| 2002CA104- ADVANCE DATABASE | | | | |
|---|---|---|---|---|
| **Academic Year** | **2021- 2022** | **Question Bank** | **Programme** | **MCA** |
| **Year / Semester** | **I/I** | | **Course Coordinator** | **Mr.S.Selvaganapathy** |
| | | | | |

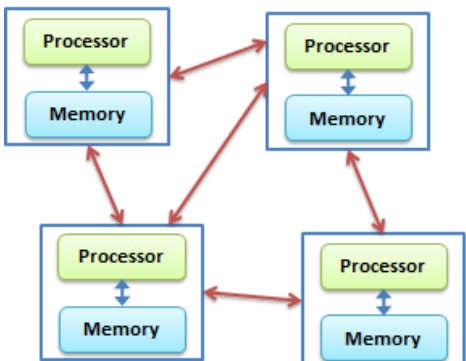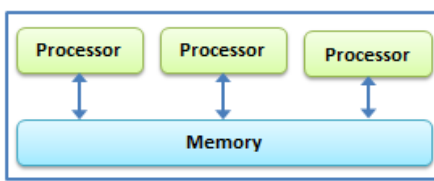| **Course Objectives** | **Course Outcomes** |
|---|---|
| 1. To learn the fundamentals of Parallel and Distributed Databases | CO1: Develop transaction processing systems with concurrency control |
| 2. To make a study on Object Oriented Databases | CO2: Design Object oriented databases for real time applications. |
| 3. To explore the concepts of XML Databases and Mobile Databases | CO3: Develop XML databases for web applications. |
| | CO4: Design Mobile databases for mobile devices |
| 4. To gain knowledge on the intelligent Databases. | CO5: Apply intelligent rules in database developement |

## UNIT I – PARALLEL AND DISTRIBUTED DATABASES

Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption –Cryptographic Hash Functions – Key Exchange – Digital Signatures – Certificates

| PART – A (2 Mark Questions with Key) | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| 1. | **CO1 : Develop transaction processing systems with concurrency control** | | |
| 1 | **Define centralized database system** | 2 | |
| | A centralized database (sometimes abbreviated CDB) is **a database that is located, stored, and maintained in a single location**. Users access a centralized database through a computer network which is able to give them access to the central CPU, which in turn maintains to the database itself | | K2 |
| 2 | **State any two features of distributed database** | 2 | K2 |
| | Location independent. Distributed query processing. Distributed transaction management. Hardware independent. | | |

| | | | |
|---|---|---|---|
| | Operating system independent.<br>Network independent.<br>Transaction transparency.<br>DBMS independent. | | |
| 3 | **Define parallel DBMS** | 2 | |
| | A parallel database system seeks to improve performance through parallelization of various operations like loading data, building index and evaluating queries parallel systems improve processing and I/O speeds by using multiple CPU's and disks in parallel | | K2 |
| 4 | **Give few drawbacks of having centralized database architecture** | 2 | |
| | **If the network is slow, the accessibility of required because all data is stored in one place**. Since all the data is at one location. The searching process takes much time. If centralized server failure due to some reasons all database will be a loss | | K2 |
| 5 | **Difference between parallel system and distributed system** | 2 | |
| | A parallel computing system consists of multiple processors that communicate with each other using a shared memory, whereas a distributed computing system contains multiple processors connected by a communication network<br><br>**Distributed Computing**<br><br>**Parallel Computing**<br><br>Processor Memory | | K2 |
| 6 | **Describe the shared-nothing system** | 2 | |
| | A shared-nothing architecture (SN) is **a distributed computing architecture in which each update request is satisfied by a single node (processor/memory/storage unit) in a computer cluster** | | K1 |
| 7 | **List out the types of fragmentation?** | 2 | |
| | There are three different but related forms of fragmentation: **external fragmentation, internal fragmentation**, and data fragmentation, which can be present in isolation or conjunction. | | K1 |
| 8 | **Show the different between homogeneous and heterogeneous DDBMS** | 2 | K1 |
| | Homogeneous and Heterogeneous databases are the two main classifications | | |

| | | | |
|---|---|---|---|
| | of **DDBMS**. In Homogenous distributed database system, the data is distributed but all servers run the same Database Management System (DBMS) software. In Heterogeneous distributed databases dissimilar sites run under the control of different DBMSs | | |
| 9 | What is serializability and its types? | 2 | |
| | It can be of two types namely, **Serializable and Non-Serializable Schedule**. The Non-Serial Schedule can be divided further into Serializable and Non-Serializable. Serializable: This is used to maintain the consistency of the database. | | K2 |
| 10 | **Differentiate inter and intra operation parallelism** | 2 | |
| | Inter-query parallelism refers to the ability of multiple applications to query a database at the same time. ... Intra-query parallelism refers to the **ability to break a single query into a number of pieces** and replicate them at the same time using either intra-partition parallelism or inter-partition parallelism, or both  | | K2 |
| 11 | **What is snapshot? What is the benefit of snapshot?** | 2 | |
| | A snapshot log is **a copy of the master table**. The snapshot table is updated using batch updates. The log can also be used to track the rows that have been updated in the master table<br><br>A key benefit of snapshots is that **they allow a faster roll-back to a previous point-in-time than from backups**. Another plus is that snapshots allow much more frequent protection than backup. | | K2 |
| 12 | **Identify the need for building a distributed database system** | 2 | K2 |

