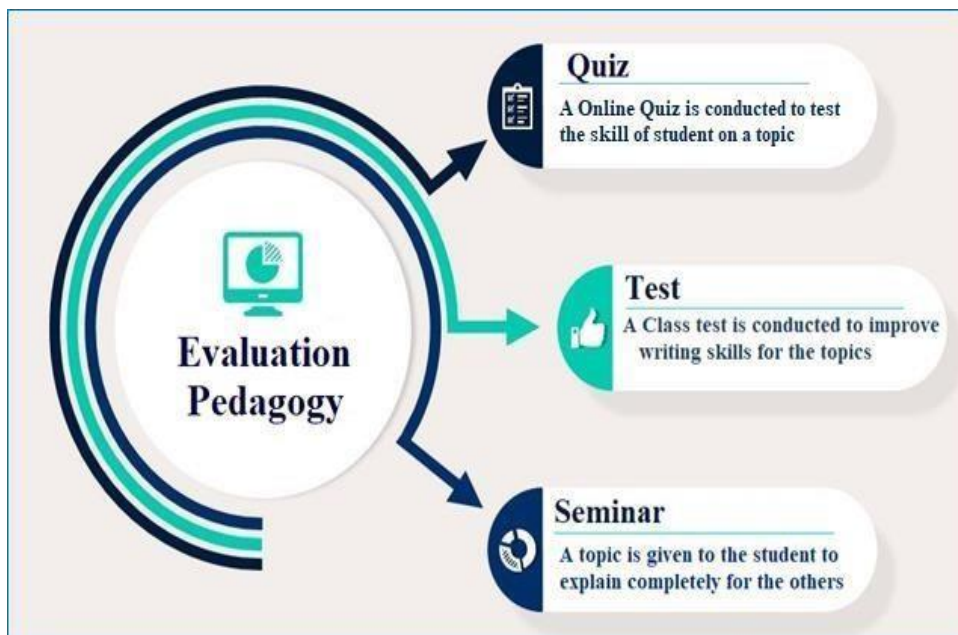
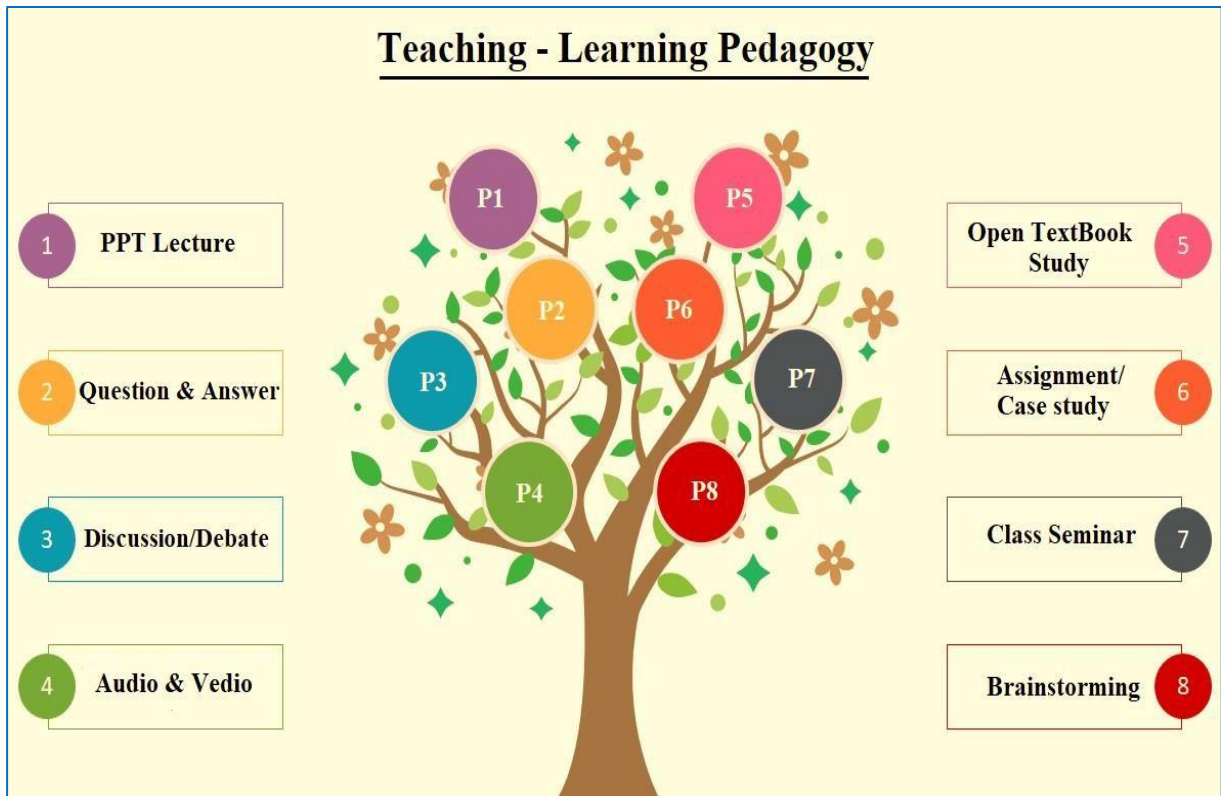


