



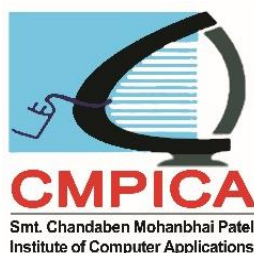
ACADEMIC REGULATIONS & SYLLABUS 2023 -24

**Faculty of Computer Science &
Applications**

**Smt. Chandaben Mohanbhai Patel Institute of
Computer Applications**

**Online Bachelor of Computer Applications (B.C.A.)
Programme**

(Choice Based Credit System)



**Charotar University of Science and Technology (CHARUSAT)
CHARUSAT Campus, At Post: Changa – 388421, Taluka: Petlad, District:
Anand**

Phone: 02697-247500, Fax: 02697-247100, Email: info@charusat.ac.in
www.charusat.ac.in

ACADEMIC RULES

To ensure uniform system of education, duration of under graduate programmes, eligibility criteria for and mode of admission, credit load requirement and its distribution between course and system of examination and other related aspects, following academic rules and regulations are recommended.

1. System of Education

The Semester system of education should be followed across the Charotar University of Science and Technology (CHARUSAT) at Master's levels. Each semester will be at least 90 working days duration. Every enrolled student will be required to take a specified load of course work in the chosen course of specialization and also complete a project/dissertation if any.

2. Duration of Programme

Undergraduate Programme	Bachelor of Computer Applications(BCA)
Minimum	6 Semesters (3 Academic years)
Maximum	10 Semesters (5 Academic years)

3. Eligibility & Mode of Admissions

Eligibility of a candidate and mode of admission to the programme will be according to the regulations for admission committee decided by Government of Gujarat from time to time.

4. Programme structure and Credits

A student admitted to a program should study the course and earn credits specified in the course structure.

5. Attendance

5.1 All activities prescribed under these regulations and listed by the course faculty members in their respective course outlines are

compulsory for all students pursuing the courses. No exemption will be given to any student from attendance except on account of serious personal illness or accident or family calamity that may genuinely prevent a student from attending a particular session or a few sessions. However, such unexpected absence from classes and other activities will be required to be condoned by the Dean/Principal.

6. Course Evaluation

6.1 The performance of every student in each course will be evaluated as follows:

- 6.1.1 Internal evaluation by the course faculty member(s) based on continuous assessment, for 30% of the marks for the course; and
- 6.1.2 Final examination by the University through written paper or practical test or oral test or presentation by the student or a combination of any two or more of these, for 70% of the marks for the course.

6.2 University Examination

- 6.2.1 The final examination by the University for 70% of the evaluation for the course will be through written paper or practical test or oral test or presentation by the student or a combination of any two or more of these.
- 6.2.2 In order to earn the credit in a course a student has to obtain grade other than FF.
- 6.2.3 Performance at Internal & University Examination will be done on the relative grading system.

7. Grading

The student's performance in any semester will be assessed by the Semester Grade Point Average (SGPA). Similarly, his performance at the end of two or more consecutive semesters will be denoted by the Cumulative Grade Point Average (CGPA). The SGPA and CGPA are defined as follows:

Grading Scheme

Grading Scheme Range of Marks (%)	96.0-100	86.0-95.9	76.0-85.9	66.0-75.9	56.0-65.9	46.0 – 55.9	36.0 – 45.9	Below 36.0	Absent
Letter Grade	O (Outstanding)	A+ (Excellent)	A (Very Good)	B+ (Good)	B (Above Average)	C (Average)	P (Pass)	F (Fail)	Ab (Absent)
Grade Point	10	9	8	7	6	5	4	0	0

$SGPA = \sum C_i G_i / \sum C_i$ where C_i is the number of credits of course i

G_i is the Grade Point for the course

i and $i = 1$ to n , n = number of courses in the semester

$CGPA = \sum C_i G_i / \sum C_i$ where C_i is the number of credits of course i

G_i is the Grade Point for the course

i and $i = 1$ to n , n = number of courses of all semesters up to which CGPA is computed.

8. Detention Rule

A student will be promoted to next year

only if he/she has cleared all the courses of the year he/she is studying in.

Awards of Degree.

8.1 Every student of the programme who fulfils the following criteria will be eligible for the award of the degree:

8.1.1 He should have earned at least minimum required credits as prescribed in course structure; and

8.1.2 He should have cleared all evaluation components in every course; and

8.2 The student who fails to satisfy minimum requirement of CGPA will be allowed to improve the grades so as to secure a minimum CGPA for the award of degree. Only latest grade will be considered.

9. Award of Class

The class awarded to a student in the programme is decided by the final CGPA as per the following scheme:

Distinction:	CGPA ≥ 7 & ≤ 10
First class:	CGPA ≥ 6.0 & < 7
Second Class:	CGPA ≥ 5.0 & < 6.0
Pass Class:	CGPA < 5.0

10. Transcript

The transcript issued to the student at the time of leaving the University will contain a consolidated record of all the courses taken, credits earned, grades obtained, SGPA, CGPA, class obtained, etc.

CHOICE BASED CREDIT SYSTEM

The choice based credit system provides flexibility in designing curriculum and assigning credits based on the course content and hour of teaching. The choice based credit system provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective and open elective courses. The CBCS provides a cafeteria type approach in which the students can take courses of their choice and adopt an interdisciplinary approach to learning. The courses shall be evaluated on the grading system, which is considered to be better than the conventional marks system.

CBCS – Conceptual Definitions / Key Terms (Terminologies)

Types of Courses: The Programme Structure consist of 3 types of courses:

Foundation Courses, Core Courses and Elective Courses.

Foundation Course

These courses are offered by the institute in order to prepare students for studying courses to be offered at higher levels.

Core Courses

A Course which shall compulsorily be studied by a candidate to complete the requirements of a degree / diploma in a said programme of study is defined as a core course. Following core courses are incorporated in CBCS structure:

A. University Core Courses(UC):

University core courses are compulsory courses which are offered across university and must be completed in order to meet the requirements of programme.

B. Programme Core Courses(PC):

Programme core courses are compulsory courses offered by respective programme owners, which must be completed in order to meet the requirements of programme.

Elective Courses

Generally, a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline of study or which provides an extended scope or which enables an exposure to some other discipline / domain or nurtures the candidates

proficiency / skill is called an elective course. Following elective courses are incorporated in CBCS structure:

A. University Elective Courses(UE):

The pool of elective courses offered across all faculties / programmes.

B. Institute Elective Course (IE)

Institute elective courses are those courses which any students of the University/Institute of a Particular Level (PG/UG) will choose as offered or decided by the University/Institute from time-to-time irrespective of their Programme /Specialization.

C. Programme Elective Courses(PE):

The programme specific pool of elective courses offered by respective programme.

Vision, Mission, PEOs, POs and PSOs

Vision

To become a leading institution in the field of computer applications and contribute in national efforts of computerizing public systems

Mission

To produce competent computer professionals with the ability to face future challenges.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The graduates will:

PEO1: Be able to understand the requirement of computing problem and implement an effective solution.

PEO2: Be able to successfully take up various available career options.

PEO3: Be able to continuously learn in their preferred domains.

PEO4: Be able to acquit themselves in ethical and professional manner while demonstrating effective skills.

PROGRAM OUTCOMES (POs)

The Graduate of Computer Science and Applications will be able to:

PO1: Computational Knowledge: Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge to provide effective solution in the area of computing.

PO2: Problem Analysis: Identify, formulate, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

PO3: Design /Development of Solutions: Design and evaluate solutions for computing problems, and design and evaluate systems, components, or processes that meet specified needs by considering several societal aspects.

PO4: Modern Tool Usage: Create, select, adapt and apply appropriate techniques, resources, and modern computing tools for any computing activities, with an understanding of the limitations.

PO5: Professional Ethics: Understand and commit to professional ethics, responsibilities, and norms of professional computing practice.

PO6: Life-long Learning: Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.

PO7: Project management: Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO8: Communication Efficacy: Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.

PO9: Societal and Environmental Concern: Understand and assess societal and environmental issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.

P10: Individual and Team Work: Function effectively as an individual and as a member or a leader in diverse teams and in multidisciplinary environments.

P11: Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

PROGRAM SPECIFIC OUTCOMES

At the end of the programme, the student should be able to

PSO1: Analyze, evaluate and formulate workable computing solutions to real world problems using computing methods.

PSO2: Apply proficiencies of communication, teamwork and management skills with spirit of entrepreneurship.

SALIENT FEATURES

- Programme is designed based on Choice Based Credit System(CBCS).
- Right blend of fundamentals and latest technologies related courses.
- Exposure of humanities courses in every semester for holistic development of students.
- Interdisciplinary exposure in form of university elective courses.
- Unique methodologies in form of case study and project based learning for teaching-learning.
- Inclusion of environmental awareness through environment science courses.
- Coverage of emerging technologies through expert sessions, seminar and workshop.

Total Credits of Programme (6 Semesters): 145

**TEACHING AND
EXAMINATIONSCHEME
FOR
ONLINE BCA PROGRAMME

EFFECTIVE FROM
ACADEMIC YEAR 2023-24**

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
 (Choice Based Credit System)
Effective from Year 2023 - 24
Semester - I

Semester - I											
Course Code	Course Title	Teaching Scheme					Examination Scheme				Total
		Contact Hours			Credit	Theory		Practical			
		Theory	Practical	Total		Internal	External	Internal	External		
OBCA121	Information Technology Trends	3	-	3	3	30	70	-	-	100	
OBCA123	Foundation of Programming	4	-	4	4	30	70	-	-	100	
OBCA123 P	Foundation of Programming - Practical	-	3	3	3	-	-	30	70	100	
OBCA124	Digital Computer Fundamentals	4	-	4	4	30	70	-	-	100	
OBCA125	Fundamentals of Web Designing - Practical	-	3	3	3	-	-	30	70	100	
OHS101 C	Communicative English	-	4	4	4	-	-	30	70	100	
	Total	11	10	21	21	300		300		600	

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - II

Semester - II										
Course Code	Course Title	Teaching Scheme				Examination Scheme				
		Contact Hours			Credit	Theory		Practical		Total
		Theory	Practical	Total		Internal	External	Internal	External	
OBCA126	Fundamentals of E-Commerce	3	-	3	3	30	70	-	-	100
OBCA128	Advanced Web Designing	-	3	3	3	-	-	30	70	100
OBCA129	Fundamentals of Object Oriented Programming	4	-	4	4	30	70	-	-	100
OBCA129 P	Fundamentals of Object Oriented Programming - Practical	-	3	3	3	-	-	30	70	100
OBCA130	Database Fundamentals	4	-	4	4	30	70	-	-	100
OBCA130 P	Database Fundamentals - Practical	-	3	3	3	-	-	30	70	100
Total		11	09	20	20	300		300		600

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - III

Semester - III										
Course Code	Course Title	Teaching Scheme				Examination Scheme				
		Contact Hours			Credit	Theory		Practical		Total
		Theory	Practical	Total		Internal	External	Internal	External	
OBCA227	Computer Oriented Management System	4	-	4	4	30	70	-	-	100
OBCA228	System Analysis and Design	3	-	3	3	30	70	-	-	100
OBCA229	Fundamentals of Data Structures and Algorithms	4	-	4	4	30	70	-	-	100
OBCA229 P	Fundamentals of Data Structures and Algorithms - Practical	-	3	3	3	-	-	30	70	100
OBCA230	Fundamentals of Operating Systems	4	-	4	4	30	70	-	-	100
OBCA230 P	Fundamentals of Operating Systems - Practical	-	3	3	3	-	-	30	70	100
OCL144.01C	Environmental Sciences	-	2	2	2	-	-	30	70	100
Total		15	8	23	23	400		300		700

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester – IV

Semester - IV										
Course Code	Course Title	Teaching Scheme				Examination Scheme				
		Contact Hours			Credit	Theory		Practical		Total
		Theory	Practical	Total		Internal	External	Internal	External	
OBCA231	Digital Marketing	-	3	3	3	-	-	30	70	100
OBCA233	Software Engineering	4	-	4	4	30	70	-	-	100
OBCA234	Advanced Database System	-	3	3	3	-	-	30	70	100
OBCA235	Open Source Technology	4	-	4	4	30	70	-	-	100
OBCA235 P	Open Source Technology - Practical	-	3	3	3	-	-	30	70	100
OBCA236	Data Communications and Networks	4	-	4	4	30	70	-	-	100
OHS111.02 C	Human Values and Professional Ethics	-	2	2	2	-	-	30	70	100
Total		12	11	23	23	300		500		800

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester – V

Semester – V										
Course Code	Course Title	Teaching Scheme				Examination Scheme				
		Contact Hours			Credit	Theory		Practical		Total
		Theory	Practical	Total		Internal	External	Internal	External	
OBCA324-325	Elective-V	4	-	4	4	30	70	-	-	100
OBCA324 P – 325 P	Elective-V - Practical	-	3	3	3	-	-	30	70	100
OBCA327	Object Oriented Programming using JAVA	4	-	4	4	30	70	-	-	100
OBCA327 P	Object Oriented Programming using JAVA - Practical	-	3	3	3	-	-	30	70	100
OBCA328	Fundamentals of Visual Programming	4	-	4	4	30	70	-	-	100
OBCA328 P	Fundamentals of Visual Programming - Practical	-	3	3	3	-	-	30	70	100
OBCA329	Introduction to Multi-Paradigms Programming language	-	3	3	3	-	-	30	70	100
OHS131.02C	Communication and Soft skills	-	2	2	2	-	-	30	70	100
Total		12	14	26	26	300		500		800

Elective-V	
Course Code	Course Title
OBCA324, OBCA324 P	Document Databases
OBCA325, OBCA325 P	Foundation of Data Science
SWAYAM courses will be included as electives and updated periodically	

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - VI

Semester - VI										
Course Code	Course Title	Teaching Scheme				Examination Scheme				
		Contact Hours			Credit	Theory		Practical		Total
		Theory	Practical	Total		Internal	External	Internal	External	
OBCA330	Basics of Mobile Applications	4	-	4	4	30	70	-	-	100
OBCA330 P	Basics of Mobile Applications - Practical	-	3	3	3	-	-	30	70	100
OBCA331	Software Testing	-	3	3	3	-	-	30	70	100
OBCA332	Minor Project	-	20	20	20	-	-	90	210	300
OHS132.03C	Contributor Personality Development	-	2	2	2	-	-	30	70	100
Total		04	28	32	32	100		600		700

DETAILED SYLLABUS

FOR

ONLINE BCA PROGRAMME
(1st SEMESTER)

EFFECTIVE FROM
ACADEMIC YEAR 2023-24

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
 (Choice Based Credit System)
Effective from Year 2023 - 24
Semester - I

Semester - I											
Course Code	Course Title	Teaching Scheme					Examination Scheme				Total
		Contact Hours			Credit	Theory		Practical			
		Theory	Practical	Total		Internal	External	Internal	External		
OBCA121	Information Technology Trends	3	-	3	3	30	70	-	-	100	
OBCA123	Foundation of Programming	4	-	4	4	30	70	-	-	100	
OBCA123 P	Foundation of Programming - Practical	-	3	3	3	-	-	30	70	100	
OBCA124	Digital Computer Fundamentals	4	-	4	4	30	70	-	-	100	
OBCA125	Fundamentals of Web Designing - Practical	-	3	3	3	-	-	30	70	100	
OHSI01 C	Communicative English	-	4	4	4	-	-	30	70	100	
	Total	11	10	21	21	300		300		600	

OBCA121: Information Technology Trends

(100 Marks)

Contact Hours: 03

Pre-requisite: None

Methodology & Pedagogy: During theory lectures emerging trends of information technology will be introduced to students. Emphasis will be given on acquisition, storage and processing of data to generate meaningful information. Students will be made familiar with applications related to information technology. Emerging trends and societal impacts of information technology will be discussed to students.

Outline of the Course:

Unit No.	Title of the Unit	Minimum Number of Theory Hours
1	Information Technology Essentials	06
2	Internet Applications	05
3	Internet Service Trends	07
4	Data Analytics Trends	06
5	GPS and GIS Trends	05
6	Emerging Trends and Societal Impact of IT	07

Total Hours (Theory): 36

Total Hours:36

Detail Syllabus:

Unit I: Information Technology Essentials

Hours 06

Introduction to Information Technology, Acquisition of various types of data- Introduction to Number and Textual Data, Image Data, Audio and Video Data Numbers and Textual Data, Data Storage and organization.

Unit II: Internet Applications

Hours 05

Internet: Introduction, Internet basics, Internet protocols, Internet addressing, Browser WWW, E-mail, telnet, FTP, application, benefits and limitation of internet, electronic conferencing, and teleconferencing.

Unit III: Internet Service Trends

Hours 07

Fundamentals of Cloud Computing, Types of Cloud based Services, Varieties of Cloud Computing, Types of Cloud Computing, Advantages and Disadvantage Cloud Computing, Cloud Computing Providers E-commerce, M-Commerce.

Unit IV: Data Analytics Trends

Hours 06

Types of Data – Qualitative and Quantitative, Data Analytics basics, Types of Analytics, Common technologies used in data analytics, Tools for Data Analytics

Unit V: GPS and GIS Trends

Hours 05

What is GPS, Key uses of GPS, how it is applied, what is GIS, Key Uses of GIS, which industries use GIS, Future of GPS and GIS.

Unit VI: Emerging Trends and Societal Impact of IT

Hours 07

Internet of Things, Virtual and Augmented Reality, Industry 4.0, Image Processing Introduction to Societal Impact, Social Use of World Wide Web, Privacy, Security and Integration of Information, Disaster Recovery, Intellectual Property Right, Career in IT

Core Books:

1. V Rajaraman : Introduction to Information Technology, 3rd Edition, PHI Learning Private Limited, 2018.
2. P.T. Joseph, S.J.: E-Commerce An Indian Perspective, th Edition, PHI Learning Private Limited, 2019.
3. Thomas Erl, Z. Mahmood and R. Puttini: Cloud Computing Concepts, Technology & Architecture, Pearson Publication, 2014

Reference Books:

1. Syed Muhammad Fahad Akhtar, Big Data Architect's Handbook, Packt Publishing ltd, 2018.
2. R. Kalakota & M. Robinson, e-Business 2.0, 2nd Edition, Pearson Publisher, 2012

Web References:

1. <https://blog.k2datascience.com/the-basics-of-data-analytics-77e5cc7ea741> [For Data Analytics]
2. <https://www.investopedia.com/terms/c/cloud-computing.asp> [For Cloud Computing]
3. <https://files.eric.ed.gov/fulltext/ED536788.pdf> [For Data Analytics]
4. <https://nobelsystemsblog.com/facts-between-gis-gps/> [For GPS,GIS]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Understand the essentials of Information Technology.
CO2 :	Aware about Internet based applications and their uses in real life.
CO3 :	Understand the trends of Internet Services.
CO4 :	Understand basics of data analytics, GPS and GIS related technologies.
CO5 :	Understand the Emerging trends and Societal Impact of Information Technology.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Information Technology Essentials	√				
2	Internet Applications		√	√		
3	Internet Service Trends			√		
4	Data Analytics Trends				√	
5	GPS and GIS Trends				√	√
6	Others Emerging Trends and Societal Impact of IT					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1	1	-	-	2	-	-	-	-	-	2	2
CO2	3	1	2	1	-	3	-	-	-	-	2	2	2
CO3	3	1	2	1	-	3	-	-	-	-	2	2	2
CO4	3	1	2	1	-	3	-	-	-	-	2	2	2
CO5	3	1	2	1	2	2	-	-	2	-	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA123: Foundation of Programming

(100 Marks)

Contact Hours: 04

Pre-requisite: None

Methodology & Pedagogy: During theory lectures the emphasis will be given on theoretical concepts of flow charts and algorithms. Structure of C programming language and different elements of C programming will be explained in lectures. During practical sessions the concepts learned in theory lectures will be implemented.

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Hours
		Theory
1	Programming Basics	8
2	Introduction to C	10
3	Expressions and Control Statements	9
4	Arrays and Strings	7
5	Introduction to Functions	5
6	Structure, Enumeration datatypes and Pointers	9

Total Hours (Theory): 48

Total Hours: 48

Detail Syllabus:

Unit I: Programming Basics

Hours 08

Introduction to algorithm, Key features of algorithm, Introduction to flow charts, Significance of flow chart, Advantages and limitation of flow chart, Introduction to programming languages, Introduction to editor, compiler, and translator

Unit II: Introduction to C

Hours 10

Introduction, characteristics of C, Structure of C Program, writing first C program, Files used in C program, Compiling and Executing C program; Basic data types in C, User define data types, Variables in C, Declaring and initializing variables in C, Constants, Input / Output statements in C; Operators - arithmetic, relational, logical, assignment, increment - decrement, conditional, Bitwise and special, comma operator, size-of operator, operator precedence chart.

Unit III: Expressions and Control Statements

Hours 09

Arithmetic expressions, evaluation of expressions, type conversions in expressions, operator precedence and associativity, mathematical functions. Type conversion and casting; Introduction to decision control statements, Conditional and branching statements, loop, nested loop, Break, continue and go to statement.

Unit IV: Array and Strings

Hours 07

Arrays: One-dimensional, two-dimensional, Handling of Character Strings: Declaring and initializing string variables, reading string from terminal, writing string to screen, string handling functions, table of strings.

Unit V: Introduction to Functions

Hours 05

Need for user-defined functions, the form of c function, return values and their types, calling a function, category of functions, handling of non-integer functions, nesting of Functions, recursion, functions with arrays, storage class.

Unit VI: Structure, Enumeration datatypes and Pointers

Hours 09

Understanding the Computer's Memory, Introduction to Pointers, Declaring Pointer Variables, Pointer Expressions and Pointer Arithmetic, Null Pointers, Generic Pointers, passing arguments to Function using Pointers, Pointers and Arrays, Passing an Array to a Function, Difference between Array name and Pointer, Pointers and Strings, Array of Pointers.

Core Books:

1. ReemaThareja: Computer Fundamentals and Programming in C, 2nd Edition, Oxford University press, 2012
2. E. Balagurusamy: Programming In C, 6th Edition, 2012
3. PradipDey and Manas Ghosh. "Programming in C", Second Edition, Oxford University Press.

Reference Books:

1. Herbert Schildt: The complete reference C, Fourth edition, Tata McGraw Hill, 2000
2. YashwantKanetkar: Let us C, 13th Edition, BPB publication, 2013.
3. PradipDey, Manas Ghosh: Programming in C, 4th Edition, Oxford University press , 2012.
4. Brian W. Kerighan and Dennis M. Ritchie : The C Programming Language, Prentice Hall.