Distributed databases allow **local users to manage and access the data in the local databases** while providing some sort of global data management which provides global users with a global view of the data



| 13 | What are the failures the can occur in distributed environment | 2 | |
|----|----------------------------------------------------------------|---|----|
| | **Failures in Distributed System** | | **K2** |
| |      Method failure : In this type of failure, the distributed system is generally halted and unable to perform the execution. | | |
| |      System failure | | |
| |      Secondary storage device failure | | |
| |      Communication medium failure | | |
| 14 | Define concurrency control | 2 | |
| | In a database management system (DBMS), concurrency control **manages simultaneous access to a database**. It prevents two users from editing the same record at the same time and also serializes transactions for backup and recovery | | **K1** |
| 15 | Summarize the implementation issues in distributed database | 2 | |
| | Distributed database allows to end worker to store and retrieve data anywhere in the network where database is located, during storing and accessing any data from distributed database through computer network faces numerous difficulties happens **e.g. deadlock, concurrency and data allocation using fragmentation** | | **K1** |

| S. No. | Questions | Mark | BTL |
|---|---|---|---|
| **CO1** : Develop transaction processing systems with concurrency control | | | |
| 1 | **Discuss in details about the different Database System Architectures design** | 12 | |
| | **EXPLAIN ABOUT**<br>What Is Database Architecture?<br>   1.    1-tier architecture<br>   2.    2-tier architecture<br>   3.    3-tier architecture<br>   4.    n-tier architecture | | **K2** |
| 2 | **Explain the Functions and Architecture of a DDBMS** | 12 | |
| | Function of a DDBMS<br>   *Architecture for a DDBMS*<br>      Global Conceptual Schema<br>      Fragmentation and allocation schemas<br>      Local Schemas | | **K2** |
| 3 | **With proper illustration explain in details about the Parallel Databases** | 12 | |
| | What is parallel database<br>*Working of parallel database*<br>*Explain the following for your example.*<br>   *Performance measures*<br>   *Benefits of parallel Database*<br>   *Speed, Capacity, Reliability, Benefits for queries* | | **K2** |
| 4 | **Explain how I/O parallelism is attained in a parallel database environment** | 12 | |
| | **I/O Parallelism**<br>*Partitioning Techniques*<br>Round-robin.<br>Hash partitioning<br>Range partitioning<br>*Comparison of Partitioning Techniques* | | **K2** |
| 5 | **Explain in details about the Distributed Data Storage** | 12 | |
| | What Is a Distributed Database?<br>*Distributed Database Features*<br>*Distributed Database Storage*<br>   • **Replication**<br>   • **Fragmentation**<br>*Advantages and Disadvantages*<br>Conclusion | | **K2** |

| | | | |
|---|---|---|---|
| **6** | **Explain in detail about the Three Tier Client Server Architecture with proper illustrations** | **12** | **K2** |
| | • What is Client Server Architecture<br>• Diagram of Client Server Architecture<br>• Types of Client-Server Architecture<br>• Components of Client Server Architecture | | |

| **PART – C (20 Mark Questions with Key)** | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO 1:** Develop transaction processing systems with concurrency control | | | |
| **1.** | Explain about inter query and intra query parallelism with suitable example | **20** | **K3** |
| | Case Study for Intra and Inter query implementation | | |
| **2.** | Generalize the methods of how the locking is achieved in concurrency control distributed database | **20** | **K3** |
| | Case study for concurrency control in distributed database | | |

## UNIT II - OBJECT AND OBJECT RELATIONAL DATABASES

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems : Object Relational features in SQL / Oracle – Case Studies

| **PART – A (2 Mark Questions with Key)** | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO2 :** Design Object oriented databases for real time applications | | | |
| **1** | **Mention the characteristics of objects?** | **2** | **K2** |
| | **Characteristics of Objects**<br>• An object has identity (each object is a distinct individual).<br>• An object has state (it has various properties, which might change).<br>• An object has behavior (it can do things and can have things done to it). | | |
| **2** | **Classify the different types of Persistence of Objects** | **2** | **K2** |
| | A **persistent object** is one that continues to exist after the program that created it has been unloaded. An object's class and current state must be saved for use in subsequent sessions<br>There are two types of persistence:<br>object persistence and process persistence<br>**object persistence**<br>object persistence refers to **an object that is not deleted until a need emerges to remove it from the memory** | | |

