# POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS

# (PGDCA_NEW)

## ASSIGNMENTS

## (January – 2023 & July – 2023)

**MCS-201, MCS-202, MCS-203, MCSL-204, MCSL-205**



**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-201** |
| Course Title | : | **Programming in C and PYTHON** |
| Assignment Number | : | **PGDCA(I)/201/Assignment/2023** |
| Maximum Marks | : | **100** |
| Weightage | : | **30%** |
| Last Date of Submission | : | **30th April, 2023 (for January session)** |
| | | **31st October, 2023 (for July session)** |

**There are sixteen questions in this assignment (eight in each section i.e. Section A and Section B) which carries 80 marks. Each question carries 5 marks. Rest 20 marks are for viva-voce. Answer all the questions from both the sections i.e. Section A and Section B. You April use illustrations and diagrams to enhance the explanations. Include the screen layouts also along with your assignment responses. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.**

## SECTION-A (C-Programming)

**Question 1.** Compare flowchart and algorithm. Write Algorithm and also draw flowchart to perform following:
  **a.** Find factorial of a number entered by user.
  **b.** Print Fibonacci series up to the number of terms entered by the uses

**Question 2.** Differentiate between Recursion and Iteration. Give suitable code to find factorial of a number entered by user in C for each.

**Question 3.** Explain the concept of call by reference, with suitable code in C for each. Give advantage and disadvantage of call by reference

**Question 4.** Write an algorithm to find the HCF (Highest Common Factor) of the two numbers entered by a user. Transform your algorithm into a C program, support your program with suitable comments.

**Question 5.** Briefly discuss the relation between pointers and arrays, giving suitable example. Write a program in C, to print transpose of a 2D matrix entered by a user. Also give comments.

**Question 6.** Write the syntax of looping control statements. Also draw the flowchart for each statement. Write a program in C to generate the following pattern :

```
      *
     * *
    * * *
```

**Question 7.** Differentiate between Random access and Sequential access of files in C. Discuss the syntax and role of fseek( ) and rewind( ) function, while accessing any file.

**Question 8.** Compare any two of the following (give suitable C code for each) :

  **a.** Break and Continue Statement
  **b.** Structure and Union

## SECTION-B (PYTHON-Programming)

**Question 9.** What is C-Python ? Briefly discuss the relation between framework, library, package and module in Python.

**Question 10.** Differentiate between mutable and immutable data types in Python. Briefly discuss the following data types of Python :
  **a.** Lists
  **b.** Tuples
  **c.** Dictionary

**Question 11.** What is the utility of map( ) function do ? Write a program in Python to print the square of the numbers present in the list, by using map( ) function.

**Question 12.** Compare overloading and overriding in Python. Give suitable example code for each in Python.

**Question 13.** Write Python code to perform the following :
  **a.** Reading data from a file
  **b.** Creating a file and add content to it

**Question 14.** What are Lambda functions ? How do Lambda functions differ from Built-in functions ? Write lambda function to calculate cube of a number. Also write the program to find cube of a number without using lambda function.

**Question 15.** Differentiate between the following with the help of suitable example for each :
  **a.** Co-routines and subroutines
  **b.** Co-routines and threads

**Question 16.** What are Cursor Objects ? Briefly discuss the utility of cursor objects. Write Python code for a cursor to execute the SQL query, to print the version of database. Support your program with suitable comments.

Course Code               :     MCS-202
Course Title            :     Computer Organisation
Assignment Number    :     PGDCA(I)/202/Assignment/2023
Maximum Marks       :     100
Weightage              :     25%
Last Dates for Submission  :     30th April, 2023 (for January session)
                                      31st October, 2023 (for July session)

There are four questions in this assignment, which carries 80 marks. Rest 20 marks are for viva voce.  You April 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.** (covers Block1)                        **(2 marks each × 10 parts =20 Marks)**

**(a)** Define the main features of von Neumann's architecture with the help of a diagram.

**(b)** List the differences between von Neumann and Harvard architecture.

**(c)** Perform the following conversion of numbers:

    (i)   Decimal $(5432109876)_{10}$ to binary and hexadecimal.
    (ii)  Hexadecimal $(FCEB9A86)_h$ to Octal.
    (iii)  String "ABCD987$@&" to UTF 16
    (iv)  Octal $(10235647)_o$ to Decimal

**(d)** Simplify the following function using K-map: $F(A, B, C, D) = \Sigma\ (1, 3, 5, 7, 13, 15)$.  Draw the resultant circuit for the function using NAND gates.

