POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS PGDCA-(NEW)

ASSIGNMENTS

(January – 2021 & July – 2021)

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

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**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/2021**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last Date of Submission	:	**31stMay, 2021 (for January session)**
		31stOctober, 2021(for July session)

There are ten questions in this assignment which carries 80 marks. Each question carries 8 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 decimal number to its equivalent Binary number. **(8 Marks)**

Question2: Write an algorithm and its corresponding C program to generate students' Progress-Report for VIII standard (section of 20 students) of a CBSE school for all its 4 terms. Use Structures concept. Assumptions can be made wherever necessary. **(8 Marks)**

Question 3: Write a C program to generate the following pattern: **(8 Marks)**

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

Question 4: Write a C program to perform the following operation on matrices D = A + (B * C), where A, B and C are matrices of (3 X 3) size and D is the resultant matrix. **(8 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. **(8 Marks)**

SECTION-B (PYTHON-Programming)

Question 6: Write a program in Python to check if a given year (entered by user) is a leap year or not, support your programme with suitable comments to improve readability **(8 Marks)**

Question 7: Write a program to prompt for a score between 0.0 and 1.0. If the score is out of range, print an error. If the score is between 0.0 and 1.0, print a grade using the following table **(8 Marks)**

Score	Grade
>= 0.9	A
>= 0.8	B
>= 0.7	C
>= 0.6	D
< 0.6	F

Question 8: Write a programme in Python to create a package named Area and create 3 module in it named – square, circle and rectangle each having a function to calculate area of square, circle and rectangle respectively. Import the module in separate location and use the functions. **(8 Marks)**

Question 9: Write a program in Python to perform following: **(8 Marks)**

- To find cube of numbers in a list using lambda function.
- To display frequency of each word in a file.
- To display first n lines from a file, where n is given by user.
- To display size of a file in bytes

Question 10: What are Co-routines? How Co-routines support cooperative multi-tasking in python? How Co-routines differ from threads? Compare Subroutines and Co-routines. **(8 Marks)**

Course Code   :   MCS-202
Course Title   :   Computer Organisation
Assignment Number   :   PGDCA(1)/202/ Assignment /2021
Maximum Marks   :   100
Weightage   :   30%
Last Dates for Submission : 31stMay, 2021 (for January session)
                            31stOctober, 2021(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:   **(2 marks each × 10 parts =20 Marks)**

(a) Explain the features of von Neumann architecture with the help of a diagram.

(b) Differentiate between von Neumann architecture and Harvard architecture.

(c) Perform the following conversion of numbers:
   (i)   Decimal $(384748940)_{10}$ to binary and hexadecimal.
  (ii)   Hexadecimal $(FAB3CDE)_h$ to Octal.
  (iii) String "The escape sequence \t represents tab" to UTF 8
  (iv)   Octal $(7651234)_O$ to Decimal

(d) Simplify the following function using K-map: $F(A, B, C, D) = \Sigma$ (2, 3, 4, 5, 9, 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 1010 and B is 0101. 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 1111 was received at a destination as 0111. 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 SR 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 master-slave flip flop and a two bit Synchronous counter with the help of a diagram of each.

(j) Represent $(-89.25)_{10}$ and $(0.000125)_{10}$ in IEEE 754 single precision format.

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

(a) What is the purpose of creating memory hierarchy? Explain the concept of DRAM. Also explain how access time of Hard disk drive is computed? Differentiate between the hard disk and optical disk characteristics.

(b) Explain the following cache to main memory mapping scheme with the help of an example and suitable diagram.
   (i)   Direct cache mapping
   (ii) Two way set associative cache mapping

(c) What is DMA? Explain its importance with the help of a diagram. How DMA is different than I/O processor?

(d) Explain the use of Interrupt in Input/output with the help of an example. How multiple interrupts, that occur simultaneously, are handled?

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

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

(a) What are various components of an instruction of a computer? Explain with the help of a diagram and example.

(b) Explain any four addressing modes with the help of an example, showing instruction and operands.

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

(d) Explain the working of micro-programmed control unit with the help of a diagram and example.

(e) What are the characteristics of RISC? Explain the use of large register file of RISC with the help of an example/diagram

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

(a) Explain the different components of 8086 micro-processor. Explain any four addressing modes supported by this micro-processor, with the help of an example each.

(b) What is the use of Interrupt 21h? Explain with the help of an example. Also, differentiate between the .com and .exe programs.