DEPARTMENT OF COMPUTER SCIENCE



Course: B.COM	Year:I	Semester:II			
Subject	OFFICE AUTOMATION TOOLS				
Units	1.Introduction to MS Office & MS Word 2.MS Word Advanced features 3.Introduction to MS Excel & Its features 4.Ms-Excel Advanced Features 5.Ms-PowerPoint and its Applications				
Duration	60hours				
Learning Objectives	1.The students will be able to Understand concept of Word Processor and use its features. 2.To use the advanced features of Ms-Word to make day to day usage easier. 3.To work comfortably with Ms-Excel Environment. To create work sheets and user advanced feature of Excel. 4.To create make presentations and inserting multimedia in them.				
Units	U1	U2	U3	U4	U5
Hours Split:Total: 60	10	12	14	10	14
Internal valuation:40marks	8	8	8	8	8
Resource Material:	<p>Study Material(Handouts): https://youtu.be/DzTCFsdxMP4 https://youtu.be/Kxf3Az-3sCo</p> <p>Reference Books: 1. Fundamentals of Computer – V . Rajaraman, Printice Hell of India. 2. Introduction to Computers–Peter Norton McGraw-Hill.</p> <p>YouTube Links: https://youtu.be/IUAq9r5B9Go https://youtu.be/utkJiQM4lx4</p> <p>Power Point Presentations: https://youtu.be/zx-syigwAc0</p>				

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	Introduction to MS Office & MS Word: MS-Word: Features of MS-Word, MS-Word Window components, working with formatted text, Shortcut keys, Formatting documents: Selecting text, Copying & moving data, Formatting characters, changing cases, Paragraph formatting ,Indents, Drop Caps ,Using format painter, Page formatting, Header & footer, Bullets & numbering, Tabs, Forming tables. Finding & replacing text, go to(F5) command, proofing text (Spell-check, Auto correct),	P1,P2,P3	PQ,P6,PT
II	: MS Word Advanced features: Difference between Wizard and Template - Customize the Quick Access Tool Bar – Macros: Purpose – Creating Macro – Using Macro – Storing Macro - ,Inserting pictures: From Computer, Online Pictures – Insert 3d Models - Insert Shapes – Insert Text Box – Insert Equation, Hyperlinks, Tables Insert tables Mail merging, Printing documents, Tables : Insert tables, Mathematical calculations on tables data. Insert Text Box etc.	P1,P2,P3,P5	P6,PT
III	: Introduction to MS Excel & Its features: MS-Excel: Excel Features, Spreadsheets, workbooks, creating, saving & editing a workbook, Renaming sheet, cell entries (numbers, labels, and formulas), spell check ,find and replace, Adding and deleting rows and columns Filling series, fill with drag, data sort, Formatting worksheet, Functions and its parts, Some useful Functions in Excel (SUM,AVERAGE,COUNT, MAX,MIN, IF),	P1,P2,P3,P5	PQ,PT