| | | | |
| --- | --- | --- | --- |
| | **process persistence**<br>it's when a process your user is running continues to exist even after the process that created it is no longer running.In this sense, a persistent process is a **process that cannot be killed or shut down** | | |
| **3** | **Generalize the need of creating the object identity** | **2** | |
| | The object need not expose its internal structure. It can still be referred to, and its other properties can be accessed via its external behaviour associated with the identity. identity **is the basis for polymorphism** in object-oriented programming. Identity allows comparison of references | | **K2** |
| **4** | **What are the goals of OODB** | **2** | |
| | The main goal of OODBMS design is **to hide from the programmer unnecessary complexity of manipulation with persistent data**. Unlike normal (transient) object, persistent object survey execution of the program and so are stored either on disk, either in some other non-volatile media | | **K2** |
| **5** | **Contrast Repeated Inheritance with Selective Inheritance** | **2** | |
| | Repeated inheritance occurs whenever (as a result of multiple inheritance) **two or more of the ancestors of a class D have a common parent A**. D is then called a repeated descendant of A, and A a repeated ancestor of D.<br>Selective inheritance dependencies, or SIDs, are **introduced to capture formally the inheritance of attribute values between tuples of any relation over a given relation scheme**. It is shown that the membership problem | | **K2** |
| **6** | **Give the Features Supported By Object-Relational Data Model** | **2** | |
| | An Object relational model is a combination of a Object oriented database model and a Relational database model. So, it supports **objects, classes, inheritance etc**. just like Object Oriented models and has support for data types, tabular structures etc. like Relational data model | | **K1** |
| **7** | **What are the object database standards?** | **2** | |
| | Having a standard for a particular type of database system is very important because of following reasons<br>portability of database applications<br>achieve interoperability<br>compare commercial products | | **K1** |
| **8** | **Classify the object constructor, destructor?** | **2** | |
| | Constructor is called automatically, while the object is created. Destructor is called automatically, as block is exited or program terminates. Constructor allows an object to initialize some of its value before, it is used. **Destructor allows an object to execute some code at the time of its destruction** | | **K1** |

| 9 | **Distinguish the Inheritance, Generalization and Specialization** | 2 | |
|---|---|---|---|

| GENERALIZATION | SPECIALIZATION |
|---|---|
| Generalization works in Bottom-Up approach. | Specialization works in top-down approach. |
| In Generalization, size of schema gets reduced. | In Specialization, size of schema gets increased. |
| Generalization is normally applied to group of entities. | We can apply Specialization to a single entity. |
| Generalization can be defined as a process of creating groupings from various entity sets | Specialization can be defined as process of creating subgrouping within an entity set |
| In Generalization process, what actually happens is that it takes the union of two or more lower-level entity sets to produce a higher-level entity sets. | Specialization is reverse of Generalization. Specialization is a process of taking a subset of a higher level entity set to form a lower-level entity set. |
| Generalization process starts with the number of entity sets and it creates high-level entity with the help of some common features. | Specialization process starts from a single entity set and it creates a different entity set by using some different features. |

*K2* (for row 9)

| 10 | **Analyze the reason for using Complex Data Types** | 2 | |
|---|---|---|---|

### Need for Complex Data Types

- Traditional database applications in data processing had conceptually simple data types
  - ★ Relatively few data types, first normal form holds
- Complex data types have grown more important in recent years
  - ★ E.g. Addresses can be viewed as a
    - ➤ Single string, or
    - ➤ Separate attributes for each part, or
    - ➤ Composite attributes (which are not in first normal form)
  - ★ E.g. it is often convenient to store multivalued attributes as-is, without creating a separate relation to store the values in first normal form
- Applications
  - ★ computer-aided design, computer-aided software engineering
  - ★ multimedia and image databases, and document/hypertext databases.

*K1* (for row 10)

| 11 | **Compare the OODM with relational data model.** | 2 | |
|---|---|---|---|

**RDBMS** and OODBMS are database management systems. RDBMS uses tables to represent data and their relationships whereas OODBMS represents data in form of objects similar to Object Oriented Programming. ... RDBMS stands for Relational DataBase Management System. OODBMS stands for Object Oriented DataBase Management System

*K2* (for row 11)

| 12 | **What are the benefits of using OODBMS over an ORDBMS?** | 2 | |
|---|---|---|---|

- Enriched Modelling Capabilities.
- Extensibility.
- Removal of Impedance Mismatch.
- More Expressive Query Language.
- Support for Schema Evolution.
- Support for Long Duration Transactions.

*K1* (for row 12)

| | | | |
|---|---|---|---|
| | • Applicability to Advanced Database Applications.<br>• Improved Performance. | | |
| 13 | **What is meant by Interface Repository?** | **2** | |
| | An interface repository is an object implementing the CORBA::Repository interface. ... The purpose of the interface repository is **to maintain type information about IDL files**. Once an IDL file is compiled, its definitions can be stored in an interface repository and can be retrieved remotely by other ORBs | | **K2** |
| 14 | **What is the use of persistent programming language?** | **2** | |
| | Programming languages that natively and seamlessly allow objects to continue existing after the program has been closed down are called persistent programming languages. JADE is one such language. A persistent programming language is a **programming language extended with constructs to handle persistent data**. | | **K1** |
| 15 | **Predict the Differentiate among ODL and OQL.** | **2** | |
| | **ODL = Object Description Language**, like CREATE TABLE part of SQL.<br>**OQL = Object Query Language**, tries to imitate SQL in an OO framework | | **K1** |

