reference, return statement, Scope, visibility and life time rules for various types of variable, static variable, calling a function, Recursion - basics, comparison with iteration, tail recursion, when to avoid recursion examples.

UNIT 4

Special constructs - break, continue, exit , goto & labels; pointers - &and * operators, pointer expression, pointer arithmetic, String, Pointer to function, Function to parameter, structure - basic, declaration, membership operator, pointer to structure, referential operator, self-referential structures, structure within structure, array in structure, array of structures, Union - basic, declaration: Enumerated data type, Command line arguments.

UNIT 5

File handling and related functions: pdntf & family, c preprocessor- basics, # Include, # define, # undef, conditional compilation directive like #if, #else, #endif, #ifdefand #ifndef, Variable argument list functions.

Reference Books:

l. Keminghan& Richie: The C progamming tanguage, pHI

2. Cooper Mullish: The Spirit ofC, Jaico publishing-Housg Delhi

3. Kanetkar Y: Let us C 4, Kanetkar Y: Pointers in C.

DBA- 104: Digital computer Organization

UNIT-1:

Digital components: Functional units of a computer, logic gates, Minimization of Boolean Expressions, Flip-Flips, Decoders, Encoders, Multiplexers, Counters, and Registers.

UNIT-2:

Data Representation: Number systems, Representations of signed and unsigned numbers, alphanumeric codes, Addition of binary numbers, subtraction, 2's complement, and Floating-point number representation.

UNIT-3:

Register Transfer Language & Micro-operations: Concepts of the Bus, Timings in Register transfer, Languages used for data transfer in registers, Data movement from/to memory.

UNIT-4:

Arithmetic circuits, Half adder, full adder, N-bit adder, Logical micro operation, arithmetic logic unit. Instruction sets for basic computer: Addressing modes, Instruction cycles, Control signal generation.

UNIT-5:

Central Processing Unit: General register organization, Memory stacks, Instruction types, Interrupts, Instruction pipelining, Arithmetic pipelining. .

Reference Books:

1. P. N. Basu, Computer Organization and Architecture, Vikas Publication, 2nd Edition.

2. H. Patterson, Computer Architecture: A Quantitative approach, Elsevier, 5th Edition.

3. W. Stalling, Computer Organization and architecture, Pearson Education Asia, 5th Edition.

4. Donald Leach & Albert Malvino, Digital Principles & Applications, McGraw Hill, 7th Edition.

DBA-105: Modern Technologies of Computer Science

UNIT 1:

Introduction to Computer Security: The Challenges of Computer Security, The OSI Security Architecture. Security Attacks (Passive Attacks, Active Attacks). Security Services (Authentication, Access Control, Data Confidentiality, Data Integrity, Nonrepudiation, Availability Service).

UNIT 2:

Introduction to Artificial Intelligence: What is AI? The Importance of AI. AI and related fields. Introduction to Natural Language Processing.,Application of AI.. Basic Problem-solving methods: Production systems-state space search, control strategies, Breadth first search, Depth first search, Heuristic search.

UNIT 3:

Introduction to Machine Learning: Learning Problems - Perspectives and Issues - Concept Learning - Version Spaces and Candidate Eliminations - Inductive bias - Decision Tree learning - Representation Algorithm- Heuristic Space Search.

UNIT 4:

Introduction to IoT: Definition, Characteristics, Conceptual framework, Architectural view. Technology involved - Server-end technology, Hardware and Software components, Development tools & Open source framework, APIs & Device interfacing components, Platforms & Integration tools, Sources of IoT, Advantages and Disadvantages of IoT.

UNIT 5:

Introduction to Data Mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining, DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas.

Reference Books:
1. Charles P. Pleeger, "Security in Computing", Pearson Education Asia, 5th Edition, 2001.
2. William Stallings, "Network Security Essentials: Applications and standards", Person Education Asia, 2000
3. Dan W. Patterson: Introduction to Artificial Intelligence and Expert System, Prentice Hall.
4. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Thing", Wiley
5. 2. Rajkamal, "Internet of Things: Architecture and Design Principles", McGraw Hill Educ
6. Data Mining Techniques; ArunK.Pujari ; University Press.

DBA-201 DATABASE MANAGEMENT SYSTEM

UNIT 1

Introduction to Databases, Transactions, and Data Models:
What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management.
Data Models
The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

UNIT 2

Database Design, ER-Diagram and Unified Modelling Language
Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML **Relational database model:** Logical view of data, keys, integrity rules. **Relational Database design:** features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).

UNIT 3

Relational Algebra and Calculus:
Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison.
Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

UNIT 4

Constraints, Views and SQL
What are constraints, types of constrains, Integrity constraints, **Views:** Introduction to views, data independence, security, updates on views, comparison between tables and views **SQL:** data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.

UNIT 5

Transaction management and Concurrency control
Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

Text Books:

- A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", fifth Edition McGraw-Hill ,
- Rob, Coronel, "Database Systems", Seventh Edition, Cengage Learning.

DBA-202 RDBMS USING MYSQL

Unit-I

Relational Database Design: pitfalls in relational database design, decomposition, normalization using functional dependency, normalization using multi-value dependency, normalization using joined dependency, Integrity Constraints: Domain Constraints, Entity Integrity Constraints, Referential Integrity Constraints, CODD's 12 rule.

Unit-II

Brief History and overview of Sql, Sql Basic: Creating a Database, Adding Tables, Adding Records, Removing and Modifying records, executing queries, Data types: Numeric, String, Date & Time, Operators: Arithmetic, Comparison, Logical, Functions: Math Function, Aggregate, String, Date & Time.

