POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS PGDCA-(NEW)

PGDCA-NEW/ASSIGN/SEMESTER-II

ASSIGNMENTS

(July – 2021 & January – 2022)

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

SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
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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 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 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(2)/206/Assignment/2021-22**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Date of Submission	**:**	**15th November, 2021 (for July session)** **15th April, 2022 (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) Explain different data types available in java. **(5 Marks)**

(b) What is an object? How it is created? Explain how data hiding is achieved in java with the help of an example. **(5 Marks)**

Question2:

(a) Explain how class is defined in java with the help of a program to create Book class. Also explain use of getter and setter methods. **(4 Marks)**

(b) Explain use of static methods in java. **(2 Marks)**

(c) Write a java program to multiply two matrices of 4X4. **(4 Marks)**

Question 3:

(a) Briefly explain different stream classes in java. Also write a java program to save the given data in a file. **(6 Marks)**

(b) Explain difference between Srting and StringBuffer classes. **(4 Marks)**

Question 4:

(a) What is polymorphism? What are different types of polymorphism? Explain advantages of polymorphism with the help of an example. **(6 Marks)**

(b) What is a package in java? Explain accessibility rules for packages. **(4 Marks)**

Question 5:

(a) What is interface? Explain difference between abstract class and interface with the help of examples. Also, write advantages of using interfaces in java programming. **(6 Marks)**

(b) What is an exception? Explain various causes of exceptions. With the help of a program explain how exceptions are handled in java. **(4 Marks)**

Question 6:

(a) What is multithreading? Explain how threads are created in java with the help of programs. Explain threads synchronization in java. **(6 Marks)**

(b) Explain use of Map and HashMap in java. **(4 Marks)**

Question 7:

(a) Briefly explain user interface components of JavaFX. **(4 Marks)**

(b) What is object serialization? Explain working and use of object serialization. **(4 Marks)**

(c) Explain use of Number class of java. **(2 Marks)**

Question 8:

(a) Explain event handling in JavaFX with the help of a program. **(4 Marks)**

(b) What is JDBC? Explain the advantages of JDBC. **(3 Marks)**

(c) Explain use of DriverManager class in JDBC programming with the help of a small program **(3 Marks)**

Course Code	**:**	**MCS-207**
Course Title	**:**	**Database Management Systems**
Assignment Number	**:**	**PGDCA(2)/207/Assignment/2021-22**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th November, 2021 (for July session)** **15th April, 2022 (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) Explain the three level DBMS architecture with the help of an example. What is data independence? How can it be related to the three-level architecture?

(b) Explain the different types of constraints that can be defined in a relational database system with the help of examples. Why these constraints should be defined in a database system?

(c) What is a transaction? What are the problems of concurrent transactions? Explain with the help of examples.

(d) What is locking? Explain with the help of examples, how locking solves the problems relating to concurrent execution of transactions.

(e) Explain the concept of database recovery with the help of an example. Also, explain the concept of query optimisation with the help of an example.

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

AMedicine Store needs to maintain a database system for maintaining its inventory of items. The database is needed for the following requirements:

- To find the medicine name, medicine code, date of manufacture, date of expiry, present stock of medicine etc.
- To find the information about various suppliers of different medicines. A suppliermay not supply all the medicines. Some of the information that is needed about supplier is: the Supplier Code, supplier name, address, the medicines that can be supplied by the supplier etc.
- To find the information of various purchase orders of medicines purchase from various suppliers. Please note that one purchase order may include several medicines.
- To keep track of current stock of medicines, the quantity of medicines received and sold etc.

(a) Draw an ER diagram for the departmental 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 a "Software Management System" that maintains the database using the following tables:

Project (<u>p-id</u>, p-title, start-date, duration, proj-cost, c-id)
Clients (<u>c-id</u>, c-name, c-address, c-phone)
Employee (<u>e-id</u>, e-name, e-address, e-phone)
Project-person (<u>p-id, e-id</u>)

Please note that an employee may be working on more than one projects in the organization at a time. Write and run the following SQL queries on the tables:

a. Find the c-id and c-name of the clients who have given the project with maximum project cost.
b. List the employee id and name of all the employees and the project titles on which they have worked from time to time.
c. Find the list of employees who are working on at least two projects.
d. Find the names of all those employees who have worked on all the projects of client whose c-name is "XYZ".
e. Find the projects which have been completed between 31st Dec, 2020 and 31st Dec. 2021
f. Find the employees who are NOT working on any project.
g. List the project titles along with their p_id in the order of project cost.
h. List the Client details of the clients who have given a project after 31st Dec, 2021.
i. List the pairs of p-id's of the employees, who are working on the same project.
j. List all the employees whose name starts with alphabet 'S'.

