

**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(An Autonomous Institute)**



Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, UTTAR PRADESH LUCKNOW



Evaluation Scheme & Syllabus

For

Masters of computer Applications (MCA Int.)

Fifth Year

Effective from the Session: (2026-27)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute)
MCA (Integrated)
Evaluation Scheme
SEMESTER IX

S. No	Subject Codes	Subjects Name	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	Total	PS	TE	PE		
1	AMICA0951	Competitive Coding	Mandatory	0	0	6				50		100	150	3
2	AMICA0958	Colloquium	Mandatory	0	0	14				100			100	7
3	AMICA0959	Project	Mandatory	0	0	24				200		500	700	12
		TOTAL								350		600	950	22

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam.
CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit,
MOOCs: Massive Open Online Courses.

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA
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Evaluation Scheme
SEMESTER X

S. No	Subject Codes	Subjects Name	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	Total	PS	TE	PE		
1	AMICA1001	Environment and Sustainability	Mandatory	2	0	0	30	20	50		50		100	2
2	AMICA1058/ AMICA1059	Industrial Project/ Internship	Mandatory	0	0	36				250		350	600	18
		TOTAL							50	250	50	350	700	20

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LAB Course Code: AMICA0958				LAB Course Name: Competitive Coding				L	T	P	C
Course Offered in: MCA INT								0	0	6	3
Pre-requisite: Knowledge of one programming language and mathematical concepts.											
Course Objectives:											
1. Given a computational problem, identify and abstract the programming task involved.											
2. Approach the programming tasks using techniques learned and write pseudo-code.											
3. Choose the right data representation formats based on the requirements of the problem.											
4. Use comparisons and limitations of the various programming constructs and choose the right one for the task in hand.											
5. By learning the competitive programming constructs, students can easily switch over to any language in future.											
To develop students problem-solving skills, algorithmic thinking, and proficiency in coding by practicing diverse and challenging problems in competitive programming environments.											
Course Outcome: After completion of the course, the student will be able to								Bloom's Knowledge Level (KL)			
CO1	Analyze and implement data structures and algorithms to efficiently solve diverse array and string programming challenges.							K4			
CO2	Develop skills in linked list operations to solve complex data structure challenges efficiently.							K3			
CO3	Develop skills in advanced algorithms for solving diverse challenges involving trees and graphs efficiently.							K3			
CO4	Develop skills in dynamic programming to efficiently solve complex optimization problems and challenges.							K3			
CO5	Apply techniques in solving complex backtracking and combinatorial problems across diverse algorithmic scenarios efficiently.							K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)											
CO-PO Mapping		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8		
CO1		3	3	2	2	1	–	–	1		
CO2		3	3	2	2	1	–	–	1		
CO3		3	3	3	3	1	–	–	2		
CO4		3	3	3	3	1	1	–	2		
CO5		3	3	3	3	1	1	–	2		
List Of Practical's ((Indicative & Not Limited To)											
S. No.	Name of Experiments/ Programs										CO
1	Find the largest sum contiguous subarray (Kadane's Algorithm)										CO1
2	Rotate an array by k steps										CO1
3	Find the intersection of two arrays										CO1
4	Remove duplicates from a sorted array										CO1
5	Find the longest common prefix among a set of strings										CO1
6	Find the first non-repeating character in a string										CO1
7	Check if a string is a valid palindrome										CO1
8	Group anagrams together										CO1
9	Implement strStr() (needle in a haystack)										CO1
10	Longest Substring Without Repeating Characters										CO1
11	Find the maximum product subarray										CO1
12	Find the majority element in an array										CO1
13	Merge overlapping intervals										CO1