| PART – B (12 Mark Questions with Key) | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO 2:** | **Understand the importance of Digital signature for secure e-documents exchange** | | |
| **1** | Explain Object oriented Concepts in database and storing objects in Relational Database | **12** | |
| | *Object Database Definition*<br>*Object-Oriented Programming Concepts*<br>*Object-Oriented Database Examples*<br>*Object-Oriented Database Advantages and Disadvantages* | **2** | **K3** |
| **2** | Differentiate the following with respect to object oriented data model.<br>  i.   Classes, subclasses and super classes<br>  ii.  Regular inheritance, multi valued and selective inheritance | **12** | |
| | i.   Classes, subclasses and super classes<br>        Explanation about Classes, subclasses and super classes and examples<br>iii.  Regular inheritance, multi valued and selective inheritance<br>        Explanation about Regular inheritance, multi valued and selective inheritance and examples | | **K2** |
| **3** | 1. **Describe briefly about Structured and unstructured complex object** | **12** | **K2** |

| | What is the difference between structured and unstructured complex objects? | | |
| :---: | :--- | :---: | :---: |
| | *Operations on structured and unstructured data* | | |
| | *Object identifier by using References* | | |
| | *Data encapsulation and ADT* | | |
| **4** | Describe the following | **12** | |
| |     i.     Object Query Language (OQL) | | |
| |     ii.    Persistence Schemes OODBMS | | |
| |     **i.**    **Object Query Language (OQL)** | | **K2** |
| |        What is object query language with example | | |
| |        Is OQL similar to SQL? | | |
| |        Example Queries | | |
| |     **ii.**    **Persistence Schemes OODBMS** | | |
| |     *How is persistence handled in typical of database systems?* | | |
| |     *How persistent objects are maintained in Oodbms?* | | |
| |     What is the difference between persistent and transient objects | | |
| | How is persistence handled in typical OO database systems*?* | | |
| **5** | Explain in detail about the Issues in OODBMS | **12** | |
| | **Lack of universal data model**: There is no universally agreed data model for an OODBMS, and most models lack a theoretical foundation. This . disadvantage is seen as a significant drawback, and is comparable to per-relational systems | | **K2** |
| | Sample case study | | |
| **6** | **Discuss the basic built in interfaces of the ODMG model** | **12** | **K2** |
| | The ODMG· Object Model | | |
| | Objects and Literals | | |
| | An object has five aspects: identifier,♣ name,♣ lifetime,♣ structure,♣ creation. | | |
| | types of literals: atomic, structured, and collection | | |

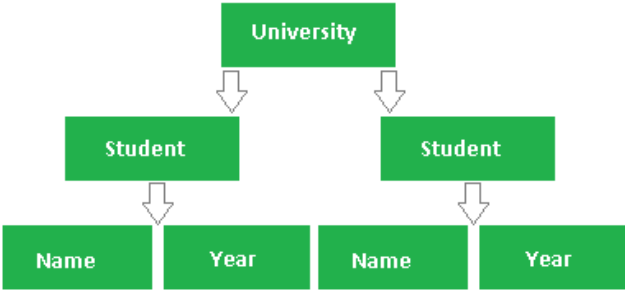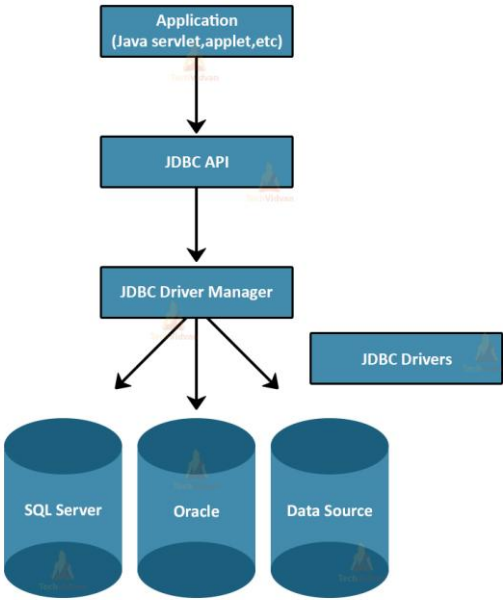| **PART – C (20 Mark Questions with Key)** | | | |
| :---: | :--- | :---: | :---: |
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO 2 : Understand the importance of Digital signature for secure e-documents exchange** | | | |
| **1.** | Discuss in detail about structure and various operations of OO query language | **20** | |
| | What is the structure of query language? | | **K3** |
| | What are the different types of structured query language? | | |
| | What are the four basic database query operations access? | | |

| 2. | Discuss the modeling and designing of OODB in detail with suitable example | 20 | |
|---|---|---|---|
| |  | | K3 |

## UNIT III - XML DATABASES

XML Databases: XML Data Model – DTD - XML Schema - XML Querying – Web Databases – JDBC – Information Retrieval – Data Warehousing – Data Mining

| PART – A (2 Mark Questions with Key) | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO3 :** Develop XML databases for web applications | | | |
| 1 | **What are the differences between structured, semi structured, and unstructured data?** | 2 | |
| | Structured Data is get organized by the means of Relational Database. While in case of Semi Structured Data is partially organized by **the means of XML/RDF**. On other hand in case of Unstructured Data data is based on simple character and binary data | | K2 |
| 2 | **What is regression?** | 2 | K2 |
| | Regression is a statistical method used in finance, investing, and other disciplines that **attempts to determine the strength and character of the relationship between one dependent variable** (usually denoted by Y) and a series of other variables (known as independent variables). | | |
| 3 | **How do you define attributes in XML schema?** | 2 | |
| | **XSD defines it as a simple type.** 1. Syntax. <xs:attribute name = "attribute-name" type = "attribute-type"/> ... 2. Example. Consider the following XML Element <student rollno = "393" /> 3. Default Value. Attribute can have a default value assigned to it. ... 4. Fixed Value. Attribute can have a fix value assigned.Restriction | | K2 |