Note: *Make suitable assumptions, if any.*

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

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

A→ BC B→E C→DF

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

(b) Differentiate between the following:
i. Object oriented database management systems and relational database management system
ii. Data mining and data warehousing
iii. NOSQL database and relational databases

Course Code	**:**	**MCS-208**
Course Title	**:**	**Data Structures and Algorithms**
Assignment Number	**:**	**PGDCA(2)/208/Assignment/2021-22**
Maximum Marks	**:**	**100**
Weightage	**:**	**40%**
Last Date of Submission	**:**	**15th November, 2021 (for July session)** **15th April, 2022 (for January session)**

This assignment has four questions which carry 80 marks. Answer all the questions. Each question carries 20 marks. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide. All the implementations should be in C language.

Question 1: **(20 Marks)**

Write an algorithm for the addition of two matrices

Question 2: **(20 Marks)**

Explain the differences between a Tree and Binary Tree.

Question 3: **(20 Marks)**

Compare any two sorting algorithms.

Question 4: **(20 Marks)**

What are the advantages and disadvantages of a Singly Linked List over a Doubly Linked List.

Course Code	**:**	**MCSL-209**
Course Title	**:**	**Data Structures and Algorithms Lab**
Assignment Number	**:**	**PGDCA(2)/L-209/Assignment/2021-22**
Maximum Marks	**:**	**100**
Weightage	**:**	**40%**
Last Dates for Submission	**:**	**15th November, 2021 (for July session)** **15th April, 2022(for January session)**

This assignment has four questions which carry 80 marks. Answer all the questions. Each question carries 20 marks. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide. All the implementations should be in C language.

Question 1: **(20 Marks)**

Write a Program in C language for the multiplication of two matrices.

Question 2: **(20 Marks)**

Write a Program in C language for creation of a Binary Tree.

Question 3: **(20 Marks)**

Write a Program in C language for Bubble Sort.

Question 4: **(20 Marks)**

Write a Program in C language for the implementation of Singly Linked List

Course Code	**:**	**MCSL-210**
Course Title	**:**	**DBMS and Java Lab**
Assignment Number	**:**	**PGDCA(2)/L-210/Assignment/2021-22**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Date of Submission	**:**	**15th November, 2021 (for July session)** **15th April, 2022 (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 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

A Central University has a main campus and a number of associated colleges. The 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). A programme may be offered through the main campus or associated college. The university has a centralized database system. A student can register in a programme in the college of his/her choice in which programme is on offer. A student on taking admission pays the fee of the first year. For subsequent years a student should reregister in the next year of the programme and pay the fee of the next year. The fee payment is also done in a yearly mode. The final data of admission can be obtained by the colleges through a query to the central database. The University has a centralized examination system. It conducts the examination of the students in various subjects of various programmes. For simplicity you may assume that a programme of the University only has three compulsory subjects in a year. 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, programme code (it should be a valid programmes), college, date of admission, fee payment details, subjects of the programme, marks of student in a course 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 so created. The database design should include keys, foreign keys, constraints and referential integrity constraints. Your database design must be normalized up to 3rd 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 student who have either failed the subject Database Management System at least once or has not given the examination for this subject. You may assume that this subject is taught in BCA 2nd Year and MCA 1st year.

d) Find the student who has topped in BCA 2nd Year examination.

e) Find the number of programmes run in each college.

f) List the college with maximum number of students.

g) List the programme, the colleges in which they are being offered and the list of subjects of the programme .

h) List the student of BCA who have paid the fee of all three years of the programme.

i) List all the students of BCA who have paid the fee of all the three years as above and have passed all the subjects of that programme.

j) Find the total fee paid by all the students so fat to the university.

Section 2: Java Lab

Question 1: **(5 Marks)**

Write a java program to demonstrate use of public, private and protected access specifiers. Define appropriate classes, constructors and methods in your program. Give suitable comments to increase readability/understanding of program.

Question 2: **(5 Marks)**

Write a java program to create an Account class and define constructors in it. Inherit Saving_Bank_Account class and Current_Bank_Account class from the Account class. Override constructors of Account class in Saving_Bank_Account and Current_Bank_Account classes. Define appropriate methods to operate these accounts. Make necessary assumptions.

Question 3: **(5 Marks)**

Write a java program to demonstrate use of File class and its methods.

Question 4: **(5 Marks)**

Write a program to demonstrate use of ResultSet Interface in JDBC programming.