MASTER OF COMPUTER APPLICATIONS (MCA_NEW)

ASSIGNMENTS
OF MCA_NEW (2Yrs) PROGRAMME
SEMESTER-II

(January - 2023 & July - 2023)

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

MCSL-222, MCSL-223

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

CONTENTS

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 (2Yrs).

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 (2yrs).

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.

Course Code	:	MCS-218
Course Title	:	**Data Communication and Computer Networks**
Assignment Number	:	**MCA_NEW(II)/218/Assign/2023**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last Dates for Submission	:	**30th April, 2023 (for January session)**
		31st October, 2023 (for July session)

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: What is meant by Modulation? Explain techniques used in digital to analog modulation with the help of a diagram. **(5 Marks)**

Q2: **(a)** What is a Hamming Code? How many redundant bits are required to identify errors in a character of 7 bits. Also mention the specified positions for inserting these redundant bits. **(4 Marks)**

(b) Find CRC for the data polynomial $X^9+X^7+X^4+X^2+1$ with the generator polynomial X^3+X^2+1 **(6 Marks)**

Q3: Sketch the Manchester and RZ encoding of the following bit stream: **(5 Marks)**

1011 00 11 01 01 11

Q4: **(a)** Discuss the key features of random access protocols (multiple access protocols). **(5 Marks)**

(b) Draw and explain the vulnerable period for pure Aloha protocol and obtain its throughput expression. **(6 Marks)**

Q5: What are the advantages of frame fragmentation in wireless network? Explain. **(6 Marks)**

Q6: Explain the implementation of token bucket traffic shaper with the help of a diagram. **(5 Marks)**

Q7: Write and apply Bellman Ford Shortest path algorithm to find the shortest paths in a graph given below: **(10 Marks)**
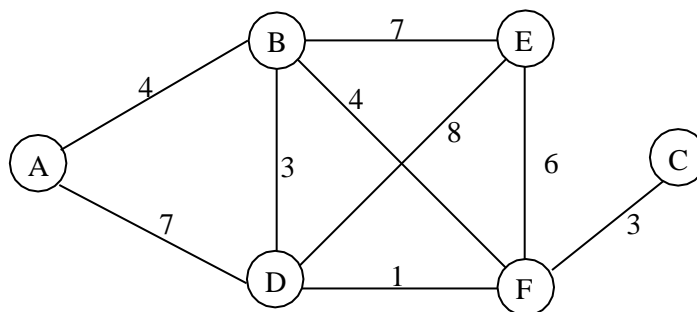
Q8: Discuss the QAM (Quadrature Amplitude Modulation) technique. Draw 8-QAM constellation diagram. **(10 Marks)**

Q9: **(a)** What is the utility of a digital certificate? Explain how digital signatures are created?

(6 Marks)

(b) Explain key generation algorithm for RSA with an example. **(7 Marks)**

(c) Explain the concept of RPC in detail. **(5 Marks)**

Course Code	:	**MCS-219**
Course Title	:	**Object Oriented Analysis and Design**
Assignment Number	:	**MCA_NEW(II)/219/Assign/2023**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last date of Submission	:	**30ᵗʰ April, 2023 (for January session)**
		31ˢᵗ October, 2023 (for July session)

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 format of presentation. Make necessary assumptions wherever required.

Q1. What is OOAD? What is OMT? Explain advantages of OOAD. **(10 Marks)**

Q2. Draw class diagram for online examination system. **(10 Marks)**

Q3. What is functional model? Explain advantages of functional model with the help of example. **(10 Marks)**

Q4. Draw a sequence diagram for online shopping system. **(10 Marks)**

Q5. What is association? Explain different types of association with example. Also describe how associations are implemented. **(10 Marks)**

Q6. Explain design optimization with the help of suitable 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 300 words) **(10 Marks)**

      i)   Inheritance Adjustment

      ii)   Creating class definition from class diagram

Course Code	:	**MCS-220**
Course Title	:	**Web Technologies**
Assignment Number	:	**MCA_NEW(II)/220/Assign/2023**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last date of Submission	:	**30th April, 2023 (for January session)**
		31st October, 2023 (for July session)

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 format of presentation.

Q1. What is need of design pattern? Explain use of Singleton Design Pattern with the help of an example. **(10 Marks)**

Q2. **(a)** What is Servlet? Explain use of GET and POST methods in Servlet programming.
(5 Marks)

Q2. **(b)** Explain JSP and database connection using JDBC, with the help of an example code.
(5 Marks)

Q3. What session management? Explain different ways of session management. **(10 Marks)**

Q4. Explain Java annotations (both built-in and custom). **(10 Marks)**

Q5. Explain CRUD application development process using Hibernate. **(10 Marks)**

Q6. Explain Hibernate (ORM) Architecture. **(10 Marks)**

Q7. Explain Java Socket Extension (JSSE) features and benefits**. (10 Marks)**

Q8. **(a)** What is Custom Login? Explain with example. **(5 Marks)**

Q8. **(b)** Explain issues and challenges in Web Security. **(5 Marks)**

Course Code	:	MCS-221
Course Title	:	**Data Warehousing and Data Mining**
Assignment Number	:	**MCA_NEW(II)/221/Assign/2023**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last Date of Submission	:	**30th April, 2023 (for January session)**
		31st October, 2023 (for July session)

