

**MASTER OF COMPUTER  
APPLICATIONS  
(Programme Code: MCA\_NEW)**

**ASSIGNMENTS  
OF MCA\_NEW (2Yrs) PROGRAMME  
SEMESTER-II**

**(July - 2021 & January - 2022)**

**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**

## CONTENTS

Course Code	Assignment No.	Submission-Schedule		Page No.
		For July-December Session	For January-June Session	
MCS-218	MCA_NEW(II)/218/Assignment/21-22	15 <sup>th</sup> November, 2021	31st May, 2022	3
MCS-219	MCA_NEW(II)/219/Assignment/21-22	15 <sup>th</sup> November, 2021	31st May, 2022	5
MCS-220	MCA_NEW(II)/220/Assignment/21-22	15 <sup>th</sup> November, 2021	31st May, 2022	9
MCS-221	MCA_NEW(II)/221/Assignment/21-22	15 <sup>th</sup> November, 2021	31st May, 2022	11
MCSL-222	MCA_NEW(II)/L-222/Assignment/21-22	15 <sup>th</sup> November, 2021	31st May, 2022	16
MCSL-223	MCA_NEW(II)/L-223/Assignment/21-22	15 <sup>th</sup> November, 2021	31st May, 2022	18

### Important Notes

1. Submit your assignments to the Coordinator of your Study Centre on or before the due date.
2. Assignment submission before due dates is compulsory to become eligible for appearing in corresponding Term End Examinations. For further details, please refer to Programme Guide of MCA\_NEW.
3. To become eligible for appearing the Term End Practical Examination for the lab courses, it is essential to fulfill the minimum attendance requirements as well as submission of assignments (on or before the due date). For further details, please refer to the Programme Guide of MCA\_NEW.
4. The viva voce is compulsory for the assignments. For any course, if a student submitted the assignment and not attended the viva-voce, then the assignment is treated as not successfully completed and would be marked as ZERO.

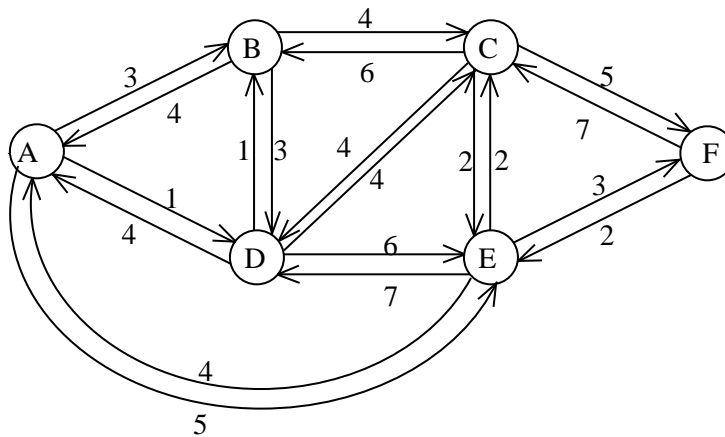


<b>Course Code</b>	<b>:</b>	<b>MCS-218</b>
<b>Course Title</b>	<b>:</b>	<b>Data Communication and Computer Networks</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA_NEW(II)/218/Assign/2021-22</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Weightage</b>	<b>:</b>	<b>30%</b>
<b>Last date of Submission</b>	<b>:</b>	<b>15<sup>th</sup> November, 2021(for July, 2021 session)</b> <b>31<sup>st</sup> May, 2022 (for January, 2022 session)</b>

**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 format of presentation.**

- Q1:** Define the term Internet Backbone. What are the key differences between tier-1 ISP and tier-2 ISP? Explain. **(8 Marks)**
- Q2:** What are the three methods to access the internet? Provide a brief description of how connections establishment, advantages and disadvantages of each method. **(10 Marks)**
- Q3:** Describe the three types of signal distortion in transmission media. What kinds of delays occur during data transmission? **(5 Marks)**
- Q4:** Discuss the key distinguishing features of QAM (Quadrature Amplitude Modulation) technique as compared to other modulation techniques. Draw 8-QAM constellation diagram. **(6 Marks)**
- Q5:** How does the slotted Aloha protocol work? Derive its throughput expression and plot its throughput Vs load graph. **(6 Marks)**
- Q6:** How does CSMA/CD protocol apply randomization process as soon as it detects collision in the channel? **(4 marks)**
- Q7:** Describe the two fundamental problems related to a wireless network. How does the MACAW protocol address the problems? Explain **(6 marks)**
- Q8:** Suppose two hosts A and B are directly connected. Length of the link is 10,000 km and the transmission rate is 10 Mbps. The propagation speed of the link is  $0.5 * 10^8$  m/s. Based on this information answer the following questions.
- (i) Suppose A sends a file of 100 MB size. How long does it take to send the file? Assume the file is sent continuously. **(4 Marks)**
- (ii) Suppose the original file is broken up into 100 packets where size of each packet is 1MB. B sends an ACK for each packet and A cannot send a packet until the previous packet is acknowledged. Transmission time of an ACK packet is negligible. How long does it take to send the file? **(4 Marks)**

