

Paper Code: BCA

102 Subjects: Applied Mathematics

A. Introduction

Objective: The objectives of this course are to provide the learners with the following: 1. The Knowledge of mathematical probability 2. Understanding of various numerical techniques 3. Familiarity with the Linear Programming and its applications

COBCA102.1	Understand the various approaches dealing the data using theory of Probability
COBCA102.2	Understand various numerical techniques and apply them to solve real life problems
COBCA102.3	Analyse and evaluate the accuracy of common Numerical Methods
COBCA102.4	Develop a mathematical model for real life situation and solving it Using Linear programming technique

C. Program Outcomes

PO1.	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies.
PO2.	Familiarized with Business environment and Information Technology and its Applications in different domains.
PO3.	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4.	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications.
PO5.	Understand the front end and backend of software applications.
PO6.	Acquire knowledge about computer networks, network devices and their configuration protocols, security concepts at various level etc.
PO7.	Apply techniques of software validation and reliability analysis to the development of computer programs
PO8.	Acquire Technical, Communication and management Skills to convey or present information, applications, instructions, policies, procedures, decisions, documentations etc. verbally as well as in writing.
PO9.	Recognize the various issues related to society, environment, health and vivid cultures and understand the responsibilities to contribute in providing the solutions.
PO10.	Acquire technical skills to lead a productive life in the society as a

	professional or as an entrepreneur.
PO11.	Gain expertise in at least one emerging technology.

D. Program Specific Outcomes

PSO.1.	The student should be able to communicate the technical information both orally and in writing professionally.
PSO.2.	Apply Create, select, adapt and apply suitable tools and technologies to a wide range of computational activities.
PSO.3.	Acquire necessary knowledge of technical, scientific as well as basic managerial and financial procedures to analyze and solve real world problems within their work domain
PSO.4	Clarity on both conceptual and application oriented skills in commerce, Finance & Accounting and its Applications in Business context.
PSO.5	Ability to analyze research and investigate complex computing problems through design of experiments, analysis and interpretation of data and synthesis of the information to arrive at valid conclusions.
PSO.6	Apply the knowledge gained in core courses to a broad range of advanced topics in computer science, to learn and develop sophisticated technical products independently.
PSO.7	Awareness on ethics, values, sustainability and creativity aspects of technical solutions.

E. Pedagogy:

The pedagogy would be the combination of the following techniques:-

- Lectures
- Presentations
- Classroom Activities
- Discussions, Questions & Answers
- Case Study

F. Evaluation

Criteria	Description	Maximum Marks
Internal Assessment	Mid-Term Exam	10
	PSDA	5
	Assignment	10
External Assessment	End-Term Exam	75
TOTAL		100

G. Syllabus

UNIT -I PROBABILITY: Introduction, Axiomatic definition of Probability, Addition Theorem, Multiplication theorem, Conditional Probability, Baye's Theorem and its applications **PROBABILITY DISTRIBUTIONS:** Random Variable, Probability Mass function, Probability density function, Mathematical Expectations of a Random Variable, Binomial Distribution, Poisson distribution, Normal Distribution.

UNIT -II INTERPOLATION: Operators: Shift; Forward Difference, Backward Difference Operators and their Interrelation, Interpolation Formulae-Newton's Forward, Backward and Divided Difference Formulae: Lagrange's Formula **SOLUTIONS OF NON LINEAR EQUATIONS:** Bisection Method, False Position Method, Newton – Raphson Method for Solving Equation Involving One Variable only.

UNIT -III SOLUTION OF LINEAR SIMULTANEOUS EQUATIONS: Gaussian Elimination Method with and without Row Interchange: LU Decomposition: Gauss - Jacobi and Gauss-Seidel Method; Gauss – Jordan Method and to find Inverse of a Matrix by this Method. **NUMERICAL DIFFERENTIATION:** First and Second Order Derivatives at Tabular and Non-Tabular Points, **NUMERICAL INTEGRATION:** Trapezoidal Rule, Simpsons 1/3 Rule: Error in Each Formula (without proof.)

UNIT –IV PROGRAMMING: Formulation of linear Programming model, Graphical method of solving linear Programming problem, Simplex Method (Maximization and Minimization) **TRANSPORTATION & ASSIGNMENT PROBLEM:** General structure of transportation problem, solution procedure for transportation problem, methods for finding initial solution, test for optimality. Maximization of transportation problem, unbalanced transportation problem, Assignment problem approach of the assignment model, solution methods of assignment problem, maximization in an assignment, unbalanced assignment problem, restriction on assignment

TEXT BOOKS:

1. S.S. Sastry, "Numerical Analysis"; Prentice Hall of India, 1998.
2. Johnson, R., Miller, I. and Friends, J., Miller and Freund's "Probability and Statistics for Engineers, Pearson Education (2005) 7th Ed.
3. . Singh J P "Probability and Numerical Methods" ANE Books, 4th Edition 2019
4. Sharma, J.K.; Operations Research: problems & solutions; Macmillan India

REFERENCE BOOKS

1. Grewal B S "Numerical Methods in Engineering and Science" Khanna Publishers, 2012
2. Walpole, Ronald E., Myers, Raymond H., Myers, Sharon L. and, Keying Ye, Probability and Statistics for Engineers and Scientists, Pearson Education (2007) 8th Ed.
3. Gupta S C, Kapoor V K "Fundamental of Mathematical Statistics" Sultan Chand and

Sons 11th edition 2002.

4. Manmohan, Gupta, P K, Kanti Swarup “Introduction to Management science operations research” Sultan Chand and Sons

I. Lecture Plan

Lecture No.	Topic(s)	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	PROBABILITY: Introduction, Axiomatic definition of Probability	Lecture	CO1	
2	Addition Theorem, Multiplication theorem, Conditional Probability,	Lecture	CO1	
3	Baye's Theorem and its applications	Lecture	CO2	
4	PROBABILITY DISTRIBUTIONS: Random Variable, Probability Mass function,	Lecture	CO1	
5	Probability density function, Mathematical Expectations of a Random Variable,	Lecture	CO3	
6	Binomial Distribution,	Lecture	CO1	
7	Corporate Level Strategy Poisson distribution,	Lecture	CO4	
8	Normal Distribution	Lecture	CO5	
9	<i>Revision</i>			
10	Class Test			
11	INTERPOLATION: Operators: Shift; Forward Difference, Backward Difference Operators and their Interrelation,	Lecture	CO5	
12	Interpolation Formulae-Newton's Forward,	Lecture	CO1	
13	Backward and Divided Difference Formulae: Lagrange's Formula	Lecture	CO2	
14	SOLUTIONS OF NON LINEAR EQUATIONS: Bisection Method,	Lecture	CO3	
15	False Position Method, Newton	Lecture	CO5	
16	– Raphson Method for Solving Equation Involving One Variable only.	Lecture	CO3	
17	<i>Revision</i>			
18	Class Test			

19	SOLUTION OF LINEAR SIMULTANEOUS EQUATIONS: Gaussian Elimination Method with and without Row Interchange:	Lecture	CO1	
20	LU Decomposition: Gauss - Jacobi and Gauss-Seidel Method;	Lecture	CO1	
21	Gauss – Jordan Method and to find Inverse of a Matrix by this Method.	Lecture	CO2	
22	NUMERICAL DIFFERENTIATION: First and Second Order Derivatives at Tabular and Non-Tabular Points,	Lecture	CO1	
23	NUMERICAL INTEGRATION: Trapezoidal Rule,	Lecture	CO3	
24	Simpsons 1/3 Rule: Error in Each Formula (without proof.)	Lecture	CO1	
25	<i>Revision</i>			
26	Class Test			
27	LINEAR PROGRAMMING: Formulation of linear Programming model,	Lecture	CO4	
28	Graphical method of solving linear Programming problem,	Lecture	CO5	
29	Simplex Method (Maximization and Minimization)	Lecture	CO5	
30	TRANSPORTATION & ASSIGNMENT PROBLEM: General structure of transportation problem,	Lecture	CO1	
31	solution procedure for transportation problem, methods for finding initial solution	Lecture	CO2	
32	test for optimality. Maximization of transportation problem,	Lecture	CO3	
33	unbalanced transportation problem,	Lecture	CO5	
34	Assignment problem approach of the assignment model,	Lecture	CO3	
35	solution methods of assignment problem,	Lecture	CO1	
36	maximization in an assignment,	Lecture	CO2	
37	unbalanced assignment problem,	Lecture	CO1	

	restriction on assignment			
38	Revision			
39	Class Test			
40	Over all Revision of Syllabus			

J. . Course Articulation Matrix: (Mapping of COs with POs& PSOs)

CO Number	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	SO4	SOO5	SOO6
COBCA102.1	-	1	1	-	-	-	-						
COBCA102.2	2	2	1	2	1	1	2						
COBCA102.3	2	2	1	1	-	-	1						
COBCA102.4	2	2	2	-	-	-	2						
COBCA102.5	2	2	2	-	-	-	2						
COBCA102.6	3	3	2	-	-	-	2						

“-”- No Correlation; 1-Low Correlation; 2- Moderate Correlation; 3-Substantial Correlation

K. Expectations from Students:

Actively participate in the classroom discussions.

Follow the class rules

Must be on time

Must be regular in the class and maintain minimum 75% attendance as per GGSIP University norms)

L. Faculty Contact

Details:

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Second Semester

Paper Code: BCA106

Subject: Data Structure and

Algorithms using C

A. Introduction

Objective: Understanding of the basic concepts of data structures and their operations like, insertion, deletion, searching and sorting and Design algorithms and pseudo codes of various linear and non-linear data structures

COBCA106.1	Familiarize the basics of data structures and algorithms
CO BCA106.2	Understand and apply linear and nonlinear data structures and their operations.
CO BCA106.3	Compare and implement searching, sorting and hashing techniques.
CO BCA106.4	Appraise and determine the correct data structure for any given real world problem.

C. Program Outcomes

PO1.	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies
PO2.	Familiarized with Business environment and Information Technology and its Applications in different domains.
PO3.	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4.	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications.
PO5.	Understand the front end and backend of software applications.
PO6.	Gain expertise in at least one emerging technology.
PO7.	Apply techniques of software validation and reliability analysis to the development of computer programs.