<p>IV</p>	<p>: Ms-Excel Advanced Features: Cell referencing (Relative, Absolute, Mixed), What-if analysis, Introduction to charts: types of charts, creation of charts, printing a chart, printing worksheet – Sort – Filters – View Menu</p>	<p>P1,P2,P4</p>	<p>PQ,P6,PT</p>
<p>V</p>	<p>Ms-PowerPoint and its Applications: MS-Power Point: Features of Power Point, Uses, components of slide, templates and wizards, using template, choosing an auto layout ,using outlines, adding sub headings, editing text, formatting text, using master slide, adding slides, changing color scheme, changing background and shading, adding header and footer, adding cliparts and auto shapes. Various presentation, Working in slide sorter view(deleting, duplicating, rearranging slides),adding transition and animations to slide show, inserting music or sound on a slide, viewing slide show ,Printing slides.</p>	<p>PQ,P6,PT,P8</p>	<p>PQ,PT</p>

Course: B.C.A	Year:I	Semester:II			
Subject	PROGRAMMING IN C				
Units	1. Introduction to Algorithms and Programming Languages 2. Control Structures and Functions 3. Arrays and Strings 4. Pointers, Structures and Unions 5. File Handling				
Duration	60hours				
Learning Objectives	<ul style="list-style-type: none"> To understand the evolution and functionality of a Digital Computer. Apply logical skills to analyze a given problem. Develop an algorithm for solving a given problem. Understand 'C' language constructs like iterative statements, Array processing, Pointers etc. Apply 'C' language constructs to the algorithm to write a 'C' language program 				
Units	U1	U2	U3	U4	U5
Hours Split: Total: 60	10	12	14	10	14
Internal valuation:40marks	8	8	8	8	8
Resource Material:	<p>Study Material(Handouts): 1. https://www.mcemotihari.ac.in/wpcontent/uploads/2019/11/file_5dc2a6c80c260.pdf 2. https://onlinecourses.nptel.ac.in/noc20_cs06/preview</p> <p>Reference Books: 1. E Balagurusamy – Programming in ANSIC – Tata McGraw-Hill publications. 2. Brain W Kernighan and Dennis M Ritchie - The 'C' Programming language” - Pearson publications. 3. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson Edition Publications. 4. Yashavant Kanetkar - Let Us 'C' – BPB Publications.</p> <p>YouTube Links: https://youtu.be/8PopR3x-VMY</p> <p>Power Point Presentations: https://www.slideshare.net/gauravjuneja11/c-language-ppt</p> <p>QuestionBank: https://www.acsce.edu.in/acsce/wp-content/uploads/2020/03/Module-wise-Question-Bank-CPS.pdf</p>				

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	<p>Introduction to Algorithms and Programming Languages: Algorithm - Key features of Algorithms - examples of Algorithms, Flow Charts– Pseudo code, Programming Languages – Generation of Programming Languages – Structured Programming Language.</p> <p>Introduction to C: Introduction – Structure of C Program, Writing the first C Program, File used in C Program – Compiling and Executing C Programs, Using Comments – Keywords – Identifiers, Basic Data Types in C, Variables – Constants, I/O Statements in C, Operators in C, Programming Examples, Type Conversion and Type Casting.</p> <p>Case Study: Enter any alphabet and display whether it is vowel or a consonant.</p>	P1,P2,P3	PQ,P6,PT
II	<p>Control Structures and Functions: Decision Control and Looping Statements: Introduction to Decision Control Statements, Conditional Branching Statements, Iterative Statements, Nested Loops, Break and Continue Statement – Go to Statement. Functions: Introduction, Using functions – Function declaration/ prototype – Function definition, Function call – Return statement – Passing parameters, Scope of variables, Storage Classes, Recursive functions.</p> <p>Case Study: Print first 10 natural numbers. (using while, do-wile, for loop , break, continue.)</p>	P1,P2,P3,P5	P6,PT
III	<p>Arrays: Introduction, Declaration of Arrays, accessing elements of the Array – Storing Values in Array, Calculating the length of the Array, Operations that can be performed on Array, Passing one dimensional array to function. Two dimensional Arrays, accessing two dimensional arrays, Passing two dimensional arrays to functions.</p> <p>Strings: Introduction, String Operations using String functions.</p> <p>Case Study: Searching an element in an array. Disadvantages of an array.</p>	P1,P2,P3,P5	PQ,PT
IV	<p>Pointers, Structures and Unions: Pointers: Understanding Computer Memory – Introduction to Pointers, Declaring Pointer Variable, Pointer Expressions and Pointer Arithmetic – Null Pointers, Passing Arguments to Functions using Pointer, Pointer and Arrays – Passing Array to Function, Memory Allocation in C Programs, Memory Usage – Dynamic Memory Allocation, Drawbacks of Pointers. Structures: Introduction to structures, Nested Structures. Union, and Enumerated Data Types: Introduction to Union – accessing union</p>	P1,P2,P4	PQ,P6,PT