**Q9:** Apply Dijkstra's algorithm to compute the shortest path from source node A to all the remaining nodes in the following network. Show all the intermediate calculations. **(8 Marks)**



**Q10:** How does TCP's 3-way handshake mechanism address the following problems? **(4 Marks)**

- (a) Delayed arrival of SYN Packet
- (b) Delayed arrival of ACK Packet

**Q11:** Draw IPV4 header structure and explain the significance for the following field. **(6 Marks)**

- (a) TTL
- (b) Fragment offset
- (c) Flags

**Q12:** Answer the following questions related to network security. **(9 Marks)**

- (i) What are the most common buffer flow attacks?
- (ii) Classify types of vulnerabilities in operating system and list some of vulnerabilities in Linux.
- (iii) What are some major techniques being used in investigation by forensic team?

<b>Course Code</b>	<b>:</b>	<b>MCS-219</b>
<b>Course Title</b>	<b>:</b>	<b>Object Oriented Analysis and Design</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA_NEW(II)/219/Assign/2021-22</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Weightage</b>	<b>:</b>	<b>30%</b>
<b>Last date of Submission</b>	<b>:</b>	<b>15<sup>th</sup> November, 2021(for July, 2021 session) 31<sup>st</sup> May, 2022 (for January, 2022 session)</b>

**Note: This assignment has eleven 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:** What is OOAD? Explain why OOAD of software system should be preferred. **(10 Marks)**
- Q2:** Draw class diagram for online university admission system. **(10 Marks)**
- Q3:** Explain relation of functional model with object model and dynamic model. **(10 Marks)**
- Q4:** Draw a sequence diagram for payment using Mobile Wallet for shopping in a retail store. **(10 Marks)**
- Q5:** Describe concept of system design optimization. Also, explain how design optimization may be achieved. **(10 Marks)**
- Q6:** Explain how Bi-directional Association can be implemented, with the help of an example. **(10 Marks)**
- Q7:** Map the object classes created in Question 2 above into database tables. Make necessary assumptions **(10 Marks)**
- Q8:** Write short note on followings (minimum in 250 words) **(10 Marks)**
- i) Handling boundary conditions in OOAD
  - ii) Aggregation

<b>Course Code</b>	<b>:</b>	<b>MCS-220</b>
<b>Course Title</b>	<b>:</b>	<b>Web Technologies</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA_NEW(II)/220/Assign/2021-22</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Weightage</b>	<b>:</b>	<b>30%</b>
<b>Last date of Submission</b>	<b>:</b>	<b>15<sup>th</sup> November, 2021(for July, 2021 session)</b> <b>31<sup>st</sup> May, 2022 (for January, 2022 session)</b>

**Note: his assignment has eleven 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.** What is Design Pattern? Explain Singleton Design Pattern and Factory Design Pattern with the help of suitable diagrams. **(10 Marks)**
- Q2.** Explain Servlet Architecture. Also explain Servlet Life Cycle. **(10 Marks)**
- Q3.** What are implicit objects in JSP? Briefly explain all the JSP implicit objects. **(10 Marks)**
- Q4.** Explain Spring Boot and Spring MVC frameworks. **(10 Marks)**
- Q5.** How a simple CRUD application can be developed using Hibernate? Explain briefly. **(10 Marks)**
- Q6.** Explain Hibernate (ORM) configuration with Annotation in brief. **(10 Marks)**
- Q7.** Explain how Java Socket Extension (JSSE) is used in Web Security. **(10 Marks)**
- Q8.** What is Role Based Login? Explain how user's access can be restricted using Role Based Login. **(10 Marks)**

**Course Code** : **MCS-221**  
**Course Title** : **Data Warehousing and Data Mining**  
**Assignment Number** : **MCA\_NEW(II)/221/Assign/2021-22**  
**Maximum Marks** : **100**  
**Weightage** : **30%**  
**Last Date of Submission** : **15<sup>th</sup> November, 2021(for July, 2021 session)**  
**31<sup>st</sup> May, 2022 (for January, 2022 session)**

**This assignment has six 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.**

**Question 1:** (15 Marks)

Describe any Cloud-based data warehouse package covering the features like data repository, data cleansing, importing the data, data sharing, queries, federated queries handling, enabling Artificial Intelligence, Analytics, Security, Scalability, encryption, Visualization, facilitation of data mining, data analytics, business intelligence support, performance aspects, maintenance, backup, fault tolerance, APIs support, logs, semi structured data processing, integration of 3<sup>rd</sup> party tools etc.. Also elaborately discuss any two Use-case of this data warehouse package.