**(e)** Consider the Adder-Subtractor circuit given in Unit 3 of Block 1. Explain how this circuit will perform subtraction (A-B) if the value of A is 0001 and B is 1101. You must list all the bit values including $C_{in}$ and $C_{out}$ and overflow condition.

**(f)** Explain the functioning of a 3×8decoder. You should draw its truth table and explain its logic diagram with the help of example input.

**(g)** Assume that a source data value of 1110 was received at a destination as 1100. Show how Hamming's Error-Correcting code will be appended to source data, so this error of one bit is identified and corrected at the destination. You April assume that error while transmission occurs only in the source data and not in the code

**(h)** Explain the functioning of the T flip-flop with the help of a logic diagram and characteristic table. Also, explain the excitation table of this flip-flop.

**(i)** Explain the functioning of a 3-bitripple counter with the help of a diagram.

**(j)** Represent $(-78.25)_{10}$ and $(0.03125)_{10}$ in IEEE 754 single precision format.

**Question 2.** (covers Block 2)                    **(4 marks each × 5 parts =20 Marks)**

**(a)** What is DRAM? Why is it used as the main memory of a computer? How is it different that the cache memory? Explain the data organisation of a Hard disk with the help of a diagram. What is CLV? What are its advantages and disadvantages? How can you overcome the disadvantages of CLV?

**(b)** Explain the following cache to the main memory mapping scheme with the help of an example and a suitable diagram.

    (i)      Directcache mapping
    (ii)     Four-way set associative cache mapping

**(c)** What are the different types of Interrupts? How is an interrupt processed? What is the need for DMA even though there exists an Interrupt driven I/O mechanism? Explain the functions of DMA.

**(d)** Explain the functioning of Programmed I/O. What are its advantages and disadvantages? For what kind of architecture would you like to use Programmed I/O? Explain when an I/O processoris needed in a computer system.

**(e)** Explain the following in the context of I/O technologies:

    (i)     Video Memory
    (ii)    LCD monitor
    (iii)   Voice-based input
    (iv)   Scanners

**Question 3.** (Covers Block 3)                    **(4 marks each × 5 parts =20 Marks)**

**(a)** Explain the following instructions for a computer system:

    i)   Shift Instructions
    ii)   Branch and Jump Instructions
    iii)  Subroutine call and return instructions
    iv)  Bit manipulation instructions

**(b)** Assume that a computer has 16-bit memory words. The size of instructions on this machine is 32 bits, which consists of an 8-bit operation code, a 4-bit addressing mode, one4-bit register address and one 16-bit memory address. Some of the opcodes and addressing modes for this machine are shown below:

    Opcode: 10001111 – Add the content of the operand into the Accumulator register
    Opcode: 10001110 - Subtract the content of the operand from the Accumulator register
    Addressing Mode: 0011 Direct addressing using a memory address
    Addressing Mode: 0100 Base Register Addressing; where the 4-bit register address is the address of the register and the 16-bit memory address contains the offset from the base register.

Show the content of memory containing two add instructions one using addressing mode 0011 and the other using addressing mode 0100 along with operands and operand addresses. You should show instructions, operandsand memory addresses in the diagram.

**(c)** With the help of micro-operations, explain how an instruction that uses direct addressing mode can be fetched, decoded and executed by a machine. You April follow the conventions as given in Unit 10 of Block 3.

**(d)** What is a micro-instruction? Explain the organisation of control unit. How microinstruction-based control unit work? Explain with the help of a diagram.

**(e)** Explain how the circular buffer in RISC helps in implementation of efficient procedure calls. Also, explain the concept of RISC pipelining and optimisation of RISC pipelining.

**Question 4.** (Covers Block 4)                           **(5 marks each × 4 parts =20 Marks)**

**(a)** Explain the structure of 8086 micro-processor. What are segment registers? Explain how segment registers can be used for computation of physical address in 8086 micro-processor.

**(b)** How does 8086 microprocessor handle interrupts? Explain with the help of an example. Write a program using 8086 assembly language to output a string "Computer Organisation includes assembly programming"

**(c)** Write a program in 8086 assembly language, which converts a four-digitpacked BCD number to ASCII digits and then prints them. Explain each step of the program.The program should take the BCD value from the memory.

