POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS (PGDCA_NEW)

PGDCA_NEW/ASSIGN/SEMESTER-II

ASSIGNMENTS

(July – 2022 & January – 2023)

MCS-206, MCS-207, MCS-208, MCSL-209, MCSL-210

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

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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 PGDCA_NEW Programme Guide.
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 PGDCA_NEW Programme Guide.
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-206**
Course Title	**:**	**Object Oriented Programming Using Java**
Assignment Number	**:**	**PGDCA_NEW(2)/206/Assignment/2022-23**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Date of Submission	**:**	**31st October, 2022 (for July session)** **30th April, 2023 (for January session)**

Note: his 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.

Question1:

(a) What are the different data types available in java? Explain use of char, float and boolean data types with the help of examples. **(5 Marks)**

(b) What is iterative statement? Explain use of for-loop and while-loop in Java programming. **(5 Marks)**

Question2:

(a) Write a Java program for Matrix Addition. Make necessary assumptions. **(4 Marks)**

(b) What is a class? Explain how a class is defined in java with the help of a program to create Account class for Banking System. Also explain use of getter and setter methods. **(4 Marks)**

(c) Explain why main method in java is always static. **(2 Marks)**

Question 3:

(a) Briefly explain different stream classes in java. Also write a java program to print the Data stored in a file. **(4 Marks)**

(b) Explain difference between Srting class and StringBuider class. **(4 Marks)**

(c) Explain use of Unboxing and Autboxing in Java with the help of example. **(2 Marks)**

Question 4:

(a) What is polymorphism? What are different types of polymorphism? Explain how polymorphism is implemented in Java with the help of an example program. **(6 Marks)**

(b) What is Interface in java? Explain use of Interface with the help of a Java program. **(4 Marks)**

Question 5:

(a) Explain use of abstract class in Java with the help of a program. **(4 Marks)**

(b) What is an exception? Explain various causes of exceptions. Explain how multiple exceptions are handled in Java with the help of a program. **(6 Marks)**

Question 6:

(a) What is multithreading? Explain advantages of multithreading with the help of Java programs. **(6 Marks)**

(b) Explain use of Set Interface in Java programming with the help of an example program. **(4 Marks)**

Question 7:

(a) What is FXML? Briefly explain use of FXML. **(4 Marks)**

(b) What is object serialization? Explain advantage of object serialization. **(2 Marks)**

(c) What is need of event handling in JavaFX? Write a Java program to demonstrate event handling in JavaFX. **(4 Marks)**

Question 8:

(a) What is JDBC? Explain use of DriverManager class in JDBC programming with the help of a Java program. **(4 Marks)**

(b) Write a Java program using JDBC to manage attendance record of all the students of your Batch. Make necessary assumptions. **(6 Marks)**

Course Code	**:**	**MCS-207**
Course Title	**:**	**Database Management Systems**
Assignment Number	**:**	**PGDCA_NEW(2)/207/Assignment/2022-23**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**31st October, 2022 (for July session)** **30th April, 2023 (for January session)**

There are four questions in this assignment, which carries 80 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 Programme Guide for the format of presentation. Answer to each part of the question should be confined to about 300 words. Make suitable assumption, if any.

Question 1: **(20 Marks)**

(a) What are the different components of Database Management System? Explain with the help of a diagram.

(b) Explain the characteristics of relational model. What are the various relational algebraic operations? Explain each relational algebraic operation with the help of an example.

(c) Explain the ACID properties of a transaction. What are the problems of concurrent execution of transactions? How can you use locking to solve this problem.

(d) Explain how log files can be used for recovery in case of system failure? What is a checkpoint? What are its advantages?

(e) What are the uses of indexes in execution of a query? Explain with the help of an example/diagram.

Question 2: **(10+10 Marks)**

A Book Store needs to maintain a database system for maintaining the information about the books. The database is needed for the following requirements:

- To find the available books in the store along with the name of publisher, date of publishing and price of the book.
- To find the information about various publishers of the Books, from whom the books can be procured directly.
- To find the information of various purchase orders of books from various publishers. Please note that one purchase order may include list of various books and their copies being ordered.
- To keep track of current stock of books, book sale, reordering of books etc.

(a) Draw an ER diagram for the book store. Specify key attributes and constraints of each entity type and on each relationship type. Note any unspecified requirements and make appropriate assumptions to make the specification complete.

(b) Design normalized tables in 3NFfrom the ER diagram drawn in part (a), with the required integrity constraints.

Question 3: **(20 Marks)**

Consider an e-Commerce Application, which maintains the database using the following tables:

Product (<u>prodid</u>, prodName, price, quantityInStore)
Customer (<u>custid</u>, custName, custAddress, custPhone)
Order (<u>ordid, custid</u>, orderdate, orderdeliverydate)
OrderDetail(<u>ordid, prodid</u>, quantityordered)

Please note that a customer order may include more than one products and a customer can place many orders. Write and run the following SQL queries on the tables:

a. Write the commands to create Product and customer table with key constraints.
b. Write the commands to create Order and OrderDetail table with key constraints and foreign key constraints.
c. List all the orders and their details of the orders given in the last month by the customer whose custid is C001.
d. Find the total price of the order O01.
e. List the product information in the increasing order of price.
f. Find the product, which has not been ordered at all.
g. List the customer, who has given maximum number of orders.
h. List the product and the quantity of the product under order.
i. List the pair of customers who share the same phone number.
j. List all the customers whose name starts with alphabet 'A'.