| 4 | Distinguish the XML schema and XML DTD | 2 | |
|---|---|---|---|
| | XML schemas are **written in XML** while DTD are derived from SGML syntax. XML schemas define datatypes for elements and attributes while DTD doesn't support datatypes. XML schemas allow support for namespaces while DTD does not. XML schemas define number and order of child elements, while DTD does not  | | K2 |
| 5 | Illustrate the diagram of JDBC connectivity | 2 | |
| |  | | K2 |
| 6 | Classify the types of data warehouse? | 2 | |
| | The three main types of data warehouses are **enterprise data warehouse (EDW), operational data store (ODS), and data mart** | | K1 |
| 7 | Generalize the goal of data warehouse? | 2 | |
| | Data warehousing is the secure electronic storage of information by a business or other organization. The goal of data warehousing is **to create a** | | K1 |

| | trove of historical data that can be retrieved and analyzed to provide useful insight into the organization's operations | | |
|---|---|---|---|
| **8** | What are the different approaches to data mining problems | **2** | |
| | Data mining brings together different methods from a variety of disciplines, including **data visualization, machine learning, database management, statistics, and others**. These techniques can be made to work together to tackle complex problems | | **K1** |
| **9** | Summarize rules of valid or well formed XML. | **2** | |
| | **These rules are:** <ul><li>A well-formed XML document must have a corresponding end tag for all of its start tags.</li><li>Nesting of elements within each other in an XML document must be proper. ...</li><li>In each element two attributes must not have the same value. ...</li></ul> Markup characters must be properly specified | | **K2** |
| **10** | Point out the XML Query languages and tools | **2** | |
| | **XML Query Language (XQuery)** is a query and programming language for processing XML documents and data. XML data and other databases that store data in a format analogous to HTML can be processed with XQuery | | **K1** |
| **11** | Create an sample XML document for student database | **2** | |
| | <?xml version="1.0" encoding="UTF-8"?><br><?xml-stylesheet type='text/xsl' href='cgpa.xsl'?><br><class><br><student><br><name> ABC </name><br><id> 001 </id><br><branch> IT </branch><br><cgpa> 9 </cgpa><br></student><br><student><br><name> PQR </name><br><id> 004 </id><br><branch> Computer </branch><br><cgpa> 7 </cgpa><br></student><br><student><br><name> XYZ </name><br><id> 006 </id><br><branch> IT </branch> | | **K2** |

| 12 | <cgpa> 10 </cgpa><br></student><br></class> | | |
|----|----|----|----|
| | What is Knowledge Discovery? | **2** | |
| | **Data Cleaning** − In this step, the noise and inconsistent data is removed. Data Integration − In this step, multiple data sources are combined. Data Selection − In this step, data relevant to the analysis task are retrieved from the database | | **K1** |
| 13 | What are the applications of a data warehouse?. | **2** | |
| | **Data Warehouse Applications**<br>• Financial services.<br>• Banking services.<br>• Consumer goods.<br>• Retail sectors.<br>• Controlled manufacturing. | | **K2** |
| 14 | Name the layers of 3-tier client server architecture and give its functions | **2** | |
| | Three-tier architecture is a well-established software application architecture that organizes applications into three logical and physical computing tiers: **the presentation tier, or user interface; the application tier, where data is processed; and the data tier, where the data associated with the application is stored and managed** | | **K1** |
| 15 | What is web interface to database? | **2** | |
| | When a Web server receives a URL corresponding to a CGI resource, it starts a CGI program (such as a perl script, or the PowerDynamo Application Server) which connects to the DBMS, queries the database, and returns the information to the Web server to be handed on to the Web client | | **K1** |

| PART – B (12 Mark Questions with Key) | | | |
|----|----|----|----|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO 3:** | Develop XML databases for web applications | | |
| 1 | Explain in detail about the XML documents and create the sample XML database | 12 | |
| | What is XML document?<br>What is an XML database and explain its types?<br>How can a XML file be created from a database?<br>sample XML database | | **K3** |
| 2 | Discuss in details about the different types of Querying and Transformation languages and tools | 12 | **K2** |

| | What is a database query? | | |
|---|---|---|---|
| | What are the different types of query languages? | | |
| | What are query tools and languages? | | |
| **3** | Give details about approaches used to store XML documents in database | **12** | |
| | **Approaches to store the XML Document**<br>　1. Using a DBMS to store the document as text. ...<br>　2. Using a DBMS to store the document as data elements. ...<br>　3. Designing a specialized system for storing native XML document. ...<br>　4. Creating or publishing customized XML documents from preexisting relational database.<br>(https://www.brainkart.com/article/Storing-and-Extracting-XML-Documents-from-Databases_11476/) | | **K2** |
| **4** | Explain in details about the JDBC with neat illustration | **12** | |
| | What JDBC means?<br>Major components of the JDBC?<br>JDBC architecture? | | **K2** |
| **5** | Explain in details about the process of Information Retrieval | **12** | |
| | The steps involved in the search process for information retrieval?<br>Processes of information storage and retrieval system? | | **K2** |
| **6** | Describe in detail about the components of a Data warehouse | **12** | **K2** |
| | What is data warehouse explain in detail?<br>5 components of Data Warehouse Architecture:<br>　1) Database<br>2) ETL Tools<br>3) Meta Data<br>4) Query Tools<br>5) DataMarts | | |