Web References:

1. <https://cprogrampracticals.blogspot.com/p/basic-concepts.html> [For basic c programing practical]
2. <https://www.programtopia.net/c-programming/docs/operators-expressions> [For operators and expressions in C]
3. <https://www.javatpoint.com/functions-in-c> [For functions]
4. <https://www.programiz.com/c-programming> [For basic c programing practical]
5. <https://www.javatpoint.com/c-pointers> [pointers in c]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Be able to solve problems using algorithms and flowcharts.
CO2 :	Learn about the structure of C program and able to develop simple programs using the C Programming language with data types, variables and constants.
CO3 :	Gain the knowledge of different conditional and iterative statements and expressions.
CO4 :	Arrays of numbers and characters as well as manipulating with them.
CO5 :	Be able to understand user define function. Also Understand the concept of Dynamic memory management. Learn Programing-using Array with Pointer and Structure.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Programming Basics	√				
2	Introduction to C		√			
3	Expressions and Control Statements			√		
4	Arrays and Strings		√	√	√	
5	Introduction to Functions		√	√		√
6	Structure, Enumeration datatypes and Pointers		√			√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	2	1	2	2	2	1	1	1	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	2	2	3	3	2	2	2	2	2	1	1	1	3	2
CO4	3	3	3	3	3	3	3	3	3	2	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	2	3	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA123 P: Foundation of Programming - Practical

(100 Marks)

Contact Hours: 03

Prerequisites: None

Methodology, Pedagogy: Practical session covered structure of C programming language and different elements of C programming will be explaining.

Outline of the Course:

Week No	Practical	Description
1	Introduction to Programming and IDE	Overview of programming languages, algorithms, flowchart, Setting up the development environment, Introduction of development environment.
2-3	Basic of C programming & Operators	Structure of C Program, writing first C program, Files used in C program, Compiling and Executing C program; Basic data types in C. Variables in C, Declaring and initializing variables in C, Constants, Input / Output statements in C, Operators - arithmetic, relational, logical, assignment, increment - decrement, conditional, Bitwise and special, comma operator, size-of operator, operator precedence chart.
4-5	Expressions evaluation, type conversions & Decision-making statements.	Arithmetic expressions, evaluation of expressions, type conversions, Decision-making statements (if, else if, else) and nested decision-making statements, Switch statement.
6-7	Looping statements & Jump Statements	Looping statements (for, while, do-while), nested looping statements Break and continue statements.
8-9	Arrays & Character Arrays	Understanding arrays, one-dimensional array, two-dimensional arrays, practical exercises of one-dimensional and two-dimensional array. Declaring and initializing string variables, reading string from terminal, writing string to screen, string-handling functions.

10-11	User defined functions	Introduction to functions, Function declaration, definition, and calling, Parameters and return values. Scope and lifetime of variables, Recursion.
12	Pointers	Introduction to pointers, Pointers and arrays, Pointer arithmetic.

Total Hours (Practical): 36

Total Hours: 36

Core Books:

1. E. Balagurusamy, Mcgraw Hill, Programming in ANSI C
2. Asok N Kamthane, Pearson, Programming in C
3. Anita Goel, Pearson, Computer Fundamentals
4. Schaum Series, Gottfried B.S., Tata McGraw Hill, Programming with C

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, Pearson, C Programming Language
2. Rajaraman V, PHI, Computer Basics and Programming in C
3. Yashavant P, Kanetkar, BPB Publications, Let us C

Web References:

1. <https://cprogrampracticals.blogspot.com/p/basic-concepts.html> [For basic c programing practical]
2. <https://www.programtopia.net/c-programming/docs/operators-expressions> [For operators and expressions in C]
3. <https://www.javatpoint.com/functions-in-c> [For functions]
4. <https://www.programiz.com/c-programming> [For basic c programing practical]
5. <https://www.javatpoint.com/c-pointers> [pointers in c]
6. <https://www.programiz.com/c-programming/c-structures> [structures in c]

Course Outcomes: Upon successful completion of the course, the students will:

CO1 :	Be able to write algorithm and draw a flowchart for solving the same problem
CO2 :	Be able to write a simple c programming with variable, input and output.
CO3 :	Be able to used different conditional and looping statements.
CO4 :	Be familiar and understanding the important of number and character array.
CO5 :	Be able to work with user defined functions and pointer.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Programming and IDE	√				
2-3	Basic of C programming & Operators		√			
4-5	Expressions evaluation, type conversions & Decision-making statements.			√		
6-7	Looping statements & Jump Statements			√		
8-9	Arrays & Character Arrays				√	
10-11	User defined functions					√
12	Pointers					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	2	2	1	2	2	2	1	1	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	2	2	3	3	2	2	2	2	2	1	1	3	2
CO4	3	3	3	3	3	3	3	3	3	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	2	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA124: Digital Computer Fundamentals

(100 Marks)

Contact Hours: 04

Pre-requisite: None

Methodology & Pedagogy: In order to achieve the course objectives, students will be introduced to digital technologies. Various digital modules used to create digital computer devices like gates, flip flops, decoder, encoder etc. are to be studied. Mathematical base is created to understand the organization of digital computer.

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Hours
1	Digital Systems and Binary Numbers	10
2	Boolean Algebra and Logic Gates	10
3	Combinational Circuit Designing	8
4	Sequential Circuit Designing	8
5	Memory Interfaces and Data Representation	6
6	The Arithmetic Logic Unit and Control Unit	6

Total Hours (Theory): 48

Total Hours: 48

Detailed Syllabus:

Unit - I: Digital Systems and Binary Numbers:

Hours 10

Introduction and Evolution of Digital computers, Major components of digital computer, Interfaces and Buses, compiler, interpreter, Assembler, Introduction to various number systems (Decimal, Binary, Octal, Hexadecimal, BCD), Conversion of number system, Binary operations, signed binary numbers, 1's complement and 2's complement.

Unit - II: Boolean Algebra and Logic Gates:

Hours 10

Fundamental concepts and rules of Boolean algebra, , Boolean Algebra Laws, Boolean expressions and its simplification with and without Truth Tables, Canonical form and standard form, D-Morgan's Theorem, Basic duality laws, Derivation of Boolean expressions, Introduction to logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR), Implementation of Boolean expressions using logic gates, Sum of product and Product of Sum forms, Universal gates, Implementation of other gates using universal gates, Karnaugh Map method for two, three, four and five variables, K-map with don't care conditions, Tabulation method, determination and selection of prime applicants.

Unit - III: Combinational Circuit Designing:

Hours 08

Introduction to combinational circuits, Design procedures, Adders, Subtractors, code conversion circuits, Analysis procedures, Multilevel NAND circuits, Multilevel NOR circuits, EX-OR functions, Binary adder and Subtractors, Decimal adder and Subtractors, Magnitude comparator, Decoder and encoders, Multiplexer and de-multiplexer.

Unit - IV: Sequential Circuit Designing:

Hours 08

Introduction to Sequential circuits, Concepts of Flip-flops, triggering flip-flops, Clock signals, Analysis of clock sequential circuits, State Reduction and assignments, Flip flop excitation table, Design procedure of asynchronous and synchronous counters (Ripple counter, Binary counter, BCD counter), Design of registers, Shift registers, Timing sequences.

Unit - V: Memory Interfaces and Data Representation:

Hours 06

Memory, Types of ROM, Design of ROM, Types of RAM, Magnetic disc memory, Magnetic tape, Digital recording techniques, Linear-select memory organization, Types of digital codes (Gray code, 8421 code, Alphanumeric codes), Parity checking codes, Floating point representation, Fixed point representation.

Unit - VI: The Arithmetic Logic Unit and Control Unit:

Hours 06

Basic operations of Arithmetic Logic Unit, Construction of the Arithmetic Logic Unit, Representation of Instruction word, Control registers, Instruction and execution cycles of Control registers, Sequence operation of Control Registers.

Core Books:

1. M. Morris Mano: Digital Logic and Computer Design, Third Edition, Pearson Education, 2016.
2. Thomas C. Bartee: Digital Computer Fundamentals, Sixth Edition, Tata McGraw Hill Publishing, 2012.
3. M. Morris Mano: Computer System Architecture, Third Edition, Pearson Education, 2011.

Reference Books:

1. Andrew S. Tanenbaum: Structured Computer Organization, Fourth Edition, Pearson Education, 2005.
2. Abert Paul Malvino and Jerald A. Brown: Digital Computer Electronics, Third Edition, Tata McGraw Hill Publishing, 2008.

Web References:

1. https://www.tutorialspoint.com/digital_circuits/index.htm [Digital Circuits Tutorial]
2. <https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/> [Digital Electronics and Logic Design Tutorials]
3. <https://studymaterialz.in/digital-logic-and-computer-design-by-morris-mano/> [Digital Logic and Computer Design book]
4. <https://cupola.gettysburg.edu/oer/1/> [Digital Circuit Projects]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	To get the idea about digital system and numbering system.
CO2 :	To study logic gates for digital circuit designing.
CO3 :	Learn to design various combinational circuits
CO4 :	Learn to design various sequential circuits
CO5 :	To learn memory design concepts and to study computer Arithmetic Logic Unit and Control Unit

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Digital Systems and Binary Numbers	√				
2	Boolean Algebra and Logic Gates		√			
3	Combinational Circuit Designing			√		
4	Sequential Circuit Designing				√	
5	Memory Interfaces and Data Representation					√
6	The Arithmetic Logic Unit and Control Unit					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	-	3	2	-	-	2	1	3	2
CO2	3	2	2	2	-	3	2	-	-	2	1	3	2
CO3	3	3	3	2	-	2	2	-	-	2	2	3	2
CO4	3	3	3	2	-	2	2	-	-	2	2	3	2
CO5	3	3	3	2	-	3	2	-	-	2	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA125: Fundamentals of Web Designing

(100 Marks)

Contact Hours: 03

Pre-requisite: Basic concepts of web

Methodology & Pedagogy: This course focuses on providing hands-on experience to students for design and develop entire web sites using several web designing tools and HTML scripting language.

Outline of the course:

Week No	Practical	Description
1 - 2	Basic Construction of an HTML & HTML5 Page, HTML Text Editors, HTML Building blocks. Adding Content : Basic HTML tags – Text formatting tags, heading tags, paragraph tags, division tag, Span tags, Break line tag, Binding space in HTML	Student can learn basic concepts of web page design. Students get familiar with different tags and attributes which is used to add the text in a web page
3 - 4	Controlling Font size and color, Adding Table – Table tag, grouping and merging table rows and columns. Adding List – ordered, unordered and definition list	Student can able to change the font styles and color in more attractive way. Also, they can able to display the information in tabular & List format
5 - 6	Adding Image, Adding links - Changing link colors, Email link, Embedding audio and video, Adding Field sets.	Student can add multimedia like image, audio, video in a web page. Student can explore various internal and external linking methods.
7 - 8	Adding Form: Form tag, Action, Method. Basic form controls – Textbox, Password field, Radio Button, Checkbox, Multiple line text area, file upload, Various types of buttons – submit, reset, image, simple button,	Student can design the various form elements for interaction with the web page users.
9 - 10	HTML5 input elements - Color, Number, Date, Month, week, Time, datetime-local, Email, url, range, search, <datalist>, <output>, <progress>, <meter>	Student can apply HTML5 input element to make form more attractive
11 - 12	Regular expression, HTML5 new attributes – Placeholder, Required, Pattern, Autocomplete, Autofocus, novalidate, formnovalidate, formaction, formmethod, spellcheck, contenteditable.	Student can explore the basic HTML5 new attributes and also apply validation on form submission

Total Hours (Practical): 36

Total Hours: 36

Core Books:

1. Powel Thomas: HTML - The Complete Reference, 3rd Edition, McGraw-Hill Education – Europe, 2018.
2. DT Editorial Services: HTML 5 Black Book, 2nd Edition, Dreamtech Press, 2016
3. Matt West: HTML 5 Foundations, Wiley publication, 2013
4. Farrar: HTML Example book, BPB, 2007.

Reference Books:

1. David DuRocher : HTML and CSS QuickStart Guide, Paperback, 2021
2. Laura Lemay, Rafe Colburn, Jennifer Kyrnin : Mastering Html, Css & Javascript Web Publishing, Paperback, 2016.
3. Whyte: Basic HTML, 2nd Edition, Payne-Gallway, Oxford, 2003.
4. Shelly Woods: HTML introductory concepts and techniques, 5th Edition, Course Technology, 2009.
5. Jon Duket: Beginning Web Programming with HTML, XHTML and CSS, Wrox Publication.

Web References:

1. www.w3schools.com/html [For HTML tutorials]
2. html.net/tutorials/html/ [For HTML tutorials]
3. www.htmlgoodies.com/ [For HTML resources]
4. <https://developer.mozilla.org/en-US/learn/html> [For HTML best practices]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Able to understand basic construction of HTML & HTML5 document and started using basic tags.
CO2 :	Able to Add content using various tags and format the content in table & list.
CO3 :	Able to design links and multimedia elements such as image, audio, video.
CO4 :	Able to design a web page form using HTML & HTML5.
CO5 :	Able to apply validation using HTML5 attributes.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Basics of Hyper Text Markup Language	√				
2	Controlling font and adding Tables & Lists		√	√		
3	Adding Image, audio, video and Links			√		
4	Adding Form and Basic Form Controls				√	√
5	Adding HTML5 new Elements		√			√
6	Adding HTML5 new attributes & apply validation on form control		√		√	√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	2	1	3	2	2	1	1	-	1	1	1	1
CO2	-	1	2	3	1	3	1	-	-	2	2	2	2
CO3	1	1	2	3	1	3	1	-	-	2	2	2	2
CO4	1	1	2	3	1	1	1	1	-	1	-	1	1
CO5	2	2	3	3	2	3	3	2	1	2	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OHS101 C: Communicative English

(100 Marks)

Pre-requisite courses: Grammar and Punctuation (Free Online Course for Beginners)

<https://www.coursera.org/learn/grammar-punctuation>

Outline of the Course:

Unit No.	Title of the unit	Minimum number of hours
1.	Introduction to Communicative English	03
2.	Communication Functions	06
3.	Basic Communication Skills I – Listening	03
4.	Basic Communication Skills II – Reading	03
5.	Basic Communication Skills III – Speaking	06
6.	Basic Communication Skills IV – Writing	06
7.	Developing Vocabulary	03

Total Hours (Practical): 30

Total Hours: 30

Detailed Syllabus:

Unit I :	Introduction to Communicative English	03 Hours
	English as a Window Language; Varieties of English: British English, American English, Indian English; Language Variations; Importance of English for Academic and Professional Development; Strategies for Language Acquisition; Formal VS Informal English	
Unit II :	Communication Functions	06 Hours
	Greeting and Introducing; Making Requests and Asking for Information; Expressing Likes and Dislikes; Seeking Permission; Giving and Taking Advice; Describing People, Place, Things; Retelling Past Events; Comparing and Contrasting; Persuading; Describing Cause and Effect	
Unit III :	Basic Communication Skills I – Listening	03 Hours
	Importance of Listening as a Language Skill; Basic Listening Skills; Types of Listening; Barriers to Listening; Strategies for Effective Listening; Listening Practice	
Unit IV :	Basic Communication Skills II – Reading	03 Hours
	Importance of Reading as a Language Skill, Reading Strategies: Skimming, Scanning, Intensive Reading, Extensive Reading, Strategies for Effective Reading Comprehension, Reading Practice	
Unit V :	Basic Communication Skills III – Speaking	06 Hours
	Importance of Speaking as a Language Skill, Basic Speaking Skills; Paralanguage for Effective Speaking; Strategies for Oral Communication; Extempore and Public Speaking	
Unit VI :	Basic Communication Skills IV – Writing	06 Hours
	Importance of Writing as a Language Skill; Process of writing: Prewriting, Drafting, Revision, Editing, Publication; Seven C's of Writing; Sentence Construction – Complex, Compound, Paragraph Development; Letter Writing (Academic Context)	

Unit VII : Developing Vocabulary

**03
Hours**

High Frequency Vocabulary (Every day and Academic use);
Words Often Confused and Misused; Useful Phrasal Verbs,
Idioms and Proverbs, Homonyms and Homographs; Lexical
Range, Word Games

Text book:

1. Sanjay Kumar and PushpLata (Second Edition, 2015), Communication Skills, Oxford University Press, New Delhi
2. M V Rodriques (2013), Effective Business Communication, Concept Publishing Company (P) Ltd., New Delhi
3. Krishna Mohan and Meera Banerji (2010), Developing Communication Skills, Macmillan Publications India Ltd., New Delhi

Reference book:

1. Mohan and Meenakshi Raman (2006), Effective English Communication, Mcgraw-Hill Publishing Company Limited, New Delhi
2. Geoffrey Leech & Jan Swartvik (1994), A Communicative Grammar of English, Longman Publications, New York
3. Jones Leo (1979), Functions of English, Cambridge University Press, UK
4. European Journal of Language and Literature Studies Vol.1 Nr, 1 April 2015
5. English for Academic Purpose: A Tool for Enhancing Students' Proficiency in English Language Skills

Web material:

1. <https://www.futurelearn.com/courses/language-assessment>
2. <https://www.coursera.org/learn/importance-of-listening?#syllabus>
3. <https://www.futurelearn.com/courses/english-academic-study>

Course Outcome (COs): At the end of the course, the students will be able to

CO1	Communicate with people using English language functions including greetings, introductions, making and responding to requests, suggestions, invitations and apologies, conducting simple transactions in shops and offices, asking for and giving directions, etc
CO2	Go through a text and identify specific and global information.
CO3	Become more knowledgeable about speaking strategies and speak effectively using appropriate words, expression, tone and pronunciation.
CO4	Be aware about various reading strategies and read and comprehend academic and non-academic prose (text).
CO5	Write systematically using nuances of writing
CO6	Express their opinion and likes and dislikes, advice and convince others in a more polite and accepted way.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	-	-	3
CO2	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	2	-	-	3	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

DETAILED SYLLABUS

FOR

ONLINE BCA PROGRAMME
(2nd SEMESTER)

EFFECTIVE FROM
ACADEMIC YEAR 2023-24

Online Bachelor of Computer Applications (B.C.A.) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - II

Semester - II										
Course Code	Course Title	Teaching Scheme				Examination Scheme				
		Contact Hours			Credit	Theory		Practical		Total
		Theory	Practical	Total		Internal	External	Internal	External	
OBCA126	Fundamentals of E-Commerce	3	-	3	3	30	70	-	-	100
OBCA128	Advanced Web Designing	-	3	3	3	-	-	30	70	100
OBCA129	Fundamentals of Object Oriented Programming	4	-	4	4	30	70	-	-	100
OBCA129 P	Fundamentals of Object Oriented Programming - Practical	-	3	3	3	-	-	30	70	100
OBCA130	Database Fundamentals	4	-	4	4	30	70	-	-	100
OBCA130 P	Database Fundamentals - Practical	-	3	3	3	-	-	30	70	100
Total		11	09	20	20	300		300		600

OBCA126: Fundamentals of E-Commerce (100 marks)

Contact Hours: 03

Pre-requisite: None

Methodology & Pedagogy: During theory lectures, the fundamental concepts regarding Ecommerce, E-Payment, E-Security, E-branding and E-Data Interchange, CRM, ERP will be discussed. Students will be required to carry out case studies using the concepts and techniques they have learnt during theory sessions.

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Theory Hours
1	Introduction to E-commerce	07
2	E- Marketing	06
3	E-Security and E-Payment	07
4	Mobile Commerce	05
5	CRM and ERP	07
6	E-Commerce Applications	04

Total Hours (Theory):36

Total Hours:36

Detail Syllabus:

Unit I: Introduction to E-commerce

Hours: 07

Emergence and use of Internet, origin of web and world wide web, advantages and disadvantages of E-commerce, Features of E-Commerce, Electronic Commerce over the Internet, Types of E-commerce.

Unit II: E- Marketing:

Hours:06

Traditional Marketing, Online Marketing, E- advertising, Internet Marketing Trends and strategies, E-branding.

Unit III: E-Security and E-Payment:

Hours:07

Security on the Internet, E-Business risk management issues, Digital token based E-Payment System, Properties of Electronic Cash, Digital Signature.

Unit IV: Mobile Commerce:

Hours:05

Definition of M-Commerce, Features of M-Commerce, Advantages and Disadvantages of M-Commerce, Areas of M-Commerce Applications, Payment Systems and Models in M-Commerce.

Unit V: CRM and ERP

Hours: 07

Customer Relationship Management, CRM capabilities and Customer life cycle, Introduction to ERP, Reasons for the growth of the ERP Market, Advantages and Disadvantages of ERP.

Unit VI: E-Commerce Applications

Hours:04

Retail and Wholesale, Finance, Manufacturing, Online Booking, Online Publishing, Digital Advertising, Digital Shopping, Digital Media, Auctions, A case study need to be discussed for these application. Hands-on experience in setting up and managing an e-commerce store. Developing a business plan for an ecommerce startup.

Core Books:

1. P.T.Joseph, S.J.: E-Commerce- An Indian Perspective, 3rd Edition, PHI learning Private Limited.
2. Kamlesh K. Bajaj, Debjani Nag: E-Commerce, The Cutting Edge of Business, 2nd Edition, McGraw-Hill Education.

Reference Books:

1. Anita Rosen: The e-commerce Question and Answer Book: A Survival Guide for Business Managers, 2nd Edition, Amacom.
2. Janice Reynolds: The Complete E-Commerce Book: Design, Build & Maintain a Successful Web-based Business, 2nd Edition, CRC Press.
3. By Philippe Humeau&Matthieu Jung : The White Book of Ecommerce Solutions, NBS System.
4. IshitaLahiri and Sujit Kumar Ghose : Principals of Marketing and E-Commerce

Web References:

1. <http://www.ecommercetutorial.net/> [For Tutorial]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	To understand basic of Electronic Commerce and its Application
CO2 :	Getting knowledge of E-marketing and its Strategies.
CO3 :	Learn E-security and E-Payment in Detail and its term. Also, learn Encryption and decryption in basic.
CO4 :	To gain understanding of Mobile Commerce and its Application through real life examples.
CO5 :	To learn concepts of Customer Relationship Management and various solutions of E-Commerce (Software and Framework).

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to E-commerce	√				
2	E- Marketing	√	√			
3	E-Security and E-Payment		√	√		
4	Mobile Commerce		√	√		
5	CRM and ERP				√	
6	Application of E-Commerce					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	2	1	2	2	2	1	1	1	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	2	2	3	3	2	2	2	2	2	1	1	1	3	2
CO4	3	3	3	3	3	3	3	3	3	2	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	2	3	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA128: Advance Web Designing (100 Marks)

Contact Hours: 03

Pre-requisite: OBCA125 – Fundamentals of Web Designing

Methodology & Pedagogy: This subject focuses on hands-on experiments to create dynamic and interactive web sites using HTML5, CSS3 and JavaScript.

Outline of the course:

Week No	Practical	Description
1 - 2	CSS Styling the web - Applying CSS Building blocks – CSS Selectors, Cascade & inheritance, CSS Properties, CSS Box model.	Student can apply various types of CSS with its basic properties.
3 - 4	Creating Layout - Header, footer, navigation menu, and sub-navigation. Floats, Flexbox, Grids, Positioning, Multiple column layout.	Student can create different layout using semantic elements of HTML5 & CSS classification properties.
5 - 6	Creating Image Gallery and Animation - 2D/3D Transformation, Transitions and Animation, CSS Media query	Student can create layout image gallery & animation.
7 - 8	JavaScript – Adding Internal & External JavaScript, Working with variables, datatype – Number, String, Boolean, Array, Object, Operators, Conditional statements, Looping statements.	Student can write script for basic programs using condition, Loop, array and object.
9 - 10	Adding Dialog boxes in HTML page – Alert, Confirm and Prompt. Creating user defined function, Adding Mouse and Keyboard Event in HTML page, Manipulating String and Date.	Student can able to use in-build and user defined functions of JavaScript and make user interaction using various Events
11 - 12	JavaScript Document Object Model hierarchy – Create find and manipulate HTML Element using Objects and methods. Form validation, Applying Style using JavaScript. Creating New window, Accessing & manipulating History of HTML Pages.	Student can explore the DOM Hierarchy and apply various objects to make web page dynamic with user interactions.