	elements, Enumerated Data Types. Case Study: Difference between Arrays, structures & unions		
V	File Handling: Files: Introduction to Files, Using Files in C, Reading Data from Files, Writing Data from Files, Detecting the End-of-file, Error Handling during File Operations. Case Study: Write a program to read a text file, convert all the lowercase characters into upper case and rewrite the uppercase characters in the file.	PQ,P6,PT, P8	PQ,PT

Course: BCA	Year:II		Semester:III		
Subject	Data Structures				
Units	1.Introduction to Data Structure &Algorithms 2. Arrays, Records and Pointers 3.Linked Lists ,Stacks 4.Queues, Sorting 5.Trees, Graphs				
Duration	60hours				
Learning Objectives	<ul style="list-style-type: none"> • Identify data structures suitable to solve any specific problem • Identifying various data structures and their real-time applications • Identifying the use of Time and Space Complexity. • Implementing different sorting &searching techniques. 				
Units	U1	U2	U3	U4	U5
Hours Split:Total: 60	10	12	14	10	14
Internal valuation:40marks	8	8	8	8	8

**Resource
Material:**

Study Material(Handouts):

1 <https://youtu.be/B31LgI4Y4DQ>

Reference Books:

1. . Data Structures & Algorithms Using C, Khanna Publishers
2. Theory and Problems of Data Structures by Seymour Lipschutz, McGraw Hill (Schaum's Outlines)
3. Data Structures & Algorithms in C by M.A. Weiss, Addison Wisley.
4. Data Structures Using C, Reema Thareja, oxford.

YouTube Links:

1. https://youtu.be/5_5oE5lgrhw
2. <https://youtu.be/2vh2YP46CNw>

Power Point Presentations:

1. <https://youtu.be/NQzKC3NV6OI>
2. <https://www.facebook.com/watch/?v=1249935912674727>

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	Introduction and Overview- Elementary Data Organization, Data Structures classification, Data Structure Operations, Algorithms: Complexity, Time-Space Tradeoff. Preliminaries- Mathematical Notation and Functions, Algorithmic Notation, Control Structures used in algorithms, Complexity of Algorithms. Other Asymptotic Notations, Sub algorithms, Variables, Data Types. Case Study: 1. Calculate the space complexity of a given code <pre>int tot (int a, int b) { int c; c = a + b; return c; }</pre>	P1,P2,P3	PQ,P6,PT
II	Arrays, Records and Pointers – Linear Arrays, Representation and Traversing Linear Arrays, Inserting and Deleting. Passing an array to function, Pointer & Arrays Multidimensional Arrays, Sparse Matrices. Case Study: 1. Application of arrays in the real world	P1,P2,P3,P5	P6,PT
III	Linked Lists – Representation, Dynamic Memory Allocation, Traversing, Searching, Insertion, Deletion, Header Linked Lists, Two-Way Lists Stacks- Stacks, Operations on stacks, Array representation of stacks, Linked List representation of stacks, Arithmetic Expressions, Polish notation, Recursion. Case Study: 1. Linked list verses Arrays. 2. Towers of Hanoi.	P1,P2,P3,P5	PQ,PT
IV	Queues, Linked representation of Queues, Deques, Priority Queues. Sorting - Insertion Sort, Bubble Sort, Selection sort, Quick Sort, Merge sort, Heap Sort, Searching – Linear Search, Binary Search. Case Study: 1. Application of Queues. 2. Comparison of sorting algorithms.	P1,P2,P4	PQ,P6,PT
V	Trees- Binary trees, Representing and traversing binary trees, Traversal algorithms using stacks. Binary Search Trees, Searching, Insertion and Deletion in Binary Search Trees, Graphs- Terminology, Sequential representation of Graphs, Linked representation of Graphs, Operations on Graphs, Traversing a Graph. Case Study: 1. Applications of Binary Tree. 2. Warshall's Algorithm.	PQ,P6,PT,P8	PQ,PT

