MASTER OF COMPUTER APPLICATIONS (MCA_NEW)

ASSIGNMENTS
OF MCA_NEW (2Yrs) PROGRAMME
SEMESTER-II

(July - 2025 & January - 2026)

MCS-218, MCS-219, MCS-220, MCS-221

MCSL-222, MCSL-223

SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
MAIDAN GARHI, NEW DELHI – 110 068

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Important Notes

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Course Code	**:**	**MCS-218**
Course Title	**:**	**Data Communication and Computer Networks**
Assignment Number	**:**	**MCA_NEW(II)/218/Assign/2025-26**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**31st October, 2025 (For July, 2025 Session)** **15th April, 2026 (For January, 2026 Session)**

Note: Answer all the questions in the assignment which carry 80 marks in total. 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the formatof presentation.

Q1: Explain TCP/IP model with layer functionality. Are there any alternative models to TCP/IP. If yes, explain them. **(30 Marks)**

Q2: How does Slotted ALOHA improve the performance of the system over Pure ALOHA. **(30 Marks)**

Q3: What are various mechanisms for congestion control? **(20 Marks)**

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Course Code	**:**	**MCS-219**
Course Title	**:**	**Object Oriented Analysis and Design**
Assignment Number	**:**	**MCA_NEW(II)/219/Assign/2025-26**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last date of Submission	**:**	**31st October, 2025 (For July, 2025 Session)** **15th April, 2026 (For January, 2026 Session)**

Note: This assignment has eight questions of 80 Marks. Answer all questions. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the formatof presentation.

Q1: What is OOAD? Explain basic constructs of object orientation. **(10 Marks)**

Q2: Draw class diagram for Online Banking System. Make necessary assumptions. **(10 Marks)**

Q3: What is object modeling, dynamic modeling and functional modeling? Briefly explain the diagrams used in these modeling. **(10 Marks)**

Q4: Draw state diagrams for: **(10 Marks)**

(i) Online Banking System

(ii) Online Examination System

Q5: What is an abstract class? Explain concepts of aggregation, generalization and specialization with the help of suitable example. **(10 Marks)**

Q6: Explain design optimization? Also, explain need of design documentation. What are features of a good design document? **(10 Marks)**

Q7: Map the object classes created in Question 2 above into database tables. Note: Make necessary assumptions. **(10 Marks)**

Q8: Write short notes on the following: **(10 Marks)**

(i) Associations and its Implementation

(ii) Implementation of Controls

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Course Code	**:**	**MCS-220**
Course Title	**:**	**Web Technologies**
Assignment Number	**:**	**MCA_NEW(II)/220/Assign/2025-26**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last date of Submission	**:**	**31st October, 2025 (For July, 2025 Session)** **15th April, 2026 (For January, 2026 Session)**

This assignment has nine questions of 80 Marks. Answer all questions. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1: **(a)** What is a Singleton Design Pattern? Explain a scenario where it is useful in a web application and provide a Java code example for its implementation. **(5 Marks)**

(b) Differentiate between a Web Server and a Web Container. Explain the core components of the Model-View-Controller (MVC) architecture with a suitable diagram. **(5 Marks)**

Q2: **(a)** Explain the two primary mechanisms for servlet communication: RequestDispatcher and sendRedirect. Highlight the key differences between them with an example. **(5 Marks)**

(b) What is Session Management in a web application? Briefly explain the different techniques used to manage sessions in Servlets. **(5 Marks)**

Q3: **(a)** What are JSP Implicit Objects? Explain the purpose and use of the request, response, session, and out implicit objects with code snippets. **(5 Marks)**

(b) Explain the function of the following JSP Action Tags with suitable code examples: **(5 Marks)**

i. <jsp:include>
ii. <jsp:forward>
iii. <jsp:useBean>

Q4: What do you mean by Maven? Explain the structure and purpose of a pom.xml file. Also, describe the key phases of the default Maven build lifecycle. **(5 Marks)**

Q5: Explain the concept of Inversion of Control (IoC) and Dependency Injection (DI) in the Spring Framework. Provide a simple example demonstrating DI using annotations. **(5 Marks)**

Q6: **(a)** Explain how to perform Update and Delete operations in a web application using Spring Boot and Hibernate. Provide relevant code snippets for the Repository and Service layers. **(5 Marks)**

(b) Explain how form validation is handled in Spring MVC. Provide an example of a model class with validation annotations and the corresponding Controller method to process it. **(5 Marks)**

Q7: Explain the request processing workflow in a Spring MVC application. Describe the roles of the DispatcherServlet, Controller, and ViewResolver with the help of a diagram. **(5 Marks)**

Q8: **(a)** Describe the steps to configure Spring Security in a Spring Boot application using Java-based configuration. Show a basic security configuration class that secures all endpoints. **(5 Marks)**

(b) Write a complete Servlet program that retrieves user data (e.g., name, email) from an HTML form and inserts it into a database table using JDBC. **(5 Marks)**

Q9: Write short notes on the following: **(15 Marks)**
(a) Hibernate ORM Framework
(b) JSP Directives (page, include, taglib)
(c) Spring Boot Actuator

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Course Code	**:**	**MCS-221**
Course Title	**:**	**Data Warehousing and Data Mining**
Assignment Number	**:**	**MCA_NEW(II)/221/Assign/2025-26**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Date of Submission	**:**	**31st October, 2025 (For July, 2025 Session)** **15th April, 2026 (For January, 2026 Session)**

This assignment has ten questions. All the questions are compulsory and there is no choice. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide.