Total Hours (Practical): 36

Total Hours:36

Core Books:

1. Julie C. Meloni, Jennifer Kyrnin : HTML, CSS, and JavaScript All in One, 3rd Edition, Pearson, 2018.
2. Joseph R. Lewis, Meitar Moscovitz : AdvancED CSS, W3C CSS Working Group, Apress, 2020.
3. Peter Gasston: The Book of CSS3: A Developer's Guide to the Future of Web Design, No Starch Press, April 2011.
4. MArijin Haverbeke : Eloquent Javascript – A modern Introduction to JavaScript, 3rd Edition, 2018
5. Michael Morrison: Head First JavaScript, O'Reilly, 2014

Reference Books:

1. Andy Budd, Emil Björklund: CSS Mastery 3rd Edition, Apress - Advance Web Standard Solutions.
2. Karl Barksdale, Shane Turner: HTML and Java Scripts Basics, 4th Edition, Course Technology, 2006.
3. Jon Duket: Beginning Web Programming with HTML, XHTML and CSS, Wrox Publication.
4. Richard York: Beginning CSS: Cascading Style sheets for Web Design, Wrox Press (Wiley Publishing), 2005.

Web References:

1. https://www.tutorialspoint.com/css/css3_tutorial.htm [For CSS Basics]
2. <https://www.tutorialrepublic.com/css-tutorial/> [For CSS3 BOX Model & Animation]
3. <https://javascript.info/> [For modern JavaScript tutorials]
4. <https://www.tutorialsteacher.com/javascript/javascript-hoisting> [JavaScript Basics]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Able to apply CSS & its basic properties in web pages.
CO2 :	Able to create HTML, CSS layout.
CO3 :	Able to apply the transition, transformation and animation in web page.
CO4 :	Able to write client side script – JavaScript to perform basic program
CO5 :	Able to use DOM objects for dynamic web pages

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	CSS Styles & Properties	√				
2	CSS Layout	√	√			
3	CSS Animation & Transition	√		√		
4	Adding client side script – JavaScript				√	
5	Handling function and events in JavaScript				√	
6	Accessing and manipulating DOM in JavaScript				√	√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	2	3	3	2	1	2	1	1	2	1	1	1
CO2	1	3	3	3	2	2	1	1	1	2	3	2	1
CO3	1	2	2	3	2	1	1	1	1	2	2	1	1
CO4	2	2	3	3	2	1	1	1	2	1	2	1	1
CO5	2	2	3	3	2	1	2	1	2	1	2	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA129: Fundamentals of Object Oriented Programming

(100 Marks)

Contact Hours: 04

Pre-requisite: OBCA123: Foundation of Programming.

Methodology & Pedagogy: During the Theory sessions concept will be covered with real world examples to understand the application and usage of object oriented programming over procedural programming. During Practical sessions, students will implement the concepts using various assignments and case study.

Outline of the Course:

Unit No.	Title of the Unit	Minimum Number of Hours
		Theory
1.	Introduction to Object Oriented Programming	06
2.	Classes and Objects	08
3.	Polymorphism	09
4.	Inheritance	09
5.	Exception Handling and Type cast operators	09
6.	Managing I/O formats and operations	07

Total Hours (Theory): 48

Total: 48

Detailed Syllabus:

Unit - I: Introduction to Object Oriented Programming Hours:06

Structured programming vs. object oriented programming, Introduction to C++: structure of a C++ program Tokens, inline function, pass by reference, default arguments, OOP characteristics.

Unit - II: Classes and Objects Hours:08

Define class, objects, visibility modes, static members, friend function, Constructors and Destructors, Default Constructor, Copy constructors, Parameterized Constructor, this keyword.

Unit - III: Polymorphism

Hours:09

Introduction of Static Binding, Function Overloading and ambiguity raised in function overloading,;Operator overloading through member function and friend functions, type conversions from primitive to class, class to primitive and class to class.

Unit - IV: Inheritance

Hours:09

Objective of Inheritance, types of inheritance, impact of access modes during inheritance, Virtual base classes, Dynamic Binding, Virtual functions, Pure virtual functions, Abstract class, Early vs. Late binding.

Unit - V: Exception Handling and Type Cast Operators

Hours: 09

Introduction to Exception handling, catching class types, using multiple catch statements, exception handling options, creating custom exceptions, introduction to cast operators, const cast, static cast, reinterpret cast, dynamic cast.

Unit - VI: Managing I/O Formats and Operations

Hours:07

Understand and apply concepts from various header files like iostream. Iomanip ,fstream, etc. opening and closing file, reading and writing text files and binary files, performing random access on files, handle command line arguments.

Core Books:

1. Herbert Schildt: C++: A Beginner's Guide, 2nd Edition Paperback, McGraw-Hill,2003.
2. E Balagurusamy: Object Oriented Programming with C++ Paperback, McGraw Hill India,2017.

Reference Books:

1. Yashavant Kanetkar: Let Us C++, Paperback, BPB Publications,2020.
2. Robert Lafore: Object Oriented Programming in C++, 4th Edition, Sams Publications,2002.
3. Bruce Eckel:Thinking in C++, Volume 1, 2nd Edition, Pearson Education,2006.

Web References:

1. <https://www.geeksforgeeks.org/c-plus-plus/> [For Entire Syllabus]
2. <https://google.github.io/styleguide/cppguide.html>
[For coding standards and concepts]
3. http://www.tutorialspoint.com/cplusplus/cpp_basic_input_output.htm
[For Practicals]

Course Outcomes: Upon successful completion of the course, the students will:

CO1 :	Understand the basic structure of C++ program and understand the concept of object oriented programming characteristics.
CO2 :	Understand the concept of Constructor and Destructor and able to create class and objects.
CO3 :	Understand the need of Polymorphism and implement static polymorphism
CO4 :	Understand the purpose of Inheritance, identify relations between classes, implement inheritance and perform dynamic binding.
CO5 :	Able to handle the runtime errors or exceptions in C++ and use type cast operators. Able to read input from device, file, command line arguments and apply formats to input and output.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Object Oriented Programming	√				
2	Classes and Objects		√			
3	Polymorphism			√		
4	Inheritance				√	
5	Exception Handling and Type cast operators					√
6	Managing I/O formats and operations					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	2	2	2	2	2	2	2	2	2	3	2
CO2	3	3	3	2	2	2	3	2	2	2	2	3	2
CO3	3	2	3	2	2	2	3	2	2	2	2	3	2
CO4	3	3	3	2	2	2	3	2	2	2	2	3	2
CO5	3	2	3	2	2	2	2	2	2	2	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA129 P: Fundamentals of Object Oriented Programming -Practical

(100 Marks)

Contact Hours: 03

Pre-requisite: OBCA123 P Foundation of Programming- Practical

Methodology & Pedagogy: During the practical sessions of the course, students will apply the concepts through a variety of assignments and case studies. These sessions will feature real-world examples to illustrate the value of object-oriented programming (OOP) in problem-solving. These examples will highlight the practical use of OOP principles, including classes, objects, inheritance, polymorphism, and exception handling. Through these practical applications, students will develop a deeper comprehension of how OOP can efficiently address complex problems. Students will engage in independent learning, where they will finish practical assignments and case study to assess their comprehension and progress.

Outline of the course:

Week No	Practical	Description
1- 2	Introduction to Object Oriented Programming and Setting up IDE Classes and Objects	Introduction to C++, Setting up a development environment and its introduction, structure of a C++ program, Define class, objects, visibility modes, static members,
3 - 4	Friend Functions and Constructors and Destructors	Introduction and hands on friend functions, Constructors and Destructors, Default Constructor, Types of constructs
5 - 6	Inheritance	Exposure on Inheritance programs and their types
7 - 8	Virtual Function, Function Overloading	Programs on Virtual Function, Pure Virtual functions, Abstract Class, Early Binding and Late Binding, Introduction of Static Binding, Function Overloading and ambiguity raised in function overloading

9 - 10	Operator Overloading, Exception Handling, Multiple Catch Statements	Operator overloading through member function and friend functions, Introduction to Exception handling, catching class types, Using multiple catch statements, exception handling options, creating custom exceptions
11 - 12	Type Cast Operators, Managing I/O Formats, File Handling, File Handling Operations, Command Line Arguments	Introduction to cast operators, const cast, static cast, reinterpret cast, dynamic cast, Understand and apply concepts from various header files like iostream, fstream, etc, Opening and closing file, reading and writing text files and binary files, opening and closing file, reading and writing text files and binary files, performing random access on files, handle command line arguments.

Total Hours (Practical) : 36

Total Hours : 36

Core Books:

1. Herbert Schildt: C++: A Beginner's Guide, 2nd Edition Paperback, McGraw-Hill, 2003.
2. E Balagurusamy: Object Oriented Programming with C++ Paperback, McGraw Hill India, 2017.

Reference Books:

1. Yashavant Kanetkar: Let Us C++, Paperback, BPB Publications, 2020.
2. Robert Lafore: Object Oriented Programming in C++, 4th Edition, Sams Publications, 2002.
3. Bruce Eckel: Thinking in C++, Volume 1, 2nd Edition, Pearson Education, 2006.

Web References:

1. <https://www.geeksforgeeks.org/c-plus-plus/> [For Entire Syllabus]
2. <https://google.github.io/styleguide/cppguide.html> [For coding standards and concepts]
3. http://www.tutorialspoint.com/cplusplus/cpp_basic_input_output.htm [For Practicals]

Course Outcomes: Upon successful completion of the course, the students will:

CO1 :	Understand the basic structure of C++ program and understand the concept of object oriented programming characteristics.
CO2 :	Understand the concept of Constructor and Destructor and able to create class and objects.
CO3 :	Understand the need of Polymorphism and implement static polymorphism
CO4 :	Understand the purpose of Inheritance, identify relations between classes, implement inheritance and perform dynamic binding.
CO5 :	Able to handle the runtime errors or exceptions in C++ and use type cast operators. Able to read input from device, file, command line arguments and apply formats to input and output.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1-2	Introduction to Object Oriented Programming and Setting up IDE Classes and Objects	✓				
3-4	Friend Functions and Constructors and Destructors		✓			
5-6	Inheritance				✓	
7-8	Virtual Function, Function Overloading			✓		
9-10	Operator Overloading, Exception Handling, Multiple Catch Statements				✓	✓
11-12	Type Cast Operators, Managing I/O Formats, File Handling, File Handling Operations, Command Line Arguments					✓

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	2	2	2	2	2	2	2	2	2	3	2
CO2	3	3	3	2	2	2	3	2	2	2	2	3	2
CO3	3	2	3	2	2	2	3	2	2	2	2	3	2
CO4	3	3	3	2	2	2	3	2	2	2	2	3	2
CO5	3	2	3	2	2	2	2	2	2	2	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA130: Database Fundamentals

(100 Marks)

Contact Hours: 04

Pre-requisite: Basic knowledge of working with computer

Methodology & Pedagogy: During the theory lectures, concepts for data storage will be discussed. Also DBMS and RDBMS concepts will be discussed in depth. The database applications used in the real world will be discussed with necessary examples. During the laboratory hours' students will implement the concepts that are discussed during lecture.

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Hours
		Theory
1	Introduction to Database System	04
2	Data Modeling using Entity Relationship Model	08
3	Relational Data Modeling	08
4	Database Design Methodology	08
5	Schema Definition, Constraints, Queries	10
6	Advanced Query Processing	10

Total Hours (Theory): 48

Total Hours: 48

Detail Syllabus:

Unit I: Introduction to Database System

Hours: 04

Basic Concepts: data, **information**, **file**, database, database systems, database management system Purpose and advantages of Database management system (over file systems), **Applications of DBMS** Various data models – ER Model and Relational Model, Three level architecture, Structure of DBMS, Database actors and workers

Unit II: Data Modeling using Entity Relationship Model

Hours: 08

Entity Types, Entity Sets, Attributes, Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types, ER Diagram – Notations and fundamentals, Concept of Generalization and Specialization, Associative Entity, Conversion from ER Model to Relational Model

Unit III: Relational Data Modeling

Hours: 08

Relational Model Concepts, Relational Model Constraints, Relational Model Schemas, Update Operation, Transactions, Dealing with Constraint Violations, Relational Algebra and Calculus, Difference between ER Model and Relational Model.

Unit IV: Database Design Methodology

Hours: 08

Functional Dependency and Normalization for Database – Informal Design Guidelines for Relational Schemas, Functional Dependencies, Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF, 5NF), Codd Rules

Unit V: Schema Definition, Constraints, Queries

Hours:

10

Table Fundamentals: Basic Data types, Create Table Command, Viewing Data in the tables, sorting, Insert, Delete and Update Statements in SQL, Modifying the structure of tables, renaming table, truncating table, destroying table.; Data Constraints and Functions: - Pseudo columns, Null values, TAB table, DUAL table Operators, Data constraints, Type of data constraints, modifying constraints, working with data dictionary and use of USER_CONSTRAINTS Functions – introduction, merits and demerits, types of functions Numeric functions, Character functions, Date functions, Conversion functions, Aggregate functions

Unit VI: Advanced Query Processing

Hours: 10

Union, Intersect and Minus Clause, Except Nested Queries – Introduction, Co-related Nested Queries, Set Comparison Operators Aggregate Operators, Group By clause with Rollup and Cube, having clause, Order by clause Null Values – Comparison using Null Values, Logical Connectivity – AND, OR and NOT, Using Like predicate and IN, EXISTS, NOT EXISTS, ANY Operators, Impact on SQL constructs, Joins (Inner Join, Outer Join, Self-Join, Equi Join, Cross Join) Complex Integrity Constraints in SQL – constraints over single table, domain constraints and distinct types Creation and manipulation of database objects – indexes, views, sequences and synonym.

Core Books:

1. RamezElmasri, Shamkant B. Navathe : Fundamentals of Database Systems , 5th Edition, , Pearson Publication.
2. Ivan Bayross : SQL, PL/SQL – The programming Language Oracle.
3. Ramkrishnan, Gehrke : Database Management Systems, 3 rd Edition, McGrawHill Publication.

Reference Books:

1. Silberschatz, Korth, Sudarshan : Database System Concepts, 5th Edition, McGraw Hill.
2. C.J.Date, a Kannan, S Swaminathan : An Introduction to Database Systems, 8th Edition, Pearson Education,(Equivalent Reading).
3. Scoot Urban : Oracle 9i, PL/SQL Programming, Oracle Press.
4. S. K. Singh : Database Systems: Concepts, Design and Applications, Pearson Education
5. Peter Rob, Carlos Coronel: Database Systems: Design, Implementation and Management, 7th Edition, Cengage Learning, 2007.
6. Anjali, Amisha, Roopal and Nirav : Practice book on SQL and PL/SQL.
7. Leon and Leon : Database management Systems, Vikas Publication.

Web References:

1. <https://www.javatpoint.com/er-model-vs-relational-model> [For difference of ER and Relation model]
2. http://www.microsoftvirtualacademy.com/trainingcourses/databasefundamentals#?fbid=tbZ92pOp_Tt [For overall subject]
3. http://www.ntu.edu.sg/home/ehchua/programming/sql/Relational_Database_Design.html [for relational database design]
4. http://docs.oracle.com/cd/A97335_02/apps.102/a81358/05_dev1.htm [For ER Diagram]
5. <http://plsql-tutorial.com/> [For PL/SQL]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Understand basic concepts regarding data, database systems and various data models.
CO2 :	Understand various data modeling techniques and entity relationship models.
CO3 :	Learn about relational data model and related concepts.
CO4 :	Gain insights into database design, SQL and normalization concepts.
CO5 :	Advanced query processing

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Database System	√				
2	Data Modeling using Entity Relationship Model		√			
3	Relational Data Modeling			√		
4	Database Design Methodology				√	
5	SQL, Schema Definition, Constraints, Queries					√
6	Advanced Query Processing					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	3	1	1	-	3	-	-	-	-	-	2	-
CO2	1	3	3	3	-	3	1	-	-	-	-	1	5
CO3	3	3	3	3	-	3	2	-	-	2	-	3	2
CO4	-	3	3	3	-	3	3	-	-	3	3	-	3
CO5	2	3	3	3	2	3	3	-	-	3	3	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA130 P: Database Fundamentals - Practical (100 Marks)

Contact Hours: 03

Pre-requisite: Basic knowledge of working with computer

Methodology & Pedagogy: Teaching database fundamentals involves hands-on practice, real-world examples, and collaborative activities, guided by constructivist principles and differentiated instruction to ensure active engagement and comprehension among students.

Outline of the course:

Week No	Practical	Description
1	Table Fundamentals: Basic Data types, Create Table Command, Viewing Data in the tables, sorting, Insert, Delete and Update Statements in SQL	Student can learn basic concepts of database and students get familiar with different schema creation and manipulation statements of DBMS.
2	Modifying the structure of tables, renaming table, truncating table, destroying table	Student can learn basic concepts of database schema updation.
3	Data Constraints and Functions: - Pseudo columns, Null values, TAB table, DUAL table Operators, Data constraints	Student can learn basic concepts of database constraints and pseudo columns.
4	Type of data constraints, modifying constraints, working with data dictionary and use of USER_CONSTRAINTS	Student can learn basic concepts of database constraints and storage.
5	Functions introduction, merits and demerits, types of functions Numeric functions, Character functions,	Students can learn in-built functions with different categories of function.
6	Date functions, Conversion functions, aggregate functions	Students can learn in-built functions with different categories of function.
7	Union, Intersect and Except, Nested Queries	Students can learn union, intersect and minus clause with introduction of nested queries.
8	Co-related Nested Queries, Set Comparison Operators	Students can learn co-related nested queries with different set operators

9	Aggregate Operators, Group By clause, having clause, Order by clause	Students can learn aggregation using group by and having clause.
10	Null Values Comparison using Null Values, Logical Connectivity AND, OR and NOT, Impact on SQL constructs	Students can learn null value and null value comparisons with logical operators.
11	Joins (Inner Join, Outer Join, Self-Join, Equi Join, Cross Join), Complex Integrity Constraints in SQL constraints over single table, domain constraints	Students can learn concept of join and its types. Also can explore domain constraints.
12	Creation and manipulation of database objects indexes, views, sequences and synonym.	Students can learn and explore different database objects.

Total Hours (Practical): 36

Total Hours: 36

Core Books:

1. RamezElmasri, Shamkant B. Navathe : Fundamentals of Database Systems , 5th Edition, , Pearson Publication.
2. Ivan Bayross : SQL, PL/SQL – The programming Language Oracle.
3. Ramkrishnan, Gehrke : Database Management Systems, 3 rd Edition, McGrawHill Publication.

Reference Books:

1. Silberschatz, Korth, Sudarshan : Database System Concepts, 5th Edition, McGraw Hill.
2. C.J.Date, a Kannan, S Swaminathan : An Introduction to Database Systems, 8th Edition, Pearson Education,(Equivalent Reading).
3. Scoot Urban : Oracle 9i, PL/SQL Programming, Oracle Press.
4. S. K. Singh : Database Systems: Concepts, Design and Applications, Pearson Education
5. Peter Rob, Carlos Coronel: Database Systems: Design, Implementation and Management, 7th Edition, Cengage Learning, 2007.
6. Anjali, Amisha, Roopal and Nirav : Practice book on SQL and PL/SQL.
7. Leon and Leon : Database management Systems, Vikas Publication.

Web References:

1. <https://www.javatpoint.com/er-model-vs-relational-model> [For difference of ER and Relation model]
2. http://www.microsoftvirtualacademy.com/trainingcourses/databasefundamentals/#?fbid=tbZ92pOp_Tt [For overall subject]
3. http://www.ntu.edu.sg/home/ehchua/programming/sql/Relational_Database_Design.html [for relational database design]
4. http://docs.oracle.com/cd/A97335_02/apps.102/a81358/05_dev1.htm [For ER Diagram]
5. <http://plsql-tutorial.com/> [For PL/SQL]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Understand basic concepts regarding data, database systems and various data models.
CO2 :	Understand various data modelling techniques and entity relationship models.
CO3 :	Learn about relational data model and related concepts.
CO4 :	Gain insights into database design, SQL and normalization concepts.
CO5 :	Advanced query processing

Course Outcome Mapping :

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1-2	Schema Definition	√			√	
3-4	Schema modification and constraints		√		√	
5-6	Built-in functions and its categories			√		
7-8	Introducing SQL Set Operators: Union, Union All, Minus and SQL Correlated Subqueries			√		√
9-10	Aggregation, logical connectivity and the concept of null			√		√
11-12	Join and its types, database objects			√		√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	3	1	1	-	3	-	-	-	-	-	2	-
CO2	1	3	3	3	-	3	1	-	-	-	-	1	5
CO3	3	3	3	3	-	3	2	-	-	2	-	3	2
CO4	-	3	3	3	-	3	3	-	-	3	3	-	3
CO5	2	3	3	3	2	3	3	-	-	3	3	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

DETAILED SYLLABUS

FOR

ONLINE BCA PROGRAMME

(3rd SEMESTER)

EFFECTIVE FROM

ACADEMIC YEAR 2023-24

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - III

Semester - III										
Course Code	Course Title	Teaching Scheme				Examination Scheme				
		Contact Hours			Credit	Theory		Practical		Total
		Theory	Practical	Total		Internal	External	Internal	External	
OBCA227	Computer Oriented Management System	4	-	4	4	30	70	-	-	100
OBCA228	System Analysis and Design	3	-	3	3	30	70	-	-	100
OBCA229	Fundamentals of Data Structures and Algorithms	4	-	4	4	30	70	-	-	100
OBCA229 P	Fundamentals of Data Structures and Algorithms - Practical	-	3	3	3	-	-	30	70	100
OBCA230	Fundamentals of Operating Systems	4	-	4	4	30	70	-	-	100
OBCA230 P	Fundamentals of Operating Systems - Practical	-	3	3	3	-	-	30	70	100
OCL144.01C	Environmental Sciences	-	2	2	2	-	-	30	70	100
Total		15	8	23	23	400		300		700

OBCA227: Computer Oriented Management System (100 Marks)

Contact Hours: 4

Pre-requisite: None.

Methodology & Pedagogy: During the Theory sessions, illustrations of working real time information system will be demonstrated. Industrial visits will be arranged in order to demonstrate actual functioning of such systems. Students will be required to carry out a case study of such system.

Outline of the Course:

Unit No.	Title of the Unit	Minimum Number of Hours
1.	Introduction to Information System	07
2.	Transaction Processing Systems	08
3.	Management Information System	09
4.	Decision Support System	09
5.	Knowledge Management & Executive Support Systems	08
6.	Introduction To ERP and Technology	07

Total Hours (Theory): 48
Total: 48

Detailed Syllabus:

Unit - I: Introduction to Information System

Hours:07

Data & Information, what is a system, Types of Systems, Types of information, Quality of Information, what is an Information System, Functions of Information System, classification of an Information System, Major Types of Information Systems, Interrelationship of Information Systems.