This assignment has seven 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.

a) Compare and contrast operational database systems with a Data Warehouse. **(5 Marks)**

b) Define a Data Mart. What is the importance of Data Marts? Compare and contrast Data Mart with Data Warehouse. **(5 Marks)**

Q2.

a) Along with the details, draw and illustrate Star, Snowflake and Fact Constellation schemas.
Note: Give examples other than the ones discussed in the course material. **(10 Marks)**

b) Discuss the three-tier data warehouse architecture with a neat diagram. **(5 Marks)**

Q3.

Discuss **any two** Use Cases of implementing Data Warehouse in organizations which includes their dimensional design, ETL, data quality, security aspects, dash boards, data mining techniques etc. **(15 Marks)**

Q4.

a) Compare k-Means with k-Medoids algorithms for clustering with the help of suitable examples. **(5 marks)**

b) How to evaluate clustering algorithms? Explain with suitable examples. **(5 Marks)**

Q5.

a) What are key issues in hierarchical clustering? Explain them. **(5 Marks)**
b) Discuss Agglomerative Hierarchical clustering algorithm with an example. **(5 Marks)**

Q6.

a) Explain discretization and concept hierarchy generation for numerical data. **(5 Marks)**

b) Why naive Bayesian classification is called "Naive"? Briefly outline the major ideas of naive Bayesian classification. Explain Naive-Bayes classification. Give an example to illustrate your answer. **(5 Marks)**

Q7.

Describe the functionalities of *Orange* Data Mining tool. Discuss how it is used for developing, testing, and visualizing data mining workflows. Also illustrate a Use Case of it. **(10 Marks)**

Course Code	:	**MCSL-222**
Course Title	:	**OOAD and Web Technologies Lab**
Assignment Number	:	**MCA_NEW(II)/222/Assign/2023**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last date of Submission	:	**30ᵗʰ April, 2023 (for January session)**
		31ˢᵗ October, 2023 (for July session)

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 Shopping System. Make necessary assumptions required. **(6 Marks)**

Q2. Draw Class Diagram for Online Admission System for an Institution which offers Bachelor and Master Level Programmes. The system supports for online registration and fee payment. Make necessary assumptions required. **(8 Marks)**

Q3. Define the classes in C++/Java, created in Q2 above. **(6 Marks)**

Section 2: Web Technologies Lab

Q1. Write a program using JDBC and JSP to display the MCA_NEW Students counseling attendance details for theory and practical courses separately. The program should take enrollment 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 for registration in Quiz Competition**. (10 Marks)**

Course Code	:	**MCSL-223**
Course Title	:	**Computer Networks and Data Mining Lab**
Assignment Number	:	**MCA_NEW(II)/223/Assign/2023**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last Dates for Submission	:	**30th April, 2023 (for January session)**
		31st October, 2023 (for July session)

This assignment has two Sections. Answer all the questions. Each section is for 20 marks. Computer Networks and Data mining lab record 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 MCA(New) Programme Guide for the format of presentation. If any assumptions made, please state them.

Section 1: Computer Networks

Q1: **(10 Marks)**

Create a UDP client on a node n1 and a UDP server on a node n2. Perform the following tasks for these node n1 and n2:

a) Send packets to node n2 from node n1 and plot the number of bytes received with respect to

time at node n2.

b) Show the pcap traces at node n2's WiFi interface.

c) Show the pcap traces at node n1's WiFi interface.

Q2: **(10 Marks)**

Create a simple network topology having two client nodes on left side and two server nodes on the right side. Connect both the client nodes with another client node n1. Similarly, connect both the server nodes to a client node n2. Also connect nodes n1 and n2, thus forming a dumbbell shape topology. Use point to point link only. Perform the following tasks using this topology:

a) Install a TCP socket instance connecting either of the client node with either of the server node.

b) Install TCP socket instance connecting remaining client nodes with the remaining server nodes.

c) Send packets to respective clients from both the servers and monitor the traffic for both the pair and plot the number of bytes received.

d) Also plot the packets received.

Section 2: Data Mining Lab

Q1.

Perform the following:

a. Demonstrate data classification on dataset *Customer.csv* which includes creation of a *csv* file, reading it into WEKA and using the WEKA explorer. **(4 Marks)**

b. Use WEKA to implement Decision Tree (J48), Naive Bayes and Random Forest using individual datasets. **(6 Marks)**

c. Illustrate and implement a java program using Naive Bayes Classification. **(4 Marks)**

d. Use WEKA to implement the following Clustering Algorithms: k-Means, Agglomerative and Divisive. **(6 Marks)**