POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS PGDCA-(NEW)

> **PGDCA-NEW/ASSIGN/SEMESTER-I**

ASSIGNMENTS

(January – 2022 & July – 2022)

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

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-201**
Course Title : **Programming in C and PYTHON**
Assignment Number : **PGDCA(I)/201/Assignment/2022**
Maximum Marks : **100**
Weightage : **30%**
Last Date of Submission : **31stMay, 2022 (for January session)**
31stOctober, 2022(for July session)

There are sixteen questions in this assignment 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 may 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)

Question1: Write an algorithm, draw a flow chart and write its corresponding C program to convert a Binary number to its equivalent Decimal number. **(5 Marks)**

Question 2: Write an algorithm and flowchart to calculate the roots of quadratic equation $AX^2 + BX + C = 0$.Transform your algorithm in to an equivalent C program. **(5 Marks)**

Question 3: Write a C program to generate the following pattern: **(5 Marks)**

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

Question 4: Write a C program to perform the following operation on matrices of dimension (3 X 3)
        a) Addition   b) Multiplication **(5 Marks)**

Question 5: Write a C program to take a list of N numbers, separate even and odd numbers and put them in two appropriate files (evenfile and oddfile). Use File Handling concept. **(5 Marks)**

Question 6: Write a program to enter a list of strings and rearrange them in alphabetical order, using a one-dimensional array of pointers, where each pointer indicates the beginning of a string. **(5 Marks)**

Question 7: Write a C program to sort a list of N numbers **(5 Marks)**

Question 8: Write a C program to print reverse of a string (without using strrev() function), and checks that the entered string is a palindrome or not **(5 Marks)**

SECTION-B (PYTHON-Programming)

Question 9: Write a program in Python Program to display the Fibonacci Sequences up to nth term where n is provided by the user **(5 Marks)**

Question 10: Write a Program in Python that Accepts a Sentence and Calculate the Number of Digits, Uppercase and Lowercase Letters **(5 Marks)**

Question 11: Create a module series.py containing functions to determine Fibonacci series and Exponential series. Import the module created to make it accessible, and Call the functions of that module with module name . Demonstrate the access of functions in the module created. **(5 Marks)**

Question 12: Differentiate Between Modules and Scripts, give suitable python code for each

(5 Marks)

Question 13: Differentiate Between Co-routines and Sub-routines, give suitable python code for each

(5 Marks)

Question 14: Write Short notes on Generators, Iterators and Decorators give suitable python code for each **(5 Marks)**

Question 15: Write a Program in Python to check if a given year is a leap year **(5 Marks)**

Question 16: Briefly discuss the Lambda, map() and filter() function; with suitable code for each

(5 Marks)

Course Code	:	MCS-202
Course Title	:	Computer Organisation
Assignment Number	:	PGDCA(1)/202/Assign/2022
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	31st May, 2022 (for January Session)
		31st October, 2022 (for July 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: (covers Block1) **(2 marks each × 10 parts =20 Marks)**

(a) Explain the Harvard architecture with the help of a diagram.

(b) Explain how Harvard architecture is different from the von Neumann Architecture.

(c) Perform the following conversion of numbers:

    (i) Decimal $(8734595454)_{10}$ to binary and hexadecimal.
    (ii) Hexadecimal $(B1DFEC1)_h$ to Octal.
    (iii) String "ASCII to UTF 16" to UTF 8
    (iv) Octal $(6703421)_O$ to Decimal

(d) Simplify the following function using K-map: $F(A, B, C, D) = \Sigma (0, 1, 3, 4, 5, 6, 7, 14, 15)$. Draw the 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 0111 and B is 0011. You must list all the bit values including C_{in} and C_{out} and overflow condition, if any.

(f) Explain the functioning of a 4×1 multiplexer. You should draw its truth table and explain its logic diagram with the help of an example input.