Unit - II: Transaction Processing Systems

Hours:08

Introduction of Transaction Processing System (TPS), Transaction Processing System (TPS) Architecture, Transaction Processing System (TPS) Life cycle, Methods of Transaction Processing System (TPS), Information System Availability Control, Illustrations and live demonstration of TPS such as Banking System, Railway reservation system etc.

Unit - III: Management Information System

Hours:09

Introduction to Management: Approaches of Management, Function of Management, System from Functional Perspective, Reports of Management Information System, A business perspective of MIS, Dimensions of MIS, contemporary Approaches to Information System.

Unit - IV: Decision Support System

Hours:09

Business value of Improved Decision making, Types of Decision, Decision making Process, The difference between MIS and DSS, Components of DSS, System for Decision Support Group Decision Support System, Business value of GDSS.

Unit - V: Knowledge Management & Executive Support Systems

Hours:08

Important Dimensions of knowledge, Organizational learning and Knowledge Management, The Knowledge Management value chain, Overview of different types of Knowledge Management Systems, Characteristics of ESS, The Role of ESS in the Firm, Business value of ESS, Monitoring Corporate Performance, Working Examples of ESS.

Unit - VI: Introduction to ERP and Technology

Hours:07

An overview of ERP, Basic ERP Concepts, Risk and Benefits of ERP, ERP and Related Technologies, Business Intelligence, Some case studies on ERP or Information system

Core Books:

1. K. C. Laudon and J. P. Laudon: Management Information Systems, 12th Edition, Pearson Education.
2. Alexis Leon: ERP Demystified, Second Edition, Tata McGraw-Hill.

Reference Books:

1. W.S. Jawadekar: Management Information Systems, 2nd Edition, Tata McGraw-Hill.

Web References:

1. <http://www.slideshare.net/NorazilaMat1/laudon-mis12-ppt01-16595885>[Function of Information system, A business perspective of MIS, Dimensions of MIS, Contemporary Approaches to Information System]
2. <http://www.uh.edu/~mrana/try.htm>[Types and Functions of Information system]
3. <http://bisom.uncc.edu/courses/info2130/Topics/istypes.htm>[Types of Information system]
4. <http://kalyan-city.blogspot.com/2011/05/levels-of-management-topmiddleand.html>[classification of information system]
5. http://my.safaribooksonline.com/book/management/9780470916803/operationalplanning_andcontrol-systems/management_levels_comma_functions_comm[classification of information system]
6. <http://ambarwati.dosen.narotama.ac.id/files/2011/05/FIS-2011-w2.pdf>[Transaction Processing System]

Course Outcomes: Upon successful completion of the course, the students will able to :

CO1 :	To understand basic of data & information, types of information system, function of information system and its quality.
CO2 :	To understand transaction processing concepts and its working.
CO3 :	Learning Management Information system, its types and its implementation.
CO4 :	To gain understanding of Decision Support Systems.
CO5 :	To learn Knowledge Management, Executive Support Systems, ERP and its technology.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		Co1	Co2	Co3	Co4	Co5
1	Introduction to Information System	√				
2	Transaction Processing Systems		√			
3	Management Information System			√		
4	Decision Support System				√	
5	Knowledge Management & Executive Support Systems					√
6	Introduction To ERP and Technology					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	1	3	1	3	2	1	2	2	1
CO2	3	2	2	2	2	2	2	2	1	1	2	2	2
CO3	3	3	2	2	3	2	3	3	2	2	2	3	2
CO4	3	3	2	3	3	3	2	2	1	3	2	3	3
CO5	3	3	2	2	3	3	3	2	2	3	3	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA228: System Analysis and Design

(100 Marks)

Contact Hours: 03

Pre-requisite: None

Methodology & Pedagogy: During theory lectures emphasis will be given on understanding how Information Systems are designed and constructed and how major modifications are made to existing systems, analyse business needs for information and develop an appropriate strategy to solve a particular business problem, understand the issues associated with physical design, utilize some of the tools used by systems analysts in the design of Information Systems, a significant portion of the course will deal with computer aided system engineering (CASE) tools and techniques in the context of a case study.

Outline of the Course:

Unit No.	Title of the Unit	Minimum Number of Hours
1.	Introduction to System Development	05
2.	Classical Systems Development Methodology	07
3.	Introduction to Data flow diagrams and Prototype design	07
4.	Systems Design	06
5.	Quality assurance, maintenance and Audit	06
6.	Designing reliable system, training and conversion	05

Total Hours (Theory): 36

Total Hours: 36

Detail Syllabus:

Unit I: Introduction to System Development

Hours 05

Concept of system, Basic components, Information systems categories, Business Information Systems, Examples of real-life systems, System analyst – meaning, role and need, Users, need of information system development, Application development portfolio, Integration of portfolio, Controlling and monitoring committees.

Unit II: Classical Systems Development Methodology

Hours 07

Classical Systems Development Life Cycle (SDLC) method, Requirement determination, Fact finding techniques, Modern methods for determining systems requirements, Joint Application Development Program, Tools for documenting procedures and decisions,

Tools for systems development, understanding the format of system requirement specification.

Unit III: Introduction to Data flow diagrams and Prototype design

Hours 07

Structured Analysis Development Strategy, Data Flow Diagrams (DFDs) for analysis and design, Physical and logical DFDs, Purpose of Application Prototyping, Steps in prototype method, Use of prototypes, Tools for prototyping, Strategies for prototype development, misconceptions about prototyping

Unit IV: Systems Design

Hours 06

Analysis to design transition, Design of output system, Design of input system, Design of security and control, Design of user interface and Design of Database Interaction, design of software, software design and documentation tools.

Unit V: Quality assurance, maintenance and Audit

Hours 06

Introduction to quality assurance, levels of quality assurance, the testing process with test data: Program testing, Link testing, Full system testing with live data.; Control: audit and security of information systems, why controls are needed, objectives of control, techniques used in control, auditing information systems security of information systems, maintenance, types of maintenance

Unit VI: Designing reliable system, training and conversion

Hours 05

Introduction to software reliability, approaches of software reliability, user training, training methods and conversion, conversion methods.

Core Books:

1. James A Senn : Analysis and Design of Information System, McGraw Hill International, 2003.
2. Kendall and Kendall : Systems analysis and Design, 5th Edition, Prentice-Hall of India Private Limited, 2003.

Reference Books:

1. V. Rajaraman: Analysis and Design of Information Systems, Prentice-Hall of India Private Limited, 2003.
2. Jeffrey L. Whitten, Lonnie D. Bentely and Kevin C. Dittman : Systems Analysis and Design Methods, Tata McGraw Hill Publishing Co. Ltd., 2001.
3. Tuthill and Leavy : Knowledge Based Systems : Mangers Perspectives : Tab professional and Reference Books, 1991.

Web References:

1. <http://lecture-notes-forstudents.blogspot.in/2010/04/system-analysis-and-design-sad.html> [For referring SDLC]
2. <http://www.slideshare.net/aroravinay/1-introduction-to-ado-infosys>[For Introduction of System analysis and design]
3. <http://bcastuff.blogspot.in/p/sad-notes.html#.U6uW-ZzWIeo>[For brief notes on System analysis]
4. <http://www.eis.mdx.ac.uk/staffpages/geetha/bis2030/DFD.html>[For DFD notes and examples]
5. <http://faculty.washington.edu/ytan/is460/notes/LN11.pdf>[For DFD notes and examples]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Understand the basics of system, type of information systems, system analyst- meaning, role and need, portfolio development of the system, the methods or ways to review and select the project.
CO2 :	Understand the concept of SDLC, the fact finding techniques, detailed study of modern methods for collecting the requirements of system to be developed, Decision and procedure documentation and a brief introduction to the SRS document.
CO3 :	Learn the concept of structured analysis, detail study of DFD and its types and the study of data dictionary.
CO4 :	Gain understanding of prototypes, its uses and tools for development, clarification of the misconception about the prototype and categories of tools including the use of automated tools like case tools.
CO5 :	Be able to learn objective of collecting data, methods to collect data for designing the input and output interface, the concept and objective of database design,
CO6 :	Study the designing of reliable and maintainable systems, documentation tool, quality assurance management and need for user training.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes					
		Co1	Co2	Co3	Co4	Co5	Co6
1.	Introduction to System Development	√					
2.	Classical Systems Development Methodology		√				
3.	Introduction to Data flow diagrams and Prototype design			√			
4.	Systems Design				√		
5.	Quality assurance, maintenance and Audit					√	
6.	Designing reliable system, training and conversion						√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	2	2	1	2	2	2	2	2	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	2	3	3	2
CO4	3	3	3	2	3	2	3	2	2	2	2	3	2
CO5	1	2	2	2	3	3	3	2	1	2	2	3	2
CO6	1	2	2	2	3	3	3	2	1	2	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA229: Fundamentals of Data Structures and Algorithms

(100 Marks)

Contact Hours: 04

Pre-requisite: OBCA123: Foundation of Programming, OBCA129: Fundamentals of OOP's

Methodology & Pedagogy: During the theoretical lectures, the focus will be on understanding the fundamental ideas of data structures and algorithms, as well as how to use and select the most efficient data structures from a variety of options for various applications. Designing, analyzing, and implementing all types of data structures for addressing computational issues using a high-level programming language is emphasized in practical sessions.

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Hours
		Theory
1	Introduction to Data Structures and Algorithms	06
2	Linear Data Structures Stack and Queue	10
3	Dynamic Linear Data Structures	09
4	Trees Data Structure	08
5	Graph Data Structure	08
6	Sorting and Searching	07

Total Hours (Theory): 48

Total Hours: 48

Reference Books:

1. Yashvant Kanethkar : Data structures through C++, 2nd Edition, BPB Publications.
2. Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum : Data structures using C and C++ , 2nd Edition, Eastern economy edition, Pearson Education, 2015.
3. Mark Allen Weiss: Data Structures and Algorithm Analysis in C++, 3rd Edition, Pearson Education, 2017.
4. Reema Thareja: Data Structures using C, 1st Edition, Oxford University Press, 2012.

Web References:

1. https://www.cs.auckland.ac.nz/~jmor159/PLDS210/ds_ToC.html [For materials of Data Structures and Algorithms]
2. <http://www.cs.usfca.edu/~galles/visualization/> [For Data Structures Visualization]
3. <https://www.cs.auckland.ac.nz/~jmor159/PLDS210/mst.html> [For Graph Data Structures]
4. <http://interactivepython.org/runestone/static/pythonds/Trees/trees.html> [For Tree Data Structures]
5. https://www.cs.auckland.ac.nz/~jmor159/PLDS210/niemann/s_man.pdf [For Sorting and Searching Cookbook]
6. <http://www.cs.princeton.edu/~rs/AlgsDS07/10Hashing.pdf> [For Hashing Materials]
7. <http://nptel.ac.in/video.php?subjectId=106102064> [For Data Structures videos]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Design and apply appropriate data structures for solving computing problems
CO2 :	Understands and restates the fundamentals of basic data structures.
CO3 :	Explore and implement linear data structures like link list
CO4 :	Students will familiar with non-linear data structure like tree and graph
CO5 :	Apply Algorithm for solving problems like sorting, searching

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Data Structures and Algorithms	√				
2	Linear Data Structures Stack and Queue		√			
3	Dynamic Linear Data Structures			√		
4	Trees Data Structure				√	
5	Graph Data Structure				√	
6	Sorting and Searching					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	2	2	2	2	-	-	-	3	1
CO2	2	3	2	2	-	2	-	-	1	-	1	3	1
CO3	2	3	3	2	-	2	-	-	1	-	1	3	2
CO4	2	3	3	2	-	2	-	-	1	-	1	3	2
CO5	3	3	3	2	-	2	-	-	1	-	1	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA229 P: Fundamentals of Data Structures and Algorithms - Practical

(100 Marks)

Contact Hours: 3

Pre-requisite: OBCA123 P: Foundation of Programming - Practical, OBCA129 P: Fundamentals of Object Oriented Programming – Practical

Methodology & Pedagogy: The practical sessions are designed to engage students in hands-on activities focused on designing, analysing, and implementing various data structures to tackle computational challenges effectively. Through practical demonstrations, and coding exercises, students will gain a deep understanding of the fundamental principles behind data structures and their applications.

Outline of the course:

Week No.	Practical	Description
1-2	Array and Pointers	Acquire a solid understanding of arrays and pointers, crucial concepts in programming.
3-4	Stack and Queue Programming	Dive into the practical implementation of stacks and queues, including applications such as Tower of Hanoi and Polish Notation. Programming exercises on Queues and their types.
5-6	Link List	Explore the various types of linked lists and learn to implement operations like insertion, updating, and deletion.
7-8	Trees Data Structure	Grasp the intricacies of nonlinear data structures, particularly trees. Implement binary search trees and traversal techniques.
9-10	Graph Data Structure	Delve into the complexities of graph data structures. Implement various Minimum Spanning Tree (MST) algorithms and Shortest Path Algorithm (SPA).
11-12	Sorting and Searching	Gain hands-on experience implementing sorting algorithms to analyse time and space complexities. Implement both linear and binary search algorithms.

Total Hours (Practical): 36

Total Hours: 36

Core Books:

1. Jean-Paul Tremblay, Paul G. Sorenson: An introduction to data structures with applications, 2nd Edition, Tata McGraw Hill Publications, Paperback.
2. Data structures A Programming Approach with C, D.S.Kushwaha and A.K.Misra, PHI
3. Varsha h. Patil, Data Structures Using C++, 1st Edition, Oxford University Press.
4. D. Samanta, Classic Data Structures, 2nd Edition, PHI Publications.

Reference Books:

1. Yashvant Kanethkar : Data structures through C++, 2nd Edition, BPB Publications.
2. Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum : Data structures using C and C++ , 2nd Edition, Eastern economy edition, Pearson Education, 2015.
3. Mark Allen Weiss: Data Structures and Algorithm Analysis in C++, 3rd Edition, Pearson Education, 2017.
4. Reema Thareja: Data Structures using C, 1st Edition, Oxford University Press, 2012.

Web References:

1. https://www.cs.auckland.ac.nz/~jmor159/PLDS210/ds_ToC.html [For materials of Data Structures and Algorithms]
2. <http://www.cs.usfca.edu/~galles/visualization/> [For Data Structures Visualization]
3. <https://www.cs.auckland.ac.nz/~jmor159/PLDS210/mst.html> [For Graph Data Structures]
4. <http://interactivepython.org/runestone/static/pythonds/Trees/trees.html> [For Tree Data Structures]
5. https://www.cs.auckland.ac.nz/~jmor159/PLDS210/niemann/s_man.pdf [For Sorting and Searching Cookbook]
6. <http://www.cs.princeton.edu/~rs/AlgsDS07/10Hashing.pdf> [For Hashing Materials]
7. <http://nptel.ac.in/video.php?subjectId=106102064> [For Data Structures videos]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Design and apply appropriate data structures for solving computing problems
CO2 :	Understands and restates the fundamentals of basic data structures.
CO3 :	Explore and implement linear data structures like link list
CO4 :	Students will familiar with non-linear data structure like tree and graph
CO5 :	Apply Algorithm for solving problems like sorting, searching

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1-2	Introduction to Data Structures and Algorithms	√				
3-4	Linear Data Structures Stack and Queue		√			
5-6	Dynamic Linear Data Structures			√		
7-8	Trees Data Structure				√	
9-10	Graph Data Structure				√	
11-12	Sorting and Searching					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	2	2	2	2	-	-	-	3	1
CO2	2	3	2	2	-	2	-	-	1	-	1	3	1
CO3	2	3	3	2	-	2	-	-	1	-	1	3	2
CO4	2	3	3	2	-	2	-	-	1	-	1	3	2
CO5	3	3	3	2	-	2	-	-	1	-	1	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA230: Fundamentals of Operating Systems

(100 Marks)

Contact Hours: 04

Pre-requisite: None

Methodology & Pedagogy: In order to achieve the course objectives, students will be introduced to the basic operating system concepts and basic functions. During practical sessions, the students will be required to use DOS and UNIX commands to understand the system properties and to write script files.

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Hours
		Theory
1	Operating System Fundamentals	6
2	Memory Management	10
3	Processor Management	10
4	Device Management	8
5	File Management	6
6	Introduction to Shell Script	8

Total Hours (Theory): 48

Total Hours: 48

Detailed Syllabus:

Unit - I: Operating System Fundamentals:

Hours: 06

What is an operating system, Brief history of an operating system, Pyramid structure of an operating system, Operating system hardware and software, Evolution of an operating system, types of operating system, Batch system, Interactive system, Real time system, Hybrid system, Shell, compiler, assembler, interpreter?

Unit - II: Memory Management:

Hours: 10

Memory management of early system, Fixed partition, Dynamic partition, Re-locatable dynamic partition, Best fit and first fit allocation method, De-allocation, Paged memory allocation, Demand paging allocation, segmented memory allocation, Virtual memory, cache memory, Associative memory, Page replacement policies.

Unit - III: Processor Management:

Hours: 10

What is job and Process, Multiprogramming concept, Process scheduler, Job scheduler, various process states, Thread control, Process Control Block (PCB), Processor scheduling policies, FCFS, SJN, SRT, RR, EDF, Multiple level queues

Unit - IV: Device Management:

Hours: 08

Types of devices, dedicated device, Virtual device, shared device, I/O devices in cloud, Sequential Access Storage Media, Direct access storage media, Device handler seek strategies, FCFS, SSTF, SCAN and LOOK strategies, Optical disk storage, RAID

Unit - V: File Management:

Hours: 06

Fundamentals of File management, File naming conventions, Fixed length and variable length records, Physical file organization, Physical storage allocation, File access methods, File control matrix, File compression

Unit - VI: Introduction to Shell Script:

Hours: 08

Shell Script, Shell environment, Making Script interactive, Command Line Argument, Evaluating Expression, Operator, Control Statement, Looping statement.

Core Books:

1. Ann McIver McHoes, Ida M Flynn: Understanding Operating System, 7th Edition, Cengage Learning, 2014
2. William Stallings: Operating Systems Internals and Design Principles, 5th Edition, PHI, 2005.
3. Sumitabha Das: Unix concepts & application, 4th Edition, Tata McGraw Hill, 2010.
4. Kenneth Rosen, Douglas Host, James Farber and Richard Rosinski: The Complete Reference, Tata McGraw Hill, 1999.

Reference Books:

1. Silberschatz: Operating System Concepts, 5th Edition, John Wiley & Sons (ASIA) Ltd., 2008.
2. Mark G. Sobell: A Practical Guide to Linux, Pearson Education, 1997.
3. K.J.George, Operating System Concepts and Principles, Sroff Publishers, 2003

Web References:

1. <https://study.com/learn/operating-system.html> [Operating System Video Lessons]
2. <https://www.studytonight.com/operating-system/> [Operating System Tutorial]
3. <http://www.tutorialspoint.com/unix/index.htm> [Unix Tutorials]
4. <http://williamstallings.com/OS/Animation/Animations.html> [Animations of Operating Systems Concepts]
5. <http://www.ics.uci.edu/~ics143/lectures.html> [Lecture notes of OS]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	To understand the fundamental concepts of an operating System.
CO2 :	To understand memory allocation and de-allocation methods.
CO3 :	To study fundamentals of processor and its scheduling policies.
CO4 :	To study various supported device and file access technologies.
CO5 :	Learning basic shell programming

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Operating System Fundamentals	√				
2	Memory Management		√			
3	Processor Management			√		
4	Device Management				√	
5	File Management				√	
6	Introduction to Shell Script					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1	2	2	-	2	2	-	1	1	-	3	2
CO2	3	2	2	2	-	2	2	-	1	1	-	3	2
CO3	3	2	2	2	-	2	2	-	1	1	-	3	2
CO4	3	2	2	2	-	2	2	-	1	1	-	3	2
CO5	2	2	3	3	-	2	3	-	1	1	-	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA230 P: Fundamentals of Operating Systems –Practical

(100 Marks)

Contact Hours: 03

Pre-requisite: None

Methodology & Pedagogy: During the practical session, student will commence the learning from MS-DOS commands in windows environment. The student will also get hands on working with basic Linux commands. Finally using base of Linux commands, shell scripts would be written to demonstrate operating system programming.

Outline of the course:

Week No	Practical	Description
1	Disk operating system -Commands	Introduction to MS DOS environment with basic commands
2	Introduction to Linux Editor	Introduction to Cygwin as Linux Editor along with its usage
3	Linux Operating System-Commands	Using basic commands of Linux
4	Linux Operating System-Advanced Commands	Implementation of advanced Linux commands used in industry
5	Vi editor-Create Text file	Practice of writing and modifying various files in Vi editor
6	Introduction of Shell Programming-Create .sh file and Execute file	Creating simple shell script to get introduced with operating system programming
7	Variable and Rules for variable	Creating and using variables, and constants in shell scripts
8	Interactive Shell Script, Working with Command Line Arguments	Practicing shell scripts which are responsive to the user input
9	Working with expression	Arithmetic expressions in shell script
10	Conditional statement-IF, Working with Operator	Learning conditional statements such as if, elif, case. Using arithmetic, relational, and logical operators.
11	Looping Statement-While	Writing shell scripts with while loops with real life examples
12	Looping Statement-Until, For	Writing shell scripts with until and for loops with real life examples

Total Hours (Practical): 36

Total Hours: 36

Core Books:

1. Sumitabha Das: Unix concepts & applications, 4th Edition, Tata McGraw Hill, 2017.
2. Christopher Negus: Linux Bible, 10th Edition, Wiley, 2020.

Reference Books:

1. Mark G. Sobell: A Practical Guide to Linux, Pearson Education, 1997.

Web References:

1. <http://www.tutorialspoint.com/unix/index.htm> [Unix Tutorials]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	To understand the fundamental concepts of an operating System.
CO2 :	To understand memory allocation and de-allocation methods.
CO3 :	To study fundamentals of processor and its scheduling policies.
CO4 :	To study various supported device and file access technologies.
CO5 :	Learning basic shell programming

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Disk operating system -Commands	√				√
2	Introduction to Linux Editor	√				√
3	Linux Operating System-Commands	√				√
4	Linux Operating System-Advanced Commands	√				√
5	Vi editor-Create Text file		√	√	√	√
6	Introduction of Shell Programming-Create .sh file and Execute file		√	√	√	√
7	Variable and Rules for variable		√			√
8	Interactive Shell Script, Working with Command Line Arguments		√			√
9	Working with expression					√
10	Conditional statement-IF, Working with Operator					√
11	Looping Statement-While					√
12	Looping Statement-Until, For					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1	2	2	-	2	2	-	1	1	-	3	2
CO2	3	2	2	2	-	2	2	-	1	1	-	3	2
CO3	3	2	2	2	-	2	2	-	1	1	-	3	2
CO4	3	2	2	2	-	2	2	-	1	1	-	3	2
CO5	2	2	3	3	-	2	3	-	1	1	-	3	2

2. 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

DETAILED SYLLABUS

FOR

ONLINE BCA PROGRAMME

(4th SEMESTER)

EFFECTIVE FROM

ACADEMIC YEAR 2023-24

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - IV

Semester - IV										
Course Code	Course Title	Teaching Scheme				Examination Scheme				
		Contact Hours			Credit	Theory		Practical		Total
		Theory	Practical	Total		Internal	External	Internal	External	
OBCA231	Digital Marketing	-	3	3	3	-	-	30	70	100
OBCA233	Software Engineering	4	-	4	4	30	70	-	-	100
OBCA234	Advanced Database System	-	3	3	3	-	-	30	70	100
OBCA235	Open Source Technology	4	-	4	4	30	70	-	-	100
OBCA235 P	Open Source Technology - Practical	-	3	3	3	-	-	30	70	100
OBCA236	Data Communications and Networks	4	-	4	4	30	70	-	-	100
OHS111.02 C	Human Values and Professional Ethics	-	2	2	2	-	-	30	70	100
Total		12	11	23	23	300		500		800

OBCA231 - Digital Marketing

(100 Marks)

Contact Hours: 3 Hours

Prerequisites: None.