| PART – C (20 Mark Questions with Key) | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO 3 :** Develop XML databases for web applications | | | |
| **1.** | **Describe the need for data warehousing and data mining for any database application of your choice** | **20** | |
| | **Definition for data warehousing and data mining**<br>**Example with explanation** | | **K3** |
| **2.** | **Develop a inventory management system using XML schema** | **20** | |
| | XML schema definition<br>Example with inventory database explanation | | **K3** |

### UNIT IV -   MOBILE DATABASES

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Mobile Database Recovery Schemes.

| PART – A (2 Mark Questions with Key) | | | |
| :---: | :--- | :---: | :---: |
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO4 :** | Design Mobile databases for mobile devices | | |
| **1** | Define mobile computing | **2** | |
| | Mobile Computing is **a technical field that covers the design, development and evaluation of mobile applications using appropriate solutions that meet user requirements**. This includes learning the technology that is used to perform a wide variety of tasks on devices that are portable | | **K2** |
| **2** | What is the need for location dependent queries? | **2** | **K2** |
| | Location dependent query processing, **the location information of mobile user is revealed to obtain location based information**. Many research works are focusing on privacy protection of mobile users. Many other research works focus on reducing the workload of server while processing mobile queries | | |
| **3** | Define mobile databases? | **2** | |
| | A mobile database is **a database that resides on a mobile device such as a PDA**, a smart phone, or a laptop. Such devices are often limited in resources such as memory, computing power, and battery power | | **K2** |
| **4** | What are the issues in distributed database? | **2** | |
| | Distributed database allows to end worker to store and retrieve data anywhere in the network where database is located, during storing and accessing any data from distributed database through computer network faces numerous difficulties happens **e.g. deadlock, concurrency and data allocation using fragmentation** | | **K2** |
| **5** | Examine the need of handoff operation in mobile network | **2** | |
| | In cellular communications, the handoff is the process of transferring an active call or data session from one cell in a cellular network or from one channel to another. ... Handoff is **necessary for preventing loss of interruption of service to a caller or a data session user**. Handoff is also called handover | | **K2** |
| **6** | Define Mobile Database Recovery Schemes | **2** | |
| | The chapter discusses few of mobile database recovery schemes such as **three phase hybrid recovery scheme**, low-cost synchronous snapshot collection scheme, mobile agent based log management scheme, forward log | | **K1** |

| | unification scheme, and forward notification scheme | | |
|---|---|---|---|
| **7** | Differentiate the shared lock and exclusive lock modes | **2** | |
| | Shared **lock can be placed on objects that do not** have an exclusive lock already placed on them. Exclusive lock can only be placed on objects that do no have any other kind of lock | | **K1** |
| **8** | What is web database explain? | **2** | |
| | A web database is **essentially a database that can be accessed from a local network or the internet instead of one that has its data stored on a desktop or its attached storage**. ... Web database applications can be free or require payment, usually through monthly subscriptions | | **K1** |
| **9** | What is the relationship between failure and timeout transitions? | **2** | |
| | If the coordinator fails while in state q1, all the cohorts perform the timeout transition, **thus aborting the transition**. Upon recovery, the coordinator performs the failure transition | | **K2** |
| **10** | What is lock compatibility matrix in DBMS? | **2** | |
| | Lock Compatibility Matrix **controls whether multiple transactions can acquire locks on the same resource at the same time**. If a resource is already locked by another transaction, then a new lock request can be granted only if the mode of the requested lock is compatible with the mode of the existing lock. | | **K1** |
| **11** | What is the use of verion vector scheme? | **2** | |
| | The version vector allows **the participants to determine if one update preceded another (happened-before)**, followed it, or if the two updates happened concurrently (and therefore might conflict with each other). | | **K2** |
| **12** | Differentiate the hard handoff and soft handoff operations | **2** | |

| BASIS OF COMPARISON | SOFT HAND OFF | HARD HAND OFF | K1 |
|---|---|---|---|
| **Description** | Soft hand-off is where a new connection is established before old one is released. | Hard hand-off is one where an existing connection must be broken when the new one is established. | |
| **Frequency** | It allocates same frequency. | It allocates different frequency. | |
| **Use** | Soft hand-off is used in CDMA and in some TDMA systems. | Hard hand-off is typically used in TDMA and FDMA. | |