(g) Assume that a source data value 0011 was received at a destination as 0001. 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 may assume that error while transmission occurs only in the source data and not in the code.

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

(i) Explain the functioning of a 3-bit Synchronous counter with the help of a diagram.

(j) Represent $(-54.5)_{10}$ and $(0.0625)_{10}$ in IEEE 754 single precision format.

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

(a) What is SRAM? How is it different to DRAM? Define the access time of a Hard disk. How is access time of hard disk is computed? Explain with the help of an example. Also differentiate between CLV and CAV types of disk organisation.

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

   (i)   Associative cache mapping
   (ii) Two way set associative cache mapping

(c) What is an Input/Output processor? Why is it needed? What are the functional similarities and differences between I/O processor and DMA module?

(d) Explain the concept of Programmed I/O and Interrupt driven I/O techniques. How are these two techniques different? In what situation, would you use the Interrupt driven I/O?

(e) Explain the technology of two Input and two output devices in details.

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

(a) What are different types of instruction supported by a computer? Explain at least two instructions of each type.

(b) Using a diagram showing content of sample memory and registers, explain the following addressing modes – Register Indirect addressing, Relative addressing, Index addressing and Base register addressing. (You should show instruction, operands and addresses in the diagram.)

(c) What is a micro-operation? Explain different types of micro-operations with the help of one example each.

(d) Explain the design of a simple ALU and micro-operations supported by it.

(e) What is the need of RISC? How are RISC processors different than the CISC processors? Explain with the help of a diagram, how the large register file in RISC is useful for procedure calls.

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

(a) Explain different set of registers used in 8086 micro-processor. Also explain the utility of all the segment registers with the help of examples.

(b) What is the use of IVT? Explain with the help of a diagram. Write a program using 8086 assembly language to output a string "Use assembly program for speed".

(c) Write a program in 8086 assembly language, which converts a two-digit ASCII number to a packed BCD number. Explain each step of the program.

(d) List the characteristics of the following:

   (i)   Multiprocessors
   (ii)   Multiport memory
   (iii) Inter processor communication and synchronization
   (iv)   Multi-core processors

Course Code	:	MCS-203
Course Title	:	**Operating Systems**
Assignment Number	:	**PGDCA(1)/203/Assignment/22**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last Date of Submission	:	**31ˢᵗ May, 2022 (for January Session)**
		31ˢᵗ October, 2022 (for July Session)

This assignment has five questions carrying 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.

Question 1: **(15 Marks)**

Consider the following set of processes, with the length of the CPU burst time given in milliseconds.

Process	Burst time	Priority
P1	8	3
P2	3	1
P3	4	4
P4	7	2
P5	6	5

The processes are assumed to have arrived in the order P1, P2, P3, P4 and P5 all at time 0.

a. Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF a non-preemptive priority (a smaller priority number implies a higher priority) and Round Robin (quantum=2) scheduling.
b. What is the turnaround time of each process for each of the scheduling algorithm in (a)?
c. What is the waiting time of each process for each of the scheduling algorithm in (a)?
d. Which of the schedules in (a) results in minimal average waiting time (overall processes)?

Question 2: **(10 Marks)**

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

Question 3: **(15 Marks)**

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

How many page faults would occur for the following replacement algorithms, assuming three frames? Remember all frames are initially empty.
a. FIFO replacement b. LRU replacement c. Optimal

Mention the merits and demerits of each of the above algorithms.

Question 4:   **(10 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: 123, 874,692, 475, 105, 376. Perform the computation for the following disk scheduling algorithms:
(a) FIFO (b) SSTF (c) SCAN (d) LOOK

Question 5:

  (a) What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem?   **(5 Marks)**

  (b) Explain in detail how semaphores and monitors are used to solve the Dining-Philosopher problem.   **(10 Marks)**

Question 6:   **(15 Marks)**

Android has continued upgrading since it was first launched a few years ago. The latest version is Android 12 released in October 2021. Mention its functions and also compare this with the earlier versions namely Android 10 (released in Sept, 2019) and Android 11(released in Sept, 2020).

