POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS (PGDCA)

PGDCA/FINAL/ASSIGN/SEMESTER-II

ASSIGNMENTS

MCS-021, MCS-022, MCS-023, MCS-024, MCSL-025

SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
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Important Details

- *These assignments are valid up to the maximum duration of your registration. Submit accordingly*

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-021**
Course Title	**:**	**Data and File Structures**
Assignment Number	**:**	**PGDCA(II)/021/Assignment/Final**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	:	**31st October (For July Session)** **15th April (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 programming language.

Q1. Write an algorithm that converts a Tree into a Binary Tree. **(20 Marks)**

Q2. Is it possible to implement multiple stacks in a Queue. Justify your answer. **(20 Marks)**

Q3. List the names of all SEARCH Algorithms along with their Complexities (Best case, Average case and Worst case). List as many names as possible along with their year of Invention and Inventor. Make necessary assumptions. **(20 Marks)**

Q4. Write an algorithm for creation of an AVL tree. **(20 Marks)**

Course Code	**:**	**MCS-022**
Course Title	**:**	**Operating System Concepts and Networking Management**
Assignment Number	**:**	**PGDCA(II)/022/Assignment/ Final**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October (For July Session)** **15th April (For January Session)**

Answer all the questions of the assignment having 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. Answer of each part of the question should be confined to about 300 words.

Q1. Discuss the key characteristics of a modern operating system. **(4 Marks)**

Q2. Discuss the basic design issues in distributed OS which are different from traditional OS and network OS and how are they implemented? **(5 Marks)**

Q3. Explain the memory management model of the Linux Operating System. **(8 Marks)**

Q4. **(a)** What is the default location of the print spooler in Windows NT ? **(2 Marks)**

(b) Explain virtual to physical address mapping concepts with the help of an abstract model. Make appropriate diagrams if required. **(5 Marks)**

Q5. Answer the following questions related to Linux commands: **(5 Marks)**

- List all the directories using echo command only
- List all the files within a directory including hidden files
- Display a Calendar for a specific month and year
- What will be the output of the following:

  who| more
  who –a
  cat file name | more ℓs- ℓ > temp

- What options can be used with a *grep* command? Show output with each option

Q6. **(a)** What are the objectives of dynamic addressing and directory services in Windows 2000? How are they configured? **(4 Marks)**

(b) How is static IP address different from dynamic IP address? **(2 Marks)**

Q7. What is the meaning of map drive in Windows 2000? What are the benefits in mapping a network drive? Write all the steps for mapping a network drive. ? **(5 Marks)**

Q8. Explain functions of Primary Domain Controller. Also, explain the role of the 'primary domain controller' and 'backup domain controller' in enhancing security of window 2000 server. **(6 Marks)**

Q9. Write a Shell Script program to find Greatest Common Divisor (GCD) for any two numbers. Ensure that your script carries out basic error checking. **(7 Marks)**

Q10. What are the three strategies that can be used to authenticate a user to a computer system? Describe how authentication can be done using hardware tokens. **(6 Marks)**

Q11. **(a)** Differentiate between dial-up connection and VPN connection for remote access. List the requirements to set up a VPN connection. Explain the steps for configuring Windows 2000 VPN **(6 Marks)**

(b) Discuss the protocols and tools for providing secure VPN services **(4 Marks)**

Q12. What are intrusion detection systems (IDS)? What IDS can do? **(5 Marks)**

Q13. Define IPSec? What are its features? Discuss its implementation in Windows 2000. **(6 Marks)**

Course Code	**:**	**MCS-023**
Course Title	**:**	**Introduction to Database Management Systems**
Assignment Number	**:**	**PGDCA(II)/023/Assignment/ Final**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Date of Submission	**:**	**31st October (For July Session)** **15th April (For January Session)**

This assignment has four questions. Answer all questions of total 80 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance 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.

Q1. **(40 Marks)**

a) Draw and explain the detailed system architecture of DBMS.
b) With the help of a diagram, describe the concept of client/server model.
c) Explain in detail about various key constraints used in database system. Give examples for each.
d) Explain the importance of Null values in Relational Model.
e) Discuss the mechanism of attribute relationship inheritance. How is it useful?
f) By considering an example describe various data update operations in SQL. Give examples.
g) Explain insertion, deletion and modification anomalies with suitable examples.
h) State BCNF. How does it differ from 3NF?
i) How can a database recover from failure when many transactions are going on? Describe with the help of an example.
j) What is a distributed database management system? How is it different to that of client server database systems?

Q2. **(20 Marks)**

Suppose you are given the following requirements for a simple database for the National Football League (NFL):

- the NFL has many teams,
- each team has a name, a city, a coach, a captain, and a set of players,
- each player belongs to only one team,
- each player has a name, a player position (such as Centre Forward, left midfield, center midfield, right midfield, left fullback, centre back etc..), a skill level, and a set of injury records,
- a team captain is also a player,
- a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 2000) and a score (such as 4 to 2).

Construct an ER diagram for the NFL database using the Chen notation with all conventions. List your assumptions and clearly indicate the cardinality mappings as well as any role indicators in your ER diagram.

Q3. **(10 Marks)**

Consider a "Library Management System" which keeps the following tables:
Book (isbn-no, book-title, author, publisher, edition, year-of-copyright)
BookAccession (accession-no, isbn-no, date-of-purchase)
Members (m-id, m-name, m-address, m-phone).