**(d)** Explain the following in the context of parallel processing:

  (i)    Arithmetic pipelining
 (ii)    Array processing
(iii)    Inter-processor arbitration
(iv)    Cache coherence

| Course Code | : | MCS-203 |
|---|---|---|
| Course Title | : | Operating Systems |
| Assignment Number | : | PGDCA(I)/203/Assignment/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 six questions. Answer all the questions. Rest 20 marks are for viva voce. You April use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide.**

**Question 1:** (15 Marks)

Consider the following jobs:

| Job # | Arrival time | Run time |
|---|---|---|
| A | 0 | 7 |
| B | 2 | 4 |
| C | 3 | 6 |
| D | 5 | 3 |

**a)** Using the **FCFS** method, compute the completion times of the above jobs, average turn around time and average waiting time.

**b)** Using the **SJF** (Shortest Job First) method, compute the completion times of the above jobs, the average turn around time and the average waiting time.

**c)** Using the Round Robin method (with Quantum = 3), compute the completion times of the above jobs and the average waiting time.

**Question 2:** (20 Marks)

On a disk with 1000 cylinders, numbers 0 to 999, compute the number of tracks the disk arm must move to satisfy all the requests in the disk queue. Assume the last request serviced was at track 345 and head is moving to track 0. The queue in FIFO order contains requests for the following tracks: 128, 870, 694, 470, 107, 378. Show the disk arm movement and calculate the number of tracks traversed using the following policies:
(a) FIFO (b) SSTF (c) SCAN (d) LOOK

**Question 3:** (15 Marks)

Consider the following page-reference string:
1, 7. 6, 5, 4 , 3, 2, 1, 2, 3, 4, 2, 1, 3, 4, 6, 2, 1, 2, 3, 7, 6, 3, 2

How many page faults would occur for following replacement algorithms assuming four frames? Remember that all frames are initially empty, so your first unique pages will all cost one fault each.

    i.       FIFO replacement.
    ii.      LRU replacement.
    iii.     Optimal replacement.

**Question 4:** **(10 Marks)**

Write a program in C to implement Banker's Algorithm to avoid Deadlock. Also explain the code briefly.


**Question 5:** **(10 Marks)**

Discuss in detail the I/O management, File management and Security and Protection in WINDOWS 11 Operating System.


**Question 6:** **(10 Marks)**

Write about the App management, APIs, behaviour changes (privacy, security and performance), flash memory management and Battery Resource Utilization in Android 13 Mobile Operating System.

| Course Code | : | MCSL-204 |
|---|---|---|
| Course Title | : | WINDOWS and LINUX Lab |
| Assignment Number | : | PGDCA(I)/204/Lab_Assignment/2023 |
| Maximum Marks | : | 100 |
| Weightage | : | 30% |
| Last Dates for Submission | : | 30th April, 2023 (for January session) |
| | | 31st October, 2023 (for July session) |

**The assignment has two parts A and B. Answer all the questions. Each part is for 20 marks. WINDOWS and LINUX lab record carries 40 Marks. Rest 20 marks are for viva voce.  You April use illustrations and diagrams to enhance the explanations.  Please go through the guidelines regarding assignments given in the PGDCA Programme Guide for the format of presentation.  If any assumptions made, please state them.**

### PART-I: Windows 10

**Question 1.**      For the following given tasks of Windows 10, write the step-by-step procedure as well as attach the main screen shots:                                    **(1X20=20 marks)**

**(a)**      To personalize the start screen using the charms bar and Change PC Settings.
**(b)**      To customize the tiles on the START screen using the mouse with press and drag.
**(c)**      Copy an item to the clipboard.
**(d)**      Downloading and configuring a Acrobat Reader and any UNZIP package.
**(e)**      Use Cortana(voice search feature) to locate any application.
**(f)**      Scheduling file backups.
**(g)**      To change the screen saver, screen resolution, display settings, text size, lock screen and mouse pointer settings
**(h)**      Connect your system to Wi-Fi
**(i)**      Use Windows Defender
**(j)**      Activate Screen Reader
**(k)**      Find the firewall and change its settings
**(l)**      Use Task Manager, see the processes/services and remove any process which doesn't affect your system and consuming lot of resources.
**(m)**      Dismiss Notifications using Notification Centre
**(n)**      Download any WINDOWS APP and configure it.
**(o)**      Download ZOOM video conferencing tool (free download only) and video conferencing with peer group / friends.
**(p)**      Look at the features of Calendar App. Add an event and set any alarm for it.
**(q)**      Bookmark a website with Edge. Pin a site to the start menu.
**(r)**      Using Edge, Clear Browsing History and clear all cookies.
**(s)**      Explore the Maps Feature, view 3d  features, street views etc..
**(t)**      Upload, share and sync with Microsoft's OneDrive.
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### PART-II: LINUX