Methodology, Pedagogy & Andragogy: This course focuses on providing hands-on experience to students for understanding social media marketing strategies and BLOG writing skills.

Outline of the Course:

Week No	Practical	Description
1	Introduction to Digital Marketing - Understanding digital marketing - Traditional marketing vs. digital marketing - Facets of digital marketing - Roles of social media in digital marketing	Learn basics of digital marketing
2	Introduction to Social Media - Platforms for social media marketing - Roles of social media in digital marketing	Learn basics of Social Media
3	Optimizing for Social Media Platforms - Facebook - Instagram - X (formerly Twitter)	Learn about various social media platforms and optimizing for them.
4	Content Calendar for Social Media Creating content calendar with different focus	
5	Content creation and Management in Meta Business Suite Understanding and Managing Meta Business Suite	
6	Paid Marketing in Meta Platforms – I - Understanding Ads Manager - Understanding Billing	Understanding paid marketing in Meta platforms
7	Paid Marketing in Meta Platforms – II - Brand awareness campaign - Traffic campaign - Engagement campaign	Understanding paid marketing in Meta platforms with different objectives

8	Paid Marketing in Meta Platforms – III • Lead generation campaign • Conversion campaign	Understand to embed Social Media with website
9	• Getting data from Social Media Paid Advertisement using Meta Pixel	For custom audiences and lookalike audiences
10	Search Engine Optimization • SERP • On-the-page Optimization • Off-the-page Optimization	Understanding Search Engine Result Page, and learn about On-the-Page and Off-the-Page Optimization
11-12	Case Study	-

Total hours: 36

Text Books:

1. Damian Ryan and Calvin Jones: Understanding Digital Marketing, Kogan Page, 2014
2. Stephanie Diamond: Digital Marketing All-in-One for Dummies, Wiley Publication, 2019
3. Amy Lupold Bair, Blogging for Dummies, 7th Edition, Wiley Publication, 2020

Reference Books:

1. Philip Kotler, Hermawan Kartajaya, and Iwan Setiawan: Marketing 4.0: Moving from Traditional to Digital, Wiley Publication, 2016
2. Jan Zimmerman and Deborah Ng: Social Media Marketing All-in-One for Dummies, Wiley Publication, 2017

Web References:

1. <https://www.simplilearn.com/tutorials/digital-marketing-tutorial>
2. https://www.tutorialspoint.com/digital_marketing/index.htm
3. <https://intellipaat.com/blog/digital-marketing-tutorial/>
4. <https://www.javatpoint.com/digital-marketing>
5. <https://www.javatpoint.com/blog>

Course Outcome: Upon successful completion of the course, student will:

CO1 :	Able to understand digital marketing and its importance.
CO2 :	Able to create and manage content using social media platforms
CO3 :	Able to understand paid advertisements on social media platforms.
CO4 :	Able to understand SEO and its importance in digital marketing.
CO5 :	Able to use generative AI in Digital Marketing.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	2	1	3	2	2	1	1	-	1	1	1	1
CO2	-	1	2	3	1	3	1	-	-	2	2	2	2
CO3	1	1	2	3	1	3	1	-	-	2	2	2	2
CO4	1	1	2	3	1	1	1	1	-	1	-	1	1
CO5	2	2	3	3	2	3	3	2	1	2	2	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

Pre-requisite: Fundamentals of System Analysis and Design

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Theory Hours
1	Introduction to software and Software Engineering	07
2	Software Process Models	09
3	Managing Software Projects	08
4	Software Requirement analysis and specification	08
5	Software Maintenance and Risk Management	08
6	Modern methods in Software Engineering	08

Total Hours (Theory): 48
Total Hours:48

Unit I: Introduction to software and Software Engineering Hours 07

Unit II: Software Process Models Hours 09

Definition of Software Process, Software Process Model - The Waterfall model, Incremental Process Models: The Incremental model, The RAD model Evolutionary Process models: Prototyping, The Spiral model, The Concurrent Development model, A final comment on evolutionary Processes, Component based development, Concept of Product and Process.

Unit III: Managing Software Projects

Hours 08

The Management Spectrum, W5HH principles, Concepts of measures, metrics and indicators. Process Metrics and Project Metrics: An overview, Software Measurements: Size oriented and function oriented metrics.

Unit IV: Software Requirement analysis and specification

Hours 08

Introduction to system and software requirements, types of software requirements: Functional and non-functional requirements. Requirement Specification (SRS), Requirement Analysis and Requirement Elicitation, Requirement Engineering.

Unit V: Software Maintenance and Risk Management

Hours 08

Software risks, risk identification, risk projection, risk mitigation, monitoring and management. Introduction to software maintenance, types of maintenance. Concept of software reengineering, Business Process Reengineering(BPR), BPR life cycle, reverse engineering, Applications of Software Engineering.

Unit VI: Modern methods in Software Engineering

Hours 08

Introduction to Agile development: What is Agility? principles and values of Agile development, concept of Extreme Programming, values of XP.

Core Books:

1. Roger S.Pressman, Software Engineering- A practitioner's Approach, McGraw-Hill International Editions
2. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User
3. Rajib Mall, Fundamentals of software Engineering, Prentice Hall of India.

Reference Books:

1. Ian Sommerville, Software engineering, Pearson education Asia
2. Pankaj Jalote, Software Engineering – A Precise Approach Wiley
3. Merlin Dorfman (Editor), Richard H. Thayer (Editor), Software Engineering
4. Robert C. "Uncle Bob" Martin, Clean Architecture: A Craftsman's Guide to Software Structure and Design
5. Deepak Gaikwad, Viral Thakkar, DevOps Tools from Practitioner's ViewPoint, Wiley

Web References:

1. https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering/Process/Methodology [Introduction to Software Engineering/Process/Methodology]
2. <https://www.uml-diagrams.org/> [UMLUnits]
3. <https://nptel.ac.in/courses/106/101/106101061/> [Agile Software Development and Extreme Programming and Overview of DevOps]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Able to understand concept of Software and its types.
CO2 :	Get familiarize with software processes and related models.
CO3 :	Able to analyze requirements and mange project
CO4 :	Able to understand concepts of creating Software Requirement Specification
CO5 :	Able to understand risk management, software maintenance and modern Software engineering methods.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to software and Software Engineering	√				
2	Software Process Models		√			
3	Managing Software Projects			√		
4	Software Requirement analysis and specification				√	
5	Software Maintenance and Risk Management					√
6	Modern methods in Software Engineering					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	2	3	1	3	3	3	1	1	3	1	3	3
CO2	2	2	3	2	3	3	3	1	1	3	3	2	2
CO3	2	3	3	3	3	3	3	2	1	3	3	3	3
CO4	3	2	3	2	3	3	3	3	1	2	2	3	3
CO5	2	3	3	3	2	3	3	1	1	2	1	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA234: Advanced Database System **(100 Marks)**

Contact Hours: 03

Pre-requisite: OBCA130-Database Fundamentals.

Methodology & Pedagogy: During the practical session student will learn how to create table and perform operation on data and table using different oracle objects. Through procedure and function students can understand the concept of reusability. Student will learn how to handle error using exception and using trigger they can understand how to restrict the operation at particular time or given condition.

Outline of the course:

Week No	Practical	Description
1 - 2	Introduction to PL/SQL:	Basic syntax of PL/SQL Block, Declaration of variable and constants, SELECT INTO
3 - 4	Procedural statements:	Usage of Conditional statements and Looping structure inside the block
5 - 6	Implicit Cursor, Explicit Cursor, Parameterized Cursor:	Usage of cursor and working
7 - 8	Objects of the database: User defined Function and Stored Procedure:	Creations and usage of sub programs
9 - 10	Error Handling using pre-defined exception and user-defined exception:	Runtime errors and handling those errors
11 - 12	Row level and Statement level Trigger, GRANT & REVOKE:	Syntax of trigger and its working, Assign privileges at different level

Total Hours (Practical): 36

Total Hours: 36

Core Books:

1. SQL, PL/SQL – The programming Language Oracle - by Ivan Bayross.
2. Teach Yourself Database Technologies - by Ivan Bayross

Reference Books:

1. Oracle 9i, PL/SQL Programming by Scoot Urban, Oracle Press
2. Practice book on SQL and PL/SQL by Anjali, Amisha, Roopal and Nirav publications

Web References:

1. <http://plsql-tutorial.com/index.htm> [For PL/SQL]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Be familiar with PL/SQL programming
CO2 :	Be familiar with database objects
CO3 :	Be familiar with retrieval and manipulation of data
CO4 :	Learn the concept of exception handling
CO5 :	Controlling user security

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to PL/SQL:	√				
2	Procedural statements:		√			
3	Implicit Cursor, Explicit Cursor, Parameterized Cursor:			√		
4	Objects of the database: User defined Function and Stored Procedure:		√			
5	Error Handling using pre-defined exception and user-defined exception:				√	
6	Row level and Statement level Trigger, GRANT & REVOKE:					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	2	1	2	-	-	-	-	-	3	3
CO2	3	3	3	3	3	3	3	-	-	-	-	-	3	3
CO3	2	2	3	3	2	2	2	-	-	-	-	-	3	2
CO4	3	3	3	3	3	3	3	-	-	-	-	-	3	2
CO5	3	3	3	3	3	3	3	-	-	-	-	-	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA235 : Open Source Technology **(100 Marks)**

Contact Hours: 04

Pre-requisite: Working knowledge of HTML and basic knowledge of MYSQL

Methodology & Pedagogy: During theory, students able to install & configure PHP and prerequisite software(s). Also, student will be emphasized to develop dynamic web applications.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Hours
		Theory
1	Introduction to Open Source and Web	08
2	PHP Configuration and Basics	07
3	Array and Functions in PHP	08
4	Handling Form Data	08
5	PHP utilities	09
6	Database Connectivity with MYSQL	08

Total Hours (Theory): 48

Total Hours:48

Detail Syllabus:

Unit I: Introduction to Open Source and Web

Hours 08

Introduction of open source software, Development philosophy of open source software, pros and cons of open source software, open source vs. close source software, Community support in open source, Version Control, Introduction to Webpage and Website, Static and Dynamic Website, Client & Server Side Scripting, Web Hosting: Shared / Cloud / VPS / Dedicated

Unit II: PHP Configuration and Basics

Hours 07

Introduction to PHP, Installation of Apache, MySQL and PHP (OOP approach), How PHP code is parsed, Embedding PHP and HTML, Executing PHP and viewing in Browser, Data types, Operators, PHP variables: static and global variables, Comments in PHP, Conditional Structure, Looping Structure.

Unit III: Array and Functions in PHP

Hours 08

Types of Array, Array Functions, Miscellaneous Functions: define, constant, include, require, header, die, exit, Overview of built in functions of PHP: Date and Time, Math functions, File handling functions, String functions, User Defined Functions.

Unit IV: Handling Form Data

Hours 08

HTML Form element & its attributes, Send Form data using GET Method & POST Method, Receive Form data using \$_GET, \$_POST & \$_REQUEST variables, PHP form validations

Unit V: PHP utilities

Hours 09

File Uploading: Upload Single and Multiple file using PHP script, Understanding HTTP requests, Exploring and modifying HTTP responses, getting information from web server, Sending mails

Unit VI: Database Connectivity with MYSQL

Hours 08

OOPs Concepts, PHP Data Objects (PDO), CRUD operations, Handling Errors, State Management Techniques: Concept of Session, starting session, modifying session variables, Un registering and deleting session variable, Concept of Cookies

Core Books:

1. Vikram Vaswani, PHP: A Beginner's Guide: Indian Edition, First Edition, McGraw Hill, 2009
2. Matt Doyle , Beginning PHP 5.3 , Wrox , 2010

Reference Books:

1. Timothy Boronczyk , Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz, Michael K. Glass): Beginning PHP6, Apache, MySQL Web Development : Wrox , 2009.
2. Lynn Beighley and Michael Morrison, Head First PHP & MySQL, First Edition, O'Reilly Publication, 2009

Web References:

1. <https://github.com/PHPMailer/PHPMailer> [PHPMailer Code]
2. <https://www.php.net/> [Official website of PHP]
3. <https://www.geeksforgeeks.org/php-tutorials/> [Lecture notes of PHP]
4. <https://www.w3schools.com/php/default.asp> [Lecture notes of PHP]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Gain the skills and knowledge for Open Source and Web Hosting.
CO2 :	To utilize knowledge and skills for basics of PHP and configuration of MYSQL Server.
CO3 :	Learn the array and built-In functions in PHP.
CO4 :	Gain understanding of Form handing and utilities in PHP.
CO5 :	Be able to develop dynamic web based application using PHP and MySQL with state management techniques.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Open Source and Web	√				
2	PHP Configuration and Basics		√			
3	Array and Functions in PHP			√		
4	Handling Form Data				√	
5	PHP utilities				√	
6	Database Connectivity with MYSQL					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	3	-	1	-	1	2	-	-	2	-
CO2	3	3	3	3	-	1	-	1	1	-	-	3	-
CO3	3	3	3	3	-	1	-	1	1	-	-	3	-
CO4	3	3	3	3	-	1	-	1	1	-	-	3	-
CO5	3	3	3	3	2	1	1	1	2	1	1	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA235 P: Open Source Technology - Practical (100 Marks)

Contact Hours: 03

Prerequisites: Working knowledge of HTML and basic knowledge of MySQL

Methodology, Pedagogy: During practical sessions, students will install and configure PHP and prerequisite software(s). The focus will be on hands-on implementation of theoretical concepts to develop dynamic web applications.

Outline of the Course:

Week No	Practical	Description
1-2	Introduction to Open Source and Web & PHP Basics and Configuration	Overview of open-source software, setting up the development environment (Apache, MySQL, PHP), Introduction to web hosting and website types (Static vs Dynamic), Writing and executing basic PHP scripts, Embedding PHP in HTML and parsing PHP code, Understanding PHP data types, variables, and constants.
3-4	Operators and Control Structures & Arrays in PHP	Practice with arithmetic, relational, logical, and other PHP operators, Conditional statements: if, else if, else, switch, Looping structures: for, while, do-while, Declaring and initializing arrays, Types of arrays: Indexed, Associative, Multidimensional. Array functions: array_merge, array_push, array_pop, etc.
5-6	Built-in Functions in PHP & User-defined Functions	Introduction to built-in PHP functions: Date and Time, Math functions, String functions, File handling functions, Practice with functions like define, include, require, Creating and using user-defined functions, Function parameters, return values, and scope, Recursion in PHP.
7-8	Form Handling in PHP	Creating HTML forms with various input types, sending form data using GET and POST methods, validating form data on the server-side, retrieving form data using \$_GET, \$_POST, and \$_REQUEST, Sanitizing and validating user inputs, Error handling in form submissions.

9-10	File Uploading in PHP & PHP Utilities	Uploading single and multiple files, Managing uploaded files and setting permissions, Handling errors during file uploads, Understanding HTTP requests and responses, retrieving server information, sending emails using PHP.
11-12	Database Connectivity with MySQL & State Management in PHP	Connecting PHP with MySQL using PDO, Performing CRUD operations, Handling errors and exceptions in database interactions, Concept of sessions and cookies, Starting and managing sessions, Creating, reading, and deleting cookies.

Total Hours (Practical): 36

Total Hours: 36

Core Books:

1. "PHP and MySQL Web Development" by Luke Welling and Laura Thomson.
2. "Beginning PHP and MySQL" by W. Jason Gilmore.

Reference Books:

1. "PHP for the Web: Visual QuickStart Guide" by Larry Ullman.
2. "Programming PHP" by Kevin Tatro, Peter MacIntyre, and Rasmus Lerdorf.

Web References:

1. <https://www.php.net/manual/en/>
2. <https://www.w3schools.com/php/>
3. <https://www.tutorialspoint.com/php/index.htm>

Course Outcomes: Upon successful completion of the course, the students will:

CO1:	Set up a PHP development environment and execute basic scripts.
CO2:	Implement PHP programs using variables, constants, operators, and control structures.
CO3:	Work with arrays, strings, and functions to solve problems.
CO4:	Develop PHP scripts for web forms, file handling, and basic CRUD operations with MySQL.s
CO5:	Use sessions, cookies, and manage user interactions securely.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to PHP Programming Environment	✓				
2-3	Variables, Constants, and Operators		✓			
4-5	Control Structures in PHP		✓			
6-7	Arrays and Strings			✓		
8	User-Defined Functions			✓		
9	PHP Forms and Server Interaction				✓	✓
10	File Handling in PHP				✓	
11	Sessions and Cookies				✓	✓
12	Basic Database Connectivity with MySQL				✓	✓

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	3	-	1	-	1	2	-	-	2	-
CO2	3	3	3	3	-	1	-	1	1	-	-	3	-
CO3	3	3	3	3	-	1	-	1	1	-	-	3	-
CO4	3	3	3	3	-	1	-	1	1	-	-	3	-
CO5	3	3	3	3	2	1	1	1	2	1	1	3	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

CA236: Data Communications and Networking (100 Marks)

Contact Hours: 04

Pre-requisite: Basic knowledge of computers and their working.

Methodology, Pedagogy & Andragogy: During the lecture sessions, the students will learn about role of computer network in modern communication systems, underlying principles of network communication, need for standardization through network reference model. The teacher will also discuss communication issues at different layers and concepts related to network security. The students will adopt the latest certification courses from reputed and recognized platforms. Furthermore, the students will be engaged in problem-solving, emphasizing real-world applications and relevance.

Outline of the course:

Unit Number	Title of the Unit	Minimum Number of Theory Hours
1	Introduction to Computer Networks	08
2	Basics of network communication	06
3	Network reference model	08
4	Data Link Layer Functions and Protocol	08
5	Network Layer Functions and Protocol	10
6	Network security	08

Total Hours (Theory):48
Total Contact Hours:48

Detail Syllabus:

Unit I: Introduction to computer network

Hours 08

Definition of computer network, aim and objective of computer network: applications of computer network, merits & demerits of computer network, examples of computer network, components of computer network, types of networks, network topologies, network devices: hub, switch, repeater, router, gateway, bridge.

Unit II: Basics of network communication

Hours 06

Parallel & serial communication, synchronous & asynchronous communication, modes of communication: simple, half-duplex, full-duplex, multiplexing, de-multiplexing: frequency division multiplexing (FDM), time division multiplexing (TDM), communication media: guided media, unguided media, switching techniques: circuit switching, message switching, packet switching.

Unit III: Network reference model

Hours 08

Need for network reference model, history of TCP/IP and OSI model, layers of OSI and TCP/IP model, comparison between TCP/IP and OSI model, Protocol Hierarchy, Network Protocols: Simple Mail Transfer Protocol (SMTP), File Transfer Protocol (FTP), Multiple Internet Mail Extension (MIME), Post Office Protocol (POP), Telnet, Domain Name Service (DNS), Dynamic Host Configuration Protocol (DHCP), Address Resolution Protocol (ARP), Reverse Address Resolution Protocol (RARP).

Unit IV: Data Link Layer Functions and Protocol

Hours 08

Definition of Framing, Framing methods, Error detection techniques, Error correction techniques, Flow control mechanisms- Simplex protocol, Stop and Wait ARQ, Go-Back-N ARQ, Point to Point protocol.

Unit V: Network Layer Functions and Protocol

Hours 10

Connection oriented vs Connectionless services, Definition of Routing, Routing algorithms, IP protocol, IP addresses, ARP, RARP

Unit VI: Network security

Hours 08

Introduction to cryptography, symmetric key and public key encryption systems, digital signature and key management concepts, communication security.

Core Books:

1. Andrew S. Tanenbaum: Computer Networks, 6th edition, Pearson Publication: 2021.
2. Behrouz Forouzan: Data communications and networking, 4th Edition, McGraw Hill, 2018.
3. William Stallings: Data and computer communication: 5th Edition, Pearson Publication, 2019.