Issue-return (accession-no, m-id, expected-date-of-return, actual-date-of-return)

Please note that a member can be issued a book for a period of 15 days. The actual-date-of-return is kept blank for the books that have not been returned. Write and run the following SQL queries on the tables:

(i) Find the m-id and m-name of the members who have got maximum number of un-returned books.
(ii) List the book details along with the number of copies for that book in the library (issued or not-issued both)
(iii) Find the names of all those students who have got all the books issued to him of the author named "ABC" .
(iv) Find the books that are expected to be returned in this week.
(v) Find those members who have not got any book issued to him/her during last six months.

Make suitable assumptions, if any.

Q4. **(10 Marks)**

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

A→F B→CD C→G F →E

What is the key for R? With the help of a suitable example discuss the Insertion, Deletion and Updation anomalies which can arise if the relation is not in 2NF and 3NF ? Decompose R into 2NF, 3NF and finally in BCNF relation.

Course Code	**:**	**MCS-024**
Course Title	**:**	**Object Oriented Technologies and Java Programming**
Assignment Number	**:**	**PGDCA(II)/024/Assignment/ Final**
Maximum Marks	**:**	**100%**
Last Date of Submission	**:**	**31st October (For July Session)** **15th April (For January Session)**

There are eight questions in this assignment which carried 80 marks. Rest 20 marks are for viva-voce. Answer all the questions. Give appropriate comments in programs to increase understandability. Wherever required, you may write java program, run it on machine and take its output as part of solution. Please go through the guidelines regarding assignments given in the Program Guide for the format of presentation.

Q1.

(a) What is Object Oriented Programming? Explain concept of encapsulation with example in java. **(5 Marks)**

(b) Explain use of different operators available in java. **(5 Marks)**

Q2.

(a) What is a class ? Explain how you will define Book class in java. Also, explain use of getter and setter methods. **(4 Marks)**

(b) Explain use of super and final keywords in java. **(3 Marks)**

(c) Write a java program to find the factorial of a given number. **(3 Marks)**

Q3.

Write a java program to create an Teacher class and define constructors. Inherit Professor class, Associate_Professor class and Assistant Professor class from the Teacher class. Define appropriate methods to calculate salary of teachers. Show how to implement method overriding in this program. Make necessary assumptions. **(10 Marks)**

Q4.

(a) Explain uses of abstract class in java with the help of an example. **(4 Marks)**

(b) Explain accessibility rules for packages in java. **(2 Marks)**

(c) What is polymorphism? Explain different types of polymorphism in java programming with the help of example. **(4 Marks)**

Q5.

(a) What is interface? Explain difference between abstract class and interface with the help of examples. Write a java program to demonstrate use of interface. **(5 Marks)**

(b) What is an exception? Explain various causes of exceptions. Explain exceptions hierarchy in java. **(5 Marks)**

Q6.

(a) What is multithreading? What is thread priority? Describe interthread communications in java with the help of a program. **(7 Marks)**

(b) Create an Applet to draw a triangle on the basis of input given by user. **(3 Marks)**

Q7.

(a) What is object serialization? Explain advantage of object serialization. **(2 Marks)**
(b) What is need of layout manager? Explain different layouts available in java for GUI programming. Write code to set the layout of an applet. **(8 Marks)**

Q8.

(a) What is RMI? Explain its use. **(3 Marks)**

(b) What is JDBC? Explain need of JDBC drivers. **(3 Marks)**

(c) What is Servlet? Explain use of GET and POST methods in Servlet. **(4 Marks)**

Course Code	**:**	**MCSL-025**
Course Title	**:**	**Lab Course**
Assignment Number	**:**	**PGDCA(II)/025/Assignment/ Final**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October (For July Session)** **15th April (For January Session)**

This assignment has four parts. Answer all questions of each part. Each part is of 10 marks. Lab records of each part will carry 10 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.

PART-1: MCS-021

Q1. **(5 Marks)**

Write a program in C language for addition of two sparse matrices using Pointers

Q2. **(5 Marks)**

Write a program in C language that will accept a Graph as input and will perform a Depth First Search on it. Make necessary assumptions.

PART-2: MCS-022

Q1.

Write a shell script in Linux/Unix that accepts a text file as input and prints the number of words in the file with at least two vowels **(5 Marks)**

Q2.

Your PC is on a network. Make the printer that is directly connected to your machine as non-sharable **(5 Marks)**

PART-3: MCS-023

Q1. **(10 Marks)**

Create a database consisting of Name of Hospital, Number of Departments, Number of Patients in each Department, Number of Patients who are discharged within a week's time of their admission to Hospital. Make necessary assumption.

After creating the database, perform the following tasks:

(i) List the names of all Hospitals during last five years from where less than 50% patients admitted are discharged within a week's time. Make necessary assumptions.

Part-4: MCS-024

Q1.

Write a program in Java for multiplication of two sparse matrices **(5 Marks)**

Q2.

Write a program in Java that connects to a database and generates a report that consists of the list of all areas (names with pin codes) in a specific city / town where at least one person tested positive for Covid-19 during last 24 hours. Make assumptions wherever necessary **(5 Marks)**

Note: You must execute the program and submit the program logic, sample inputs and outputs along with the necessary documentation for this question. Assumptions can be made wherever necessary.