POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS (PGDCA_NEW)

ASSIGNMENTS

(July – 2023 & January- 2024 sessions)

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_NEW (2)/206/Assignment/2023-24**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last date of Submission:		**31ˢᵗ October, 2023 (for July session)**
		30ᵗʰ April, 2024 (for January session)

Note: This assignment has eight questions of 80 Marks. Answer all the 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.

Question 1:

(a) Explain use different logical operator available in java with the help of examples. **(5 Marks)**

(b) What is object oriented programming? Explain features of object oriented programming.

(5 Marks)

Question 2:

(a) What is a class? How a class is defined in Java? Explain use of getter and setter methods in Java. **(4 Marks)**

(b) Explain use of final and super keywords in Java. **(2 Marks)**

(c) Write a java program to find factorial of a given number. Define proper class and methods in your program. **(4 Marks)**

Question 3:

(a) Briefly explain different classes used for I/O in java with the help of examples. **(8 Marks)**

(b) Explain difference between String and StringBuilder classes of Java. **(2 Marks)**

Question 4:

(a) What is polymorphism? What is difference between static binding and dynamic binding? Explain with the help of an example. **(8 Marks)**

(b) What is abstract class? Explain its advantages. **(2 Marks)**

Question 5:

(a) What is interface? Explain advantages of using interfaces in Java with examples. Also, write limitations of interfaces. **(5Marks)**

(b) What is an exception? Explain various causes of exceptions. Explain how create user defined exceptions in Java. **(5 Marks)**

Question 6:

(a) What is multithreading? Explain use of threads in Java with the help of a programs. Also explain how threads are synchronized in Java. **(7 Marks)**

(b) Explain use of Set and HashMap in Java. **(3 Marks)**

Question 7:

(a) Explain user interface components of JavaFX with the help of suitable programs. **(6 Marks)**

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

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

Question 8:

(a) Explain need of event handling in JavaFX with the help of a program. **(2 Marks)**

(b) Write a Java program using JDBC to create a simple registration form for a Quiz competition. Make necessary assumptions. **(6 Marks)**

(c) Explain use of commit() and rollback() in JDBC programming with the help of a small Program. **(2 Marks)**

Course Code	:	MCS-207
Course Title	:	Database Management Systems
Assignment Number	:	PGDCA_NEW(2)/207/Assignment/2023-24
Maximum Marks	:	100
Weightage	:	30%
Last Dates for Submission	:	31st October, 2023 (for July session)
		30th April, 2024 (for January session)

There are five 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 the presentation. The answer to each part of the question should be confined to about 300 words. Make suitable assumptions, if any.

Question 1: **(4+4+4+8= 20 Marks)**

a) What are the advantages of a database management system over a file-based system? Explain the three-level architecture of a DBMS.
b) Explain the following terms in the context of a relational model with the help of one example of each– Cartesian Product, Candidate Key, Primary Key constraint, Set difference operation and Referential Integrity.
c) Explain the concept of clustering index with the help of an example.
d) A Bank uses a database system for maintaining information about its customers. This database is used for the following requirements:
   - To find the customer id, name, account number and balance of various customers.
   - To find the deposits and withdrawals made by a customer for a specific period.
   - To calculate the interest on the customer deposit.

   Perform the following tasks for the Bank:
   i. Draw an ER diagram for the Bank. Specify key attributes and constraints on each entity type and on each relationship type. Note any unspecified requirements and make appropriate assumptions to make the specification complete.
   ii. Design normalized tables in 3NF from the ER diagram drawn in part (i), with the required integrity constraints.

Question 2: **(5+5+10= 20 Marks)**

(a) What is MVD? Explain with the help of an example. Explain the 4th Normal Form.
(b) Consider the Relation R={A, B, C, D, E, F, G} and the set of functional dependencies.
    A→ DE   B→CG   AB→ EF
What is the key to the relation R? Decompose R into 2NF and 3NF relations.
(c) Consider the following relational database:
   Student (stid, stName, stProg, Phone)
   Programme (progId, prName, prDuration, prFee)
   Course (courseCode, courseName, courseCredit)
   CourseProgramme(progID, courseCode)

   The underlined attributes form the primary key of the relations. In relation Student, the stProg is the programme code of the student and should reference progId of the Programme table. Please note that a course may be part of several programmes. Please note that the CourseProgramme

relation has two foreign keys. Write and run the following SQL queries on the tables:

(i) Create the tables with the primary and foreign key constraints.
(ii) Insert at least 5 records in the first 3 tables and 20 records in the 4th table.
(iii) List all the Programmes of the University in the order of programme name
(iv) Find the list of all the courses of programme whose ID is "PGDCA".
(v) Find the list of those courses that are part of more than one programme.
(vi) Find the list of courses, which are to be studied by a student whose ID is "S001"
(vii) Find the total credits of each programme.
(viii) Find the list of students in each Programme.
(ix) List the pair of students who share the same phone number.
(x) List all the students whose name starts with the alphabet 'A'.