**Question 1:**                                                                                    **(5 Marks)**

Write the LINUX commands for the following:

**(a)** To display the present working directory. Make a directory with your name and add a text file with the file name "text1".

**(b)** To create any empty file using touch command.

**(c)** To move a file from one directory to any other directory.

**(d)** To display the first 10 lines of any text file.

**(e)** To grant the permissions of **read and execute** to the *user* and **execute only** permission to the *group* and *others* for all the files in a current directory.

**(f)** To display the file content in a reverse order (from the last line) of any text file.

**(g)** To diplay the User ID / Group ID.

**(h)** To compare two files or streams.

**(i)** To translate the file content from lower case to upper case.

**(j)** To count no. of lines, words and characters in a file.


**Question 2:**

**(a)** Write a shell program to compress any file given by the user as an argument and display its original file size and compressed file size. **(5 Marks)**

**(b)** Write a shell script to find whether the given year is a leap year or not. **(5 Marks)**

**(c)** Write a shell script to display the line count over several files(given as arguments). **(5 Marks)**

| Course Code | : | MCSL-205 |
|---|---|---|
| Course Title | : | C and PYTHON Lab. |
| Assignment Number | : | PGDCA(I)/L-205/Lab_Assignment/2023 |
| Maximum Marks | : | 100 |
| Weightage | : | 30% |
| Last Date of Submission | : | 30th April, 2023 (for January session) |
| | | 31st October, 2023 (for July session) |

**There are two questions in each section of this assignment (i.e over all four questions) carrying a total of 40 marks. Your Lab Record will carry 40 Marks. Rest 20 marks are for viva voce. You April 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. Submit the screenshots along with the coding and documentation.**

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

### Section 1: C Programming Lab

**Question 1.**    Using Structures write an interactive program in C language to create an application program for a small school to maintain the Student_'s database. This application should be having menu options like                                            **(10 Marks)**

• Creating a New Record
• Reading/Listing of Records
• Modify the record
•Delete the record

Each Student_ record should have Student_Name, Student_Roll_No., Student_Class, Student_Fees, Date of Admission, etc.). The application should be designed user-friendly.

**Question 2.**    Write program in C, for the following :                                            **(10 Marks)**

a) To find the sum of digits in an N digit number entered by the user, and print weather the final sum of digits is even or odd
b) To replicate strcpy() function of string.h header file
c) To convert decimal number enetered by the user into its equivalent Binary number.
d) To find the Largest and Smallest number in an unsorted array of integers, entered by the user.
e) To find count vowels and consonants present in any sentence entered by the user

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

### Section 2: PYTHON Programming Lab

**Question 3.**    Write Program to perform following tasks                                            **(10 Marks)**

a. Create a database PRODUCT_SELECTION_DB
b. Set connection with mysql.connector.connect.

c. Create a table PRODUCT _SELECTION in database PRODUCT_SELECTION_DB with following data PRODUCT_NAME,PRODUCT_PRICE, MANUFACTURER, EXPIRY_DATE.

d. change table structure / (add, edit, remove column of a table) at run time

    i. add a column address in the PRODUCT_SELECTION table.

    ii. execute SQL *INSERT* statement to create a record into PRODUCT _SELECTION table

    iii. run the query to updates all the records having EXPIRY_DATE as 31-Dec-2022 and increase PRICE of all the PRODUCTS by 10% of PRODUCT_PRICE.

    iv. delete all the records from PRODUCT _SELECTION Table where EXPIRY_DATE is before 31-Dec-2022.

**Question 4.** Download any Dataset, then write a python code to read the downloaded dataset of your choice (April be CSV file) and print all features i.e. columns of the dataset. Determine the descriptive statistics i.e. Mean Median, Maximum, Minimum ,Range, Count, Variance, Standard Deviation etc. of the numeric features like age, marks, income etc., which April be present in the dataset. **(10 Marks)**

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