D. Program Specific Outcomes

PSO.1.	To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs by critical understanding, analysis and synthesis
PSO.2.	Apply Identify applications of Computer Science in other fields in the real world to enhance the career prospects
PSO.3.	Realize the requirement of lifelong learning through continued education and Research.
PSO.4.	Use the concepts of best practices and standards to develop user interactive and abstract application
PSO.5	Understand the professional, ethical, legal, security, social issues and responsibilities

E. Pedagogy:

The pedagogy would be the combination of the following techniques:-

- Lectures
- Presentations
- Classroom Activities
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F. Evaluation

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	PSDA	5
	Assignment	5
External Assessment	End-Term Exam	75
TOTAL		100

G. Syllabus

Unit-I: Linear Data Structures- Static

(Lectures-12)

- Introduction to Algorithms- Attributes, Design Techniques, Time Space Trade Off, Data Structures, Classification and Operations of Data Structures.
- Arrays:** Single Dimension, Two-Dimension and Introduction to Multi Dimensions, Memory Representation, Address Calculation, Sparse Matrices- Types, Representation.
- Searching and Sorting:** Linear and Binary Search, Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Elementary Comparison of Searching and Sorting Algorithms.
- Hashing:** Hash Table, Hash Functions, and Collision Resolution.

Unit-II: Linear Data Structures- Dynamic

(Lecture08)

- Introduction:** Dynamic Memory Allocation, Dynamic Memory versus Static Memory Allocation.
- Linked List Types:** Singly Linked List, Doubly Linked List, Header Linked List, Circular Linked List.
- Operations:** Creation, Insertion, Deletion, Modification, Searching, Sorting, Reversing, and Merging.

Unit-III: Abstract Data Types:

(Lectures-08)

- Stacks:** Introduction, Static and Dynamic Implementation, Operations, Applications- Evaluation and Conversion between Polish and Reverse Polish Notations.
- Queues:** Introduction, Static and Dynamic Implementation, Operations, Types- Linear Queue, Circular Queue, Doubly Ended Queue, Priority Queue.

Unit-IV: Non Linear Data Structures:

(Lectures-12)

- Introduction to Graphs:** Notations & Terminologies, Representation of Graphs- Adjacency Matrix, Incidence Matrix and Linked Representation.
- Trees:** Notations & Terminologies, Memory Representation, Binary Trees Types- Complete, Full, Strict, Expression Binary Tree, Tree Traversals (Recursive), Binary Search Tree and Basic Operations
- Introduction and Creation (Excluding Implementation):** AVL Tree, Heap Tree, M-Way Tree, and B Tree.

H. References

Text Books

- Schaum's Outline Series, "Data Structures", TMH, Special Indian Ed., Seventeenth Reprint, 2014.
- Y. Langsam, M. J. Augenstein and A.M. Tanenebaum, "Data Structures using C and C++", Pearson
- Education India, Second Edition, 2015.

4. D. Samanta, “Classic Data Structures”, PHI, Second Edition, 2009.

References:

1. Ashok N kamthane “Introduction to Data Structures in C”, Pearson, Third Edition, 2009.
2. E. Horowitz and S. Sahni, “Fundamentals of Data Structures in C”. Universities Press, Second edition, 2008.
3. 2008.
4. D. Malhotra and N. Malhotra, “Data Structures and Program Design using C“, Laxmi Publications,
5. Indian adapted edition from Mercury Learning and Information-USA, First edition, 2018.
6. Y. Kanetkar “ Data Structures through C”, BPB Publication, Third Edition, 2019.
7. R.F Gilberg, and B A Frouzan- “Data Structures: A Pseudocode Approach with C”, Thomson
8. Learning, Second Edition, 2004.
9. K. Rath, and A.K. Jagadev, “Data Structures and Program Design Using C”, Scitech Publications, Second Edition, 2011.

Digital Resources

S. No.	Topic/ Title	Source/ URL
1	Linear Data Structures	https://www.geeksforgeeks.org/difference-between-linear-and-non-linear-data-structures/
2	Non-Linear Data Structures	https://www.javatpoint.com/what-is-a-non-linear-data-structure

I. Lecture Plan

Lecture No.	Topic(s)	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Linear Data Structures, Introduction to Algorithms	Lecture	CO1	MCQs&Subjective Assessment
2	Attributes, Design Techniques	Lecture	CO1	

3	Time Space Trade Off	Lecture	CO1	
4	Data Structures, Classification and Operations of Data Structures.	Lecture/ Discussion	CO1	
5	Arrays: Single Dimension, Two-Dimension	Lecture/ Discussion	CO2	
6	Introduction to Multi Dimensions, Memory Representation,	Lecture/ Discussion	CO2	
7	Address Calculation, Sparse Matrices- Types, Representation	Lecture/ Discussion	CO2	
8	Searching and Sorting: Linear and Binary Search,	Lecture	CO3	
9	Selection Sort, Bubble Sort,	Lecture/ Discussion	CO3	
10	Insertion Sort, Merge Sort,		CO3	
11	Elementary Comparison of Searching and Sorting Algorithms	Lecture/ Discussion	□	
12	Hashing: Hash Table, Hash Functions, and Collision Resolution.	Lecture/ Discussion	CO3	
13	MCQ			
14	Revision Test	Lecture/ Discussion	CO2	
15	Linear Data Structures- Dynamic	Lecture/ Discussion	CO2	

16	Dynamic Memory Allocation,	Lecture/ Discussion	CO4	
17	Dynamic Memory versus Static Memory Allocation.	Lecture/ Discussion	CO4	
18	Introduction Linked List Types: Singly Linked List,	Lecture/ Discussion	CO2	
19	Doubly Linked List, Header Linked List,	Lecture/ Discussion	CO2	
20	Circular Linked List.	Lecture	CO2	
21	Operations: Creation, Insertion, Deletion,	Lecture	CO2	
22	Modification, Searching, Sorting, Reversing, and Merging	Lecture	CO3	
23	<i>Continue</i>	Lecture	CO3	
24	MCQ	Lecture/ Discussion	CO3	
25	Revision Test	Lecture/ Discussion	CO3	
26	Abstract Data Types: Stacks: Introduction	Lecture/ Discussion	CO4	
27	Static and Dynamic Implementation,	Lecture	CO4	
28	Operations, Applications-Evaluation	Lecture/ Discussion	CO4	
29	Conversion between Polish and Reverse Polish Notations.	Lecture	CO4	

30	Queues: Introduction,	Lecture/ Discussion	CO2	
31	Static and Dynamic Implementation	Lecture/ Discussion	CO2	
32	Operations, Types- Linear Queue	Lecture	CO2	
33	Circular Queue,	Lecture/ Discussion	CO4	
34	Doubly Ended Queue,	Lecture	CO4	
35	Priority Queue.	Lecture	CO4	
36	MCQ	Discussion		
37	Revision Test	Discussion		
38	Non Linear Data Structures: Introduction to Graphs	Lecture/ Discussion	CO2	
39	Notations & Terminologies, Representation of Graphs	Lecture	CO4	
40	Adjacency Matrix, Incidence Matrix	Lecture/ Discussion	CO4	
41	Continue	Lecture	CO4	
42	Linked Representation	Lecture	CO2	
48	Trees: Notations & Terminologies, Memory Representation,	Lecture	CO2	
49	Binary Trees Types- Complete, Full, Strict, Expression Binary Tree	Lecture	CO2	
50	Tree Traversals (Recursive), Binary Search Tree and Basic Operations	Lecture	CO2	

51	Introduction and Creation :AVL Tree, Heap Tree	Lecture	CO4	
52	M- Way Tree, and B Tree.	Lecture	CO4	
53	Class Test	Discussion		

J. . Course Articulation Matrix: (Mapping of COs with POs& PSOs)

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	SOO5	SOO6
COBALL.B 505.1	-	1	1	-	2	-	1						
COBALL.B 505.2	2	2	1	2	1	1	2						
COBALL.B 505.3	2	2	1	1	-	-	1						
COBALL.B 505.4	2	2	2	1	1	-	2						

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- Actively participate in the classroom discussions /seminar
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L. Faculty Contact

Details:

Name:	Ms Shweta Rana
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Code: BCA 108

Subject: DataBase Management System

A. Introduction

Objective: The paper aims to introduce the concept of Back end, data storage in computers, design of a DBMS, Queries to construct database, store and retrieve data from the database. The objective of this course is to provide the learners expertise.

COBCA108.1	Understand the DBMS concepts with detailed architecture, characteristics. Describe different database languages and environment and learn various data models, along with the related terminologies.
COBCA108.2	Explore Structure Query Language, a brief on NOSQL, Query By Example. Also understand the overview of SQL, and try to implement DDL, DML and DCL along with operators, use of joins, nested query, use of views and Indexes Discuss Integrity Constraints
COBCA108.3	Describe Relational Data Model, explain Codd's Rules, Relational Algebra, Set theory operations and the concept of functional dependencies and normalization.
COBCA108.4	Acquire Knowledge about Transaction Processing, concurrency problems, and its controlling techniques, Database backup and recovery and security.

C. Program Outcomes

PO1.	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies
PO2.	Familiarized with Business environment and Information Technology and its Applications indifferent domains.
PO3.	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4.	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications.
PO5.	Understand the front end and backend of software applications.
PO6.	Gain expertise in at least one emerging technology.
PO7.	Apply techniques of software validation and reliability analysis to the development of computer programs.
PO8.	Acquire technical skills to lead a productive life in the society as a professional or as an entrepreneur.

D. Program Specific Outcomes

PSO.1.	To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs by critical understanding, analysis and synthesis
PSO.2.	Apply Identify applications of Computer Science in other fields in the real world to enhance the career prospects
PSO.3.	Realize the requirement of lifelong learning through continued education and Research.
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E. Pedagogy:

The pedagogy would be the combination of the following techniques:-

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TOTAL		100

G. Syllabus

Unit-I: (lectures-10)

a) Introduction: An overview of database management system, Characteristics of database approach, DBMS architecture, client/server, data Models, Introduction to Distributed Data processing, schema and instances, data independence

b) Data Modelling using Entity Relationship Model: Basic introduction about the terminologies like Entity, Entity types, entity set, notation for ER diagram, attributes and keys, Types of attributes (composite, derived and multivalued attributes) and keys (Super Key, candidate key, primary key), relationships, relation types, weak entities, enhanced E-R, specialization and generalization.

Unit-II: (lectures-13)

a) Introduction to SQL: Overview, Characteristics of SQL. Advantage of SQL, SQL data types and literals.

b) Types of SQL commands: DDL, DML, DCL. Basic SQL Queries.

c) Logical operators: BETWEEN, IN, AND, OR and NOT

Null Values: Disallowing Null Values, Comparisons Using Null Values

d) Integrity constraints: Primary Key, Not NULL, Unique, Check, Referential key
Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators, Aggregate Operators: The GROUP BY and HAVING Clauses

e) Joins: Inner joins, Outer Joins, Left outer, Right outer, full outer joins.