| | **Complexity** | It is more complex than hard hand-off. | Less complex when compared to soft hand-off. | | |
|---|---|---|---|---|---|
| | **Communicatio n** | Soft hand-off handsets communicates up to three or four radio links at the same frequency. | Hard hand-off communicates with one BS at a time. | | |
| **13** | Illustrate the Wait-for graph method for detecting deadlock. | | | **2** | |
| | Wait-for-graph is one of the methods for detecting the deadlock situation. This method is suitable for smaller databases. In this method, a graph is **drawn** based on the transaction and their lock on the resource. If the graph created has a closed-loop or a cycle, then there is a deadlock | | | | **K2** |
| **14** | What are two problems of lock based protocols? | | | **2** | |
| | Pitfalls of Lock-Based Protocols (Cont.) The potential for deadlock exists in most locking protocols. Deadlocks are a necessary evil. **Starvation is** also possible if concurrency control manager is badly designed | | | | **K1** |
| **15** | Describe the use of concurrency control mechanism? | | | **2** | |
| | Concurrency Control in Database Management System is a procedure of managing simultaneous operations without conflicting with each other. It **ensures that Database transactions are performed concurrently and accurately to produce correct results without violating data integrity of the respective Database** | | | | **K1** |

| **PART – B (12 Mark Questions with Key)** | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO 4:** Design Mobile databases for mobile devices | | | |
| **1** | How the location and Handoff management can be performed in mobile databases? | 12 | K3 |
| | What is location management in mobile computing? Two types of handoff during the conversation over the mobile? | | |
| **2** | Explain the Effect of Mobility on Data Management | 12 | |
| | What is data management explain? Mobile databases list the characteristics and challenges in implementing mobile database? Impact of Mobility on Transaction Management | | K2 |
| **3** | Write detailed notes on Concurrency control in mobile database | 12 | |
| | What is concurrency in mobile computing? Various methods of concurrency control Why concurrency is used for sequence control? | | K2 |

| 4 | Describe the following aspects mobile databases in detail<br>(i)  Mobile Computing<br>(ii) Routing and Query Processing<br>(iii)Broadcasting data<br>(iv)Disconnectivity and consistency. | 12 | |
|---|---|---|---|
| | **What you mean by mobile computing?**<br>Mobile Computing is **a technical field that covers the design, development and evaluation of mobile applications using appropriate solutions that meet user requirements**. ... Portable devices include Smart Phones, Tablets, Laptops, wearable devices, vehicles etc.<br><br>What is query processing?<br>Query processing refers to **the process to answer a query to a database or an information system**, which usually involves interpreting the query, searching through the space storing data, and retrieving the results satisfying the query.<br><br>What is meant by broadcast data?<br>Data broadcasting is the **system that the receiving device automatically decodes and receiver directly gets** the decoding data in the case of transmitting digital signal through broadcasting wave. | | K2 |
| 5 | Explain in details about the Timestamp-Based Protocols with proper illustration | 12 | |
| | What are the timestamp-based protocols?<br>Timestamp-ordering protocol example?<br>Timestamp-ordering explain timestamp-based protocol for serializable schedule? | | K2 |
| 6 | Generalize the available methods of Deadlock Detection and Recovery | 12 | K2 |
| | Methods of deadlock detection?<br>Deadlock discuss various detection and recovery methods?<br>Deadlock explain deadlock detection and recovery in DBMS? | | |

| PART – C (20 Mark Questions with Key) | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO 4 :** Design Mobile databases for mobile devices | | | |
| **1.** | **Explain the effect of mobility on data management** | **20** | K3 |
| | What are mobile databases | | |

| | List the characteristics and challenges in implementing mobile database <br> The issues of data management? <br> Sample case study | | |
|---|---|---|---|
| **2.** | **How the geographical location of mobile unit is expressed? What is the reference point? Develop a simple scheme for identifying the geographical location of mobile unit in the cell.** | **20** | |
| | **geographical Database.** <br> **geographical location** of a **mobile unit** is **expressed** <br> **reference point** <br> **Example** | | **K3** |

## UNIT V - INTELLIGENT DATABASES

Active databases – Deductive Databases – Knowledge bases – Multimedia Databases- Multidimensional Data Structures – Image Databases – Text/Document Databases- Video Databases– Audio Databases – Multimedia Database Design –Spatial Databases.

| PART – A (2 Mark Questions with Key) | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO5 :** | Apply intelligent rules in database developement | | |
| **1** | Give any three potential applications for Active database | **2** | |
| | An active database is a database that includes an event-driven architecture (often in the form of ECA rules) which can respond to conditions both inside and outside the database. Possible uses include **security monitoring, alerting, statistics gathering and authorization** | | **K2** |
| **2** | Point out the components of a rule in ECA model? | **2** | **K2** |
| | Such a rule traditionally consisted of three parts: The **event part specifies the signal that triggers** the invocation of the rule. The condition part is a logical test that, if satisfied or evaluates to true, causes the action to be carried out. The action part consists of updates or invocations on the local data. | | |
| **3** | What is row level trigger and statement trigger? | **2** | |
| | **Row level triggers executes once for each and every row in the transaction**. Statement level triggers executes only once for each single transaction. ... Example: If 1500 rows are to be inserted into a table, the statement level trigger would execute only once | | **K2** |
| **4** | Give any two Specifications of Deductive database | **2** | |
| | A deductive database uses two main types of specifications: **facts and rules**. ... In a deductive database, the meaning of an attribute value in a tuple is determined solely by its position within the tuple. Rules are somewhat similar | | **K2** |

