Information Booklet cum Syllabus

Of

NoSQL Database-MongoDB

Revision-I

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National Institute of Electronics and Information Technology
An Autonomous Scientific Society under
Ministry of Electronics and Information Technology, Government of India

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1. **About Course**

   MongoDB course will help you to understand & learn the leading document-oriented NoSQL database, MongoDB Architecture, CRUD, Schema Design, Data Modelling, and Indexing using real-life case studies. The instructors will help you understand why more organizations are using MongoDB as a database for their business requirements. MongoDB is a distributed database at its core, so high availability, horizontal scaling, and geographic distribution are built-in and easy to use. MongoDB course allows you to work on real-time projects that help in building your career.

2. **NIELIT**

   National Institute of Electronics and Information Technology, NIELIT, (Erstwhile DOEACC Society) is an autonomous scientific society of the Ministry of Electronics & Information Technology, Government of India. The Society is registered under the Societies Registration Act, 1860. NIELIT was set up to carry out Human Resource Development and related activities in the area of Information, Electronics & Communications Technology (IECT). NIELIT is engaged both in Formal & Non-Formal Education in the areas of IECT besides development of industry-oriented quality education and training programs in the state-of-the-art areas. NIELIT has endeavored to establish standards to be the country's premier institution for Examination and Certification in the field of IECT. It is also one of the National Examination Body, which accredits institutes/organizations for conducting courses in IT and Electronics in the non-formal sector.

3. **Objective of Course**

   With the large volume of unstructured data generated through social media and many other platforms, it is becoming difficult to manage voluminous unstructured data. Existing Relational Database Management Systems are expensive and not in a position to support these unstructured data. NoSQL database technology is now getting popularity to manage these voluminous unstructured data. The objective of this course is to make candidates familiarize with NoSQL database Technology and give some hands-on on one of the most popular NoSQL database MongoDB.

4. **Job Roles of Course**

   After successful completion of the course the candidates shall be employed in the industries for following occupations:

   - Big data Analyzer
   - Big data developer
   - MongoDB database administrator

5. **Eligibility**

   Graduate/ Polytechnic Diploma/ 2 Year ITI passed/ pursuing with basic knowledge of computer OR O-level.

6. **Total duration of the Course**

   60 Hours(Theory: 18 hours, Practical/Tutorial/Assignment: 27 hours, Project: 15 hours)

7. Course Details

7.1. Course Outline and Objective of Each Unit

S. No.	Unit Name	Duration (Theory) in Hours	Duration (Practical) in Hours	Total Learning Hours	Learning Objectives
1.	Introduction to database	01	02	03	After completing this unit, Learner will be able to • Need of a database • Different types of database • Relational vs. Non-relational database
2.	NoSQL databases	01	02	03	After completing this unit, Learner will be able to • Introduction to NoSQL Databases • NoSQL features • Different types of NoSQL databases
3.	Introduction to MongoDB	01	02	03	After completing this unit, Learner will be able to • Data modelling in MongoDB • Advantages of MongoDB over RDBMS • Mongo Shell • Configuration file in MongoDB • JSON File format for storing documents
4.	Documents,collections	02	02	04	After completing this unit, Learner will be able to • Introduction to Documents, Collections • Database Commands in Mongodb • Inserting and Saving Documents • Inserting multiple documents
5.	CRUD operations	02	03	05	After completing this unit, Learner will be able to • Updating Documents • Removing Documents • Document Replacement • Operator and Modifiers
6.	Indexing	01	02	03	After completing this unit, Learner will be able to • Indexing in MongoDB • Single index