Overview of other SQL Objects: Views, Sequences, Indexes, Triggers and stored procedure

Unit-III: (lectures-12)

a) Relational Data Models: Relational model terminology domains, Attributes, Tuples, Relations, characteristics of relations, relational constraints domain constraints, key constraints and constraints on null, relational DB Schema. Codd's Rules

b) Relational algebra: Basic operations selection and projection,

Set Theoretic operations: Union, Intersection, set difference and division (Order, Relational calculus: Domain, Tuple, Well Formed Formula, specification, quantifiers)

c) Join operations: Inner, Outer, Left outer, Right outer, and full outer join.

d) ER to relational mapping: Steps to map ER diagram to relational schema

Data Normalization: Functional dependencies, Armstrong's inference rule, & Normalization (Upto BCNF)

Unit-IV (lectures-9)

a) Transaction Processing: Definition of Transaction, Desirable ACID properties

b) Database recovery and Database Security: System failure, Backup & recovery Techniques, Authentication, Authorization.

c) Overview of Query by Language, NoSql databses

H. References

Text Books:

1. R. Elmarsri and SB Navathe, "Fundamentals of Database Systems", Pearson, 5th Ed.
2. Singh S.K., "Database System Concepts, design and application", Pearson Education Ramakrishnan and Gherke, "Database Management Systems", TMH.
3. Bipin Desai, "An Introduction to Database Systems", Galgotia Publications, 1991

References:

1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 6th Edition, McGraw Hill, 2010
2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
3. A. K. Majumdar, P. Battacharya, "Database Management Systems", TMH, 2017

Digital Resources

S. No.	Topic/ Title	Source/ URL
1	SQL queries an implementation	https://www.tutorialspoint.com

I. Lecture Plan

Lecture No.	Topic(s)	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	An overview of database management system, Characteristics of database approach	Lecture	CO1	MCQs & Subjective Assessment
2	DBMS architecture, client/server	Lecture	CO1	
3	data Models	Lecture	CO1	
4	Introduction to Distributed Data processing	Lecture/ Discussion	CO1	
5	schema and instances	Lecture/ Discussion	CO1	
6	data independence	Lecture/ Discussion	CO1	
7	Basic introduction about the terminologies like Entity, Entity types, entity set		CO1	
8	Notation for ER diagram	Lecture/ Discussion	CO1	
9	Attributes and keys	Lecture/ Discussion		
10	Types of attributes (composite, derived and multivalued attributes)	Lecture		

11	Keys (Super Key, candidate key, primary key)	Lecture	CO1	
12	Relationships, relation types, weak entities, enhanced E-R	Lecture/ Discussion	CO1	
13	Specialization and generalization	Lecture/ Discussion	CO1	
14	MCQ	Discussion	CO1	
15	Revision Test	Discussion	CO1	
16	Overview, Characteristics of SQL. Advantage of SQL	Lecture/ Discussion	CO2	
17	SQL data types and literals	Lecture	CO2	
18	DDL, DML, DCL. Basic SQL Queries	Lecture	CO2	
19	BETWEEN, IN, AND, OR and NOT	Lecture	CO2	
20	Disallowing Null Values, Comparisons Using Null Values	Discussion	CO2	
21	Primary Key, Not NULL	Discussion	CO2	
22	Unique, Check, Referential key	Lecture/ Discussion	CO2	
23	Introduction to Nested Queries, Correlated Nested Queries	Lecture/ Discussion	CO2	
24	Set-Comparison Operators, Aggregate Operators: The GROUP BY and HAVING Clauses	Lecture/ Discussion	CO2	
25	Inner joins, Outer Joins, Left outer, Right outer, full outer joins	Lecture	CO2	
26	Overview of other SQL Objects	Lecture/ Discussion	CO2	
27	Views, Sequences, Indexes	Lecture/ Discussion	CO2	

28	Triggers and stored procedure	Lecture/ Discussion	C02	
29	Revision Test	Discussion	CO2	
30	Relational model terminology domains	Lecture/ Discussion	CO3	
31	Attributes, Tuples, Relations	Lecture/ Discussion	CO3	
32	Characteristics of relations	Lecture/ Discussion	CO3	
33	Relational constraints domain constraints	Lecture/ Discussion	CO3	
34	Key constraints and constraints on null	Lecture/ Discussion	CO3	
35	Relational DB schema. Codd's Rules	Lecture/ Discussion	CO3	
36	Basic operations selection and projection	Lecture/ Discussion	CO3	
37	Union, Intersection, set difference and division (Order, Relational calculus: Domain, Tuple, Well Formed Formula, specification, quantifiers)	Lecture/ Discussion	CO3	
38	Inner, Outer, Left outer, Right outer, and full outer join	Discussion		
39	Steps to map ER diagram to relational schema	Lecture/ Discussion		
40	Functional dependencies, Armstrong's inference rule, & Normalization (Upto BCNF)		CO3	
41	Revision Test	Discussion	CO3	
42	Definition of Transaction, Desirable ACID properties	Lecture/ Discussion	CO4	
43	System failure, Backup & recovery Techniques	Lecture/ Discussion	CO4	
44	Authentication, Authorization.	Lecture	CO4	
45	Overview of Query by Language, NoSql databses	Discussion	CO4	
46	Revision Test	Discussion	CO4	

J. Course Articulation Matrix: (Mapping of COs with POs& PSO)

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COBCA 108.3	2	2	1	1	-	-	1						
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K. Expectations from Students:

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- /seminar
- Follow the class rules
- Must be on time
- Must be regular in the class and maintain minimum 75% attendance as per GGSIP University norms)

L. Faculty Contact

Details:

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Paper Code BCA 110

Subject: ENVIRONMENTAL STUDIES

A. Introduction

Objective: To develop and acquire the values and attitude towards understanding complex environmental economic-social challenges and active participation in solving current environmental and preventing future ones.

COBCA.110.1	To gain in depth knowledge on natural processes and resources that sustain life and govern economy
COBCA.110.2	To understand the consequences of human action on the web of life, global economy and quality of human life
COBCA.110.3	To develop ability for shaping strategies for environmental protection, conservation of biodiversity, sustainable development
COBCA.110.4	To adopt sustainability as a practice in life, society and industry
COBCA.110.5	To have in depth knowledge about legal environment in context of industries.
COBCA.110.6	Acquire values and attitudes towards understanding complex environmental economic-social challenges, and active participation in solving current environmental problems and preventing the future one

C. Program Outcomes

PO1.	Critical Thinking: Take informed actions after understanding the legal provisions well and identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO2.	Effective Communication: To improve the communication skills and oratory skills through mootings, debating, negotiating and mediation exercises.
PO3.	Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4.	Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of social and legal issues and participate in civic life through volunteering.
PO5.	Ethics: To inculcate professional ethics and to recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO6.	Environment and Sustainability: Understand the role of Law regarding issues of environmental and sustainable development.
PO7.	Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio- technological changes

D. Program Specific Outcomes

PSO.1.	Ability to link technology with different environmental aspect to have better understanding of environmental problems and their solution.
PSO.2.	Ability to apply various environmental laws in context of various industrial projects.
PSO.3.	Ability to conduct effective research and exploring different environmental issues.
PSO.4.	Clarity on both conceptual and application oriented skills in commerce, Finance & Accounting and it Applications in Business context.
PSO.5	The student should be able to communicate the technical information both orally and in writing professionally in context of environment
PSO.6	Ability to apply ethics, values, sustainability and creativity aspects on environmental problems.

E. Pedagogy:

The pedagogy would be the combination of the following techniques:-

- Lectures
- Presentations Classroom Activities
- Discussions, Questions & Answers
- Case Study

F. Evaluation

Criteria	Description	Maximum Marks
Internal Assessment	Mid-Term Exam	10
	PSDA	5
	Assignment	10
External Assessment	End-Term Exam	75
TOTAL		100

G. Syllabus

Unit 1

Introduction to Environmental Studies

- Multidisciplinary nature of environmental studies; components of environment: atmosphere, hydrosphere, lithosphere, and biosphere.
- Scope and importance; Concept of sustainability and sustainable development
- Emergence of environmental issues: Climate change, Global warming, Ozone layer depletion, Acid rain etc.
- International agreements and programmes: Earth Summit, UNFCCC, Montreal and Kyoto protocols, Convention on Biological Diversity (CBD), Ramsar convention, The Chemical Weapons Convention (CWC), UNEP, CITES, etc

UNIT II

Ecosystems and Natural Resources

- Definition and concept of Ecosystem
- Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem: Physical (energy flow), Biological (food chains, food web, ecological succession), ecological pyramids and homeostasis.
- Types of Ecosystems: Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries); importance and threats with relevant examples from India
- Ecosystem services (Provisioning, Regulating, Cultural, and Supporting); Ecosystem preservation and conservation strategies; Basics of Ecosystem restoration
- Energy resources: Renewable and non-renewable energy sources; Use of alternate energy sources; Growing energy needs; Energy contents of coal, petroleum, natural gas and bio gas; Argo-residues as a biomass energy source

Unit III

Biodiversity and Conservation

- Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity
- India as a mega-biodiversity nation; Biogeographic zones of India; Biodiversity hotspots; Endemic and endangered species of India; IUCN Red list criteria and categories
- Value of biodiversity: Ecological, economic, social, ethical, aesthetic, and informational values of biodiversity with examples.
- Threats to biodiversity: Habitat loss, degradation, and fragmentation; Poaching of wildlife; Man-wildlife conflicts; Biological invasion with emphasis on Indian biodiversity; Current mass extinction crisis
- Biodiversity conservation strategies: in-situ and ex-situ methods of conservation (National Parks, Wildlife Sanctuaries, and Biosphere reserves).

UNIT IV

Environmental Pollution and Control Measures

- Environmental pollution (Air, water, soil, thermal, and noise): causes, effects, and controls; Primary and secondary air pollutants; Air and water quality standards
- Nuclear hazards and human health risks
- Solid waste management: Control measures for various types of urban, industrial waste, Hazardous waste, E-waste, etc.; Waste segregation and disposal
- Environmental Impact Assessment and Environmental Management System.