Note: *Make suitable assumptions, if any.*

Question 4: **(8+12 Marks)**

(a) Consider the Relation A={A, B, C, D, E, F, G} and the set of functional dependencies.

B→ AC A→EG D→CF

What is the key of R? Decompose R into 2NF and 3NF relations.

(b) Explain the features and characteristics of the following (maximum 200 words each part):
i. Object oriented database management systems
ii. Data warehouse
iii. NOSQL database

Course Code	**:**	**MCS-208**
Course Title	**:**	**Data Structures and Algorithms**
Assignment Number	**:**	**PGDCA_NEW(2)/208/Assignment/2022-23**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Date of Submission	**:**	**31st October, 2022 (for July session)** **30th April, 2023 (for January session)**

There are four questions in this assignment, which carry 80 marks. Each question carries 20 marks. Rest 20 marks are for viva voce. All algorithms should be written nearer to C programming language. You may use illustrations and diagrams to enhance the explanations, if necessary. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Question 1: **(20 Marks)**

What are Sparse Matrices? Explain with example(s)

Question 2: **(20 Marks)**

How many different traversals of a Binary Tree are possible? Explain them with example(s).

Question 3: **(20 Marks)**

What are AVL trees? How do they differ from Splay trees.

Question 4: **(20 Marks)**

What are Tries? How do they differ from Binary Tries?

Course Code	**:**	**MCSL-209**
Course Title	**:**	**Data Structures and Algorithms Lab**
Assignment Number	**:**	**PGDCA_NEW(2)/L-209/Assignment/2022-23**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**31st October, 2022 (for July session)** **30th April, 2023 (for January session)**

There are two questions in this assignment carrying a total of 40 marks. Each question carries 20 marks. Your Lab Record will 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 Programme Guide for the format of presentation.

Question 1: **(20 Marks)**

Write a program in `C' language that accepts two matrices as input and prints their product.

Input: Two matrices A and B in two-dimensional arrays

Output: Matrix `C' which is result of A X B in the form of two dimensional array

Question 2: **(20 Marks)**

Write a program in 'C' language that accepts a string as input and reverses it.

Course Code	**:**	**MCSL-210**
Course Title	**:**	**DBMS and Java Lab**
Assignment Number	**:**	**PGDCA_NEW(2)/L-210/Assignment/2022-23**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Date of Submission	**:**	**31st October, 2022 (for July session)** **30th April, 2023 (for January 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, comments(in program) 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: DBMS Lab

An Open University offers several types of programmes: Diploma (1 year duration), Bachelor's degree (3 year's duration), Post Graduation (2 years duration) and research degree Programmes (5 years duration). University offer its programmes in Open and Distance Learning (ODL) Mode and Online Mode. The university has a centralized database system. Each Programme has a Minimum and Maximum period to complete. A student on taking admission pays the fee of the first semester/year. For subsequent semesters/years a student should reregister in the next semester/year of the programme by paying the fee of that semester/year. The final data of admission can be obtained by the Admission Division through a query to the central database. Perform the following tasks for the University. You may include following attributes in your design:

Student enrolment number, name, father's name, date of birth, ProgrammeCode, ProgrammeFee, date of admission, fee payment details, subjects of the programme etc.

Please make and state assumptions, if any.

Question 1: **(5 Marks)**

List the entities, their attributes and relationships for the description and make an ER-diagram for the University. You may use the concept of keys, aggregation, generalisation, cardinality etc. in a proper way. Design the suitable RDBMS tables for the ER-diagram created by you. The database design should include keys, foreign keys, constraints and referential integrity constraints. Your database design must be normalized up to 2nd Normal form.

Question 2: **(5 Marks)**

Implement the database design that you have created in question 1 using a RDBMS with proper integrity constraints. Enter about 10-20 records of meaningful data in each of your table.

Question 3: **(10 Marks)**

Write and run the following queries for your database using SQL commands:

a) Find the details of the programme having the maximum number of students.

b) Find the programme that has the maximum fee. Also find the number of students enrolled in this programme.

c) Find the number of programmes offered in Online Mode.

d) List the Programme with maximum number of students.

e) List the student of BCA who have paid the fee of all the six semesters of the programme.

f) List all the students of MCA who have paid the fee of first two semesters.

g) Find the total fee paid by all the students so far to the university.

h) List the details of all Programmes offered in ODL mode and whose minimum duration is three years.

Section 2: Java Lab

Question 1: **(4 Marks)**

Write a java program for Matrix Multiplication. Define appropriate class(es), constructor(s) and methods in your program.

Question 2: **(6 Marks)**

Write a java program to create a Teacher class and define constructors. Inherit Professor class, Associate_Professor class and Assistant_Professor class from the Teacher class. Override constructors of Teacher class in the derived classes. Define appropriate methods to calculate salary of teachers. Show how to implement method overriding in this program. Make necessary assumptions.

Question 3: **(5 Marks)**

Write a java program to demonstrate use of multithreading in problem solving.

Question 4: **(5 Marks)**

Write a program to demonstrate use of ResultSet Interface in JDBC programming. Use appropriate GUI in your program.