Reference Books:

1. James F. Kurose, Keith W. Ross: Computer networking – A top-down approach: 3rd Edition: Pearson Publication: 2017
2. Narsimha Karumanchi: Elements of computer networking: An Integrated Approach: 1st Edition: Careermonk Publication: 2014
3. Ed Tittel: Computer networking: 1st Edition, Schum's Publication: 2020

Web References:

1. <https://computer.howstuffworks.com/computer-networking-channel.htm> [How Stuff Works]
2. [https://learn.microsoft.com/en-us/previous-versions/windows/it-pro/windows-server-2012-R2-and-2012/dn313100\(v=ws.11\)?redirectedfrom=MSDN](https://learn.microsoft.com/en-us/previous-versions/windows/it-pro/windows-server-2012-R2-and-2012/dn313100(v=ws.11)?redirectedfrom=MSDN) [Microsoft Networking]
3. https://help.sap.com/docs/SAP_COMMERCE/d0224eca81e249cb821f2cdf45a82ace/8c74877b866910148cc9ba5f39a2fd28.html?version=6.7.0.0 [For multicast and unicast]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Student will be able to understand role of computer network in digital communication
CO2 :	Student will grasp underlying concepts related with network communication
CO3 :	Student will understand role of reference models in standardizing communication
CO4 :	Students will learn about intra and inter network communication and technology behind it.
CO5 :	Students will learn about different aspects of network security.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Computer Networks	√				
2	Basics of network communication		√			
3	Network reference model			√		
4	Data Link Layer Functions and Protocol				√	
5	Network Layer Functions and Protocol				√	
6	Network security					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	3	2	1	-	1	1	1	-	-	1	2	-
CO2	2	3	3	2	-	1	1	1	-	-	1	3	1
CO3	3	3	3	2	-	1	1	1	1	-	1	3	3
CO4	1	3	3	2	-	1	1	1	1	-	1	3	2
CO5	3	3	3	2	-	1	1	1	1	-	1	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OHS111.02 C: HUMAN VALUES & PROFESSIONAL ETHICS (100 Marks)

Contact Hours: 03

Pre-requisite courses: Ethical Leadership through Giving Voice to Values

(<https://www.coursera.org/learn/uva-darden-giving-voice-to-values?skipBrowseRedirect=true>)

Outline of the Course:

Unit. No.	Title of the unit	Minimum number of hours
1.	Introduction to Values and Ethics	05
2.	Elements and Principles of Values	08
3.	Applied Ethics	08
4.	Value, Ethics & Global Issues	05
5.	Contemporary Issues in Values and Ethics	04

Total Hours (Practical): 30

Total Hours: 30

Detailed Syllabus:

Unit – I	Introduction to Values and Ethics Need, Relevance and Significance of Values General, Concept and Meaning of Values and Ethics	Hours: 05
Unit – II	Elements and Principles of Values Universal & Personal Values, Social, Civic & Democratic Value	Hours: 08
Unit –III	Applied Ethics Universal Code of Ethics, Professional Ethics, Organizational Ethics, Ethical Leadership, Domain Specific Ethics	Hours: 08
Unit – IV	Value, Ethics & Global Issues Cross-Cultural Issues, Role of Ethics & Values in Sustainability	Hours: 05
Unit – V	Contemporary Issues in Values and Ethics Case Studies, Presentations, Projects	Hours: 04

Course Outcome (COs): At the end of the course, the students will be able to

CO1	Understand the concepts and mechanics of values and ethics.
CO2	Understand the significance of value and ethical inputs in and get motivated to apply them in their life and profession.
CO3	Understand the significance of value and ethical inputs in and get motivated to apply them in social, global and civic issues.
CO4	Develop their responsibility towards society.
CO5	Comprehend their own core values and adhere to those values at their workplace.
CO6	Practice Ethical Leadership.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	3	-	-	-	2	-	-	-	-
CO3	-	-	-	-	-	3	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	2	-	-	-
CO5	-	-	-	-	3	-	-	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	2	-	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

Reference book:

1. Human Values and Ethics in Workplace, United Nations Settlement Program, 2006. (http://www.unwac.org/new_unwac/pdf/HVWSHE/Human%20Values%20&%20Ethics%20-%20Individual%20Guide.pdf).
2. Ethics for Everyone, Arthur Dorbin, 2009. (<http://arthurdobrin.files.wordpress.com/2008/08/ethics-for-everyone.pdf>).
3. Values and Ethics for 21st Century, BBVA. (https://www.bbvaopenmind.com/wp-content/uploads/2013/10/Values-and-Ethics-for-the-21st-Century_BBVA.pdf)

Web material:

1. www.ethics.org

OHS121.02 C: CREATIVITY, PROBLEM SOLVING AND INNOVATION (100 Marks)

Contact Hours: 03

Pre-requisite: Creative Problem Solving (<https://www.coursera.org/learn/creative-problem-solving>)

Outline of the Course:

Unit No.	Title of the Unit	Minimum number of hours
1.	Introduction to Creativity, Problem Solving and Innovation	06
2.	Questioning, Learning and Visualization	06
3.	Creative Thinking and Problem Solving	06
4.	Logic, Language and Reasoning	06
5.	Contemporary Issues and Practices in Creativity and Problem Solving	06

Total Hours (Practical): 30

Total Hours: 30

Detailed Syllabus:

Unit - I	Introduction to Creativity, Problem Solving and Innovation	Hours: 06
	Definitions of Creativity and Innovation, Need for Problem Solving and Innovation, Scope of Creativity in various Domains, Types and Styles of Thinking, Strategies to develop Creativity, Problem Solving and Innovation skills	
Unit - II	Questioning, Learning and Visualization	Hours: 06
	Strategy and Methods of Questioning, Asking the Right Questions, Strategy of Learning and its Importance, Sources and Methods of Learning, Purpose and Value of Creativity Education in real life, Visualization strategies - Making thoughts Visible, Mind Mapping and Visualizing Thinking	
Unit - III	Creative Thinking and Problem Solving	Hours: 06
	Creative Thinking and its need, Strategy of Thinking Fluency, Generating all Possibilities, SCAMPER Technique, Divergent Vs Convergent Thinking, Lateral Vs Vertical Thinking, Fusion of Ideas for Problem Solving, Applying strategies for Problem Solving	
Unit - IV	Logic, Language and Reasoning	Hours: 06
	Basic Concepts of Logic, Statement Vs Sentence, Premises Vs Conclusion, Concept of an Argument, Functions of Language: Informative, Expressive and Directive, Inductive Vs Deductive Reasoning, Critical Thinking & Creativity, Moral Reasoning	
Unit - V	Contemporary Issues and Practices in Creativity and Problem Solving	Hours: 06
	Cognitive Research Trust Thinking for Creatively Solving Problems, Case Study on Contemporary Issues and Practices in Creativity and Problem Solving	

Text book:

1. R Keith Sawyer, ZigZag, The Surprising Path to Greater Creativity, Jossy-Bass Publication 2013
2. Michael Michalko, Crackling Creativity, The Secrets of Creative Genus, Ten Speed Press 2001

Reference book:

1. Michael Michalko, Thinker Toys, Second Edition, Random House Publication 2006
2. Edward De Beno, De Beno's Thinking Course, Revised Edition, Pearson Publication 1994
3. Edward De Beno, Six Thinking Hats, Revised and Update Edition, Penguin Publication 1999
4. Tony Buzan, How to Mind Map, Thorsons Publication 2002
5. Scott Berkun, The Myths of Innovation, Expanded and revised edition, Berkun Publication 2010
6. Tom Kelly and David Kelly, Creative confidence: Unleashing the creative Potential within Us all, William Collins Publication 2013
7. Ira Flatow, The all Laughed, Harper Publication 1992
8. Paul Sloane, Des MacHale & M.A. DiSpezio, The Ultimate Lateral & Critical Thinking Puzzle book, Sterling Publication 2002

Additional Readings

1. Keith Sawyer, Group Genius, The Creative Power of Collaboration, Basic Books Publication 2007
2. Edward De Beno, Lateral Thinking, Creativity Step by Step, Penguin Publication 1973
3. Nancy Margulies with Nusa Mall, Mapping Inner Space, Crown House Publication 2002
4. Tom Kelly with Jonathan Littman, The Art of Innovation, Profile Publication 2001
5. Roger Von Oech, A Whack on the Side of the Head. Revised edition, Hachette Publication 1998
6. Roger Von Oech, A Kick in the Seat of the Head, William Morrow 1986
7. Jonah Lehrer, Imagine How Creativity Works, Canongate Books Publication 2012
8. James M Higgins, 101 Creative Problem Solving Techniques, New Management Publication 1994
9. Scott G Isaksen, K Brain Doval, Donald J Treffinger, Creative Approach to Problem Solving, Sage Publication 2000
10. Donald J Treffinger, Scott G Isaksen, K Brainstead Dorval Creative Problem Solving An Introduction, Prufrock Press 2006
11. H Scott Fogler & Steven E. LeBlance, Strategies for Creative Problem Solving, Prentice Hall Publication 2008
12. Dave Gray, Sunni Brown and James Macanufo, Game Storming, O'reilly Publication 2010.
13. Howard Gardner, Creating minds, Basic Books Publication 1993
14. Mihaly Csikszentmihalyi, Creativity—Flow and Psychology of Discovery and Invention, Harper Publication 1996
15. Martin Gerdner, W. H., Aha! Insight, Freeman Publication 1978
16. Paul Sloane, Test Your Lateral Thinking IQ, Sterling Publication 1994

Web material:

1. Internet Search based May TED talks and other sources for videos, slide shares, problems, etc.

Course Outcome (COs): At the end of the course, the students will be able to

CO1	Demonstrate creativity in their day to day activities and academic output.
CO2	Solve personal, social and professional problems with a positive and an objective mindset.
CO3	Think creatively and work towards problem solving in a strategic way.
CO4	Initiate new and innovative practices in their chosen field of profession.
CO5	Give logical ideas, opinions, and solutions to problems.
CO6	Think critically over the situation and drawing conclusion.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	-	-	2
CO2	-	-	3	-	-	-	-	-	3	-	-	-	2
CO3	-	-	-	-	-	-	-	-	3	-	-	-	2
CO4	-	-	-	-	3	-	-	-	3	-	-	-	2
CO5	-	-	-	-	-	-	-	-	3	-	-	-	2
CO6	-	-	-	-	-	-	-	-	3	-	-	-	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

DETAILED SYLLABUS

FOR

ONLINE BCA PROGRAMME
(5th SEMESTER)

EFFECTIVE FROM
ACADEMIC YEAR 2023-24

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - V

Semester – V										
Course Code	Course Title	Teaching Scheme				Examination Scheme				
		Contact Hours			Credit	Theory		Practical		Total
		Theory	Practical	Total		Internal	External	Internal	External	
OBCA324-325	Elective-V	4	-	4	4	30	70	-	-	100
OBCA324 P – 325 P	Elective-V - Practical	-	3	3	3	-	-	30	70	100
OBCA327	Object Oriented Programming using JAVA	4	-	4	4	30	70	-	-	100
OBCA327 P	Object Oriented Programming using JAVA - Practical	-	3	3	3	-	-	30	70	100
OBCA328	Fundamentals of Visual Programming	4	-	4	4	30	70	-	-	100
OBCA328 P	Fundamentals of Visual Programming - Practical	-	3	3	3	-	-	30	70	100
OBCA329	Introduction to Multi-Paradigms Programming language	-	3	3	3	-	-	30	70	100
OHS131.02 C	Communication and Soft skills	-	2	2	2	-	-	30	70	100
Total		12	14	26	26	300		500		800

Elective-V	
Course Code	Course Title
OBCA324, OBCA324 P	Document Databases
OBCA325, OBCA325 P	Foundation of Data Science
SWAYAM courses will be included as electives and updated periodically	

OBCA324 : Document Databases

(100 Marks)

Contact Hours: 04

Pre-requisite: Should know that Database Management Systems, Database and Data Structure concepts

Methodology & Pedagogy: During theory lectures student will understand that what is difference between SQL and NoSQL i.e. Document Database, the essential concepts that act as the building blocks for many of the NoSQL products. It starts from the fundamentals of NoSQL and graduates to advanced concepts of architecture, storage internals and indexing.

Outline of the Course:

Unit No.	Title of the Unit	Minimum Number of Hours
		Theory
1	Introduction to Document Database (NoSQL)	07
2	Data Models in NoSQL	08
3	Storage Replica of NoSQL	09
4	Working with Document Data using MongoDB	08
5	Executing CRUD operation using MongoDB	08
6	Managing Database using MongoDB	08

Total Hours (Theory): 48

Total Hours: 48

Detail Syllabus:

Unit I: Introduction to Document Database (NoSQL)

Hours 07

Introduction to SQL Relational Model, Codd Rules, Overview of Normalization, Overview and History of NoSQL Databases, Taxonomies by Data Model, Overview of No-SQL Storage: Key Value, Document-Oriented, Column-Family and Graph-storage. Difference Between SQL and NoSQL, Techniques and Pattern: CAP Theorem, ACID Vs. BASE properties and Comparison of relational databases to new NoSQL stores.

Unit II: Data Models in NoSQL

Hours

08

Different Types of Database System to use Document Database by using MongoDB, Cassandra, HBASE, Neo4j use and deployment, Features and Application, Limitation and

Challenges to use NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Data Model. Overview of Replication and Sharding, Overview of Map Reduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

Unit III: Storage Replica of NoSQL

Hours 09

Working with Column-Oriented Databases, Document Store, Key Value Store and Graph data storage. Using Tables and Columns in Relational Databases, Contrasting Column Databases with RDBMS, Document Store Internals, Instructions for Using Collections and Indexes in MongoDB, MongoDB Reliability and Durability, Horizontal Scaling.

Unit IV: Working with Document Data using MongoDB

Hours 08

Overview of MongoDB, Document Databases, What Is a Document Database? Advantages and Disadvantages of Document Database, Installing MongoDB on Your System, Running MongoDB, Installing Additional Drivers, Introduction to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell and others.

Unit V: Executing CRUD operation using MongoDB

Hours 08

Navigating your databases, viewing available data and collections, inserting data, querying data, using sort, limit and skip functions, retrieving single document, using aggregation commands and constraints, working with condition, updating data, insert and save command, rename a collection, referencing a database

Unit VI: Managing Database using MongoDB

Hours 08

MongoDB server, backup a single database, single collection, restoring the collection, importing data into Mongo-DB, exporting data from MongoDB, securing with authorization your data, restricting access, protecting your server with authentication.

Core Books:

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Author: Sadalage, P. & Fowler, Publication: Pearson Education.

Reference Books:

1. Redmond, E. & Wilson, Author: Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition: 1st Edition.
2. Getting started with NOSQL by Gaurav Vaish, PACKT.
3. Guy Harrison, Next Generation Database: NoSQL and big data, Apress.
4. Definite Guide to MongoDB by Eelco Plugge, Peter Membrey and Tim Hawkins, Apress.
5. NOSQL theory and Examples by Piotr fulmanski, Simple introduction series: e-book.

Web References:

1. <https://www.javatpoint.com/mongodb-tutorial> [MongoDB Tutorial - Javatpoint]
2. https://www.tutorialspoint.com/neo4j/neo4j_data_model.htm [Neo4j - Data Model (tutorialspoint.com)]
3. <https://appinventiv.com/blog/hbase-vs-cassandra/> [HBase vs Cassandra: Which is The Best NoSQL Database (appinventiv.com)]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Able to understand the difference between SQL and NoSQL, needs and what is NoSQL
CO2 :	Able to compare, define and use the four types of NoSQL Databases.
CO3 :	Able to demonstrate an understanding of the detailed architecture, define objects, load the data, and execute the data
CO4 :	Able to implement various column store internals and design Schema, implement CRUD operations, distributed data operations
CO5 :	Able to create and use an Application with Graph Data model

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Document Database (NoSQL)	√				
2	Data Models in NoSQL		√			
3	Storage Replica of NoSQL			√		
4	Working with Document Data using MongoDB			√		
5	Executing CRUD operation using MongoDB				√	
6	Managing Database using MongoDB					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	1	-	-	-	-	-	-	-	-	-
CO2	3	-	2	2	-	-	-	3	2	-	-	1	2
CO3	3	3	3	-	1	-	-	-	3	-	-	3	-
CO4	3	-	2	-	2	-	2	2	2	-	3	1	1
CO5	3	3	1	3	3	-	-	3	-	-	1	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA324 P: Document Databases (100 Marks)

Contact Hours: 03

Pre-requisite: Should know that Database Management Systems, Database and Data Structure concepts

Methodology & Pedagogy: During Practical sessions, students will be required to design and create an applications using NoSQL Databases.

Outline of the Course:

Week No	Practical	Description
1- 2	Introduction to MongoDB	Data modelling in MongoDB, Advantages of MongoDB over RDBMS, Installation of MongoDB, Mongo Shell, Configuration file in MongoDB, JSON File format for storing documents, Datatypes available in MongoDB, MongoDB through the JavaScript's Shell
3 - 4	Documents, collections	Introduction to Documents, Collections, Database Commands in Mongoddb, Inserting and Saving Documents, Inserting multiple documents
5 - 6	CRUD operations, Indexing	Updating Documents, Removing Documents, Document Replacement, Operator and Modifiers
7 - 8	Querying	Viewing available data and collections, querying data using limit and skip functions, retrieving single document
9 - 10	Aggregation framework, Pipeline operations	Aggregation Framework, Pipeline Operations- \$match, \$sort , \$group , \$project
11 - 12	Database operations	Backup and restore, Export and import of data, Importing from JSON file

Total Hours (Practical): 36

Total Hours: 36

Core Books:

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Author: Sadalage, P. & Fowler, Publication: Pearson Education.

Reference Books:

1. Redmond, E. & Wilson, Author: Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition: 1st Edition.
2. Getting started with NOSQL by Gaurav Vaish, PACKT.
3. Guy Harrison, Next Generation Database: NoSQL and big data, Apress.
4. Definite Guide to MongoDB by Eelco Plugge, Peter Membrey and Tim Hawkins, Apress.
5. NOSQL theory and Examples by Piotr fulmanski, Simple introduction series: e-book.

Web References:

1. <https://www.javatpoint.com/mongodb-tutorial> [MongoDB Tutorial - Javatpoint]
2. https://www.tutorialspoint.com/neo4j/neo4j_data_model.htm [Neo4j - Data Model (tutorialspoint.com)]
3. <https://appinventiv.com/blog/hbase-vs-cassandra/> [HBase vs Cassandra: Which is The Best NoSQL Database (appinventiv.com)]
4. <https://www.mongodb.com/docs/manual/>

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Gain proficiency in working with data stored in BSON and JSON formats, enabling effective handling of MongoDB data structures.
CO2 :	Develop skills to create, manage, and manipulate documents in MongoDB for real-world applications.
CO3 :	Acquire comprehensive knowledge and expertise in performing Create, Read, Update, and Delete (CRUD) operations to manage data efficiently.
CO4 :	Learn to design and implement Aggregation Pipelines and leverage the Compass utility for visualizing and analyzing MongoDB data.
CO5 :	Develop a deep understanding of advanced database operations to ensure effective data management and optimization in MongoDB.

Course Outcomes Mapping:

Week No.	Week Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to MongoDB	√				
2	Documents, collections		√			
3	CRUD operations, Indexing			√		
4	Querying			√	√	
5	Aggregation framework, Pipeline operations			√	√	
6	Database operations					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	1	-	-	-	-	-	-	-	-	-
CO2	3	-	2	2	-	-	-	3	2	-	-	1	2
CO3	3	3	3	-	1	-	-	-	3	-	-	3	-
CO4	3	-	2	-	2	-	2	2	2	-	3	1	1
CO5	3	3	1	3	3	-	-	3	-	-	1	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA325 : Foundation of Data Science (100 Marks)

Contact Hours: 04

Pre-requisite: OBCA130- Database Fundamentals

Methodology & Pedagogy: During theory sessions topics related to Data Science will be covered with suitable examples. During Practical Sessions, students will be required to develop small applications related to reading, cleaning, analysis and visualization. Student will also get exposure of model building using machine learning algorithms. Student will get in-depth knowledge of Data Science based real applications using case study approach.

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Hours
		Theory
1	Overview of Data Science	07
2	Mathematics and Statistics in Data Science	09
3	Data Collection and Preparation	08
4	Data Plotting and Visualization	08
5	Machine Learning for Data Science	10
6	Data Science Applications and future trends	06

Total Hours (Theory): 48

Total Hours: 48

Detailed Syllabus:

Unit -I: Overview of Data Science

Hours: 07

Introduction to Data Science, Definition and description of Data Science, history and development of Data Science, Need of Data Science, Data Science Process, Prerequisites for Data Scientist, Components of Data Science, Tools and Skills needed.

Unit -II: Mathematics and Statistics in Data Science

Hours: 09

Linear Algebra, Calculus, Descriptive and Inferential Statistics, Central Tendency, Measure of Variability, Probability, Implementation using Python.

Unit -III: Data Collection and Preparation

Hours:

08

Introduction to Data Preprocessing, Data types and forms, Possible data error types, Consistent Data,
Data Cleaning - Filling Missing Values, smoothing noisy data, Detecting and removing outliers,
Data Integration, Data transformation- Rescaling, Normalizing data, Standardizing data, Implementation Using Python.

Unit -IV: Data Plotting and Visualization

Hours: 08

Introduction to Data Visualization, Visual encoding, Basic plots using Python, Data Visualization libraries in Python.

Unit -V: Machine Learning for Data Science

Hours:

10

Overview of Machine Learning- Supervised, Unsupervised, Semi-Supervised and Reinforcement Learning
Regression Methods – Simple Linear Regression, Multiple Linear Regression, Classification Methods- Logistic Regression, Naïve Bayes, Clustering Method- k-means clustering

Unit -VI: Data Science Applications and future trends

Hours:

06

Applications- Manufacturing, Personalization, Medical Image Analysis, Internet Search, Genomics, Speech Recognition, Advertising, Financial Fraud Detection, Airline Route Planning, Cyber-threats, transportation, gaming, recommendation system

Core Books:

1. Sanjeev J, Wagh, Manisha S. Bhende, Anuradha D. Thakare : Fundamentals of Data Science: First Edition: CRC Press : 2023
2. Dr. Gypsy Nandi, Dr.Rupamkumar Sharma: Data Science Fundamentals and Practical Approaches: BPB Publications:2020

Reference Books:

1. Parikshit Narendra Mahalle, Gitanjali Rahul Shinde, Priya Dudhale Pise, Jyouti Yogesh Deshmukh:
Foundation of Data Science for Engineering Problem Solving: Springer:2022
2. K.G.Srinivasa,G.M.Siddesh,ChetanShetty,SowmyaB.J:Statistical Programming in R: First Edition: Oxford Press: 2017.
3. Lillian Pearson : Data Science for Dummies, :John Willey & Sons:2015
4. Rachel Schutt, Carthy O'Neil: Doing Data Science: First Edition:O'Reilly: 2014.

Web References:

1. <https://www.cs.cornell.edu/jeh/book.pdf> [Foundation of Data Science E-book]
2. <https://www.edureka.co/blog/math-and-statistics-for-data-science/> [Essentials Mathematics and Statistics of Data Science]

3. https://www.w3schools.com/datascience/ds_analyze_data.asp [Data Preparation using tools]
4. <https://www.kdnuggets.com/2022/06/plotting-data-visualization-data-science.html> [Data Plotting and Visualization]
5. <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [Machine Learning Algorithms]
6. <https://www.geeksforgeeks.org/major-applications-of-data-science/> [Applications of Data Science]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Able to understand fundamentals of Data Science.
CO2 :	Able to use mathematics and statistical techniques for Data Science Applications
CO3 :	Able to apply data preparation and visualization techniques.
CO4 :	Able to build model using machine learning techniques.
CO5 :	Able to understand applications and future trends of Data Science.

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Overview of Data Science	√				
2	Mathematics and Statistics in Data Science		√			
3	Data Collection and Preparation			√		
4	Data Plotting and Visualization			√		
5	Machine Learning for Data Science				√	
6	Data Science Applications and future trends					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1	1	1	1	1	-	-	1	-	1	2	-
CO2	3	3	2	3	-	3	-	-	-	-	1	2	-
CO3	2	3	2	3	-	3	-	-	-	-	1	2	-
CO4	3	3	3	3	-	3	-	-	-	-	2	3	-
CO5	1	1	1	-	-	1	-	-	3	-	-	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA325 P- Foundation of Data Science (100 Marks)

Practical Syllabus

Contact Hours: 03

Pre-requisite courses: OBCA130- Database Fundamentals

Methodology & Pedagogy: Students will participate in practical tasks intended to enhance theoretical knowledge throughout sessions. From basic to intricate projects, they will learn various tools used for solving data science problems. To improve data analytical skills and problem-solving abilities, sessions will incorporate guided exercises, live demos of data processing and analysis using specialized tools, and developing machine learning based models to solve complex problems of data science.

Outline of the Course:

Week No	Practical	Description
1	General concepts of Python programming for Data Science	Creating simple applications using Python to form basis of programming for data science.
2 - 3	Programs based on NumPy	Introduction and Application of NumPy in data science. Writing Python code using NumPy to work with arrays.
4	Mathematical and Statistical Functions	Working with NumPy to solve mathematical and statistical problems such as operations on matrices, and descriptive and inferential Statistics.
5	Understanding the Data Set and Finding General Information from Dataset	Obtaining and creating data sets for data science project. Accessing data sets using Python programs. Analyzing metadata of data set.
6 - 7	Programs based on Pandas	Working on data sets using Pandas for performing basic operations. Programs based on Pandas series and data frames.
8 - 9	Data preprocessing	Writing programs for data cleaning operations such as filling missing values, smoothing noisy data, and detecting and removing outliers. Implementation of data integration, such as data transformation- rescaling, normalizing data, and standardizing data.