Question 3:   **(8+6+6 = 20Marks)**

a) Explain the problems of concurrent transactions with the help of examples. What is a serializable schedule in this context? What is the two-phase locking protocol? Does it solve the problems of concurrent transactions? Justify your answer. Can deadlock occur when you use two-phase locking? Justify your answer.

b) Explain the process of recovery using a log file. How is a checkpoint useful in recovery? Explain. Explain the process of access control in the context of database system security.

c) Explain any one method of the query cost computation for SELECT and JOIN operations. Make the query tree for the following query (assume the database of problem 2(c).
      SELECT s.name, p.pogID, c.courseName
      FROM Student s, Programme p, Course c, Course_Programme cp
      WHERE s.stProg = p.progID AND p.progID = cp.progID AND
                c.courseCode=cp.courseCode AND progID="MCA";

Question 4: Explain the following with the help of an example of each: **(4×5=20 Marks)**

a) Features of Object-oriented database systems.
b) The multi-dimensional data model of a data warehouse.
c) Multimedia database
d) NoSQL databases

Course Code	:	MCS-208
Course Title	:	Data Structures and Algorithms
Assignment Number	:	PGDCA_NEW(2)/208/Assignment/2023-24
Maximum Marks	:	100
Weightage	:	30%
Last Dates for Submission	:	31st October, 2023 (for July session)
		30th April, 2024 (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. 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 B-trees? Explain with example.

Question 2: **(20 Marks)**

Explain the process of converting a Tree into a Binary Tree with an example.

Question 3: **(20 Marks)**

What is Heap Sort? What is Merge Sort? Write the factors on the basis of which Heap Sort or Merge Sort is selected.

Question 4: **(20 Marks)**

What is a Doubly Linked List? How does it differ from Circularly Doubly Linked List?

Course Code	:	MCSL-209
Course Title	:	**Data Structures and Algorithms Lab**
Assignment Number	:	**PGDCA(2)/L-209/Assignment/2023-24**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last Date of Submission	:	**31st October, 2023 (for July session)**
		30th April, 2024 (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 an algorithm and program in `C' language that accepts a Tree as input and converts it into a Binary Tree. The output of the program should be Binary Tree.

Input: Tree

Output: Binary Tree

Question 2: **(20 Marks)**

Write a program in 'C' language that implements a Queue using Linked Lists. Make necessary assumptions.

Course Code	:	MCSL-210
Course Title	:	DBMS and Java Lab
Assignment Number	:	PGDCA_NEW(2)/L-210/Assignment/2023-24
Maximum Marks	:	100
Weightage	:	30%
Last date of Submission	:	31st October, 2023(for July session)
		30th April, 2024 (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. 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: DBMS Lab

An e-Commerce portal provide online product purchase/shopping facility to its customers. It maintains the database of Products, Customers, Orders and Order Details . Customers need to register themselves by providing their address and contact details including email id and mobile number before placing any order. Customer order may include more than one products and a customer can place many orders. This shopping portal provides facility of both online payment and cash on delivery (COD).

Question 1:   **(5 Marks)**

List the entities, their attributes and relationships for the description and make an ER-diagram for this e-Commerce Portal. 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 3rd Normal form. Make necessary assumptions wherever require.

Question 2:   **(5 Marks)**

Implement the database design (create tables) that you have created in question 1 using a RDBMS with proper integrity constraints. Enter about 10-15 meaningful records in each of your table.

Question 3:   **(10 Marks)**

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

1.   List all the customers whose pin code is "1100067".

2.   List the order id and amount of those orders which are placed in first week of the month and are of amount more than 10,000.

3.   List the customer name and contact number of those customers who have placed more than one order in October 2023.

4.   List the customer details, who has placed their orders on 10-10-2023.

5.   List all the customers whose name starts with alphabet 'A'.

6. Find the total price of the order id O0011 .

7. List the electronic products information in the increasing order of price.

8. Find the detail of products which have been ordered more than once.

9. ist the order details of the orders placed on 11-10-2023 and payment mode is COD.

10. List the different types (such as electronic, grocery, cloth etc.) of items available for shopping.

Section -2: Java Lab

Question 1: **(5 Marks)**

Write a program to demonstrate use of different data types and operators in Java.

Question 2: **(5 Marks)**

Write a java program to create an abstract class Student. Inherit UG_Student class and PG_Student class from the Student class. Define constructors and appropriate methods to display details of students. Make necessary assumptions

Question 3: **(5 Marks)**

Write a java program to demonstrate use of Set and Map collection interfaces in problem solving.

Question 4: **(5 Marks)**

Write a program to demonstrate use of *commit* and *rollback* methods in JDBC programming.