LNCT UNIVERSITY, BHOPAL

Programme:- MCA (AI/ML) Semester - I wef: July 2022

Name of Paper	Paper Code	Theory					
		Credit			Marks		
Principles & Programming in C	**MAI-101**	**L**	**T**	**J**	**EST**	**CAT**	**Total**
		3	1	0	80	20	100

Course Objective	The objective of this course is to provide the students with foundations in the basic concepts of C programming. Also to teach the students how to develop the programming logics that are appropriate for problems to solve them.

Units	Contents (*Theory*)	Hours /week
I	**Introduction to Computing** – Computer Systems-Hardware and Software, Computer Languages, Algorithm, Flowchart, Representation of Algorithm and Flowchart with examples. **Introduction to C–** History of C, Features of C, Structure of C Program, Character Set, C Tokens-Keywords, Identifiers, Constants, Variables, Data types, Operators.	8
II	**Control Statements**-Selection statements (Decision Making)- if and switch statements with examples, Repetition statements (loops)- while, for, do-while statements with examples, Unconditional statements- break, continue, goto statements with examples.	8
III	**Functions:** Introduction to Functions, Function Declaration, Function Categories, Standard Functions, Parameters and Parameter Passing, Call – by value/reference, Recursion, Global and Local Variables, Storage classes	8
IV	**Arrays:** Introduction to Arrays, Array Declaration, Single and Multidimensional Array, Memory Representation, Matrices, Strings, String handling functions. **Structure and Union:** Declaration of structure, Accessing structure members, Structure Initialization, Arrays of structure, nested structures, Unions	8
V	**File Management:** Introduction: Creating a data file, opening and closing a data file, processing a data file. **Pointers:** Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers, Assignment through pointers, Pointers and Arrays, Dynamic Memory Allocation.	8

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Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Yashvant P Kanetkar	Let Us C	VII	BPB Publications, New Delhi.
E. Balagurusami	Programming in ANSI C	IV	Tata McGraw Hill
R. S. Salaria	Problem Solving and Programming in C	II	
H.Schildt, Osborne	C Made Easy		McGraw-Hill
Yashwant Kanetkar	Understanding Pointers in C	V	BPB

COURSE OUTCOMES: Students will be able to

CO1	Understand the fundamentals and structure of programming language C.
CO2	Understand and implement control structure C Language.
CO3	Know the need and implementation of functions and its various calling conventions.
CO4	Understand and implement structure and union data types and their differences
CO5	Understand and implement file structure and their usage.

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Data analysis using Python, Numpy, Pandas, Matplotlib and Seaborn	**MAI-102**	3	1	0	80	20	100

Course Objective	The objective of this course is to provide the students with foundations in the basic concepts of Data analysis using Python, Numpy, Pandas, Matplotlib and seaborn.

Units	Contents (*Theory*)	Hours /week
I	**Python programming Basic**: Python interpreter, IPython Basics, Tab completion, Introspection, %run command, magic commands, matplotlib integration, python programming, language semantics, scalar types. Control flow.	8
II	**Data Structure, functions, files**: tuple, list, built-in sequence function, dict, set, functions, namescape, scope, local function, returning multiple values, functions are objects, lambda functions, error and exception handling, file and operation systems	8
III	**NumPy: Array and Vectorized computation**: Multidimensional array object. Creating ndarrays, arithmetic with numpy array, basic indexing and slicing, Boolean indexing, transposing array and swapping axes, universal functions, array-oriented programming with arrays, conditional logic as arrays operations, file input and output with array.	8
IV	**Pandas:** Pandas data structure, series, DataFrame, Index Object, Reindexing, dropping entities from an axis, indexing, selection and filtering, integer indexes, arithmetic and data alignment, function application and mapping, sorting and ranking, correlation and covariance, unique values, values controls and membership, reading and writing data in text format.	8
V	**Visualization with Matplotlib:** Figures and subplots, colors, markers, line style, ticks, labels, legends, annotation and drawing on subplots, matplotlib configuration **Plotting with pandas and seaborn:** line plots, bar plots, histogram, density plots, scatter and point plots, facet grids and categorical data	8

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Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Mark Lutz	Programming Python		Shroff/Murach, 2016
Michael Urban and Joel Murach	Python Programming	4th Edition , 2010	O`Reilly
David M. Baezly	Python Cookbook	Third edition	O`Reilly
W.Chun	Core Python Programming		Pearson

COURSE OUTCOMES: Students will be able to	
CO1	To learn and understand Python programming basics and paradigm.
CO2	To learn and know the concepts of file handling, exception handling
CO3	To learn different type of arrays and their implementation
CO4	To learn about dictionaries in python, variance and covariance
CO5	To impart the knowledge of plots and subplots.