10 - 11	Data Visualization	Working with data visualization libraries of Python. Writing code for visual encoding, and basic plots using Python.
12	Demonstration of Machine Learning Algorithm Execution	Using machine learning algorithms such as linear regression, logistic regression, and Naïve Bayes classifiers to solve real life problems of data science.

Total Hours (Practical): 36

Total Hours: 36

This syllabus focuses on translating theoretical concepts into practical applications, providing students the skills to develop solutions of problems such as gathering, analyzing, interpreting, and summarizing the data.

Core Books:

1. Sanjeev J, Wagh, Manisha S. Bhende, Anuradha D. Thakare : Fundamentals of Data Science: First Edition: CRC Press : 2023
2. Dr. Gypsy Nandi, Dr.Rupamkumar Sharma: Data Science Fundamentals and Practical Approaches: BPB Publications:2020

Reference Books:

1. Parikshit Narendra Mahalle, Gitanjali Rahul Shinde, Priya Dudhale Pise, Jyouti Yogesh Deshmukh: Foundation of Data Science for Engineering Problem Solving: Springer:2022
2. K.G.Srinivasa,G.M.Siddesh,ChetanShetty,SowmyaB.J: Statistical Programming in R: First Edition: Oxford Press: 2017.
3. Lillian Pearson: Data Science for Dummies: John Willey & Sons:2015
4. Rachel Schutt, Carthy O'Neil: Doing Data Science: First Edition: O'Reilly: 2014.

Web References:

1. <https://www.cs.cornell.edu/jeh/book.pdf>
[Foundation of Data Science E-book]
2. <https://www.edureka.co/blog/math-and-statistics-for-data-science/> [Essentials Mathematics and Statistics of Data Science]
3. https://www.w3schools.com/datascience/ds_analyze_data.asp
[Data Preparation using tools]
4. <https://www.kdnuggets.com/2022/06/plotting-data-visualization-data-science.html> [Data Plotting and Visualization]
5. <https://www.simplilearn.com/10-algorithms-machine-learning-engineers-need-to-know-article> [Machine Learning Algorithms]
6. <https://www.geeksforgeeks.org/major-applications-of-data-science/>
[Applications of Data Science]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Able to understand fundamentals of Data Science.
CO2 :	Able to use mathematics and statistical techniques for Data Science Applications
CO3 :	Able to apply data preparation and visualization techniques.
CO4 :	Able to build model using machine learning techniques.
CO5 :	Able to understand applications and future trends of Data Science.

Course Outcomes Mapping:

Week No.	Practical	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	General concepts of Python programming for Data Science	√				
2 - 3	Programs based on NumPy		√			
4	Mathematical and Statistical Functions		√			
5	Understanding the Data Set and Finding General Information from Dataset			√		
6 – 7	Programs based on Pandas			√		
8 - 9	Data preprocessing			√		
10 – 11	Data Visualization			√		
12	Demonstration of Machine Learning Algorithm Execution				√	√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1	1	1	1	1	-	-	1	-	1	2	-
CO2	3	3	2	3	-	3	-	-	-	-	1	2	-
CO3	2	3	2	3	-	3	-	-	-	-	1	2	-
CO4	3	3	3	3	-	3	-	-	-	-	2	3	-
CO5	1	1	1	-	-	1	-	-	3	-	-	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA327: Object Oriented Programming using JAVA

(100 Marks)

Contact Hours: 04

Pre-requisite: Basic Knowledge of Introduction to Programming in C and OOPs concepts.

Methodology & Pedagogy: During theory lectures illustrations emphasizing the need for Object Oriented Programming concepts will be discussed. Emphasize will be given on Core Java concepts, various Java packages, Multithreading and Collection Frameworks. During Practical sessions, students will be required to develop different Java programs, develop simple to intermediate level applications on Java platform.

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Hours
		Theory
1	Introduction to Object Oriented Programming in Java	07
2	Fundamental programming structures in java	08
3	Inheritance, Abstract class, and Interface	09
4	Packages and Wrapper Classes	08
5	Exception handling and Multithreading	08
6	Basics of Collections Framework	08

Total Hours (Theory): 48

Total Hours: 48

Detailed Syllabus:

Unit - I: Introduction to Object Oriented Programming in Java **Hours**
07

Programming Paradigms (Procedure Oriented and Object Oriented), Object Oriented Programming concepts, comparison of POP and OOP, Introduction to Java programming language, History of Java, Features of Java, Structure of Java program, creating an application in Java, Compiling and executing applications in java, command line arguments.

Unit - II: Fundamental programming structures in java **Hours**
08

Data types, Variables, Literals, Control & Looping Structure, break, continue and return, Arrays, for-each loop, defining a class in Java, creating objects, Instance variables, methods, and its overloading, use of toString (), method of String class, Constructors and its

overloading, this keyword, Objects as Parameters, returning objects, static members, Initializer blocks, Garbage collection and finalize method.

Unit - III: Inheritance, Abstract class, and Interface

Hours 09

Inheritance and its types, method overriding, final keyword, super keyword, Abstract class and abstract methods, Interfaces, Runtime Polymorphism, Introduction to Anonymous Class.

Unit - IV: Packages and Wrapper Classes

Hours 08

Defining a Package, finding packages and CLASSPATH, Important of Packages, Access protection, importing packages, Wrapper Classes, Boxing and Unboxing conversions.

Unit - V: Exception handling and Multithreading

Hours 08

Fundamentals of Exception Handling, Types of Exceptions, keywords used in Exception handling, Multiple catch clauses, Nested try Statements, Java Built in Exceptions, User Defined Exceptions, The Java Thread Model, creating a thread, Creating Multiple Threads, Thread class and the Runnable Interface, Priorities, synchronization, Inter thread communication.

Unit - VI: Basics of Collections Framework

Hours 08

The Collections Framework Overview, Collection Interfaces- Collections, List, Set, Sorted Set, Deque, The Collection classes- Array List, Linked List, Vector, Hash Set, Tree Set, Priority Queue. Accessing a collection using an Iterator, ListIterator and Enumeration, Map Interfaces and Classes: Map, Map Entry, SortedMap, and NavigableMap, HashMap, LinkedHashMap, TreeMap, Comparable & Comparator Interface.

Core Books:

1. Pravin M. Jain: The class of JAVA, Pearson Education, 2011.
2. Herbert Schildt: The Complete Reference Java J2SE, 5th Edition, TMH Publishing Company Ltd, New Delhi.

Reference Books:

1. Ivor Horton: Beginning Java JDK, 5th Edition, Wiley Press, 2008.
2. Cay Horstmann and Gary Cornell: Core Java Volume 1, 8th Edition or later, Pearson Education, 2008.
3. Ken Arnold, James Gosling and David Holmes: The Java Programming Language, 4th Edition, Addison Wesley.

Web References:

1. <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-092introductiontoprogramming-in-java-january-iap-2010/lecture-notes/> [Lecture Notes in PDF]
2. <http://www.javatpoint.com/java-tutorial> [Notes]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	To understand basic of Object Oriented Concepts, Java Buzz Words and application of Java, execution environment in IDEs i.e. NetBeans & Eclipse .
CO2 :	To understand basic syntax and semantics of Java, structure of java.
CO3 :	Learning Inheritance, Abstract class and Interface to understand how the java works ethically .
CO4 :	To gain understanding creating packages and how to import packages , creating application using multithreading & exception handling.
CO5 :	To learn classes and interfaces of collections Framework

Course Outcomes Mapping:

Unit No.	Unit Name	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Object Oriented Programming in Java	√	√			
2	Fundamental programming structures in java		√			
3	Inheritance, Abstract class, and Interface			√		
4	Packages and Wrapper Classes			√	√	
5	Exception Handling and Multithreading				√	
6	Basics of Collections Framework					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	2	2	2	-	-	-	1	-	3	3
CO2	3	3	2	3	3	3	-	-	-	1	-	3	3
CO3	2	2	2	3	2	2	-	-	-	2	-	2	2
CO4	3	3	3	3	2	3	-	-	-	2	-	2	2
CO5	3	3	3	3	3	3	-	-	-	1	-	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA327 P: Object Oriented Programming using JAVA (100 Marks)

Contact Hours: 03

Prerequisites: Basic Knowledge of Introduction to Programming in C and OOPs concepts.

Methodology, Pedagogy: Practical session covered the development of different Java programs, develop simple to intermediate level applications on Java platform.

Outline of the Course:

Week No	Practical	Description
1	Introduction to Programming using Java	Structure of Java Program, writing, saving and executing program in Java. Writing first Java program, Compiling and Executing Java program; Variables in Java, Declaring and initializing variables in Java. Command line arguments in Java.
2-3	Basic of Programming Constructs in Java.	Basic data types in Java. Control & Looping Structure, Operators - arithmetic, relational, logical, assignment, increment - decrement, conditional, Bitwise and special operators. Array implementation in Java. Creating objects, constructors and methods. Overloading constructors and methods. String class methods, this keyword in Java.
4-5	Inheritance and Interface.	Implementing inheritance in Java. Method overriding, abstract keyword, final keyword and Interface implementation.
6-7	Packages and Wrapper classes in Java.	Understanding Access Protection and implementing packages in Java. Understanding autoboxing and unboxing and implementing Wrapper classes in Java.
8-9	Exception handling and multithreading.	Understanding significance of handling exceptional situations using Java and implementing multithreading using Java using Thread class and Runnable interface.

10-11	Collection Framework classes implementation and introduction to IDE.	Introduction to collection framework interfaces, classes, and their implementation. Introduction to IDE, IntelliJ for building Java Applications.
12	Developing various Java applications using IDEs.	Developing various Java based applications using IDE.

Total Hours (Practical): 36

Total Hours: 36

Core Books:

1. Pravin M. Jain: The class of JAVA, Pearson Education, 2011.
2. Herbert Schildt: The Complete Reference Java J2SE, 5th Edition, TMH Publishing Company Ltd, New Delhi.

Reference Books:

1. Ivor Horton: Beginning Java JDK, 5th Edition, Wiley Press, 2008.
2. Cay Horstmann and Gary Cornell: Core Java Volume 1, 8th Edition or later, Pearson Education, 2008.
3. Ken Arnold, James Gosling and David Holmes: The Java Programming Language, 4th Edition, Addison Wesley.

Web References:

1. <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-092introductiontoprogramming-in-java-january-iap-2010/lecture-notes/> [Lecture Notes in PDF]
2. <http://www.javatpoint.com/java-tutorial> [Notes]

Course Outcomes: Upon successful completion of the course, the students will:

CO1 :	To understand basic of Object Oriented Concepts, Building Java applications using notepad. Compiling and executing Java programs and taking input as command line argument.
CO2 :	To understand Programming constructs of Java and implement constructors using Java. Creating objects and implementing arrays in Java.
CO3 :	Learning Inheritance, Abstract class and Interface to understand how the java works ethically .
CO4 :	To gain understanding creating packages and how to import packages , creating application using multithreading & exception handling.
CO5 :	To learn classes and interfaces of collections Framework and Get exposure to various IDEs for building Java applications.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Programming using Java	√				
2-3	Basic of Programming Constructs in Java.		√			
4-5	Inheritance and Interface.			√		
6-7	Packages and Wrapper classes in Java.				√	
8-9	Exception handing and multithreading				√	
10-11	Collection Framework classes implementation and introduction to IDE.					√
12	Developing various Java applications using IDEs.		√	√	√	√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	2	2	3	2	2	2	1	1	3	3
CO2	3	3	3	2	3	3	3	3	3	3	3	3	3
CO3	2	2	3	2	2	3	2	2	2	1	1	3	2
CO4	3	3	3	3	3	3	3	3	3	2	3	3	2
CO5	3	3	3	3	3	3	3	3	3	2	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA328 : Fundamentals of Visual Programming (100 Marks)

Contact Hours: 04

Pre-requisite: Basic knowledge of programming language.

Methodology & Pedagogy: During theory lectures illustrations emphasizing the need for advanced features of .Net framework and to develop windows and web based application using C# language will be given. During Practical sessions, students will be required to develop Web Applications and Desktop Applications using concepts discussed during class.

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Hours
		Theory
1	Introduction of .NET Framework	07
2	Object-Oriented Programming with C#.NET	09
3	Introduction To Windows Forms	08
4	Introduction To ADO.NET	08
5	WPF and Advanced Features of .NET	08
6	Web Applications	08

Total Hours (Theory): 48

Total Hours: 48

Detail Syllabus:

Unit I: Introduction of .NET Framework

Hours 07

Introducing .NET Framework, .NET Framework Component, .NET Framework Version Compatibility, Core of .NET Framework: Application Services, Base Class Library and CLR, Types of Applications which can be developed using MS.NET, MS.NET Base Class Library, MS.NET Namespaces, Common Language Runtime (CLR), Managed Code, MS.NET Memory Management/Garbage Collection, Common Type System (CTS), Common Language Specification (CLS), Types of JIT Compilers

Unit II: Unit II: Object-Oriented Programming with C#.NET

Hours 09

Overview of Object-Oriented Programming, Principles of Object Orientation programming: Encapsulation, inheritance, polymorphism, Object, Defining Properties, Using Auto- Implemented Properties, Defining Methods, Understanding Constructors, Defining and Implementing Interfaces, Understanding the Role of Interfaces in .NET. C# Datatypes & Variables Declaration, Implicit and Explicit Casting, Checked and Unchecked

Blocks – Overflow Checks, Boxing and Unboxing, Operators, Control Statements, Working with Arrays, C# Application Basics: Command line and VS.NET compilation.

Unit III: Introduction To Windows Forms

Hours 08

Building Windows Forms Applications, Setting Form Properties, Understanding the Life-cycle of a Form, Using the Windows Forms Designer, MessageBox Class and .config File, Working with Windows Forms Controls: TextBox, Button, Selection, List, DateTimePicker, Container, Image, Timer, ErrorProvider, TooltipProvider, Dialog box (ColorDialog, FolderBrowserDialog, OpenFileDialog, SaveFileDialog, FontDialog), MenuStrip, Handling Events: Understanding the Event-Driven Programming Model, Writing Event Handlers, Sharing Event Handlers, MDI, SDI.

Unit IV: Introduction To ADO.NET

Hours 08

Evolution of ADO.NET, Understanding the ADO.NET Object Model, Connected vs. Disconnected Access, Use of Connection, Command, DataReader, DataAdapter and Dataset class, Exceptional Handling.

Unit V: WPF and Advanced Features of .NET

Hours 08

Overview of WPF, Features of WPF, Windows Forms vs WPF, Introduction to XAML, WPF Layout: Grid Panel, Stack Panel, Dock Panel, Wrap Panel and Canvas Panel, WPF Controls: TextBlock, PasswordBox, ListBox, Slider, Popup, Menus and Expander, Animation using WPF, Introduction to MVC, Custom Controls, Introduction to Multithreading.

Unit VI: Web Applications

Hours 08

Basic of Http Request and Http Response. o Understand form Tag and Comparison between Get and Post. ASP.NET Page Life Cycle. Structure of an ASP.NET Page: ASPX Page, Code behind File, Web config and Machine config, Rich Web Control, Validation Controls. State Management Techniques o Client side: ViewState, Hidden Field, Cookie , Server Side: ApplicationState, Session.**Core Books:**

1. Christian Nagel : Professionals C# and .NET 2021 Edition , Wiley – India, WROX
2. Albahani Josheph: C# 4.0 Pocket Reference, Shroff publication,2010

Reference Books:

1. Jon Skeet, C# in Depth, Managing Publication,2010
2. Drayton David: C# Language Pocket Reference, Shroff publication,2005

Web References:

1. <http://csharp.net-informations.com/> [to learn C# and .NET fundamentals]
2. <http://www.wpftutorial.net/> [to learn WPF]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Understanding .NET Framework core features and Components.
CO2 :	To develop object oriented programming skills using C#.
CO3 :	To develop windows and web based application using core feature of .NET framework and C# language.
CO4 :	Access and manipulate data in a Microsoft SQL Server database by using Microsoft ADO.NET.
CO5 :	Use modern approach to build windows based application using WPF.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to .NET framework	√				
2	Basics of Object Oriented programming skills using C#		√			
3	Building desktop application			√		
4	Web programming fundamentals			√		
5	Database connectivity through ADO.NET				√	
6	Building WPF application					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	3	-	2	1	-	-	1	1	2	-
CO2	2	3	2	2	-	3	2	-	-	2	-	1	-
CO3	2	3	3	2	-	2	2	-	-	2	1	2	1
CO4	2	3	3	2	-	3	3	-	-	2	2	2	1
CO5	-	3	3	-	-	-	-	-	-	-	1	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA328 P- Fundamentals of Visual Programming Practical

(100 Marks)

Practical Syllabus

Contact Hours: 03

Pre-requisite courses: A fundamental understanding of object-oriented programming ideas, familiarity with basic data structures, and a basic command of programming languages.

Methodology & Pedagogy: Students will participate in practical tasks intended to enhance theoretical knowledge throughout sessions. From basic to intricate projects, they will create desktop and online apps. To improve programming skills and problem-solving abilities, sessions will incorporate peer critiques, guided exercises, live code demos, and debugging approaches.

Outline of the Course:

Week No	Practical	Description
1- 2	Introduction to .NET Framework and Console-based Applications	Hands-on with setting up the .NET environment, exploring the IDE, writing simple .NET applications, understanding core components like CLR, CTS, and BCL, and creating basic console-based applications.
3 - 4	Basics of Object-Oriented Programming and Console-based Applications	Writing C# programs to practice OOP principles: encapsulation, inheritance, and polymorphism. Implementing interfaces, constructors, and auto-implemented properties. Extending exercises with console-based applications to demonstrate these principles.
5 - 6	Building Desktop Applications	Creating Windows Forms applications. Working with forms, controls, and events. Building a basic desktop application using TextBox, Buttons, and List controls.
7 - 8	Web Programming Fundamentals	Developing ASP.NET web forms with controls. Understanding HTTP Request/Response, GET vs POST, and building a simple web page using ASP.NET life cycle.
9 - 10	Database Connectivity through ADO.NET	Connecting applications to a database using ADO.NET. Performing CRUD operations with

		the Connection, Command, DataReader, and DataAdapter objects.
11 - 12	Building WPF Applications	Creating a WPF application using XAML. Working with layouts like Grid and StackPanel, and exploring controls such as TextBox, ListBox, and Slider.

Total Hours (Practical): 36

Total Hours: 36

This syllabus focuses on translating theoretical concepts into practical applications, providing students with the skills to develop both desktop and web-based solutions.

Core Books:

1. Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner: Professional C# 2019 and .NET 4.5, Wiley – India, WROX, 2019. Asok N Kamthane, Pearson, Programming in C
2. Kogent Learning Solutions: C# Programming Black Book, Dreamtech Publication, 2018
3. Cogent Solutions Inc.: ASP.Net 4.5 Black book, Dreamtech press, 2019

Reference Books:

1. E. Balagurusamy: Programming in C# a primer, McGraw Hill Publication, 2018
2. John Paul Mueller, Bill Sempf, Chuck Sphar: C# 7.0 All-in-One for Dummies, Wiley, 2018
3. Bolton, Justin Langford, Glenn Berry, Gavin Payne, Amit Banerjee, Rob Farley: Professional SQL Server 2019 internals and troubleshooting, Wiley India publication, October, 2019.

Web References:

1. [https:// docs.microsoft.com/en-us/dotnet/csharp/](https://docs.microsoft.com/en-us/dotnet/csharp/) [Official C# documentation]
2. <https://visualstudio.microsoft.com/vs/> [Software download]
3. <https://www.tutorialsteacher.com/csharp>
4. <https://www.tutorialsteacher.com/csharp/object-oriented-programming>
5. <https://www.javatpoint.com/asp-net-tutorial>

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Understanding .NET Framework core features and Components.
CO2 :	To develop object oriented programming skills using C#.
CO3 :	To develop windows and web based application using core feature of .NET framework and C# language.
CO4 :	Access and manipulate data in a Microsoft SQL Server database by using Microsoft ADO.NET.
CO5 :	Use modern approach to build windows based application using WPF.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to .NET Framework and Console-based Applications	√				
2	Basics of Object-Oriented Programming and Console-based Applications		√			
3	Building Desktop Applications			√		
4	Web Programming Fundamentals			√		
5	Database Connectivity through ADO.NET				√	
6	Building WPF Applications					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	3	-	2	1	-	-	1	1	2	-
CO2	2	3	2	2	-	3	2	-	-	2	-	1	-
CO3	2	3	3	2	-	2	2	-	-	2	1	2	1
CO4	2	3	3	2	-	3	3	-	-	2	2	2	1
CO5	-	3	3	-	-	-	-	-	-	-	1	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA329: Introduction to Multi-Paradigms Programming language (100 Marks)

Contact Hours: 03

Pre-requisite courses: OBCA123: Foundation of Programming, OBCA129: Fundamentals of Object Oriented Programming.

Methodology & Pedagogy: During the practical session student will learn how to write Python Programs and then start implementing various programming constructs. Through the implementations of various datatypes implementation student's will realize significance of high level language. Student will learn how to create user defined function and using them. Under object oriented programming students will learn creation of class, instance and implementation of inheritance.

Outline of the Course:

Week No	Practical	Description
1 - 2	Introduction to Python: Running Python, Python Documentation, Python Basics- The print statement, comment, statements and syntax, variable assignments, identifier. Python standard types: Number, String.	Students can learn executing first program of Python. Students start familiar with printing statement in Python, declaring variable and also valid identifier in Python. Then Students will learn Number and String type in Python.
3 - 4	Conditional and looping statements in Python: If - else, if-elif-else, conditional expressions, while, for, break, continue, pass.	Usage of Conditional statements and Looping statements.
5 - 6	Python Sequence types: List, Tuple, Dictionary, Set	Implementations of sequence types List, tuple, dictionary and set with built-in functions and various operations.
7 - 8	Functional Programming: Creating function, Calling function, different types of arguments, Scope of variables.	Creating and using functions with different types of arguments and scope of variable.
9 - 10	Object Oriented Programming: Class, Class attributes, Instance, instance attributes, bind and class methods, abstraction, encapsulation, polymorphism, inheritance.	Crating class, instantiating class, defining various members of class. Implementing constructor. Developing programs using OOPS concepts.

11 - 12	Various important package coverages: Numpy and Pandas.	Introducing concept of data frame and its usage: Reading csv file, manipulating data frame and performing various operations on it using Pandas. Working with arrays using numpy .
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Total Hours (Practical): 36

Total Hours: 36

Core book:

1. Megnus Lie Hetland: Beginning Python from novice to professional, 2017 edition, Apress.
2. Wesley J. Chun: Core Python Programming, 2nd edition, Pentice Hall, 2006.

Reference book:

1. Richard L. Halterman: Learning to Program with Python, Southern Adventist University 2011.
2. Mark Lutz: Programming Python, 4th Edition, O'reilly, 2011.
3. Steve Holden: Python Web Programming, 1st edition, 2002.