Text Books

1. TB3. S.P. Mishra, S.N. Pandey; Essential Environmental Studies; Ane Books Pvt. Ltd. ; Sixth Edition
2. Asthana, D. K. (2006).Text Book of Environmental Studies. S. Chand Publishing

I. Lecture Plan

Lecture No.	Topic(s)	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Multi disciplinary nature of environmental studies	Lecture	CO1	MCQs&Subjective Assessment
2	continue			
3	components of environment	Lecture	CO1	
4	continue			
5	<i>scope and importance of environmental studies</i>	Lecture	CO1	

6	<i>continue</i>			
7	concept of sustainable development	Lecture/ Discussion	CO1,CO6,C0 4	
8	<i>continue</i>			
9	climate change and global warming	Lecture/ Discussion	CO2	
10	<i>continue</i>			
11	ozone layer depletion and acid rain	Lecture/ Discussion	CO2	
12	<i>continue</i>			
13	international environmental protection agreement	Lecture/ Discussion	CO5	
14	<i>continue</i>			
15	<i>international environmental protection agreement</i>		CO5	
16	<i>continue</i>			
17	<i>MCQ</i>			
18	structure of ecosystem	Lecture/ Discussion	CO1	
19	<i>continue</i>			
20	<i>types of ecosystem</i>		CO1,CO6	
21	<i>continue</i>			
22	different strategies to preserve the ecosystem	Lecture/ Discussion	CO3	
23	<i>continue</i>			
24	renewable and non renewable sources of energy	Lecture/ Discussion	CO3	
25	<i>continue</i>			
26	INTERNAL ASSESSMENT			
27	<i>definition and concept , levels of Biodiversity</i>		CO3,CO6	

28	continue			
29	threats to bio diversity	Lecture/	CO3	
30	continue			
31	bio diversity conservation strategies	Lecture/ Discussion	CO3	
32	continue			
33	environmental air pollution causes, effects ,control	Lecture/ Discussion	CO3	
34	continue			
35	water pollution ,causes,effect,control	Lecture/ Discussion	CO3	
36	continue			
37	nuclear hazards and human health risk	Lecture/ Discussion	CO3	
38	continue			
39	solid waste management	Lecture/ Discussion	CO3,CO4	
40	continue			
41	environment impact assessment	Lecture	,CO4	
42	continue			
43	environment management assessment	Lecture	CO3	
	CLASS TEST,REVISION			

J. . Course Articulation Matrix: (Mapping of COs with POs& PSOs)

CO Number	PO1	2	3	O4	5	O6	O7	SO1	SO2	SO3	O4	SOO5	SOO6
COBCA.110 1	1	-	-	-	-	-	1	-	-	1	-	-	-
COBCA.110 2	1	-	-	2	1	1	-	-	-	1	-	-	-
COBCA.110 3	2	-	-	2	1	1	1	-	-	1	-	-	-

COBCA.110 .4	-	-	-	1	1	2	1	-	-	-	-	-	1
COBCA.110 .5	-	-	-	1	2	-	1	-	2	-	-	-	1
COBCA.110 .6	1	-	1	-	1	-	-	-	-	-	-	-	1

“-” - No Correlation; 1-Low Correlation; 2- Moderate Correlation; 3-Substantial Correlation

K. Expectations from Students:

- Actively participate in the classroom discussions /seminar
- Follow the class rules
- Must be on time
- Must be regular in the class and maintain minimum 75% attendance as per GGSIP University norms)

L. Faculty Contact

Details:

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तेजस्वि नावधीतमस्तु
ISO 9001:2015 & 14001:2015

Paper Code- BCA 206

206 Subjects: : Introduction to Management and Entrepreneurship Development

A. Introduction

Objective: The course is designed specifically not only to introduce students with key entrepreneurship concepts but also aims to help students to integrate and apply their prior learning to various business situations. The course aims to support BCA program objectives with solid grounding in ethics, globalization and cross-functional issues.

COBCA206.1	Explain the basic concepts, principles and practices associated with Entrepreneurship formulation and implementation.
COBCA206.2	Gain in-depth knowledge on Entrepreneurial development in today's global scenario.
COBCA206.3	Understand the concept of entrepreneurs and to help the students to develop an entrepreneurial mind-set
COBCA206.4	Develop critical thinking for shaping strategies and help them to become an successful entrepreneur
COBCA206.5	Acquire values and attitudes towards understanding complex business problems, and active participation in solving current business problems.
COBCA206.6	Understand the concept of the fundamentals of management

C. Program Outcomes

PO1.	Critical Thinking: Development of critical thinking and to inspire students to developed an entrepreneurial mind-set. Encouraging students to understand the fundamentals of management
PO2.	Effective Communication: Acquire Technical, Communication and management Skills to convey or present information, applications, instructions, policies, procedures, decisions, documentations etc. verbally as well as in writing.
PO3.	Social Interaction: Recognize the various issues related to society, environment, health and vivid cultures and understand the responsibilities to contribute in providing the solutions.

PO4.	Effective Social Stratification : Promoting active participation in solving current business problems and preventing the future ones.
PO5.	Ethics: Acquire technical skills to lead a productive life in the society as a professional or as an entrepreneur
PO6.	Environment and Sustainability: Formulation, implementation and control in organizations. To help students develop skills for applying these concepts to the solution of Business problems .

D. Program Specific Outcomes

PSO.1.	Understand, interpret, and analysis the facts with the help of entrepreneurship principles.
PSO.2.	Knowledge to complex problem situations and offer potential solutions within a simulated professional context;
PSO.3.	Development of critical thinking and to inspire students to developed an entrepreneurial mind-set
PSO.4	Promoting active participation in solving current business problems and preventing the future ones.
PSO.5	Understanding of different political, economic, cultural and legal structure of business and make policy accordingly. .
PSO.6	Acquire technical skills to lead a productive life in the society as a professional or as an entrepreneur

E. Pedagogy:

The pedagogy would be the combination of the following techniques:-

- Lectures
- Presentations
- Classroom Activities
- Discussions, Questions & Answers
- Case Study

F. Evaluation

Criteria	Description	Maximum Marks
Internal Assessment	Mid-Term Exam	10
	PSDA	5
	Assignment	10
External Assessment	End-Term Exam	75
TOTAL		100

G. Syllabus

UNIT I:

Introduction to Entrepreneurship: Meaning and concept of entrepreneurship, the history of entrepreneurship development, Role of entrepreneurship in economic development, General characteristics and personality traits of entrepreneurs. Factors affecting entrepreneurship, Agencies in entrepreneurship development in India.

UNIT II:

Creativity: Necessity of Creativity in the development of entrepreneur, Steps in Creativity, Defining Innovation, importance of innovation. Identification of opportunities for problem solving with innovation. Decision making and Problem Solving (steps indecision making). Example from industry, day to day operations

UNIT III :

Role of an Entrepreneur: The Entrepreneur's role in the context of contribution to society; Examples from industry; the role of changing the mindset and the development of out of box thinking. Introduction to Design Thinking. Entrepreneurs as role models, mentors and influencers. Entrepreneurial success stories. Historical Perspective, Global Indian Entrepreneurs, Institutions, Modern Entrepreneurs:

UNIT IV:

Fundamentals of Management: Meaning of Business and its management the role and importance of leadership in entrepreneurship. Difference between Management and Leadership. The importance of planning in entrepreneurship venture. The role and importance of business plan in entrepreneurship venture

Suggested Readings:

1. S.S Khanka, Entrepreneurship Development, S.Chand
2. Sangram Keshari Mohanty, Fundamentals of Entrepreneurship, PHI Learning Private Limited 2018
3. Abha Mathur; Entrepreneurship Development, Taxman, Fifth Edition
4. Srivastava S. B: A Practical Guide to Industrial Entrepreneurs; Sultan Chand and Sons, New Delhi.
5. Prasanna Chandra: Protect Preparation, Appraisal, Implementation; Tata McGraw Hill. New Delhi.
6. Chabbra, T.N, Entrepreneurship Development, Sun India

I. Lecture Plan

Lecture No.	Topic(s)	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Course Introduction – : Meaning and concept of entrepreneurship, the history of entrepreneurship development.	Lecture/ case study	CO1	
2	Role of entrepreneurship in economic development, General characteristics and personality traits of entrepreneurs.	Lecture	CO1	
3	Factors affecting entrepreneurship, Agencies in entrepreneurship development in India.	PPT	CO2	
4	Necessity of Creativity in the development of entrepreneur, Steps in Creativity, Defining Innovation, importance of innovation.	Case Study	CO1	
5	Identification of opportunities for problem solving with innovation.	Lecture/ Discussion	CO3	
6	The Entrepreneur's role in the context of contribution to	Case study	CO1	

	society;			
7	Introduction to Design Thinking. Entrepreneurs as role models, mentors and influencers.	Case study	CO4	
8	Meaning of Business and its management the role and importance of leadership in entrepreneurship	Case Study	CO5	
9	Difference between Management and Leadership	Lecture/ Discussion	CO5	
10	The importance of planning in entrepreneurship venture.	Student PPT	CO1	
11	The role and importance of business plan in entrepreneurship venture	Student PPT	CO2	
12	Entrepreneurial success stories.	Student PPT	CO3/ CO5	
13	Decision making and Problem Solving (steps indecision making). Example from industry, day to day operations	Student PPT	CO5	
14	Historical Perspective, Global Indian Entrepreneurs, Institutions, Modern Entrepreneurs:	Lecture/	CO3	
15	<i>Revision</i>			
16	Class Test			

J. . Course Articulation Matrix: (Mapping of COs with POs& PSOs)

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	SO4	SOO5	SOO6
COBCA206.1	-	1	1	-	-	-	-						
COBCA206.2	2	2	1	2	1	1	2						
COBCA206.3	2	2	1	1	-	-	1						
COBCA206.4	2	2	2	-	-	-	2						
COBCA206.5	2	2	2	-	-	-	2						
COBCA206.6	3	3	2	-	-	-	2						

“-”- No Correlation; 1-Low Correlation; 2- Moderate Correlation; 3-Substantial Correlation

K. Expectations from Students:

- Actively participate in the classroom discussions.
- Follow the class rules
- Must be on time
- Must be regular in the class and maintain minimum 75% attendance as per GGSIP University norms)

L. Faculty Contact

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Paper Code: BCAT214**Subject: Introduction to Artificial Intelligence****A. Introduction**

Objective: To learn the basics of designing intelligent agents that can solve general purpose problems. To represent and process knowledge, plan and act, reason under uncertainty and can learn from experiences.

COBCA T214.1	To understand elements constituting problems and learn to solve it by various uninformed and informed (heuristics based)
COBCA T214.2	To understand formal methods for representing the knowledge and the process of inference to derive new representations of the knowledge.
COBCA T214.3	Analyze and apply the notion of uncertainty and some of probabilistic reasoning methods to deduce inferences under uncertainty
COBCA T214.4	Apply some mechanisms to create and improve AI system.

C. Program Outcomes

PO1.	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies
PO2.	Familiarized with Business environment and Information Technology and its Applications in different domains.
PO3.	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4.	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications
PO5.	Understand the front end and backend of software applications.
PO6.	Gain expertise in at least one emerging technology.
PO7.	Apply techniques of software validation and reliability analysis to the development of computer programs.