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
Computer Architecture	MAI-103	L	T	J	EST	CAT	Total
		3	1	0	80	20	100

Course Objective	The main objective is to understand the concept of computer system and organization, memory management, and parallel processing concepts.

Units	Contents (*Theory*)	Hours /week
I	**Fundamentals of Digital Logic**: Boolean Algebra, Logic Gates, Simplification of Logic Circuits: Algebraic Simplification, Karnaugh Maps. Combinational Circuits : Adders, Mux, De-Mux, Sequential Circuits : Flip-Flops (SR, JK & D), Counters : synchronous and asynchronous Counter	8
II	**Computer System:** Comparison of Computer Organization & Architecture, Computer Components and Functions, Interconnection Structures. Bus Interconnections, Input / Output: I/O Module, Programmed I/O, Interrupt Driven I/O, Direct Memory Access	8
III	**Memory System Organization**: Classification and design parameters, Memory Hierarchy, Internal Memory: RAM, SRAM and DRAM, Interleaved and Associative Memory. Cache Memory: Design Principles, Memory mappings, Replacement Algorithms, Cache performance, Cache Coherence. Virtual Memory, External Memory : Magnetic Discs, Optical Memory, Flash Memories, RAID Levels	8
IV	**CPU Organization**: CPU Building Blocks, CPU Registers and BUS Characteristics, Registers and System Bus Characteristics; Instruction Format; Addressing Modes; Interrupts: Concepts and types; Instruction and Execution Interrupt cycle; Hardwired and Micro Program control; Introduction to RISC and CISC	8
V	**Multi-Processor Organization:** Parallel Processing, Concept and Block Diagram, Types (SISD, SIMD, Interconnect network, MIMD, MISD), Future Directions for Parallel Processors, Performance of Processors **Pipelining**: Data Path, Time Space Diagram, Hazards. Instruction Pipelining, Arithmetic Pipelining	8

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Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
M. Morris Mano, edition	Computer System Architecture	3rd	PHI
Pal Chaudhary	Computer Organisation and architecture		
Liu and Gibson	8086/ 8088 Micro processor Assembly Language		
Tanenbaum	Structured computer organization-		

COURSE OUTCOMES: Students will be able to	
CO1	Describe the fundamental organization of a computer system
CO2	Explain addressing modes, instruction formats and program control statements
CO3	Learn memory hierarchies and their usage.
CO4	Learn and Understand various addressing modes.
CO5	Learn parallel processing concepts.

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Soft Skills & Entrepreneurship	**MAI-104**	3	1	0	80	20	100

Course Objective	The objective of this course to teach students basics of communication and to enhance their communication skills

Units	Contents (*Theory*)	Hours /week
I	Listening: Barriers of Listening skill -Approaches to Listening –How to improve Listening exercises. Speaking: Paralanguage: Sounds, stress, intonation - Art of conversation – Presentation skills – Public speaking - Expressing Techniques.	8
II	Reading: Kinds of Reading – Causes of reading difficulties – Reading strategies – exercises. Writing: Effective writing– Paragraph, Essay, Reports, Letters, Articles, Notices, Agenda & Minutes.	8
III	Communication: Modes of Communication - Barriers – Interpersonal skills, Negotiation skills Non- Verbal communication – Etiquettes.	8
IV	Group Dynamic skills: Group Discussion– Team building & Team work – Be a manager or leader – Decision making – creativity – Time & Stress management skills.	8
V	Interviews kills: Types of Interviews – Preparing for interview – Preparing a CV – Structuring the interview , Mock Interview _ Quick Tips.	8

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Sanghi Seema	Improve your communication skills	2nd	
Dr. Alex, K.	Soft sill: know yourself & Know the world		
Ashley, Roderic	How to enhance your employability		

COURSE OUTCOMES: Students will be able to

CO1	Learn critical and innovative thinking.
CO2	Learn about oral, written, and visual communication.
CO3	Learn different communication barriers
CO4	Learn about group discussion and stress management
CO5	Learn different types of interviews.