No.	Unit Name				Learning Outcome
					• Finding index • Multikey index
7.	Aggregation framework , Pipeline operations	02	03	05	After completing this unit, Learner will be able to • Aggregation Framework • Pipeline Operations- $match, $sort , $group , $project
8.	Pipeline operation	02	02	04	After completing this unit, Learner will be able to • $unwind , $limit, $skip • MapReduce • Aggregation commands
9.	Database operations	02	03	05	After completing this unit, Learner will be able to • Backup and restore • Export and import of data • Importing from JSON file
10.	Replication	03	04	07	After completing this unit, Learner will be able to • Replication • Advantages of replication • Implementation of replication • Managing Configuration File in MongoDB • Setting up replica set in MongoDB,
11.	Database features	01	02	03	After completing this unit, Learner will be able to • Choosing the right database • Database era • Taking decisions on database • Strengths and weakness of database • Free and open source database
	Total	**18**	**27**	**45**	
	Project Work	**15**			
	Grand Total	**60**			

7.2.Detailed Syllabus

Unit Name	Contents	Hrs.
Introduction to database	• Need of a database • Different types of database • Relational vs. Non-relational database	03
Introduction to NoSQL databses	• Introduction to NoSQL Databases • NoSQL features, Different types of NoSQL	03

	databases • Introduction to MongoDB • MongoDB architecture	
MongoDB	• Data modelling in MongoDB • Advantages of MongoDB over RDBMS • Mongo Shell • Configuration file in MongoDB	03
Documents and collections	• JSON File format for storing documents • Introduction to Documents, Collections • Database Commands in Mongodb • Inserting and Saving Documents • Inserting multiple documents	04
CRUD operation	• Updating Documents • Removing Documents • Document Replacement • Operator and Modifiers	05
Indexing	• Indexing in MongoDB • Single index • Finding index • Multikey index	03
Aggregation	• Aggregation Framework • Pipeline Operations- $match, $sort , $group	05
Pipeline operations	• Pipeline Operations- $project, $unwind , $limit, $skip, MapReduce • Aggregation commands	04
Database operations	• Backup and restore • Export and import of data • Importing from JSON file	05
replication	• Replication • Advantages of replication • Implementation of replication • Managing Configuration File in MongoDB • Setting up replica set in MongoDB,	07
Database features	• Choosing the right database • Database era • Taking decisions on database • Strengths and weakness of database • Free and open source database	03
Total		**45**

8.   Reference Books/Study Material

- "MongoDB: The Definitive Guide" by Kristina Chodorow.
- "The Little MongoDB Book" by Karl Seguin.
- MongoDB Manual on website MongoDB.com

9.   Practical Assignments

Assignment 1.	1. Downloading and Installation of MongoDB 2. Setting path in environment variable
Assignment 2.	1. Identify MongoDB environment 2. Using Mongo Shell 3. Configuration file in MongoDB
Assignment 3.	1. Creating database employee 2. Create collections emp_personal_details with emp_id,emp_name,emp_address,emp_DOB,emp_age,emp_mobilenumber 3. Create another collection emp_professional_details with emp_id,emp_name, designation ,salary ,incentive, working hours
Assignment 4.	1. Insert 10 records in collection emp_personal_details and emp_professional_details 2. Show all the employees having designation manager 3. Show all the employees having salary 6000
Assignment 5.	1. Update the collection emp_personal_details , add field status and set it to retired where age is greater than 60 . 2. Update collection emp_professional_details, give incentive 5000 to employees whose working hours is greater than 45 per week 3. Add 1000 to salary employee whose designation is accountant.
Assignment 6.	1. Create index on emp_id in collection emp_professional_details 2. Create multiple index on emp_id,emp_name in collection emp_professonal details
Assignment 7.	1. Find sum of salaries of employee having designation clerk. 2. Filter the employees having designation software engineer and find the minimum salary.
Assignment 8.	1. Use unwind command and show the employees whose mobile number is stored in array 2. Use skip command to skip first 3 records and display rest of records 3. Use limit command to show only first four records of collection
Assignment 9.	1.create backup of collections emp_personal_details and emp_professional_Details 2.Delete some record and then restore it from backup 3.Export the collection in csv and json format 4.Delete some records and import the collections
Assignment 10.	1. Create replica set of employee database and insert records in primary node and display the same records in secondary nodes