D. Program Specific Outcomes

PSO.1.	To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs by critical understanding, analysis and synthesis
PSO.2.	Apply Identify applications of Computer Science in other fields in the real world to enhance the career prospects
PSO.3.	Realize the requirement of lifelong learning through continued education and Research.

PSO.4.	Use the concepts of best practices and standards to develop user interactive and abstract application
PSO.5	Understand the professional, ethical, legal, security, social issues and responsibilities

E. Pedagogy:

The pedagogy would be the combination of the following techniques:-

- Lectures
- Presentations
- Classroom Activities
- Discussions, Questions & Answers
- Case Study

F. Evaluation

Criteria	Description	Maximum Marks
Internal Assessment	Mid-Term Exam	15
	PSDA	5
	Assignment	5
External Assessment	End-Term Exam	75
TOTAL		100

G. Syllabus

Unit-I: Overview of AI (Lectures-12)

- Introduction to AI, Importance of AI, AI and its related field, AI techniques, Criteria for success.
- Problems, problem space and search:** Defining the problem as a state space search, Production Systems and its characteristics, Issues in the design of the search programs.
- Heuristic search techniques:** Generate and test, hill climbing, best first search technique, problem reduction, constraint satisfaction

Unit-II: Knowledge Representation (Lecture08)

- Definition and importance of knowledge, Knowledge representation, various approaches used in knowledge representation, Issues in knowledge representation.
- Logical Reasoning:** Logical agents, propositional logic, inferences, Syntax and semantics of First Order Logic, Inference in First Order Logic Knowledge Base, forward chaining, backward chaining, unification, resolution, Expert system : Case study of Expert system in PROLOG

Unit-III: Uncertainty and Natural Language Processing (Lectures-08)

- a) **Handling Uncertainty:** Non-Monotonic Reasoning, Probabilistic reasoning, Bayes 'Theorem, Certainty factors and Rule-based Systems, Bayesian Networks, Dempster-Shafer Theory, Introduction to Fuzzy logic. Fuzzy set definition & types. Membership functions. Designing a fuzzy set for a given application
- b) **Natural Language Processing:** Introduction, Syntactic Processing, Semantic Processing, Pragmatic Processing.

Unit-IV: Learning

(Lectures-12)

- a) **Learning:** Introduction to Learning, Rote Learning, learning by taking advice, learning in problem solving, learning from examples: Induction, Explanation-based Learning, Discovery, Analogy, Neural Networks, and Genetic Learning.

H. References

Text Books

1. Rich and Knight, "Artificial Intelligence", Tata McGraw Hill, 1992.
2. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Second Edition (Indian Reprint: Pearson Education)

References:

1. Ivan brakto : "Prolog Programming for AI ", Addison Wesley
2. George F.Luger Artificial Intelligence Pearson Education
3. Ben Coppin Artificial Intelligence Illuminated Jones and Bartlett Publisher

Digital Resources

S. No.	Topic/ Title	Source/ URL
1	Artificial Intelligence Introduction	https://www.uc.edu/content/dam/uc/ce/docs/OLLI/Page%20Content/ARTIFICIAL%20INTELLIGENCER.pdf
2	Knowledge Representation in AI	https://www.javatpoint.com/knowledge-representation-in-ai
3	Learning	https://www.tutorialspoint.com/machine_learning_with_python_types_of_learning.htm

I. Lecture Plan

Lecture No.	Topic(s)	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to AI, Importance of AI, AI and its related field,	Lecture	CO1	MCQs & Subjective Assessment
2	AI techniques, Criteria for success.	Lecture	CO1	
3	Problems, problem space and search: Defining the problem as a state space search,	Lecture	CO1	
4	Production Systems and its characteristics,	Lecture/ Discussion	CO1	
5	Issues in the design of the search programs	Lecture/ Discussion	CO1	
6	Heuristic search techniques,	Lecture/ Discussion	CO1	
7	Generate and test, hill climbing	Lecture/ Discussion	CO1	
8	Best first search technique, problem reduction,	Lecture	CO1	
9	Constraint satisfaction	Lecture/ Discussion	CO1	
10	MCQ		CO3	
11	Revision Test	Discussion		
12	Definition and importance of knowledge, Knowledge representation	Lecture/ Discussion	CO2	

13	Various approaches used in knowledge representation,	Lecture	CO2	
14	Issues in knowledge representation.	Lecture/	CO2	
15	Logical Reasoning: Logical agents,	Lecture/ Discussion	CO2	
16	Propositional logic, inferences,	Lecture/ Discussion	CO2	
17	Syntax and semantics of First Order Logic,	Lecture/ Discussion	CO2	
18	Inference in First Order Logic Knowledge Base,	Lecture/ Discussion	CO2	
19	Forward chaining, backward chaining,	Lecture/ Discussion	CO2	
20	Unification, resolution,	Lecture	CO2	
21	Expert system : Case study of Expert system in PROLOG	Lecture	CO2	
22	MCQ	Discussion		
23	Revision Test	Discussion		
24	Handling Uncertainty: Non-Monotonic Reasoning,	Lecture/ Discussion	CO3	
25	Probabilistic reasoning, Bayes 'Theorem,	Lecture/ Discussion	CO3	
26	Certainty factors and Rule-based Systems	Lecture/ Discussion	CO3	
27	Bayesian Networks, Dempster-Shafer Theory,	Lecture	CO3	
28	Introduction to Fuzzy logic. Fuzzy set definition & types.	Lecture/ Discussion	CO3	

29	<i>Continue</i>	Lecture	CO3	
30	Membership functions. Designing a fuzzy set for a given application	Lecture/ Discussion	CO3	
31	Natural Language Processing: Introduction	Lecture/ Discussion	CO3	
32	Syntactic Processing, Semantic Processing,	Lecture	CO3	
33	Pragmatic Processing	Lecture/ Discussion	CO3	
34	MCQ	Discussion		
35	Revision Test	Discussion		
36	Learning: Introduction to Learning,	Discussion	CO4	
37	Rote Learning		CO4	
38	Learning by taking advice,	Lecture/ Discussion	CO4	
39	Learning in problem solving,	Lecture	CO4	
40	Learning from examples: Induction,	Lecture/ Discussion	CO4	
41	Explanation-based Learning,	Lecture	CO4	
42	Discovery, Analogy, Neural Networks	Lecture	CO2	
48	Genetic Learning	Lecture	CO2	
49	MCQ	Discussion		
50	Revision Test	Discussion		

J. Course Articulation Matrix: (Mapping of COs with POs & PSOs)

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	SOO5	SOO6
COBALL.B 505.1	2	1	1	2	-	-	-						
COBALL.B 505.2	2	2	-	2	1	1	-						
COBALL.B 505.3	2	2	1	1	-	-	1						
COBALL.B 505.4	-	-	-	2	1	2	2						

“-”- No Correlation; 1-Low Correlation; 2- Moderate Correlation; 3-Substantial Correlation

K. Expectations from Students:

- Actively participate in the classroom discussions /seminar
- Follow the class rules
- Must be on time
- Must be regular in the class and maintain minimum 75% attendance as per GGSIP University norms)

L. Faculty Contact

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BCA**Paper Code: BCA 222****Subjects: Digital Marketing****A. Introduction**

Objective: To train students at creating an understanding of the concepts and techniques of internet and digital marketing so as to exploit the opportunities of this medium to support the organization's marketing activities. In this course, the students will be able to develop expertise related to understand the basics of Digital Marketing comprehend the importance of Digital Marketing Platforms, gain knowledge about the usefulness of Social Media Marketing (SMM) and Search Engine Optimization (SEO)

COBCA222.1	Understanding the digital marketing concepts and its usefulness in business.
COBCA222.2	Planning steps for digital marketing strategy and successfully executing it.
COBCA222.3	Understand the importance of Social Media Platforms and Social Media Marketing for online communication.
COBCA222.4	Applying Search Engine Optimization techniques (SEO) to maximize reach and enhance engagement of users.
COBCA222.5	Analyzing Search Engine Marketing (SEM) types to maximize reach and enhance engagement of users.
COBCA222.6	Analyzing web using analytics tools and gaining insights to various tools for Social Media Marketing.

C. Program Outcomes

PO1.	Understand the basic concepts and principles of digital marketing to managing a business successfully
PO2.	Prepare digital marketing strategy and successfully executing it which will be effective for the current business scenario
PO3.	To familiarize the importance of Social Media Platforms and Social Media Marketing for online communication in global context.
PO4.	To expose students to Search Engine Optimization techniques (SEO) and how to maximize reach and enhance engagement of users through Search Engines..
PO5.	To enable the students to understand the Search Engine Marketing (SEM) types to maximize reach and enhance engagement of users.
PO6.	To help students in Analyzing web using analytics tools and gaining insights to various tools for Social Media Marketing in the present competitive world

D. Program Specific Outcomes

PSO.1.	Understand, interpret, and analyse the facts with the help of digital marketing principle.
PSO.2.	Apply legal Knowledge to complex problem situations and offer potential result within a digital marketing strategy and successfully executing it
PSO.3.	Ability to conduct effective communication and develop the critical skill about the Social Media Platforms and Social Media Marketing in organization's matters;
PSO.4	Articulate their independent views over Search Engine Optimization techniques (SEO) and Search Engine Marketing (SEM) in organization.
PSO.5	Understanding of different web using analytics tools and gaining insights to various tools for Social Media Marketing in organization.

E. Pedagogy:

The pedagogy would be the combination of the following techniques:-

- Lectures
- Presentations
- Classroom Activities
- Discussions, Questions & Answers
- Case Study

F. Evaluation

Criteria	Description	Maximum Marks
Internal Assessment	Mid-Term Exam	10
	PSDA	5
	Assignment	10
External Assessment	End-Term Exam	75
TOTAL		100

G. Syllabus

UNIT I

Digital Marketing Basics: Digital Marketing meaning and its importance, Traditional vs Digital Marketing, Benefits of Digital Marketing, Internet Marketing basics, Digital Marketing channels, Types of Business models, Digital Marketing strategies (P.O.E.M framework), Inbound and Outbound marketing, Digital Transformation model, 4Cs of Digital Marketing

Unit II

Social Media Marketing – Introduction, Social Media marketing strategies, Overview of Social media platforms – Instagram, Snapchat, Facebook, Mobile, Twitter, Content Planning and Strategy, Influential marketing, Content marketing, Digital Marketing campaign

Unit III

Search Engine Optimization – Introduction to SEO, On-Page and Off-Page Optimization, Role of Keywords in SEO, Organic vs Non-Organic SEO, Blogging as marketing strategy, Types of Blogs Search Engine Marketing – Introduction to Paid marketing, Google Adwords, Types of campaigns and Campaign creation

Unit IV

Tools for SMM and Marketing communication – Overview of Buffer, Hootsuite, Canva, Trello and Hot jar Web Analytics: Meaning, Purpose and process, Types, Tools for analytics – Google analytics, Audience analytics, Acquisition analytics, Behavior analytics, Conversion analytics

Suggested Readings:

TEXT BOOKS:

Rajan Gupta, Supriya Madan, “Digital Marketing”, BPB Publication, 1st Edition, 2022
Seema Gupta, “Digital Marketing”, McGraw Hill, 2nd Edition, 2018.
Puneet Singh Bhatia, “Fundamentals of Digital Marketing”, Pearson, 2nd Edition, 2020.