Course: BCA	Year:II	Semester:III			
Subject	DATABASE MANAGEMENT SYSTEM				
Units	<ol style="list-style-type: none"> 1. Overview of Database Systems, Data Models 2. Relational Model, Normalization 3. Entity Relationship Model, Basic SQL 4. SQL 5. PL/SQL, Transaction processing Concepts 				
Duration	60hours				
Learning Objectives	<ul style="list-style-type: none"> • An ability to apply Knowledge of computing and mathematics in Computer Science & Engineering. • An ability to analyze a problem, identify and define the computing requirements appropriate to its solution. • An ability to design, implement and evaluate a computer-based system to meet desired needs with appropriate societal considerations. • An ability to conduct investigations, interpret data and provide conclusions in investigating complex problems related to Computer Science & Engineering. • An ability to engage in continuing professional development and life-long learning. 				
Units	U1	U2	U3	U4	U5
Hours Split:Total: 60	10	12	14	10	14
Internal valuation:40marks	8	8	8	8	8
Resource Material:	<p>Study Material(Handouts): https://www.javatpoint.com/dbms-tutorial</p> <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Database Management Systems, 3rd Edition , Raghurama Krishnan, Johannes Gehrke, TMH 2. Database System Concepts,5th Edition , Silberschatz, Korth, TMH <p>YouTube Links:</p> <ol style="list-style-type: none"> 1.https://www.youtube.com/watch?v=YRnjGeQbsHQ 2. https://www.youtube.com/watch?v=mh26fgrO-9k <p>Power Point Presentations:</p> <ol style="list-style-type: none"> 1. https://www.youtube.com/watch?v=T2zolcNJRw8 				

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	Overview of Database Systems: Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Data Models: Introduction; types of data models, Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database. Case Study: 1. Describe the differences between Database systems and File based systems 2. Study about database models and their advantages and dis-advantages	P1,P2,P3	PQ,P6,PT
II	Relational Model: Introduction to relational model, Codd's rules, concepts of domain, attribute, tuple, relation, constraints (Domain, Key constraints, integrity constraints) and their importance , concept of keys (super key, candidate key, primary key, surrogate key, foreign key) , relational Algebra & relational calculus.Normalization: Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), Boyce-codd normal form(BCNF) Case Study: Describe Relational model and normalization for database design	P1,P2,P3,P5	P6,PT
III	Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams, BASIC SQL: Database schema, data types, DDL operations (create, alter, drop, rename), DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, aggregation, grouping, ordering. Case Study: 1. Examine issues in data storage and query processing using SQL. 2. Create, maintain and manipulate a relational database using SQL	P1,P2,P3,P5	PQ,PT
IV	SQL: Nested queries/ sub queries, implementation of different types of joins, SQL functions(Date, Numeric, String, Conversion functions), Creating tables with relationship, implementation of key and integrity constraints, views, relational set operations , Transaction Control Language: commit, Rollback, Savepoint , DCL :Grant, Revoke Case Study: 1. Try to convert some sample data to information and show how it can you be used in decision making.	P1,P2,P4	PQ,P6,PT
V	PL/SQL: Introduction , Structure , Control Structures , Cursors , Procedure , Function , Packages , Exception Handling ,Triggers. Transaction processing Concepts : Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm. Case Study: Outline the role and issues in Transaction management of data such as efficiency, privacy, security.	PQ,P6,PT,P8	PQ,PT