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Programme:- MCA (AI/ML) Semester - I wef: July 2022

Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Introduction to AI, Data Science, Ethics and Foundation of Data Analysis	**MAI-105**	3	1	0	80	20	100

Course Objective	The main objective is to understand the concepts and techniques of data science and data analysis.

Units	Contents (*Theory*)	Hours /week
I	**Introduction to Data Science:** Defining Data Science and Big Data, Benefits and Uses of Data Science and Big Data, Facets of Data, Structured Data, Unstructured Data, Natural Language, Machine generated Data, Graph based or Network Data, Audio, Image, Video, Streaming data, Data Science Process, Big data ecosystem and data science, distributed file systems, Distributed programming framework, data integration framework, machine learning framework, No SQL Databases, scheduling tools, benchmarking tools, system deployments	8
II	**Data Science Processes:** Six steps of data science processes, define research goals, data retrieval, cleansing data, correct errors as early as possible, integrating – combine data from different sources, transforming data, exploratory data analysis, Data modelling, model and variable selection, model execution, model diagnostic and model comparison, presentation and automation.	8
III	**Introduction to Machine Learning:** What is Machine Learning, Learning from Data, History of Machine Learning, Big Data for Machine Learning, Leveraging Machine Learning, Descriptive vs Predictive Analytics, Machine Learning and Statistics, Artificial Intelligence and Machine Learning, Types of Machine Learning – Supervised, Unsupervised, Semi-supervised, Reinforcement Learning. Types of Machine Learning Algorithms, Classification vs Regression Problem, Bayesian, Clustering, Decision Tree, Dimensionality Reduction, Neural Network and Deep Learning, Training machine learning systems	8
IV	**Introduction to AI:** What is AI, Turing test, cognitive modelling approach, law of	8

	thoughts, the relational agent approach, the underlying assumptions about intelligence, techniques required to solve AI problems, level of details required to model human intelligence, successfully building an intelligent problem, history of AI	
V	**Introduction to Data Analytics:** Working with Formula and Functions, Introduction to Power BI & Charts, Logical functions using Excel, Analysing Data with Excel.	8

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Artificial Intelligence 3e: A Modern Approach Paperback	Stuart J Russell & Peter Norvig		Pearson
Artificial Intelligence	Kevin Knight, Elaine Rich, B. Nair	Third	McGrawHill

COURSE OUTCOMES: Students will be able to

CO1	Know the concepts of big data and its usage and its various streaming processes.
CO2	Know data modelling and its uses in real life.
CO3	Learn the concept of machine learning and its applications.
CO4	Know the uses and ethics of AI and processes to solve AI domain based problems.
CO5	Know power BI, its functions and analysis procedures.

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Tools & Methodology of IT World	MAI-106	3	1	0	80	20	100

Course Objective	The main objective is to understand the concepts, techniques and principles of modern communication technology.

Units	Contents (*Theory*)	Hours /week
I	**Introduction and basic concept of modern communication and technology:** CDMA, WLL, GSM, VOIP, Bluetooth, Wi-Fi, Communication Technology: 2G, 3G, 4G, and 5G. Communication over radio, microwave systems, Communication satellite, radar, fiber optics, ISDN -their properties, Geographic Information System (GIS), Components of a GIS - H/ W,S/ W, Data, people, methods, working and application of GIS.	8
II	**Information Security:** Introduction, malicious programs, cryptography, digital signature, Firewall, Users Identification and Authentication, Security awareness and policies, Application areas requiring security. Mobile Commerce: Introduction, Growth, Success Stories of Mobile commerce, Technologies for mobile commerce, M-commerce in India, Digital Marketing.	8
III	**Artificial Intelligence:** Concept of Artificial Intelligence, Introduction to branches of Artificial Intelligence: Machine Learning, Neural Network, Robotics, Natural Language Processing, Expert System, and Fuzzy Logic. Applications of all the branches of AI, General application of AI.	8
IV	**Introduction to IoT:** Characteristics of IoT, physical design of IoT, Logical design of IoT, Functional blocks of IoT, home Automation, Industry applications, Surveillance and other IoT applications. Introduction to Virtual Reality (VR): Definition, Application of VR, Smart Systems, Embedded Systems.	8
V	**Cloud Computing:** History of Centralized and Distributed Computing, Overview of Distributed Computing, Cluster computing, Grid computing. Introduction to Cloud Computing - Cloud issues and challenges – Properties – Characteristics – Service models, Deployment models. Cloud resources: Network and API. Virtual and Physical computational resources – Data-storage.	8