REFERENCE BOOKS:

Ian Dodson, “The Art of Digital Marketing”, Wiley, 2017.
Nitin Kamat, Chinmay Nitin Kamat, “Digital Marketing”, Himalaya Publishing House, 1st Edition, 2017.
Vandana Ahuja, “Digital Marketing”, Oxford University Press, 8th Edition, 2019.
Judy Strauss, Raymond Frost, “E- Marketing”, PHI learning, 5th Edition, 2009.
Moutusy Maity, “Internet Marketing”, Oxford University Press, 2018.
Stephanie Diamond, “Digital Marketing”, Wiley, 2019.
T. N. Swaminathan, Karthik Kumar, “Digital Marketing From Fundamentals to Future”, Cengage, 1st Edition, 2019.

Lecture Plan

Lecture No.	Topic(s)	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Digital Marketing Basics	Lecture/ Discussion	CO1	
2	Digital Marketing meaning and its importance	Lecture	CO1	
3	Traditional vs Digital Marketing	Lecture/ Discussion	CO1	
4	Benefits of Digital Marketing	Lecture	CO1	
5	Internet Marketing basics	Lecture/ Discussion	CO1	
6	Digital Marketing channels	Lecture/ Discussion	CO1	
7	Types of Business models	Lecture/ Discussion	CO1	
8	Digital Marketing strategies (P.O.E.M framework)	Lecture/ Discussion	CO2	
9	Inbound and Outbound marketing	Lecture/ Discussion	CO2	
10	Digital Transformation model	Lecture/ Discussion	CO2	
11	4Cs of Digital Marketing	Student PPT	CO2	
12	Social Media Marketing – Introduction	Lecture/ Discussion	CO3	
13	Social Media marketing strategies	Lecture/ Discussion	CO3	
14	Overview of Social media platforms –	Lecture/ Discussion	CO3	
15	Instagram, Snapchat	Lecture/ Discussion	CO3	
16	Facebook, Twitter	Lecture/ Discussion	CO3	
17	Mobile	Lecture/ Discussion	CO3	
18	Content Planning and Strategy	Lecture	CO3	
19	Influential marketing	Lecture	CO3	
20	Content marketing	Lecture	CO3	
21	Digital Marketing	Lecture/	CO3	

	campaign	Discussion		
22	Search Engine Optimization	Case study	CO4	
23	Introduction to SEO	Lecture/ Discussion	CO4	
24	On-Page and Off-Page Optimization	Lecture	CO4	
25	Role of Keywords in SEO	Lecture/ Discussion	CO4	
26	Organic vs Non-Organic SEO	Lecture/ Discussion	CO4	
27	Blogging as marketing strategy	PPT	CO4	
28	Types of Blogs	Lecture/ Discussion	CO4	
29	Search Engine Marketing	Lecture	CO5	
30	Introduction to Paid marketing	Lecture/ Discussion	CO5	
31	Google Adwords	Lecture/ Discussion	CO5	
32	Types of campaigns	Lecture/ Discussion	CO5	
33	Campaign creation	Lecture/ Discussion	CO5	
34	Tools for SMM and Marketing communication	Lecture	CO6	
35	Overview of Buffer	PPT	CO6	
36	Hootsuite, Canva	PPT	CO6	
37	Trello and Hot jar	PPT	CO6	
38	Web Analytics - Meaning, Purpose	Lecture/ Discussion	CO6	
39	Web Analytics - process	Lecture/ Discussion	CO6	
40	Web Analytics - Types	Lecture/ Discussion	CO6	
41	Tools for analytics	Lecture/ Discussion	CO6	
42	Google analytics	Case study	CO6	
43	Audience analytics	Lecture/ Discussion	CO6	
44	Acquisition analytics	Lecture/ Discussion	CO6	
45	Behavior analytics	Lecture/ Discussion	CO6	

46	Conversion analytics	Lecture/ Discussion	CO6	
47	Revision			
48	Class Test			

J . Course Articulation Matrix: (Mapping of COs with POs& PSOs)

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
COBCA222. 1	2	2	1	2	2	1					
COBCA222. 2	2	2	3	2	1	1					
COBCA222. 3	2	2	1	1	2	1					
COBCA222. 4	2	2	2	3	2	1					
COBCA222. 5	2	2	2	1	1	3					
COBCA222. 6	3	3	2	2	1	1					

“-”- No Correlation; 1-Low Correlation; 2- Moderate Correlation; 3-Substantial Correlation

K. Expectations from Students:

- Actively participate in the classroom discussions.
- Follow the class rules
- Must be on time
- Must be regular in the class and maintain minimum 75% attendance as per GGSIP University norms)

L. Faculty Contact

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VI SEMESTER

BCA

Paper Code: BCA

304 Subjects: Mobile Computing

A. Introduction

Objective: • To learn the basics of Wireless voice and data communications technologies. • To build working knowledge on various telephone and satellite networks. • To build skills in working with Wireless application Protocols to develop mobile content applications • To build practical knowledge on WML and WML Script

COBCA304.1	Understand the various approaches dealing the data using theory of Probability
COBCA304.2	Understand various numerical techniques and apply them to solve real life problems
COBCA304.3	Analyse and evaluate the accuracy of common Numerical Methods
COBCA304.4	Develop a mathematical model for real life situation and solving it Using Linear programming technique

C. Program Outcomes

PO1.	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies.
PO2.	Familiarized with Business environment and Information Technology and its Applications in different domains.
PO3.	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4.	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications.
PO5.	Understand the front end and backend of software applications.
PO6.	Acquire knowledge about computer networks, network devices and their configuration protocols, security concepts at various level etc.
PO7.	Apply techniques of software validation and reliability analysis to the development of computer programs
PO8.	Acquire Technical, Communication and management Skills to convey or present information, applications, instructions, policies, procedures, decisions, documentations etc. verbally as well as in writing.
PO9.	Recognize the various issues related to society, environment, health and

	vivid cultures and understand the responsibilities to contribute in providing the solutions.
PO10.	Acquire technical skills to lead a productive life in the society as a professional or as an entrepreneur.
PO11.	Gain expertise in at least one emerging technology.

D. Program Specific Outcomes

PSO.1.	The student should be able to communicate the technical information both orally and in writing professionally.
PSO.2.	Apply Create, select, adapt and apply suitable tools and technologies to a wide range of computational activities.
PSO.3.	Acquire necessary knowledge of technical, scientific as well as basic managerial and financial procedures to analyze and solve real world problems within their work domain
PSO.4	Clarity on both conceptual and application oriented skills in commerce, Finance & Accounting and it Applications in Business context.
PSO.5	Ability to analyze research and investigate complex computing problems through design of experiments, analysis and interpretation of data and synthesis of the information to arrive at valid conclusions.
PSO.6	Apply the knowledge gained in core courses to a broad range of advanced topics in computer science to learn and develop sophisticated technical products independently.
PSO.7	Awareness on ethics, values, sustainability and creativity aspects of technical solutions.

E. Pedagogy:

The pedagogy would be the combination of the following techniques: -

- Lectures
- Presentations
- Classroom Activities
- Discussions, Questions & Answers
- Case Study

F. Evaluation

Criteria	Description	Maximum Marks
Internal Assessment	Mid-Term Exam	10
	PSDA	5
	Assignment	10

External Assessment	End-Term Exam	75
TOTAL		100

G. Syllabus

UNIT - I Introduction to wireless communications: Applications, Short History of Wireless Communications, Market of Mobile Communications. [T1] Elementary Knowledge on Wireless Transmission: Frequency of Radio Transmission, Signals, Antennas, Signal Propagation: Path Loss of Radio Signals, Additional Signal Propagation Effects, Multipath Propagation, Multiplexing: Space Division Multiplexing, Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing, Modulation: Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Advanced Frequency Shift Keying, Advanced Phase Shift Keying, Multicarrier Modulation, Spread Spectrum: Direct Sequence Spread Spectrum, Frequency Hopping Spread Spectrum, Cellular Systems. [T1]

UNIT – II Elementary Knowledge on Medium Access Control: Motivation for a specialized MAC, Hidden and exposed terminals, Near and far terminals, Introduction to SDMA, FDMA, TDMA: Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access, CDMA, Spread Aloha multiple access, Mobile communications, Comparison of S/T/F/CDMA. [T1] Elementary Knowledge on Telecommunications Systems: GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, New data services, DECT: System architecture, Protocol architecture. [T1] Elementary Knowledge on Satellite systems: History, Applications, Basics: GEO, LEO, MEO, Routing, Localization, Handover. [T1].

UNIT -III Mobile Internet: Introducing the Mobile Internet, Services for the mobile Internet, Business opportunities. [T2] Implementing WAP Services: WML: WML Variables and Contexts: Variable Substitution, Setting Variables, Browser Contexts, WML Tasks and Events, WML User Interaction: Problems with Web Interaction, Interaction in WAP, Elements:, , The tabindex Attribute, WML Timers, WML Decks, Templates, and Cards: Elements: WML Text and Text Formatting, Elements Character Formatting, Tables, WML Images: The WBMP Image Format. [T2, T3]

UNIT – IV WAP: the Mobile Internet Standard, Making the Internet Mobile: Challenges and Pitfalls, Overview of the Wireless Application Protocol [T2] Implementing WAP Services: WML Script: Datatypes, Variables, and Conversions, Operators and Expressions: Operand Conversions, Assignment Operators, Arithmetic Operators, Bitwise Operators, Shift Operators, Logical Operators, Increment and Decrement Operators, Comparison Operators, Type Operators, The Conditional Operator, The Comma Operator, Precedence and Associativity, WMLScript Statements: Expressions as Statements, Blocks of Statements, Conditions, Loops, Returning from a Function, Other Statements, WMLScript Functions: Function Declarations, Function Calls, Calls to Other Script Units, Calling WMLScript from WML, Standard Libraries, WMLScript Pragmas: The access Pragma, The meta Pragma, Elementary Knowledge on Libraries: Lang , Float , String , URL , WMLBrowser , Dialogs [T2, T3]

TEXTBOOKS:

[T1] Jochen Schiller, “Mobile Communications”, PHI/Pearson Education, Second Edition, 2003.