**Question 2:** (15 Marks)

ETL stands for “Extract, Transform, and Load”and progressed over time. It consists of the tools and processes used for pulling data from one store, transforming it for placement, and finally, loading it into another store. List and discuss any two common open source ETL tools along with their functionalities.

**Question 3:** (15 Marks)

Briefly discuss any two advanced data and information systems as Use Cases with data representation in advanced databases.

**Question 4:** (10 Marks)

Demonstrate how Bayesian classification helps in predicting class membership probabilities.

**Question 5:** (10 Marks)

Describe the functionalities of DBMiner and how it can be applied to text database and spatial databases. Also illustrate a UseCase.

**Question 6:** (15 Marks)

Discuss the following clustering algorithms using examples:

- (a) K-Means
- (b) K-Medoids



<b>Course Code</b>	:	<b>MCSL-222</b>
<b>Course Title</b>	:	<b>OOAD and Web Technologies Lab</b>
<b>Assignment Number</b>	:	<b>MCA_NEW(II)/L-222/Assign/2021-22</b>
<b>Maximum Marks</b>	:	<b>100</b>
<b>Weightage</b>	:	<b>30%</b>
<b>Last date of Submission</b>	:	<b>15<sup>th</sup> November, 2021(for July, 2021 session) 31<sup>st</sup> May, 2022 (for January, 2022 session)</b>

**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. Please go through the guidelines regarding assignments given in the Programme guide for the format of presentation.**

**Note: 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**

### **Section -1: OOAD Lab.**

- Q1.** Draw Use Case Diagram for Online Counselling Management System for IGNOU MCA\_NEW. Make necessary assumptions required. **(10 Marks)**
- Q2.** Draw Class Diagram for Online Book Shopping System. The system supports from searching of books, order, order tracking, order cancellation, delivery and order return. Also, system support both online pre-payment and cash payment on delivery Make necessary assumptions required. **(10 Marks)**

### **Section -2: Web Technologies Lab**

- Q1.** Write a program using JDBC and JSP to display the current balance from a saving bank account. The program should take account number 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. **(10 Marks)**

<b>Course Code</b>	<b>:</b>	<b>MCSL-223</b>
<b>Course Title</b>	<b>:</b>	<b>Computer Networks and Data Mining Lab</b>
<b>Assignment Number</b>	<b>:</b>	<b>MCA_NEW(II)/L-223/Assign/2021-22</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Weightage</b>	<b>:</b>	<b>30%</b>
<b>Last date of Submission</b>	<b>:</b>	<b>15<sup>th</sup> November, 2021(for July, 2021 session) 31<sup>st</sup> May, 2022 (for January, 2022 session)</b>

**The assignment has two sections A and B. Answer all the questions. Each section is for 20 marks. Computer Networks and Data Mining lab records carry 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.**

### **Section-1: Computer Networks**

**Q1:** Write run a program in C/C++ to simulate the behavior of Aloha random access protocol and show the output.

You are required to the following tasks: **(10 Marks)**

- Generate packets randomly
- Simulate transfer of packets at a random time
- Simulate the occurrence of collision of packets
- Calculate throughput of Aloha
- Plot throughput Vs Load graph

**Hint:** You might need to create several structures / classes in your program for packet transmissions, creating stations, channels, etc., and specify relevant functions with each structure/class.

**Q2:** Make online study of characteristics of NS-2 or any other open-source network Simulator and answer the following questions. **(10 Marks)**

- (a) What are the hardware and software configurations such as memory CPU speed, Graphics card and operating system required to run the simulator?
- (b) What are the objectives of using a network simulator?
- (c) List some open and commercial network simulators.
- (d) Make an overview of current developments in network Simulator.
- (e) What are the main features of network simulator?
- (f) List some pre-built libraries supported in network simulator to perform simulation.

## Section-2: Data Mining Lab

**Q1:**

Perform the following:

- a. Create a Weather Table with the help of Data Mining Tool WEKA or any other similar tool. **(4 Marks)**
- b. Apply Pre-Processing techniques to the training data set of Weather Table. **(4 Marks)**
- c. Normalize Weather Table data using Knowledge Flow / any other similar tool. **(4 Marks)**
- d. Construct a Decision Tree for Weather data and classify it.  
Note: Assumptions can be made wherever necessary. State them. **(4 Marks)**
- e. Write a procedure for Visualization for Weather Table. **(4 Marks)**