Course Code	:	**MCSL-204**
Course Title	:	**WINDOWS and LINUX Lab**
Assignment Number	:	**PGDCA(1)/L-204/Lab_Assignment/22**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last Dates for Submission	:	**31ˢᵗ May 2022 (for January Session)**
		31ˢᵗ October, 2022 (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 Mark s. 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 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: (*a to e*: 10 Marks)

(a) Add any Gadget on the Desktop

(b) Set Screen Save that can run after 1 minute of idle time.

(c) **Add apps:** (i) PDF Reader (ii) OneNote or similar app (iii) Photos (iv) Microsoft Edge

(d) Scheduling file backups.

(e) Resolving a Driver Problem Using Recovery Boot Options.

(f) Use the following WINDOWS Accessories: **(5 Marks)**

        (i)   Character Map

        (ii)   Snipping Tool

        (iii)   Steps Recorder

        (iv)   Sticky Notes

        (v)   XPS Viewer

(g) Use the following Administrative Tools and write the steps and purpose (include screenshots):

                                                                       (5 Marks)

        (i)   Event Viewer

        (ii)   Performance Monitor

        (iii)   Resource Monitor

        (iv)   Defragment and Optimize Drives

        (v)   Computer Management

PART-II: LINUX

Question 1:

Write the LINUX commands for the following: **(5 Marks)**

(a)   To connect to a remote machine to download or upload files.

(b)   To print a file using standard print command

(c)   To set an environment variable

(d)   To change the command prompt from **$** to *.

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

(f)   To set date and time.

(g)   To list all the files in the current directory whose file names starts with *a*.

(h)   To displays the first 5 lines of any text file.

(i)   To split a file *splittest*, which is containing 10 lines into 5 lines each which are directed to two various files.

(j)   To remove files starting with alphabet *c* from your directory.

Question 2:

(a)   Write a shell program to count no. of characters, vowels, special symbols and blank spaces in a given file provided by the user as input and individually display the count.   **(5 Marks)**

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

(c)   Write a shell script to add two matrices A and B of size 3X3 matrix.   **(5 Marks)**

Course Code	:	**MCSL-205**
Course Title	:	**C and PYTHON Lab.**
Assignment Number	:	**PGDCA(I)/L-205/Lab_Assignment/2022**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last Date of Submission	:	**31stMay, 2022 (for January session)**
		31stOctober, 2022(for July session)

There are two questions in this assignment carrying a total of 40 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. 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.

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Section 1: C Programming Lab   **(20 Marks)**

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Question 1: Write Recursive and Iterative program in C, for the following :

    a) To find the product of digits in an N digit number entered by the user
    b) To reverse a string and check whether it is a palindrome or not
    c) To find the sum of all the integer numbers which occur up to the number entered by the user.
    d) To find the Largest and Smallest number in an unsorted array of integers, entered by the user.

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Section 2: PYTHON Programming Lab

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Question 2: Attempt the following

    I)   Write Program to perform following tasks   **(10 Marks)**
        a. Create a database STUDENT_SELECTION_DB
        b. Set connection with mysql.connector.connect.
        c. Create a table STUDENT _SELECTION in database STUDENT_SELECTION_DB with following data FIRST_NAME,LAST_NAME,AGE,GENDER,MARKS.
        d. change table structure / (add, edit, remove column of a table) at run time
            i. add a column address in the STUDENT_SELECTION table.
            ii. execute SQL *INSERT* statement to create a record into STUDENT _SELECTION table
            iii. run the query to updates all the records having GENDER as **'M'**, and increase AGE of all the males by one year.
            iv. delete all the records from STUDENT _SELECTION Table where AGE is less than 10.

    II)   Write a python code to read a dataset (may 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 may be present in the dataset.   **(10 Marks)**