Q1: Critically evaluate the top-down and bottom-up approaches to data warehouse design, highlighting scenarios where one may significantly outperform the other in a real-world enterprise environment. **(8 Marks)**

Q2: Analyze the role of OLAP operations (Roll-up, Drill-down, Slice, Dice, and Pivot) in multidimensional data analysis. Support your explanation with a practical business intelligence scenario demonstrating how these operations aid decision-making. **(8 Marks)**

Q3: Discuss the impact of data granularity on query performance, storage, and decision-making accuracy in a data warehouse. Illustrate your answer by comparing fine-grained and coarse-grained data examples. **(8 Marks)**

Q4: Explain how ETL processes influence the accuracy, consistency, and timeliness of data in a data warehouse. Suggest strategies to handle common ETL challenges such as missing values and inconsistent data formats. **(8 Marks)**

Q5: Dimensional modeling techniques such as star schema, snowflake schema, and fact constellation each have their advantages and limitations. Compare these with respect to query performance, ease of maintenance, and user accessibility in a business context. **(8 Marks)**

Q6: Data preprocessing is a vital step in data mining. Analyze the significance of handling missing data, noise removal, and normalization in improving the performance of classification algorithms. **(8 Marks)**

Q7: Compare and contrast classification and clustering techniques in data mining with reference to their objectives, algorithms used, and real-world use cases. Provide examples where both techniques could be applied complementarily. **(8 Marks)**

Q8: Evaluate the importance of frequent pattern mining in the retail industry. How do algorithms like Apriori and FP-Growth help in mining association rules, and what are the trade-offs between them? **(8 Marks)**

Q9: Discuss the ethical implications and privacy concerns in deploying data mining applications on consumer data. Propose methods that ensure responsible data mining while preserving the value derived from large datasets. **(8 Marks)**

Q10: Web and text mining are extensions of traditional data mining. Discuss the challenges unique to unstructured data and propose techniques that are effective for extracting useful insights from web logs and textual documents. **(8 Marks)**

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Course Code	**:**	**MCSL-222**
Course Title	**:**	**OOAD and Web Technologies Lab**
Assignment Number	**:**	**MCA_NEW(II)/L-222/Assign/2025-26**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last date of Submission	**:**	**31st October, 2025 (For July, 2025 Session)** **15th April, 2026 (For January, 2026 Session)**

Note: This assignment has two sections. Answer all questions in each section. Each Section is of 20 marks. Your Lab Records will carry 40 Marks (20 Marks for each section). Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. You must execute the program and submit the program logic, sample input and output along with the necessary documentation. Assumptions can be made wherever necessary. Please go through the guidelines regarding assignments given in the Programme guide for the format of presentation.

Section 1: OOAD Lab

Q1: Draw Use Case Diagram and Deployment Diagram for Online Shopping System. Make necessary assumptions required. **(10 Marks)**

Q2: Draw Class Diagram for Online Shopping System. Make necessary assumptions required. **(10 Marks)**

Section 2: Web Technologies Lab

Q1: Write a program using JDBC and JSP to support editing (address modification, mobile number/ email id update) of customers of online shopping portal. The program should take email-id or registered mobile number as input. **(10 Marks)**

Q2: Write a program to create simple CRUD (Create, Read, Update, and Delete) application using Spring Boot and Hibernate for Online Examination Registration System. Make necessary assumptions required. **(10 Marks)**

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Course Code	**:**	**MCSL-223**
Course Title	**:**	**Computer Networks and Data Mining Lab**
Assignment Number	**:**	**MCA_NEW(II)/L-223/Assign/2025-26**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**31st October, 2025 (For July, 2025 Session)** **15th April, 2026 (For January, 2026 Session)**

The assignment has two parts A and B. Answer all the questions. Each part is for 20 marks. Computer Networks and Data Mining lab record carries 40 Marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the MCA(New) Programme Guide for the format of presentation. If any assumptions made, please state them.

PART-I: Computer Networks

Q1: Create a simple network topology having two client nodes on left side and two server nodes on the right side. Both clients are connected with another node n1. Similarly, both server nodes connecting to node n2. Also connect nodes n1 and n2 thus forming a dumbbell shape topology. Use point to point links only. Make necessary assumptions. **(20 Marks)**

PART-II: Data Mining Lab

Q1: Implement Hierarchical Clustering Algorithm to demonstrate the clustering rule process in the following datasets:

(a) employee.arff **(10 Marks)**

(b) student.arff **(10 Marks)**