14	Find all pairs in an array that sum up to a specific target	CO1
15	Implement an algorithm to check if a string has all unique characters	CO1
16	Find the minimum window substring	CO1
17	Implement atoi (convert string to integer)	CO1
18	Multiply two large numbers represented as strings	CO1
19	Find the longest palindromic substring	CO1
20	Implement a function to find the median of two sorted arrays	CO1
21	Reverse a linked list	CO2
22	Detect a cycle in a linked list	CO2
23	Merge two sorted linked lists	CO2
24	Remove N-th node from the end of a linked list	CO2
25	Find the intersection point of two linked lists	CO2
26	Add two numbers represented by linked lists	CO2
27	Flatten a multilevel doubly linked list	CO2
28	Copy a linked list with random pointers	CO2
29	Sort a linked list	CO2
30	Swap nodes in pairs	CO2
31	Partition a linked list around a value x	CO2
32	Clone a linked list with next and random pointers	CO2
33	Rotate a linked list	CO2
34	Reverse nodes in k-group	CO2
35	Find the middle of a linked list	CO2
36	Flatten a linked list	CO2
37	Remove duplicates from an unsorted linked list	CO2
38	Implement a function to add two numbers without using arithmetic operators	CO2
39	Convert a binary search tree to a sorted doubly linked list	CO2
40	Check if a linked list is a palindrome	CO2
41	Invert a binary tree	CO3
42	Find the lowest common ancestor of a binary tree	CO3
43	Level order traversal of a binary tree	CO3
44	Check if a binary tree is balanced	CO3
45	Serialize and deserialize a binary tree	CO3
46	Check if two binary trees are identical	CO3
47	Find the maximum path sum in a binary tree	CO3
48	Implement a Trie (Prefix Tree)	CO3
49	Find the shortest path in a graph (Dijkstra's Algorithm)	CO3
50	Detect a cycle in a graph	CO3
51	Check if a binary tree is a binary search tree	CO3
52	Print all paths from the root to leaf nodes	CO3
53	Find the diameter of a binary tree	CO3
54	Construct a binary tree from preorder and inorder traversal	CO3
55	Find the kth smallest element in a binary search tree	CO3

56	Implement an algorithm to check if a tree is symmetric	CO3
57	Find the deepest node in a binary tree	CO3
58	Implement a Depth-First Search (DFS) algorithm	CO3
59	Implement a Breadth-First Search (BFS) algorithm	CO3
60	Find all bridges in a graph (Tarjan's Algorithm)	CO3
61	Climbing Stairs problem	CO4
62	Longest Increasing Subsequence	CO4
63	0/1 Knapsack problem	CO4
64	Coin Change problem	CO4
65	Longest Common Subsequence	CO4
66	Minimum Path Sum in a grid	CO4
67	Edit Distance (Levenshtein Distance)	CO4
68	House Robber problem	CO4
69	Maximum Product Subarray	CO4
70	Palindromic Substrings	CO4
71	Longest Palindromic Subsequence	CO4
72	Partition Equal Subset Sum	CO4
73	Best Time to Buy and Sell Stock with Cooldown	CO4
74	Word Break problem	CO4
75	Maximum Sum of 3 Non-Overlapping Subarrays	CO4
76	Count of Subset Sum problem	CO4
77	Maximum Length of Repeated Subarray	CO4
78	Minimum Cost to Merge Stones	CO4
79	Decode Ways	CO4
80	Longest Arithmetic Subsequence	CO4
81	Solve the N-Queens problem	CO5
82	Generate all subsets of a set	CO5
83	Word Search problem	CO5
84	Sudoku Solver	CO5
85	Permutations of a string or array	CO5
86	Combination Sum problem	CO5
87	Generate Parentheses	CO5
88	Rat in a Maze problem	CO5
89	Hamiltonian Path problem	CO5
90	Subset Sum problem	CO5
91	Solve the Word Ladder problem	CO5
92	Find all possible combinations of k numbers that add up to n	CO5
93	Lexicographical permutations of a string	CO5
94	Find all unique combinations of numbers that sum up to a target	CO5
95	Implement a function to solve the Knight's Tour problem	CO5
96	Find all possible solutions for the m-coloring problem	CO5
97	Generate all permutations of a string or array with duplicates	CO5

98	Implement an algorithm for the Eight Queens puzzle	CO5
99	Solve the Cryptarithmic puzzle	CO5
100	Find the Kth permutation sequence	CO5
		Total Hours: 42 hrs.