Unit-III

Key Concept: Primary key and Foreign Key, Candidate Key. Working with data: Inserting record, Updating & Deleting Records, retrieving specific rows and columns, built in function, aliasing table and column name sorting, query results, grouping query results.

Unit-IV

Joins: Overview of Join, types of join: Cross, Inner, Outer, Self, Union, subqueries, overview of subqueries, types of sub- query: Where/Having Clause, subqueries and from clause, Subqueries and Joins.

Unit-V

Security, Access Control and Privilege: Granting, Revoking & Viewing user privileges, commit and roll back. Transaction, Acid Properties of Transaction.

Text Book:

1. Complete Reference using MySql by Vikram Vaswani.
2. An Introduction to DataBase System by Bipin.C. Desai.

DBA - 203 ORACLE

UNIT - I

Oracle product details, Overview of oracle architecture Oracle files, System and User process, Oracle Memory, System data base object, Oracle Data types.

UNIT-II

Working with Tables. Data Constraints, Select Command, Oracle Operator, Range Searching, Pattern Matching, Oracle Built in Function Grouping data from Tables in SQL, Manipulation Data in SQL, Joining Multiple Tables, Sub queries.

UNIT –III

Oracle Security –Privileges., Creating view, Granting Permissions, - Updating, Selection, destroying view Creating Indexes. Creating and Managing, Working with Sequences.

UNIT –IV

PL/SQL Introduction, Data type support in PL/SQL, Conditional Statements, Using DML Within PL/SQL, Procedures & Functions, Cursors, Parameterized Cursor.

UNIT-V

Exception handling in PL/SQL, Triggers - Concept, use, how to apply database triggers, type of triggers, Syntax, deleting.

TEXT & REFERENCE BOOKS:

- IVAN BAYP'OS.C, 'SQL. PL/SQL", BPB PUBLICATIONS"
- LIEBSCHUTY. 'THE ORACLE COOKBOOK", BPB PUBLICATION
- MICHAEL ABBEY, MICHAEL JCOREY, 'ORACLE A BEGINNERS
- GUIDE". TMHPUBLICATION
- ORACL DATA BASE 11 G SATISH ASNANI PHI LEARNING

DBA-204 MS ACCESS

UNIT–I

Introduction to database -What is a Database, Need of Database, Flat Database, Relational Database, Database Elements, Tables, Query, Form, Report, Macros and Modules. Why use a Relational Database, Concept of primary key why to use characteristics? Entity and Referential Integrity. Relationship within database objects using Key. Database file. Introduction to MS Access: Opening and Closing, Access Interface Window, Title bar, status bar, Menu bar, Help Button, Search Pane. Database, Windows Toolbar. Creating a New database in Access Using Wizard, save new database. Objects Types of Objects, Navigation. Opening a database through Tool bar, Menu bar and task pane, Object Bar. Short Keys.

UNIT- II

Create a Table in MS Access Database view and Design View. - Data Types, Field Properties, Fields: names, types, properties--default values, format, caption, validation rules Data Entry, Add record, delete record, Record Button, Detail Button edit text, Sort, find/replace, filter/ select, rearrange columns, freeze columns. Edit a Tables- copy, delete, import, modify table structure, find, replace. Short cut keys.

UNIT-III

Add a relationship, set a rule for Referential Integrity, Creating and Deleting Relationship between Tables. Change the join type, delete a relationship, save relationship Queries & Filter - difference between queries and filter, filter using multiple fields, Create Query in Design View, Query Window Design Grid, find record with select query, find duplicate record with query, find unmatched record with query, run query, save and change query.

UNIT-IV

Introduction to Forms What is Form, Create Form From Scratch, Record Source, Caption Property, Types of Basic Forms: Columnar, Tabular, Datasheet, Auto Center Property, Main/ Sub forms, Add and Resize Objects to Form, add headers and footers, add fields to form, add text to form, use label option button, check box, combo box, list box Forms Wizard, Row source, Name, control source, Source type, Column count, width, bound column ,List width ,limit to list, labels, Create Template. Save Form.

UNIT-V

Introduction to Reports, Forms vs Report, Create Report Using Wizard, From Scratch and Re save existing Report, Report Properties, Record Source, Caption for Report, Add Object to Report, Resize object, Types of Basic Reports: Single Column, Tabular Report Groups/Total, single table report, multi table report, Modify report, Add Page Header to Report, Resize text, Set up page number on Report, Add Controls, Sub Report, preview report Print preview and Layout Preview, Sorting and grouping button, Expression Builder, print report, Creating Reports and Labels. Save Report.

TEXT & REFERENCE BOOKS:

- MS OFFICE XP COMPLETE BPB PUBLICATION ISBN 8 1-7656-564-4.
- MS ACCESS FAST & EASY BY FAITHE WEMPEN PHI.

DBA-205 Big Data Analytics

UNIT I: Introduction to Big Data and Hadoop

Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analysing Data with Unix tools, Analysing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere BigInsights and Big Sheets.

UNIT II: HDFS (Hadoop Distributed File System)

The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.

UNIT III: Map Reduce

Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.

Unit IV: Hadoop Eco

Pig: Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.
Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.
HBase: HBasics, Concepts, Clients, Example, Hbase Versus RDBMS.
Big SQL: Introduction

UNIT V: Data Analytics with R

Machine Learning: Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.

Text Books:
- Tom White "Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
- Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

References:
- Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
- Jay Liebowitz, "Big Data and Business Analytics" Auerbach Publications, CRC press (2013)
- Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
- Anand Rajaraman and Jef rey David Ulman, "Mining of Massive Datasets", Cambridge University Press, 2012.
- Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
- Glen J. Myat, "Making Sense of Data", John Wiley & Sons, 2007.