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Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Alex Leon & M.Leon	Fundamental of Information Technology		Vikas Publications, New Delhi
Rao M.N.	Cloud Computing		PHI
Internet of Things	Raj Kamal		McGraw Hill
ITL Education Solutions Ltd., Seventh mpression	Introduction to Information Technology		Pearson Education
Andrew S. Tanenbaum	Computer Networks	4 th	Pearson Education

COURSE OUTCOMES: Students will be able to	
CO1	Know the basic concepts of 2G, 3G technologies.
CO2	Learn the concepts of information security and mobile commerce.
CO3	Learn the concepts of AI, natural language processing and neural network.
CO4	Learn the IoT mechanism and VR smart systems.
CO5	Know the concepts of cloud computing.

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Programme:- MCA (AI/ML) Semester - I wef: July 2022

Name of Paper	Paper Code	Practical				
		Credit		**Marks**		
Programming Lab in C	**MAI-107**	**P**	**J**	**ESP**	**CAP**	**Total**
		8	-	120	80	200

Content:

1. Write an algorithm and draw a flowchart to find the area of the following geometric figure:
   a) Triangle
   b) Rectangle
   c) Equilateral triangle
   d) Parallogram
2. Write an algorithm and draw a flowchart to print maximum of three numbers.
3. Write an algorithm and draw a flowchart to find the sum of all prime numbers between 1 to 50.
4. A Commercial bank has introduced an incentive policy of giving bonus to all its deposit holders. The Policies is as follows: a bonus of 2% of the balance held on 31st March is given to everyone irrespective of their balance and 5% is given to female account holder if their balance is more than 5000 (Using Nested if Else).
5. Write a Program to find out the grade of student when the marks of five subjects are given (Using Else-if-ladder).The method of assigning grade is as follow .

   Per >= 85 'A'
   Per < 85 & Per>=70 'B'
   Per < 70 & Per>=50 'C'
   Per < 50 & Per>=40 'D'
   Per < 40 'E'

6. Write a Menu driven program which has the following option. (using switch case).
   a) Even/Odd.
   b) Greatest of two number.
   c) Sum and average of 3 numbers
   d) Area and Perimeter of a circle.
   e) Exit

Once a menu item is selected the appropriate action should be taken and once this action is finished, the menu should reappear. Unless the user selects the Exit option the program should continue to work.

7. WAP to reverse the digits of the number entered by the user. For example, 12345 should be writer as. 54321
8. WAP to compute the sum of the digits of a given integer number.

9. Write a program to find the number of and sum of all integers between 1to100 that are divisible by 7.
10. Write a programs to print the following patterns using for loop.