Course Code: AMICA1001				Course Name: Environmental Science and sustainability				L	T	P	C
Course Offered in: MCA INT								2	0	0	2
Pre-requisite: Basic knowledge of biology, chemistry, ecology, geology, mathematics, and understanding of human impacts on natural systems.											
Course Objectives:											
To understand ecosystems, promote sustainability, address environmental issues, conserve biodiversity, and ensure responsible use of natural resources for future generations.											
Course Outcome: After completion of the course, the student will be able to								Bloom's Knowledge Level (KL)			
CO1	Understand the basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem, food chains and food webs. Ecological pyramids, biodiversity.							K2			
CO2	Understand the different types of natural resources like food, forest, Minerals and energy and their conservation.							K2			
CO3	Understand the different types of pollution, pollutants, their sources, effects and their control methods.							K2			
CO4	Understand the basic concepts of sustainable development, Environmental Impact Assessment (EIA) and different acts related to environment.							K2			
CO5								K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)											
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8			
CO1	3	3	2	2	1	3	3	2			
CO2	3	3	2	2	1	3	3	2			
CO3	3	3	2	2	1	3	3	3			
CO4	3	3	2	2	1	3	3	2			
CO5	3	3	2	2	1	3	3	2			
Course Contents / Syllabus											
Unit 1		BASIC PRINCIPLE OF ECOLOGY AND BIODIVERSITY							07 hours		
Definition, Scope and basic principles of ecology and environment. Ecosystem: Basic concepts, components of ecosystem. Food chains and food. Webs. Ecological pyramids, Energy flow in ecological systems, Characteristics of different ecosystems. Biogeochemical Cycles: Importance, gaseous and sedimentary cycles. Carbon, Nitrogen, Phosphorus and Sulphur Cycles. Biodiversity and their importance, Threats to biodiversity, major causes, extinction's, vulnerability of species to extinction, IUCN threat categories, Red data book. Strategies for biodiversity conservation, principles of biodiversity conservation in-situ and ex-situ conservation strategies Mega diversity zones and Hot spots, concepts, distribution and importance.											
Unit-2		NATURAL RESOURCES AND ECOLOGICAL SUCCESSION							07 hours		
Natural resources and associated problems. Forest resources: Use and over- exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and over- grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Land resources: Land as a resource, land degradation, man induced landslides. Equitable use of resources for sustainable lifestyles.											
Non-Renewable Energy Resources: Fossil fuels and their reserves, Nuclear energy, types, uses and effects, Renewable Energy Resources: hydropower, Solar energy, geothermal, tidal and wind energy, Biomass energy, biogas and its advantages. Ecological succession-Types, stages, examples of ecological succession											
Unit 3		POLLUTION AND WASTE MANAGEMENT							09 hours		
Air pollution: sources of air pollution, Primary and secondary air pollutants. Origin and effects of SOX, NOX, CO, CFC, Hydrocarbon, control of air pollution. Water pollution: sources and types of water pollution, Effects of water pollution, Eutrophication, Soil pollution: Causes of soil pollution, Effects of soil pollution, Major sources of and effects of noise pollution on health, Radioactive and thermal pollution sources and their effects on surrounding environment. Solid waste disposal and its effects on surrounding environment.											

Introduction to E- Waste, Types and classification of E- Waste, Impacts of E- Waste on environment and human health, E-Waste management and recycling., Climate change, global warming, acid rain, ozone layer depletion.

Unit 4 **ENVIRONMENTAL ASSESSMENT, EGISLATION AND SUSTAINABILITY** **07 hours**

Women education, Role of NGOs regarding environmental protection, Bio indicators and their role, Natural disasters and disasters management, Aims and objectives of Environmental Impact Assessment (EIA). Salient features of following Acts: Environmental Protection Act, 1986, Wildlife (Protection) Act, 1972. Water (Prevention and control of pollution) Act, 1974. Forest (Conserving) Act, 1980.

Definition and concept of sustainability, impacted areas of sustainable development, Global initiative and issues on sustainable development UNSDsGs System Thinking and Sustainability.

Total Lecture Hours **30 hours**

Textbooks:

	Authors Name
1. Brady, N.C. 1990, The Nature and Properties of Soils (10th Edition), Macmillan Publishing Co., New York.	Nyle C. Brady
2. Sodhi G.S. 2005, Fundamentals of Environmental Chemistry: Narosa Publishing House, New Delhi.	Sodhi G.S
3. Dash, M.C. (1994), Fundamentals of Ecology, Tata Mc Graw Hill, New Delhi.	Dash, M.C

Reference Books:

	Authors Name
1. Rao M.N. and H.V.N. Rao, 1989: Air Pollution, Tata McGraw Hill Publishing Co. Ltd., New Delhi	Rao M.N. and H.V.N. Rao
2. A Text Book of environmental Science	Shashi Chawla

Self-Study Content Links:

	Duration (in Hrs)
MOOCs	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01455980884423475261594/overview 6 hr 29 m
Video Lectures	https://www.youtube.com/watch?v=T21OO0sBBfc 00Hrs 07 Min https://www.youtube.com/watch?v=qt8AMjKKPD0 00Hrs 15 Min https://www.youtube.com/watch?v=_74S3z3IO_I 00Hrs 31 Min https://www.youtube.com/watch?v=7qkaz8Chell 00Hrs 21 Min https://www.youtube.com/watch?v=NuQE5fKmfME 00Hrs 13 Min https://www.youtube.com/watch?v=9CpAjOVLHII 00Hrs 09 Min https://www.youtube.com/watch?v=yEci6iDkXYw 00Hrs 05 Min https://www.youtube.com/watch?v=ad9KhgGw5iA 00Hrs 32 Min https://www.youtube.com/watch?v=nW5g83NSH9M 00Hrs 23 Min https://www.youtube.com/watch?v=xqSZL4Ka8xo 00Hrs 24 Min