[T2] Sandeep Singhal, “The Wireless Application Protocol, Writing Applications for Mobile Internet”, Pearson Education, 2000

[T3] Learning WML, and WMLScript, Programming the Wireless Web, Martin Frost, Publisher: O'Reilly 2000

REFERENCE BOOKS

[R1] William Stallings, “Wireless Communications and Networks”, PHI/Pearson Education, 2002

[R2] Theodore S Rappaport, “Wireless Communication Principles and Practice”, 2nd Ed, Pearson Education. 2002

[R3] C. Y. Lee and William, “Mobile Cellular Telecommunications”, 2nd Ed, McGraw Hill. 2001

I. Lecture Plan

Lecture No.	Topic(s)	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Introduction to wireless communications: Applications, Short History of Wireless Communications, Market of Mobile Communications. [T1]	Lecture	CO1	
2	Elementary Knowledge on Wireless Transmission: Frequency of Radio Transmission, Signals, Antennas,	Lecture/ppt	CO1	
3	Signal Propagation: Path Loss of Radio Signals,	Lecture	CO2	
4	Additional Signal Propagation Effects, Multipath Propagation,	Lecture	CO1	
5	Multiplexing: Space Division Multiplexing, Frequency Division	Lecture/ppt	CO3	

	Multiplexing, Time Division Multiplexing, Code Division Multiplexing, Modulation:			
6	Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying,	Lecture	CO1	
7	Advanced Frequency Shift Keying, Advanced Phase Shift Keying, Multicarrier	Lecture/ppt	CO4	
8	Modulation, Spread Spectrum Direct Sequence Spread Spectrum, Frequency Hopping Spread Spectrum, Cellular Systems. [T1]	Lecture	CO5	
9	<i>Revision</i>			
10	Class Test			
11	Elementary Knowledge on Medium Access Control: Motivation for a specialized MAC, Hidden and exposed terminals, Near and far terminals, [T1]	Lecture	CO5	
12	Introduction to SDMA, FDMA, TDMA: Fixed TDM,	Lecture/ppt	CO1	
13	Classical Aloha, Slotted Aloha, Carrier sense multiple access,	Lecture	CO2	
14	Demand assigned multiple access, PRMA packet reservation multiple access,	Lecture	CO3	
15	Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access,	Lecture/ppt	CO5	
16	CDMA, Spread Aloha multiple access, Mobile communications, Comparison of S/T/F/CDMA.	Lecture/ case study	CO3	
17	New data services, DECT:	Lecture	CO1	

	System architecture, Protocol architecture.[T1]			
18	Elementary Knowledge on Satellite systems: History, Applications, Basics: GEO, LEO, MEO, Routing, Localization, Handover.	Lecture	CO2	
19	<i>Revision</i>			
20	Class Test			
21	Mobile Internet: Introducing the Mobile Internet, Services for the mobile Internet, Business opportunities.[T2],	Lecture	CO1	
22	Implementing WAP Services: WML: WML Variables and Contexts: Variable Substitution,	Lecture/ case study	CO1	
23	Setting Variables, Browser Contexts, WML Tasks and Events,	Lecture	CO2	
24	WML User Interaction: Problems with Web Interaction, Interaction in WAP,,	Lecture	CO1	
25	Elements:, , The tabindex Attribute, WML Timers, WML Decks, Templates, and Cards: Elements' Text and Text Formatting,	Lecture/ case study	CO3	
26	Elements Character Formatting, Tables, WML Images: The WBMP Image Format	Lecture	CO1	
27	<i>Revision</i>			
28	Class Test			
29	WAP: the Mobile Internet Standard, Making the Internet Mobile: Challenges and Pitfalls, Other Statements,	Lecture	CO4	
30	Overview of the Wireless Application Protocol [T2] Implementing WAP Services: WML Script:	Lecture	CO5	

	Datatypes, Variables, and Conversions,			
31	Operators and Expressions: Operand Conversions, Assignment Operators, Arithmetic Operators, Bitwise Operators, Shift Operators,	Lecture	CO5	
32	Logical Operators, Increment and Decrement Operators, Comparison Operators, Type Operators,	Lecture/ case study	CO1	
33	The Conditional Operator, The Comma Operator, Precedence and Associativity,	Lecture	CO2	
34	test for optimality. Maximization of transportation problem,	Lecture	CO3	
35	WMLScript Statements: Expressions as Statements, Blocks of Statements, Conditions, Loops, Returning from a Function,	Lecture	CO5	
36	WMLScript Functions: Function Declarations, Function Calls, Calls to Other Script Units, Calling	Lecture/ case study	CO3	
37	WMLScript from WML, Standard Libraries,	Lecture	CO1	
38	WMLScript Pragmas: The access Pragma, The meta Pragma,	Lecture	CO2	
39	Elementary Knowledge on Libraries: Lang , Float , String ,URL , WMLBrowser , Dialogs	Lecture	CO1	
40	Revision			
41	Class Test			
42	Over all Revision of Syllabus			

J. .Course Articulation Matrix: (Mapping of COs with POs& PSOs)

CO Number	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	SO4	SOO5	SOO6
COBCA102.1	-	1	1	-	-	-	-						
COBCA102.2	2	2	1	2	1	1	2						
COBCA102.3	2	2	1	1	-	-	1						
COBCA102.4	2	2	2	-	-	-	2						
COBCA102.5	2	2	2	-	-	-	2						
COBCA102.6	3	3	2	-	-	-	2						

“-”- No Correlation; 1-Low Correlation; 2- Moderate Correlation; 3-Substantial Correlation

K. Expectations from Students:

- Actively participate in the classroom discussions.
- Follow the class rules.
- Must be on time
- Must be regular in the class and maintain minimum 75% attendance as per GGSIP University norms)

L. Faculty Contact

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Fourth Semester

BCA

Paper Code: BCA306

Subject: Linux Environment

A. Introduction

Objective: To understand Linux Operating System and its security.

COBCA106.1	Familiarize the basics of Linux and Unix Operating System.
CO BCA106.2	Understand and apply some Linux commands and its environment.
CO BCA106.3	Compare and implement environment and local variables.
CO BCA106.4	Understand the process related commands and Linux kernel.

C. Program Outcomes

PO1.	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies
PO2.	Familiarized with Business environment and Information Technology and its Applications indifferent domains.
PO3.	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4.	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications.
PO5.	Understand the front end and backend of software applications.
PO6.	Gain expertise in at least one emerging technology.
PO7.	Apply techniques of software validation and reliability analysis to the development of computer programs.

D. Program Specific Outcomes

PSO.1.	To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs by critical understanding, analysis and synthesis
PSO.2.	Apply Identify applications of Computer Science in other fields in the real world to enhance the career prospects
PSO.3.	Realize the requirement of lifelong learning through continued

	education and Research.
PSO.4.	Use the concepts of best practices and standards to develop user interactive and abstract application
PSO.5	Understand the professional, ethical, legal, security, social issues and responsibilities

E. Pedagogy:

The pedagogy would be the combination of the following techniques:-

- Lectures
- Presentations
- Classroom Activities
- Discussions, Questions & Answers
- Case Study

F. Evaluation

Criteria	Description	Maximum Marks
Internal Assessment	Mid-Term Exam	15
	PSDA	5
	Assignment	5
External Assessment	End-Term Exam	75
TOTAL		100

G. Syllabus

Unit-I: LINUX AND UNIX(Lectures-12)

- Overview of UNIX and LINUX Architectures, UNIX Principles,
- GNU Project/FSF,GPL,Getting help in Linux with –help,whatis,man command, info command, simple commands like date,whoami, who, w, cal, bc ,hostname,uname, concept of aliases etcLinux filesystem types ext2, ext3, ext4,
- Basic linux directory structure and the functions of different directories basic directory navigation commands like cd, mv, copy,rm,cat command , less command, runlevel

Unit-II: Standard Input and Output(Lecture08)

- Redirecting input and Output, Using Pipes to connect processes, tee command,
- Linux File Security, permission types, examining permissions, changing permissions(symbolic method numeric method),default permissions and umask Vi editor basics,
- Three modes of vi editor,concept of inodes,inodes and directories,cp and inodes ,mv and inodesrm and inodes,symbolic links and hard links,mount and umount command, creating archives, tar,gzip,gunzip,bzip2,bunzip2

Unit-III: Environment and Local Variable(Lectures-08)

- Environment variables(HOME,LANG,SHELL,USER,DISPLAY,VISUAL),
- Local variables, concept of /etc/passwd, /etc/shadow, /etc/group,andsu- command,
- Special permissions(suid for an executable,sgid for an executable,sgid for a directory,sticky bit for a directory) tail, wc, sort, uniq, cut, tr, diff, aspell, basic shell scripts grep, sed, awk

Unit-IV: Process Related Commands(Lectures-12)

- Process related commands(ps, top, pstree, nice, renice),
- Introduction to the linux Kernel, getting started with the kernel(obtaining the kernel source, installing the kernel source,using patches,
- The kernel source tree, building the kernel process management(process descriptor and the task structure, allocating the process descriptor, storing the process descriptor, process state,
- Manipulating the current process state, process context, the process family tree, the Linux scheduling algorithm, overview of system calls,.Intoduction to kernel debuggers.

