POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS

(PGDCA_NEW)

PGDCA-NEW/ASSIGN/SEMESTER-I

ASSIGNMENTS

(January – 2024 & July – 2024)

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_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/2024**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Date of Submission	**:**	**30th April, 2024 (for January session)** **31st October, 2024 (for July session)**

There are eight questions in this assignment (four in each section i.e. Section A and Section B) which carries 80 marks. Each question carries 10 marks. Rest 20 marks are for viva-voce. Answer allthe 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)

Question 1: Briefly discuss the concept of "Call by value" and "Call by reference". Give example code in C for each. Support your code with suitable comments.

Question 2: 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 3: Write an algorithm to find the slope of a line segment whose end point coordinates are $(x1, y1)$ and $(x2, y2)$. The algorithm gives output whether the slope is positive, negative or zero. Transform your algorithm into C program.

Note : Slope of line segment = $(y_2 - y_1)/(x_2 - x_1)$.

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

SECTION-B (PYTHON-Programming)

Question 1: Discuss the connect( ) method of MySQL. Connector interface. List the arguments involved with connect( ) method. Write Python code to create database student_DB and to connect to student_DB (make suitable assumptions wherever necessary).

Question 2: What are Pandas ? Write steps to import, read and print a CSV file using Pandas. Also, transform your steps in to suitable code in Python.

Question 3: Write steps to create a package. Apply these steps to create a package named volume and create 3 modules in it named cube, cuboid and sphere, having function to calculate volume of the cube, cuboid and sphere respectively. Import the modules defined in the package and use the defined functions for calculation of volume respectively.

Question 4: What does map( ) function do ? Write a program in Python to print the cube of the numbers present in the list, by using map( ) function.

Course Code	**:**	**MCS-202**
Course Title	**:**	**Computer Organisation**
Assignment Number	**:**	**PGDCA(I)/202/Assignment/2024**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**30th April, 2024 (for January session)**
		31st October, 2024 (for July session)

There are four questions in this assignment, which carries 80 marks. The remaining 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 presentation format. The answer to each part of the question should be confined to about 300 words. Make suitable assumptions, if any.

Question 1: (covers Block1) **(2 marks each × 10 parts =20 Marks)**

(a) Explain the von Neumann architecture. Show how an instruction is executed by the von Neumann machine.

(b) Explain the main architectural differences between the von Neumann architecture and Harvard architecture with the help of a diagram of each.

(c) Perform the following conversion of numbers:

(i) Decimal $(2536475891)_{10}$ to binary and hexadecimal.

(ii) Hexadecimal $(FABCD1E)_h$ to Octal.

(iii) String "ISO-8859-1 coding" to UTF 16.

(iv) Octal $(23174560)_O$ to Decimal

(d) Simplify the following function using K-map: $F(A, B, C, D) = \Sigma (1, 3, 5, 7, 8, 12, 14, 15)$. Draw the circuit of the simplified 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 1010 and B is 1011. You must list all the bit values, including C_{in} and C_{out} and overflow condition.

(f) Explain the functioning of a 3×8 decoder. 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 1001 was received at a destination as 1101. 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 the transmission error occurs in the source data, not the error correction code.

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

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

(j) Represent $(-55.25)_{10}$ and $(0.03125)_{10}$ in IEEE 754 single precision format.

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

(a) Explain the logic structure of SRAM and DRAM cells. How many RAM chips of size 256K × 8 bits are needed to build a memory of size 16M Word RAM having a word size of 32 bits? Find the storage capacity of a disk with 16 recording surfaces and 32 tracks; each track has 64 sectors. You may

assume that each sector can store 1 MB of data. Also, find the rotational latency of a disk which rotates at 12000 rpm.

(b) Consider that the main memory of a computer is 256 words, with each word of 8 bits in size. The cache memory of this computer is 16 blocks, having a block size of 32 bits. Find the cache addresses for the main memory addresses $5A_h$ and $8B_h$ given the following cache mapping schemes:

(i)Associative cache mapping
(ii)Direct cache mapping
(iii)Two-way set associative cache mapping

(c) What is the role of the Input/Output Interface in a computer? Why are I/O interfaces needed? Explain different types of asynchronous data transfer methods.

(d) Explain the Direct Memory Access and interrupt driven I/O techniques. How are these two techniques different to each other? Also, explain different kinds of Interrupts.

(e) Explain the features and technology of the following devices:

(i) LCD Monitors
(ii) Keyboard
(iii) Voice-based Input devices
(iv) Non-impact printers

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

(a) Explain the functioning of shift instructions, and subroutine call and return instructions with the help of an example/diagram of each. Also, explain the following addressing modes with the help of a diagram - Indirect Addressing and Index addressing. You should show instructions and operands in the diagram.

(b) Demonstrate how the size of a machine program changes for the computation of the expression z=(a+b)*(c+d*e) when different instruction sets, having zero address, one address, two address and three address instructions, are used.

(c) Consider a machine that brings all the operands to registers before performing the ALU operation. The machine uses PC, IR, and MAR registers. All memory accesses bring data to the AX register. The operations are performed in AC and AX registers, and results are stored in the AC register. List and explain all the microoperations required to execute an instruction AC← AC+[MAR] on this machine.

(d) Explain the control memory organisation and operation of the micro-programmed control unit with the help of a diagram of each.

(e) What are the features of RISC? Explain the instruction pipelining in the RISC processor. How is branch penalty handled in RISC?