| | to relational views | | |
|---|---|---|---|
| **5** | Discriminate prolog and datalog | **2** | |
| | Prolog is a **Turing complete programming language**, so any algorithm can be implemented in it. Datalog is a non-Turing complete subset of Prolog that does not allow, e.g., negation. Its main advantage is that every Datalog program terminates (no infinite loops) | | **K2** |
| **6** | Identify the node structure of the Point Quadtrees | **2** | |
| | A node of a point quadtree is **same to a node of a** binary tree, with the major difference being that it is associated with four pointers (each pointer is used for each quadrant) instead of two ("left" and "right") as in an ordinary binary tree. | | **K1** |
| **7** | What is the knowledge base What is it used for? | **2** | |
| | A knowledge base is **a published collection of documentation that includes answers to frequently asked questions, how-to guides, and troubleshooting instructions**. It's designed to make it easy for people to find solutions to their problems without having to ask for help | | **K1** |
| **8** | What is range query in data structure? | **2** | |
| | In data structures, a range query **consists of preprocessing some input data into a data structure to efficiently answer any number of queries on any subset of the input** | | **K1** |
| **9** | Define image database. | **2** | |
| | An image database system **organizes digital pictures into a central location for fast sharing and retrievability**. It is the storage element of digital asset management (DAM), giving DAM users extensive features. These features include tools that allow users to upload, search and share company graphics | | **K2** |
| **10** | Describe Polysemy problems in text database | **2** | |
| | There are three problems to be addressed in an adequate theory of polysemy: **sense selection, semantic relatedness, and category identity**. Each seems to require a cognitive rather than a purely linguistic solution. ... Semantic relatedness is an issue because polysemy is distinct from homo-nymy | | **K1** |
| **11** | What is triggers and active database? | **2** | |
| | A trigger is **a procedure which is automatically invoked by the DBMS in response to changes to the database**, and is specified by the database administrator (DBA). A database with a set of associated triggers is generally called an active database | | **K2** |
| **12** | What is Spatial Databases ? | **2** | |
| | A spatial database is **a general-purpose database** (usually a relational database) that has been enhanced to include spatial data that represents | | **K1** |

| | objects defined in a geometric space, along with tools for querying and analyzing such data | | |
|---|---|---|---|
| **13** | What is the basis for content based video indexing browsing and retrieval? | **2** | |
| | Content based Video Indexing and Retrieval (CBVIR), in the application of image retrieval problem, that is, **the problem of searching for digital videos in large databases**. "Content-based" means that the search will analyze the actual content of the video | | **K2** |
| **14** | What is a image database? | **2** | |
| | **An organized collection of digital images aimed at the efficient management** and the processing of queries on this image collection Learn more in: Image Database Indexing Techniques | | **K1** |
| **15** | What is Multidimensional Data Structures | **2** | |
| | Multidimensional data structures are **multidimensional data management systems that support search and update operations in multidimensional data**. In the literature, multidimensional data structures are also referred to as mul- tidimensional access methods, spatial access methods or spatial index struc- tures | | **K1** |

| PART – B (12 Mark Questions with Key) | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO 5:** | Apply intelligent rules in database developement | | |
| **1** | Describe about knowledge bases, active bases, active and deductive databases. | 12 | |
| | **knowledge bases,** **Active bases,** **Active and deductive databases.** **Comparison** | | **K3** |
| **2** | Suggest a database for knowledge management and explain the concept of knowledge retrieval with suitable example | 12 | |
| | Knowledge base definition Example. Explanation | | **K2** |
| **3** | **Describe the process of Indexing audio database** | 12 | |
| | What is audio database? How is audio data indexed? Indexing and Retrieval of Audio: A Survey | | **K2** |
| **4** | Discuss in detail about the active database with an example code to write active rules | 12 | **K2** |

| | What is active database example? | | |
|---|---|---|---|
| | What are active rules in database? | | |
| | What are active Rules discuss the different types of active databases How trigger in an Oracle systems are declared? | | |
| **5** | Describe in detail about multimedia database for current technology | **12** | |
| | What is a multimedia database explain the methods of mining multimedia database? | | **K2** |
| | What are the contents of multimedia database? | | |
| **6** | Briefly discuss about the different types of query languages for retrieving multimedia data | **12** | **K2** |
| | query language. | | |
| | What are the types of query language? | | |
| | Which type of queries are used in multimedia database queries? | | |

| PART – C (20 Mark Questions with Key) | | | |
|---|---|---|---|
| **S. No.** | **Questions** | **Mark** | **BTL** |
| **CO 5 :** Apply intelligent rules in database developement | | | |
| **1.** | **Discuss in detail about the design and architecture of multimedia database and its issues** | **20** | **K3** |
| | Multimedia database | | |
| | Design and architecture | | |
| | Its issues | | |
| | Sample case study | | |
| **2.** | **Analyze how should video data be stored, managed and delivered to accommodate for the connectivity and bandwidth dynamics as well as variances of the networks computing capabilities of the clients and battery life of multiple and most mobile devices.** | **20** | **K3** |
| | Video Database | | |
| | Sample case study | | |