H. References

Text Books

- Sumitabha Das, “Unix Concepts and Application”, TMH
- Robert Love, “Linux Kernel Development”, Pearson Education
- Sumitabha Das, “Your Unix The Ultimate Guide”, TMH

References:

1. Sivaselvan, Gopalan, “A Beginner’s Guide to UNIX”, PHI Learning
2. The Unix Programming Environment by Brian W. Kernighan and Rob Pike, PHI
3. Understanding the Linux Kernel Daniel P. Bovet; Marco Cesati, O'Reilly Media, Inc. 2005

Digital Resources

S. No.	Topic/ Title	Source/ URL
1	Linux and Unix OS	https://www.tutorialspoint.com/unix/unix-getting-started.htm
2	Linux commands and variables	https://www.tutorialspoint.com/unix/unix-using-variables.htm

I. Lecture Plan

Lecture No.	Topic(s)	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Overview of UNIX and LINUX Architectures,	Lecture	CO1	MCQs&Subjective Assessment
2	UNIX Principles,GNU Project/FSF	Lecture	CO1	
3	GPL,Getting help in Linux with –help,whatis,man command, info command,	Lecture	CO1	
4	Simple commands like date,whoami, who, w, cal, bc ,hostname,uname,	Lecture/ Discussion	CO1	
5	Concept of aliases	Lecture/ Discussion	CO1	
6	Linux filesystem types ext2, ext3, ext4,	Lecture/ Discussion	CO1	
7	Basic linux directory structure	Lecture/ Discussion	CO1	
8	The functions of different directories	Lecture	CO1	
9	Basicdirectory navigation	Lecture/	CO1	

	commands like cd, mv, copy,rm,cat command , less command, runlevel	Discussion		
10	<i>Continue</i>		CO1	
11	Difference between Linux and Unix	Lecture/ Discussion	CO1	
12	MCQ	Discussion		
13	Revision Test	Discussion		
14	Redirecting input and Output, Using Pipes to connect processes, tee command,	Lecture/	CO2	
15	Linux File Security, permission types,	Lecture/ Discussion	CO2	
16	Examining permissions, changing permissions	Lecture/ Discussion	CO2	
17	Default permissions and umask Vi editor basics,	Lecture/ Discussion	CO2	
18	Three modes of vi editor	Lecture/ Discussion	CO2	
19	Concept of inodes,inodes and directories,cp and inodes	Lecture/ Discussion	CO2	
20	mv and inodesrm and inodes,symbolic links and hard links,mount and umount command,	Lecture	CO2	
21	Creating archives, tar,gzip,gunzip,bzip2,bunzip2	Lecture	CO2	
22	<i>Continue</i>	Lecture	CO2	
23	MCQ	Discussion		
24	Revision Test	Discussion		
25	Environment variables(HOME,LANG,SHELL,USER,DISPLAY,VISUAL),	Lecture/ Discussion	CO3	
26	Local variables, concept of /etc/passwd, /etc/shadow, /etc/group,and su- command,	Lecture/ Discussion	CO3	
27	<i>Continue</i>	Lecture/ Discussion	CO3	
28	Special permissions(suid for	Lecture/	CO3	

	an executable, sgid for an executable, sgid for a directory, sticky bit for a directory)	Discussion		
29	Continue	Lecture	CO3	
30	tail, wc, sort, uniq, cut, tr, diff, aspell, basic shell scripts grep, sed, awk	Lecture/ Discussion	CO3	
31	Continue	Lecture/ Discussion	CO3	
32	MCQ	Discussion		
33	Revision Test	Discussion		
34	Process related commands(ps, top, pstree, nice, renice),	Lecture/ Discussion	CO4	
35	Introduction to the linux Kernel, getting started with the kernel	Lecture/ Discussion	CO4	
36	Installing the kernel source, using patches, the kernel source tree	Lecture/ Discussion	CO4	
37	Building the kernel process management(process descriptor and the task structure	Lecture/ Discussion	CO4	
38	Allocating the process descriptor, storing the process descriptor, process state	Lecture/ Discussion	CO4	
39	Manipulating the current process state, process context	Lecture/ Discussion	CO4	
40	The process family tree, the Linux scheduling algorithm, overview of system calls,	Lecture/ Discussion	CO4	
41	Introduction to kernel debuggers	Lecture/ Discussion	CO4	
42	MCQ	Discussion		
48	Revision Test	Discussion		
49	Class Test	Discussion		

J. Course Articulation Matrix: (Mapping of COs with POs& PSOs)

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	SOO5	SOO6
COBALL.B 505.1	-	1	1	-	2	-	1						
COBALL.B 505.2	2	2	1	2	1	1	2						
COBALL.B 505.3	2	2	1	1	-	-	1						
COBALL.B 505.4	2	2	2	1	1	-	2						

“-”- No Correlation; 1-Low Correlation; 2- Moderate Correlation; 3-Substantial Correlation

K. Expectations from Students:

- Actively participate in the classroom discussions /seminar
- Follow the class rules
- Must be on time
- Must be regular in the class and maintain minimum 75% attendance as per GGSIP University norms)

L. Faculty Contact

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Paper Code: BCA 312

Subjects: Artificial Intelligence

A. Introduction

Objective: To understand the concept of Artificial Intelligence, Knowledge Representation, Logic, NLP and Learning.

COBCA102.1	Understand the various approaches dealing the data using theory of Artificial Intelligence
COBCA102.2	Understand various numerical techniques and apply them to solve real life problems
COBCA102.3	Analyse and evaluate the accuracy of Knowledge Representation
COBCA102.4	Develop a mathematical model for real life situation and solving it Using, Logic, NLP and Learning.

C. Program Outcomes

PO1.	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies.
PO2.	Familiarized with Business environment and Information Technology and its Applications in different domains.
PO3.	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4.	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications.
PO5.	Understand the front end and backend of software applications.
PO6.	Acquire knowledge about computer networks, network devices and their configuration protocols, security concepts at various level etc.
PO7.	Apply techniques of software validation and reliability analysis to the development of computer programs
PO8.	Acquire Technical, Communication and management Skills to convey or present information, applications, instructions, policies, procedures, decisions, documentations etc. verbally as well as in writing.
PO9.	Recognize the various issues related to society, environment, health and vivid cultures and understand the responsibilities to contribute in

	providing the solutions.
PO10.	Acquire technical skills to lead a productive life in the society as a professional or as an entrepreneur.
PO11.	Gain expertise in at least one emerging technology.

D. Program Specific Outcomes

PSO.1.	The student should be able to communicate the technical information both orally and in writing professionally.
PSO.2.	Apply Create, select, adapt and apply suitable tools and technologies to a wide range of computational activities.
PSO.3.	Acquire necessary knowledge of technical, scientific as well as basic managerial and financial procedures to analyze and solve real world problems within their work domain
PSO.4	Clarity on both conceptual and application oriented skills in commerce, Finance & Accounting and it Applications in Business context.
PSO.5	Ability to analyze research and investigate complex computing problems through design of experiments, analysis and interpretation of data and synthesis of the information to arrive at valid conclusions.
PSO.6	Apply the knowledge gained in core courses to a broad range of advanced topics in computersciencetolearnanddevelopsophisticatedtechnical products independently.
PSO.7	Awareness on ethics, values, sustainability and creativity aspects of technical solutions.

E. Pedagogy:

The pedagogy would be the combination of the following techniques:-

- Lectures
- Presentations
- Classroom Activities
- Discussions, Questions & Answers
- Case Study

F. Evaluation

Criteria	Description	Maximum Marks
Internal Assessment	Mid-Term Exam	10
	PSDA	5

	Assignment	10
External Assessment	End-Term Exam	75
TOTAL		100

G. Syllabus

UNIT - I Overview of A.I: Introduction to AI, Importance of AI, AI and its related field, AI techniques, Criteria for success. Problems, problem space and search: Defining the problem as a state space search, Production system and its characteristics, Issues in the design of the search problem. Heuristic search techniques: Generate and test, hill climbing, best first search technique, problem reduction, constraint satisfaction.

UNIT - II Knowledge representation: Definition and importance of knowledge, Knowledge representation, various approaches used in knowledge representation, Issues in knowledge representation. Using Predicate Logic: Representing Simple Facts in logic, representing instances and is-a relationship, Computable function and predicate.

UNIT - III Natural language processing: Introduction syntactic processing, Semantic processing, Discourse, and pragmatic processing. Learning: Introduction learning, Rote learning, learning by taking advice, learning in problem solving, Learning from example-induction, Explanation based learning.

UNIT - IV Expert System: Introduction, Representing using domain specific knowledge, Expert system shells. LISP and other AI Programming Language

TEXTBOOKS:

[T1] E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1999.

REFERENCE BOOKS

[R1] D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1999

[R2] Nils J Nilsson, "Artificial Intelligence -A new Synthesis" 2nd Edition (2000),
Harcourt Asia Ltd.

I. Lecture Plan

Lecture No.	Topic(s)	Mode of Delivery	Corresponding CO	Mode of Assessing CO
1	Overview of A.I: Introduction to AI, ,	Lecture	CO1	
2	Importance of AI, AI and its related field	Lecture	CO1	
3	AI techniques, Criteria for success. Problems,problem	Lecture	CO2	

	space and search:			
4	Defining the problem as a state space search	Lecture	CO1	
5	Production system and its characteristics,	Lecture	CO3	
6	Issues in the design of the search problem.	Lecture	CO1	
7	Heuristic search techniques:	Lecture	CO4	
8	Generate and test, hill climbing,, best first search technique, problem reduction, constraint satisfaction	Lecture	CO5	
9	<i>Revision</i>			
10	Class Test			
11	Knowledge representation: Knowledge representation,	Lecture	CO5	
12	Definition and importance of knowledge,	Lecture	CO1	
13	various approaches used in knowledge representation,	Lecture	CO2	
14	Issues in knowledge representation.	Lecture	CO3	
15	Using Predicate Logic: Represent ting Simple Facts in logic,	Lecture	CO5	
16	Computable function and predicate.	Lecture	CO3	
17	<i>Revision</i>			

18	Class Test			
19	Natural language processing:: Learning from example-induction, Explanation based learning.	Lecture	CO1	
20	Introduction syntactic processing,	Lecture	CO1	
21	Discourse, and pragmatic processing	Lecture	CO2	
22	Semantic processing,, Learning	Lecture	CO1	
23	Introduction learning, Rote learning,	Lecture	CO3	
24	learning by taking advice, learning in problem solving,	Lecture	CO1	
25	<i>Revision</i>			
26	Class Test			
27	Expert System	Lecture	CO4	
28	Introduction, Representing using domain specific knowledge,	Lecture	CO5	
29	Expert system shells.	Lecture	CO5	
30	LIPS	Lecture	CO1	
31	AI Programming Language	Lecture	CO2	
32	<i>Revision</i>			
33	Class Test			
34	Over all Revision of Syllabus			

J. Course Articulation Matrix: (Mapping of COs with POs& PSOs)

CO Number	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	SO4	SOO5	SOO6
COBCA102.1	-	1	1	-	-	-	-						
COBCA102.2	2	2	1	2	1	1	2						
COBCA102.3	2	2	1	1	-	-	1						
COBCA102.4	2	2	2	-	-	-	2						
COBCA102.5	2	2	2	-	-	-	2						
COBCA102.6	3	3	2	-	-	-	2						

“-”- No Correlation; 1-Low Correlation; 2- Moderate Correlation; 3-Substantial Correlation

K. Expectations from Students:

- Actively participate in the classroom discussions.
- Follow the class rules
- Must be on time
- Must be regular in the class and maintain minimum 75% attendance as per GGSIP University norms)

L. Faculty Contact

Details:

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