(c) Write a program in 8086 assembly language, which converts a two digit ASCII number to its equivalent binary value. Explain each step of the program. Assume that the ASCII digits are in two different byte locations of the memory.

(d) Explain any two architectures in brief:
   (i)   Instruction Pipeline
   (ii) Multiprocessors

Course Code	:	MCS-203
Course Title	:	Operating Systems
Assignment Number	:	PGDCA(1)/203/Assignment /21
Maximum Marks	:	100
Weightage	:	30%
Last Date of Submission	:	31stMay, 2021 (for January session)
		31stOctober, 2021(for July session)

This assignment has five questions. 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 jobs:

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

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

b)   Using the **SRTF** (Shortest Remaining Time first) method, compute the completion times of the above jobs, the average turn around time and the average waiting time. Note that SRTF is SJF with preemption. (Hint: Completion time - arrival time = turnaround time).

c)   Using the Round Robin method (with Quantum = 2), compute the completion times of the above jobs and the average waiting time.

Question 2:

a)   Explain the Banker's problem. Consider the following snapshot of a system: **(15 Marks)**

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using Banker's algorithm:

i. What is the content of the matrix need?
ii. Is the system in a safe state?
iii. If a request from P1 arrives for (0, 4, 2, 0), can the request be granted immediately?

b) Consider the following page-reference string: **(10 Marks)**
1, 2, 3, 4, 2, 1, 3, 4, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 4

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

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

Question 3: (5 X 4 =20 Marks)

a) The Linux kernel does not allow paging out kernel memory. What effect does this restriction have on kernel design? What are two advantages and two disadvantages of this design decision?

b) There are two different ways that commands can be processed by a command interpreter. One way is to allow the command interpreter to contain the code needed to execute the command. The other way is to implement the commands through system programs. Compare and contrast the two approaches.

c) What are the advantages of using a higher-level language to implement an operating system?

d) What are the advantages and disadvantages of using a microkernel approach?

Question 4:

a) Discuss in detail the I/O management, File management and Security and Protection in WINDOWS 10 Operating System. **(10 Marks)**

Question 5:

a) Write about the process management, memory management and security features in Tizen (Open Source) Mobile Operating System. **(10 Marks)**

Course Code	:	MCSL-204
Course Title	:	WINDOWS and LINUX Lab
Assignment Number	:	PGDCA(1)/L-204/ Lab_Assignment /21
Maximum Marks	:	100
Weightage	:	30%
Last Dates for Submission	:	31stMay, 2021 (for January session)
		31stOctober, 2021(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)   To configure a System Restore.   **(a to e: 15 Marks)**
(b)   Configuring a Windows 10 File Recovery Drive.
(c)   To restore a file using File History.
(d)   Scheduling file backups.
(e)   Resolving a Driver Problem Using Recovery Boot Options.
(f)   Use the following system maintenance tools: **(5 Marks)**
  (i)   Disk Defragmenter,
  (ii)   Disk Cleanup
  (iii)   Task Scheduler
  (iv)   The Action Center Maintenance feature.

PART-II: LINUX

Question 1:   **(5 Marks)**
Write the LINUX commands for the following:

(a)   To print the calendar for the current month.
(b)   To append the contents of *file2* after the contents of the *file1* and redirect them to a new *file3*.
(c)   To print the first difference between any two given files.
(d)   To change the command prompt from **$** to ~.
(e)   To grant the permissions of **r w x** to the *user* and **execute only** permission to the *group* and *others* for all the files in a current directory.
(f)   To direct a standard output to any of the line printer.
(g)   To list all the files in the current directory whose file names starts with f.
(h)   To execute some command even after logout.
(i)   To split a file *splittest*, which is containing 20 lines into 5 lines each which are directed to four various files.
(j)   To display the first 2 lines in a given file.

Question 2:

(a)   Write a shell program to count no. of other symbols in a given file by the user.   **(5 Marks)**
(b)   Write a shell script to find the difference between any two given dates.   **(5 Marks)**
(c)   Write a shell script to display the smallest element in a given 2X2 matrix.   **(5 Marks)**

Course Code	:	MCSL-205
Course Title	:	C and PYTHON Lab.
Assignment Number	:	PGDCA(I)/L-205/Lab_Assignment/2021
Maximum Marks	:	100
Weightage	:	30%
Last Date of Submission	:	31stMay, 2021 (for January session)
		31stOctober, 2021(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.

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

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Question1: 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
> • 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.

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Section 2: PYTHON Programming Lab

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Question2: 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 run time
         i. add a column address in the EMP_SELECTIONtable.
         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., may 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.