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

(a) Explain different components of the execution unit of the 8086 microprocessor. Compute the physical address for the following segment register: offset pairs in an 8086 microprocessor:

(i) CS: IP = AAFEh: 9AAAh
(ii) DS: BX = 11FFh: 0220h
(iii) SS: SP = 5678h:89ABh

(b) How is IVT used in the 8086 microprocessor for Input/Output? Write a program using 8086 assembly language to input a string: "8086 Microprocessor was a 16-bit processor."

(c) Write a program in 8086 assembly language, which converts a packed four-digit packed BCD number to equivalent four ASCII digits; for example, a packed BCD number "4367" stored in a word is converted to ASCII "4", "3", "6", "7". Explain the algorithm of the program.

(d) List the characteristics of the following:

(i) Parallelism in Uni-Processor Systems
(ii) Vector Processing and Array Processor
(iii) Multi-processors
(iv) Multi-core processors
(v) Cache Coherence

Course Code	**:**	**MCS-203**
Course Title	**:**	**Operating Systems**
Assignment Number	**:**	**PGDCA(I)/203/Assignment/2024**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Date of Submission	**:**	**30th April, 2024 (for January session)** **31st October, 2024 (for July session)**

This assignment has six questions. Answer all questions. Each question is of 20 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.

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 and **all of them have arrived at time 0**.

a. Draw corresponding Gantt charts illustrating the execution of these processes using FCFS, SJF, SRTN, Priority based scheduling/even-driven scheduling and Round Robin (quantum=2) scheduling algorithms.
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: **(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 3: **(15 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 that the head is initially at cylinder 123. Suppose the requests have arrived, forming the following disk queue:

123, 874, 692, 475, 105, 376, 499, 542, 789, 645, 12, 923

(i) Perform the computation for the following disk scheduling algorithms:
(a) FCFS (b) SSTF (c) SCAN (d) LOOK

(ii) Depict the corresponding schemes in the form of a diagram.

Question 4: **(10 Marks)**

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

Question 5: **(15 Marks)**

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

Question 6: **(10 Marks)**

Write about the features of LuneOS. Also, discuss the process management, memory management and security management functions of LuneOS Mobile Operating System(GNU-General Public Licence).

Course Code	**:**	**MCSL-204**
Course Title	**:**	**WINDOWS and LINUX Lab**
Assignment Number	**:**	**PGDCA(I)/204/Lab_Assignment/2024**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Dates for Submission	**:**	**30th April, 2024 (for January session)**
		31st October, 2024 (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 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) Use Cortana. **(a to h: 16 Marks)**
(b) Configure a printer.
(c) To update the windows operating system with latest updates.
(d) Configure the appearance of Windows,
(e) Arrange the Start Menu and Task bar to your liking and personalize the privacy settings.
(f) Work with Network and Sharing center
(g) Scheduling file backups.
(h) Resolving a Driver Problem Using Recovery Boot Options.
(i) Use the following system maintenance tools: **(4 Marks)**
  (i) Windows Defender
  (ii) Disk Defragmenter
  (iii) Backup and Restore feature
  (iv) Task Scheduler

PART-II: LINUX

Question 2:

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

a) Use the ***cat*** command, and display all the .txt files in the current directory on the screen at one go.
b) To copy *dir3* to *dir4* including sub-directories.
c) To search for a certain pattern in the files existing in the current directory
d) To list lines that does not include ***and*** in a text file.
e) To compress all .dat files in the current directory.
f) To decompress all the .dat files compressed in (e).
g) To pause any process.
h) To kill a process using its process-id.
i) To send a set of files to the line printer.
j) To list all the files in the present working directory including the hidden files.

Question 3:

(a) Write a shell script program to perform all Arithmetic Operations using Command line arguments. **(5 Marks)**

(b) Write a shell script program to search whether element is present is in the list or not and also display its position in the list. **(5 Marks)**

(c) Write a shell program to illustrate the ***case*** statement. **(5 Marks)**

Course Code	**:**	**MCSL-205**
Course Title	**:**	**C and PYTHON Lab.**
Assignment Number	**:**	**PGDCA(I)/L-205/Lab_Assignment/2024**
Maximum Marks	**:**	**100**
Weightage	**:**	**30%**
Last Date of Submission	**:**	**30th April, 2024 (for January session)** **31st October, 2024 (for July session)**

There are two questions in both sections of 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.

Section 1: C Programming Lab

Question 1: Using Structures write an interactive program in C language to create an application program for a small office to maintain the employee's database. This application should be having menu options like **(20 Marks)**

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

Each employee record should have Employee Name, Employee ID, Department Name, Salary, Position, Date of Joining, etc. The application should be designed user-friendly.

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 2: Attempt the following

I) Write Program to perform following tasks **(10 Marks)**

a. Create a database SELECTION_DB

b. Set connection with mysql.connector.connect.

c. Create a table EMP_SELECTION in database SELECTION_DB with following data FIRST_NAME,LAST_NAME,AGE,GENDER,INCOME.

d. Change table structure (add,edit,remove column of a table)at runtime

   i. Add a column address in the EMP_SELECTION table.

   ii. Execute SQL *INSERT* statement to create a record into EMP_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 EMP_SELECTION Table where AGE is less than 18.

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. Maximum, Minimum Mean Median, Count, Variance, Standard Deviation etc. of the numeric features like age, salary etc., maybe 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.