Web material:

1. <https://www.python.org/about/gettingstarted/> [For beginners of Python]
2. <http://ocw.mit.edu/courses/electrical-engineering-and-computerscience/6-189-agentleintroduction-to-programming-using-pythonjanuary-iap-2008/> [Python Materials]
3. http://people.cs.aau.dk/~normark/prog303/html/notes/paradigms_them.esparadigmoverview-section.html [Overview of Programming Paradigms]
4. <https://docs.python.org> [Python Documentation]

Course Outcome (COs): At the end of the course, the students will be able to

CO1	Able to understand execute python program and implementation of basic number and string types supported by Python.
CO2	Able to learn programming constructs, conditional statements and looping statements.
CO3	Able to implement list, tuple, dictionary and set types supported by Python.
CO4	Able to create functions and implement object oriented programming in Python.
CO5	Able to use packages numpy and pandas in Python.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to Python	√				
2	Using various programming constructs		√			
3	Sequence types: List, Tuple, Dictionary, Set			√		
4	Creating and using Functions				√	
5	Object Oriented Programming using Python				√	
6	Implementation using Pandas and Numpy					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	2	2	1	2	2	2	1	1	3	2
CO2	3	3	3	2	3	3	2	2	2	2	2	3	2
CO3	2	2	3	3	3	2	2	2	2	1	1	3	2
CO4	3	3	3	3	3	3	3	3	3	2	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3
CO6	2	2	3	2	2	1	2	2	2	1	1	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OHS131.02 C: Communication and Soft skills (100 Marks)

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	30/15	--	30/15	02
Marks	--	100	--	100	

Pre-requisite courses:

- Communicative English

Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	An Introduction to Communication	06
2.	Cross-cultural Communication and Globalization	03
3.	Communication for Career Building	10
4.	Group Dynamics and Soft Skills	05
5.	Effective Presentation Strategies	04
6.	Contemporary Issues in Communication and Soft Skills	02
	Total hours (Theory) :	--
	Total hours (Practical) :	30
	Total hours :	30

Detailed Syllabus:

1.	An Introduction to Communication	06 Hours	20%
	Basics of Communication: Origin, Concept, Process, Levels, Principles and Barriers; Applications of Communication; Rhetoric in Professional Communication; Importance of Ethos, Logos, and Pathos in Communication		
2.	Cross-cultural Communication and Globalization	03 Hours	10%
	Basic Concepts: Culture, Globalization and Cross-cultural Communication; Social and People Skills; Communicating with People of Different Cultures; Conflicts in Cross-cultural Communication and Tactics / techniques to resolve them; Persuasive Communication		
3.	Communication for Career Building	10 Hours	33%
	Cover Letters and Resume; E-mail and Report; Types of Resume; Concept and Rationale of Group Discussion Skills and Aspects assessed in Group Discussion; Concept and Rationale of Personal Interview; Types of Personal Interview; Writing Statement of Purpose		
4.	Group Dynamics and Soft Skills	05 Hours	17%
	An Introduction to Group Dynamics and Soft Skills; Groups and their Structures; Roles and Functions of Members in Groups; Conflict Management; Aptitude and Attitude; Various Intelligences; Developing an Open Mindset		
5.	Effective Presentation Strategies	04 Hours	14%
	Designing Appealing Presentation; Audience Analysis and Supporting Material; Presentation Mechanics and Presentation Process; Managing Yourself during Q and A Session; Fundamentals of Persuasion		
6.	Contemporary Issues in Communication and Soft Skills	02 Hours	06%
	Trends and Practices in Communication, Case Studies		

Recommended Study Material:

❖ Text book:

1. Koneru, A. Professional Communication, Tata McGraw Hill Education Private Limited
2. Disanza, J.R. & Legge, N. Business and Professional Communication, Pearson Education
3. Raman, M & Singh, P. Business Communication, Oxford University Press

❖ Reference book:

1. Disanza, J.R. & Legge, N. Business and Professional Communication, Pearson Education
2. Anandamurugan, A. Placement Interviews – Skills for Success, Tata McGraw Hill Education Private Limited

❖ Web material:

1. <https://www.coursera.org/learn/careerdevelopment>
2. <https://www.futurelearn.com/courses/writing-applications>
3. <https://www.futurelearn.com/courses/workplace-englis>

Course Outcome (COs): At the end of the course, the students will be able to

CO1	Gain thorough understanding and proficiency in various Professional Communication Skills.
CO2	Develop awareness and competence in cross-cultural communication in their personal, academic and professional environments.
CO3	Develop business writing and presentation skills to succeed in career.
CO4	Develop soft skills to stand out and take their career to the next level.
CO5	Develop various intelligences and open Mindset to function in multi-disciplinary and cross-cultural work environment.
CO6	Practice new trends in communication in multiple perspectives at personal, professional, and social level.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	3	-	-	-	2
CO2	-	-	-	-	-	-	-	-	3	-	-	-	2
CO3	-	-	-	-	-	-	-	-	3	-	-	-	2
CO4	-	-	-	-	-	-	-	-	3	-	-	-	2
CO5	-	-	-	-	-	-	2	-	3	-	2	-	2
CO6	-	-	-	-	-	-	-	-	3	-	-	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

DETAILED SYLLABUS

FOR

ONLINE BCA PROGRAMME
(6th SEMESTER)

EFFECTIVE FROM
ACADEMIC YEAR 2023-24

Teaching & Examination Scheme
Online Bachelor of Computer Applications (B.C.A.) Programme
(Choice Based Credit System)
Effective from Year 2023 - 24
Semester - VI

Semester - VI										
Course Code	Course Title	Teaching Scheme				Examination Scheme				
		Contact Hours			Credit	Theory		Practical		Total
		Theory	Practical	Total		Internal	External	Internal	External	
OBCA330	Basics of Mobile Applications	4	-	4	4	30	70	-	-	100
OBCA330 P	Basics of Mobile Applications - Practical	-	3	3	3	-	-	30	70	100
OBCA331	Software Testing	-	3	3	3	-	-	30	70	100
OBCA332	Minor Project	-	20	20	20	-	-	90	210	300
OHS132.03 C	Contributor Personality Development	-	2	2	2	-	-	30	70	100
Total		04	28	32	32	100		600		700

OBCA330 : Basics of Mobile Applications (200 Marks)

Contact Hours: 04

Pre-requisite: OBCA327 - Object Oriented Programming using JAVA

Methodology & Pedagogy: During theory lectures illustrations emphasizing the need for basic features of Mobile Computing and Android- the Mobile Application Development platform will be given. During Practical sessions, students will be required to develop Mobile Application using JAVA programming language in Android. Student shall also develop applications with elegant user interface that deal with data storage, documents sharing among applications.

Outline of the course:

Unit No.	Title of the Unit	Minimum Number of Hours
		Theory
1	Introduction Android and Android Development tools	08
2	User Interface – I	09
3	User Interface - II	09
4	Material Design	06
5	Application Data Handling	10
6	Web Services	06

Total Hours (Theory): 48

Total Hours: 48

Detail Syllabus:

Unit I: Introduction Android and Android Development tools **Hours 08**

Introduction to Mobile Applications and Android, Basics of Kotlin, setting up development environment, Dalvik Virtual Machine, Android Application Structure, DDMS, Android Manifest File, Gradle, Android permissions, APK, Basic Building blocks – Activities, Services, Broadcast Receivers & Content providers

Unit II: User Interface – I **Hours 09**

Working with Containers: LinearLayout, RelativeLayout, TableLayout, ScrollView, and FrameLayout, Fragment, Views: Toast, TextView, EditText, Button, ImageButton, CheckBox, ToggleButton, RadioButton, RadioGroup, ProgressBar, AutoComplete TextView, Components for communication -Intents & Intent Filters Intents: Explicit Intents, Implicit Intents, switching between activities and passing data between activities

using Intents, Logging

Unit III: User Interface - II

Hours 09

Calendar: Manage Date and Time, Adapters: ArrayAdapter, BaseAdapter ListView and ListActivity, GridView, Gallery Menus: Option menu, Context menu, Sub menu Tabs and TabActivity Alert Dialogs, Android Toolbar

Unit IV: Material Design

Hours

09

Android Design Support Library, Vector Drawables, Basics of material design components and principles, Android styles and themes, Animations and Transitions

Unit V: Application Data Handling

Hours 10

Basics of Storage in Android, Shared Preference: Save key-value data, Store Data in Database, store data in a firebase, save files on Device, Sharing of data

Unit VI: Web Services

Hours 06

Working with Web Service in Android, Deploying Web Service

Core Books:

1. Wei-Meng Lee: Beginning Android 4 Application Development, Wiley India Pvt Ltd.
2. Reto Meier: Professional Android 2 Application Development, Wrox publication
3. Mark L. Murphy: The Busy Coder's Guide to Android Development

Reference Books:

1. Dawn Griffiths, David Griffiths: Head First Android Development, O'REILLY publication
2. Mark L. Murphy: Beginning Android 2, APRESS publication
3. Mark L. Murphy: The Busy Coder's Guide to Advanced Android Development, Commons Ware, LLC

Web References:

1. <https://kotlinlang.org/> [Kotlin Tutorials]
2. <https://developer.android.com/guide/> [Android Tutorials]
3. www.vogella.com/tutorials/android.html [Android Practical Tutorials]
4. <https://www.androidhive.info/> [Android Practical Tutorials]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Be acquainted with Android OS
CO2 :	Be aware with Android Development Tools
CO3 :	Be able to create proper look and feel of mobile application
CO4 :	Be capable to create interactive mobile application that handle data
CO5 :	Be able to create mobile application that works web service.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction Android and Android Development tools	√				
2	User Interface – I		√			
3	User Interface - II			√		
4	Material Design				√	
5	Application Data Handling				√	
6	Web Services					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	3	-	2	1	-	-	2	-	-
CO2	2	-	3	-	2	1	-	-	2	2	3	2	1
CO3	-	3	-	2	-	1	3	2	-	-	-	3	3
CO4	2	1	2	2	2	1	2	-	2	-	2	2	3
CO5	-	2	2	3	1	-	2	2	2	2	-	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA330 P: Basics of Mobile Applications (100 Marks)

Contact Hours: 03

Pre-requisite: OBCA327 P - Object Oriented Programming using JAVA

Methodology & Pedagogy: During theory lectures illustrations emphasizing the need for basic features of Mobile Computing and Android- the Mobile Application Development platform will be given. During Practical sessions, students will be required to develop Mobile Application using JAVA programming language in Android. Student shall also develop applications with elegant user interface that deal with data storage, documents sharing among applications.

Detail Syllabus:

Outline of the Course (Practical):

Week No	Practical	Description
1	Kotlin, Toast	Kotlin Code Programs, Toast Messages “Hello World”
2	TextView, EditText, Activity, Intent	Use of Textview, EditText and Toast with Operations. Use of Activity and Intent for values.
3	Views, EditText, ViewBinding, findViewById, layouts	Create the calculator app and use proper controls, Handle the views without using findViewById
4	Implicit, Explicit Intent, Activity Life Cycle	Manage Student Information using Intent and also create the App to learn the activity life cycle.
5	Different Activities, UI, toggle button, progress bar	Splash Screen, Login and user creation as well as create the application for addition operation of two variables.
6	EditText, Button, String Operations	Create an app to perform the arithmetic operations using 4 buttons and convert the string by upper and lower case.
7	Explicit Intent, UI with functions	Create an application to share data with native mobile apps for browser, calling app and map also create app for advanced calculator with optimized code.
8	Shared Preference and UI with complete	Use shared Preferences for the session management and also create application for one college event using radio button, check boxes and spinners.

	application, Material design	
9	Images, Alert Dialog box	Create a dice roller app using dice images and use alert dialog for the messages in the application
10	AutoCompleteTextView, Menus	Create the application using AutocompleteTextView for Countries list. Also create the application with menus.
11	Adapters, Array Adapter, Base Adapter, ListView	Use the Spinner using Array Adapter. Create the app with student photos using base adapter
12	Alert Dialog, Back Press, File handling in android	Manage the back press event using alert dialog. Also create the application to manage data for internal and external file in mobile storage.
13	Types of Menu	Create an application with different types of Menus. Popup Menu Option Menu Context Menu
14	SQLite	Create the app for CRUD operations using SQLite.
15	Firebase	Create the app for authentication using firebase. Also create the app for data management in Firestore.

Total Hours (Practical): 36

Total Hours: 36

Core Books:

1. Wei-Meng Lee: Beginning Android 4 Application Development, Wiley India Pvt Ltd.
2. Reto Meier: Professional Android 2 Application Development, Wrox publication
3. Mark L. Murphy: The Busy Coder's Guide to Android Development

Reference Books:

1. Dawn Griffiths, David Griffiths: Head First Android Development, O'REILLY publication
2. Mark L. Murphy: Beginning Android 2, APRESS publication
3. Mark L. Murphy: The Busy Coder's Guide to Advanced Android Development, Commons Ware, LLC

Web References:

1. <https://kotlinlang.org/> [Kotlin Tutorials]
2. <https://developer.android.com/guide/> [Android Tutorials]
3. www.vogella.com/tutorials/android.html [Android Practical Tutorials]
4. <https://www.androidhive.info/> [Android Practical Tutorials]

Course Outcomes: Upon successful completion of the course, students will be,

CO1 :	Be acquainted with Android OS
CO2 :	Be aware with Android Development Tools
CO3 :	Be able to create proper look and feel of mobile application
CO4 :	Be capable to create interactive mobile application that handle data
CO5 :	Be able to create mobile application that works web service.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction Android and Android Development tools	√				
2	User Interface – I		√			
3	User Interface - II			√		
4	Material Design				√	
5	Application Data Handling				√	
6	Web Services					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	3	-	2	1	-	-	2	-	-
CO2	2	-	3	-	2	1	-	-	2	2	3	2	1
CO3	-	3	-	2	-	1	3	2	-	-	-	3	3
CO4	2	1	2	2	2	1	2	-	2	-	2	2	3
CO5	-	2	2	3	1	-	2	2	2	2	-	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA331: Software Testing (100 Marks)

Contact Hours: 3 Hours

Pre-requisite courses: Object oriented programming concepts.

Methodology & Pedagogy: The practical sessions will cover the software testing concepts and practices that support the production of quality software. The practical sessions will cover the application of testing techniques at various levels of testing using manual and automated testing tools.

Outline of the Course:

Week No	Practical	Description
1- 2	Introduction to testing, Checklist preparation	Student will be able to understand role of testing in real world and he/she can prepare checklist for given problem.
3 - 4	Manual Testing concepts: Understanding of Static testing and Dynamic testing	Student will be familiarize with methods of testing which can be applied by inspecting, reviewing, or preparing walkthroughs.
5 - 6	Creating test case from use case scenarios and test scenarios.	Students will going to learn difference between test case and test scenarios. They can also prepare checklists by using UML use case scenarios.
7 - 8	Hand-on exercise on concepts of levels of testing : Unit Testing with JUnit	Student will be familiarize with different concepts of Junit and perform unit testing with using the same.
9 - 10	Testing WebApp using selenium web driver with JAVA/Python	Student will be familiarize with different concepts of Web driver and perform web application testing with using the same.
11 - 12	Understanding of basics Mobile Application testing using Appium and Demonstration of defect tracking tool such as JIRA/ Cucumber etc.	Student will be able to understating basics of mobile application testing using Appium.

Total Hours (Practical): 36

Total Hours: 36

Core book:

1. Sagar Naik, Piyu Tripathy: Software Testing and Quality Assurance, Theory and Practice, Wiley, 2008.
2. Paul C. Jorgensen : Software Testing: A Craftsman's Approach, 4th Edition by , CRC press, Taylor and Francis Group, 2014
3. Roger S Pressman: Software Engineering – A Practitioner's Approach, 7th Edition, McGRAW HILL International Edition, 2010.

Reference book:

1. Mauro Pezze, Michael Young: Software testing and Analysis- Process, Principles and Techniques, Wiley India, 2012.
2. Boris Beizer: Software Testing Techniques: 2nd Edition, Van Nostrand Reinhold, 1990.
3. Daniel Galin: Software Quality Assurance, Pearson Education, 2004.
4. Ron Patton: Software Testing, Pearson Education, 2005.

Web material:

1. <http://tryqa.com/what-is-software-testing> [Basic of Software Testing]
2. <https://www.guru99.com/functional-testing.html> [Functional Testing]
3. <http://www.softwaretestinggenius.com/download/bgstpadmini.pdf> [Software Testing Life Cycle]

Course Outcome (COs): At the end of the course, the students will be able to

CO1	Able to understand role, principles of software testing.
CO2	Familiar with the structural techniques of testing.
CO3	Understand the concepts of creating test cases with respect to levels of testing.
CO4	Learn basics of Unit testing.
CO5	Learn basics of web application and mobile application testing.

Course Outcomes Mapping:

Week No.	Practical Title	Course Outcomes				
		CO1	CO2	CO3	CO4	CO5
1	Introduction to checklist preparation	√				
2	Creating test cases		√			
3	Writing test cases			√		
4	Familiar with Unit testing using Junit				√	
5	Understanding Selenium Web driver					√
6	Testing mobile app using Appium					√

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	3	2	2	3	2	2	3	2	2	2	3
CO2	3	2	2	2	3	2	2	1	1	2	1	1	1
CO3	3	2	2	1	2	3	2	1	1	1	2	1	1
CO4	3	2	1	1	2	2	2	2	1	2	1	2	1
CO5	3	3	2	1	2	1	2	1	2	2	1	2	2
CO6	3	2	3	2	2	3	2	2	3	2	2	2	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”

OBCA332: Minor Project

(300 Marks)

Contact Hours: 18

Objective:

The main objective of this mini project is to let the students apply the programming knowledge to a real-world situation/problem and exposed the students with specific programming skills and help in developing a working model in terms of application.

Course Outcomes:

CO1	Student will understand the implementation of concepts of SDLC and Software Engineering.
CO2	The programming concepts they learn during their academics, it will be converted in to the actual implementations.
CO3	Students will be exposed to understand the requirement of proposed software and implement these requirements in terms of programming logic and methods.
CO4	Students must understand the difference between a program and professional application/product/software.
CO5	Students will learn different categories of applications like Desktop application, Web applications, etc.

Guidelines:

Mini Project is in house project development. Every student is required to carry out Mini Project work under the supervision of a guide provided by the placement Coordinator. The guide shall monitor progress of the student continuously. A candidate is required to present the progress of the Mini Project work during the semester as per the schedule provided by the placement Coordinator.

Mini Project proposal should be prepared in consultation with project guide. It should clearly state the objectives and environment of proposed Mini Project to be undertaken. Project documentation must be with the respect to the project only. Project report should strictly follow the points suggested in format of project report. Placement coordinator will provide the format of project report. Student has to submit one copy of Mini Project to the institute. Each Student is required to make a copy of Mini Project in CD and submit along with Mini Project report.

Evaluation:

The project must be evaluated in two aspects:

- a. Internal (100 Marks):
 - i. Reporting to internal project guide
 - ii. Incorporation of suggestions by project guide
 - iii. Internal Project viva examination
- b. External (200 Marks):
 - i. Project Report Preparation & Evaluation
 - ii. External Project Viva Examination

Course Code	Course Title	Teaching Scheme		Internal	End Semester Examination		Total
		Contact Hours	Credit	Continuous Evaluation	Report	Presentation & Viva	
CA332	Mini Project	18	18	90	100	110	300

Web References:

- <http://techwhirl.com/writing-software-requirements-specifications/>[For effective SRS]
- http://www.ibm.com/developerworks/websphere/library/techarticles/0306_perks/perks2.html [For best practices of Software Project Development]
- http://www.uacg.bg/filebank/acadstaff/userfiles/publ_bg_397_SDP_activities_and_steps.pdf [Requirement analysis guidelines]
- <http://www.cs.wustl.edu/~schmidt/PDF/design-principles4.pdf>[Software Design Principles and Guidelines]
- <http://www.cse.hcmut.edu.vn/~hiep/KiemthuPhanmem/Tailieuthamkhao/Effective%20Software%20Testing%20-2050%20specific%20ways%20to%20improve%20your%20testing.pdf>[ForEffective Software Testing]
- [http://www.cs.uics.edu/~jbell/CourseNotes/OO_SoftwareEngineering/SE_Project_Report_Template .pdf](http://www.cs.uics.edu/~jbell/CourseNotes/OO_SoftwareEngineering/SE_Project_Report_Template.pdf)[For guidelines to prepare software project report]

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	3	3	3	2	2	2	3	2	-
CO2	3	3	3	2	3	3	3	3	3	2	2	2	3	2	-
CO3	3	3	3	2	3	3	3	3	3	2	2	2	3	2	-
CO4	3	3	3	2	3	3	3	3	3	2	2	2	3	2	-
CO5	3	3	3	2	3	3	3	3	3	2	2	2	3	2	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation

OHS131.02 C: Contributor Personality Development (100 Marks)

Contact Hours: 02

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	--	30/15	--	30/15	02
Marks	--	100	--	100	

Pre-requisite courses:

- Communication and Soft Skills

Outline of the Course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Concept of Personality	06
2.	Soft Skills and Personality Development	08
3.	Developing Contributory Personality	06
4.	Life skills and Personality Development	06
5.	Contemporary Issues in CPD	04
	Total hours (Theory) :	--
	Total hours (Practical) :	30
	Total hours :	30

Detailed Syllabus:

1.	Concept of Personality	06 Hours	20%
	Meaning of Personality, Types of Personality, Factors contributing to Personality, Personality Traits, Personality Profiling		
2.	Soft Skills and Personality Development	08 Hours	26%
	Positive Thinking and Mind Set, Leadership, Assertiveness and Negotiation Skills, Self-Management, Interpersonal Skills, Being a Team Player		
3.	Developing Contributory Personality	06 Hours	20%
	Concept of Contributory Personality, Characteristics of a Contributor, The Contributor's Vision of Success & Career, The Scope of Contribution in a field, Embarking on the Journey to Contributor ship, Developing Contributor Personality, Reviewing Some Contributors Personalities		
4.	Life skills and Personality Development	06 Hours	20%
	Concept of life skills, Self-awareness, Empathy, Decision Making, Problem Solving		
5.	Contemporary Issues in CPD	04 Hours	14%
	Contemporary Trends and Practices in Contributory Personality Development, Case Study & Presentations		

Recommended Study Material:

❖ Text book:

1. Personality Development & Soft Skills, Oxford University Press
2. Soft Skills, Bookboon
3. Personality Development, Swami Vivekananda; Advaita Ashrama

❖ Reference book:

1. Contributor Personality Program Workbook (Volume 1,2),
2. Contributor Personality Program ActivGuide, Illumine Knowledge Pvt. Ltd

❖ Web material:

1. <https://www.coursera.org/learn/wharton-success>
2. <https://www.coursera.org/learn/personality-types-at-work>
3. <https://www.coursera.org/learn/self-awareness>

Course Outcome (COs): At the end of the course, the students will be able to

CO1	Identify one's individual personality strengths and challenges.
CO2	Develop more assertive and optimist attitude towards work and life.
CO3	Develop quintessential soft skills to groom one's personality.
CO4	Identify traits of contributor personality.
CO5	Contribute to self, society, nation, and globe.
CO6	Develop skills of global citizenship to perform societal responsibilities.

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	-	2	2	-	-	3
CO3	-	-	-	-	-	-	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	3	-	2	-	-	-	-
Co6	-	-	-	-	-	-	-	-	2	-	3	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) No correlation “-”