a)
```
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

b)
```
*****
****
***
**
*
```

c)
```
1
22
333
4444
5 5 5 5 5
```

d)
```
*
***
*****
*******
*********
```

11. Write a recursive function that will generate and print the first n Fibonacci number. Test the function for n=10 and n=15.
12. Write a function to calculate the factorial of a number using category return value & passing argument.

[Hint: if n==0 or n==1 return 1 Else return n!].

13. Write a recursive program to find the Greatest Common Divisor of two numbers.
14. Write a program to print 15 numbers in ascending order.
15. Write a program to search an element in an array.
16. Write a program to print diagonal elements and its sum of a matrix.
17. Write a program to find the multiplication of two matrices.
18. Write a menu driven program which perform the following operations using string functions.
    a) Length of a string
    b) Compare two Strings
    c) Copy one string to another
    d) Concatenate two Strings
19. Write a program to check and print whether a string is palindrome or not.
20. Write a program to swap two numbers using call by value and call by address.
21. Write a program using pointers to compute the sum of all elements stored in an array.
22. Design a structure student to contain name, roll no, total marks obtained. Write a program to print percentage along with the information.

23. Design a union employee to contain emp_name, deptment, designation and salary. Write a program to print employee information.
24. Write a program to open a file employee and store the following information in it.
    a. Emp_id
    b. Emp_name
    c. Department
    d. Salary
25. Write a program to open a file book and store the following information in it.
    a. title
    b. author
    c. pages
    d. prize

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Name of Paper	Paper Code	Practical				
		Credit		**Marks**		
Operating System Lab	**MAI-108**	**P**	**J**	**ESP**	**CAP**	**Total**
		2	0	30	20	50

Content:

1. Program for CPU Scheduling Algorithms to find turnaround time and waiting time.
   a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority
2. Program for File Allocation Strategies –
   a) Sequential b) Indexed c) Linked Memory
3. Program to simulate the following contiguous memory allocation techniques
   a) Worst-fit b) Best-fit c) First-fit
4. Program for any one of Deadlock Management Techniques
5. Program to simulate disk scheduling algorithms –
   a) FCFS b) SCAN c) C-SCAN
6. Program for Page Replacement Algorithms –
   a) FIFO b) LRU c) LFU
7. Program to simulate producer-consumer problem using semaphores
8. Program to simulate the concept of Dining-Philosophers problem.

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Name of Paper	Paper Code	Practical				
		Credit		**Marks**		
Mini Project on Data Analysis using Python	**MAI-109**	**P**	**J**	**ESP**	**CAP**	**Total**
		0	2	30	20	50

Note:-Design a project using file to automate the working of an application

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Disaster Management	*MAI-111	-	-	-			

Course Objective	The Programme has been framed with an intention to provide a general concept in the dimensions of disasters caused by nature beyond human control as well as the disasters and environmental hazards induced by human activities with emphasis on Natural disaster, Man-made disaster.

Units	Contents (*Theory*)	Hours /week
I	**Introduction:** Hazard, Risk, Vulnerability, Disaster; Disaster Management, Meaning, Nature Importance, Dimensions & Scope of Disaster Management, Disaster Management Cycle. National disaster management framework; financial arrangements for Disaster management, International Strategy for Disaster reduction	2
II	**Natural Disasters:** Meaning and nature of natural disasters, their types and effects , Hydrological Disasters - Flood, Flash flood , Drought, cloud burst, Geological Disasters- Earthquakes, Landslides, Avalanches, Volcanic eruptions, Mudflow Unit, Wind related- Cyclone, Storm, Storm surge, tidal waves, Heat and cold Waves, Climatic Change, Global warming, Sea Level rise, Ozone Depletion	2
III	**Man made Disaster:** CBRN – Chemical disasters, biological disasters, radiological disasters, nuclear disasters Fire – building fire, coal fire, forest fire, Oil fire	2
IV	**Types of Man – made Disasters:** Accidents- road accidents, rail accidents, air accidents, sea accidents Pollution and deforestation- air pollution, water pollution, deforestation, Industrial wastewater pollution, deforestation	2
V	**Disaster Determinants:** Factors affecting damage – types, scale population, social status, habitation pattern, physiology and climate. Factors affecting mitigation measures, prediction, preparation, communication, area and accessibility, population, physiology and climate	2

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Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
S.L. Goel	Disaster Administration and Management, Text & Case studies-		Deep and Deep Publications
G. K. Ghosh	Disaster Management		A.P.H. Publishing Corporation
Vinod K Sharma-	Disaster Management		IIPA
S. K .Singh, S.C. Kundu, Shobha Singh	Disaster Management		William Publications

COURSE OUTCOMES: Students will be able to	
CO1	Know disaster management processes and financial arrangements.
CO2	Know various natural disasters and its effects.
CO3	Know various Man Made disasters and its effects.
CO4	Know consequences of air pollution and deforestation.
CO5	Know disaster determinants and mitigation measures.