Course: BCA	Year:II	Semester:III			
Subject	OBJECT ORIENTED PROGRAMMING THROUGH JAVA				
Units	<ol style="list-style-type: none"> 1. Introduction to OOPS 2. Control Structures , Class and objects 3. Inheritance , Interfaces 4. Packages , Multithreading 5. Exception Handling , Applets 				
Duration	60hours				
Learning Objectives	<p>The student would become competent enough to write, debug, and document well-structured java applications</p> <ul style="list-style-type: none"> • Demonstrate good object-oriented programming skills in Java • Able to describe recognize, apply, and implement selected design patterns in Java • Understand the capabilities and limitations of Java • Be familiar with common errors in Java and its associated libraries • Develop excellent debugging skills 				
Units	U1	U2	U3	U4	U5
Hours Split:Total: 60	10	12	14	10	14
Internal valuation:40marks	8	8	8	8	8
Resource Material:	<p>Study Material(Handouts): https://www.tutorialspoint.com/java/java_oops_concepts.html</p> <p>Reference Books: 1. Herbert Schildt, “The complete reference Java”, TataMc-Graw Hill, 7th Edition.</p> <p>YouTube Links: 1.https://m.youtube.com/watch?v=j0lBrYSIYaU&t=11s 2.https://www.youtube.com/watch?v=63juf6p6ZkQ</p> <p>Power Point Presentations: https://www.youtube.com/watch?v=xiCBefiV_GQ</p>				

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	<p>Introduction to OOPS: Paradigms of Programming Languages – Basic concepts of Object Oriented Programming – Differences between Procedure Oriented Programming and Object Oriented programming - Benefits of OOPs – Application of OOPs. Java: History – Java features – Java Environment – JDK – API. Introduction to Java: Creating and Executing a Java program – Java Tokens- Java Virtual Machine (JVM) – Command Line Arguments –Comments in Java program. Elements: Constants – Variables – Data types - Scope of variables – Type casting – Operators: Special operators – Expressions – Evaluation of Expressions. Case Study: 1. Study the evolution of JAVA, why it was developed, and how it changed the software industry scenario.</p>	P1,P2,P3	PQ,P6,PT
II	<p>Control Structures: The if Statement, Nested ifs, The if-else-if Ladder and, Looping Statements: The while Loop, The do-while Loop, for loop and its variations and Nested Loops. Jumping Statements: Break, continue Statement. Class and objects: Defining a class – Methods – Creating objects – Accessing class members – Constructors – Parameterized Constructors, Adding a Constructor. Arrays: One Dimensional Array – Creating an array – Array processing – Multidimensional. Case Study: 1. Study the difference between the looping structured in JAVA And Programming in C.2. Study the limitation of Constructors in JAVA.</p>	P1,P2,P3,P5	P6,PT
III	<p>Inheritance: Defining inheritance –types of inheritance– Method overloading – Static members – Nesting of Methods – this keyword - Overriding methods – Final variables and methods – Final classes – Final methods - Abstract methods and classes – Visibility Control. Interfaces: Defining interface – Extending interface - Implementing Interface - Accessing interface variables. Strings: Constructing Strings, Operating on Strings, Arrays of Strings Case Study: 1. Study the inheritance types available in JAVA and try to identify the limitations.</p>	P1,P2,P3,P5	PQ,PT
IV	<p>Packages: Java API Packages – Defining a Package, System Packages – Naming Conventions – Creating & Package Member Access – Adding Class to a Package. Multithreading: Creating Threads – Life of a Thread – Defining & Running Thread – Thread Methods – Thread Priority – Synchronization – Implementing Runnable interface – Thread Scheduling. Case Study: 1. Study the advantages of Package compared to Libraries in Procedural languages.</p>	P1,P2,P4	PQ,P6,PT

V	Exception Handling: Limitations of Error handling – Advantages of Exception Handling - Types of Errors – Basics of Exception Handling - Syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement, Throwing Our Own Exceptions Applets: Introduction, Java applications versus Java Applets, Applet Life-cycle, Working with Applets, The HTML Applet Tag. Case Study: 1. Study and present the limitation of Applets in Web application development.	PQ,P6,PT,P8	PQ,PT
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Course: BCA	Year:II	Semester:III			
Subject	SOFTWARE ENGINEERING				
Units	<ol style="list-style-type: none"> 1. Introduction to Software Engineering, Planning a software project 2. Software Cost Estimation 3. Software design, Real-Time and Distributed System Design 4. User interface design and real time systems 5. Software quality and testing 				
Duration	60hours				
Learning Objectives	<ul style="list-style-type: none"> • Ability to gather and specify requirements of the software projects. • Ability to analyze software requirements with existing tools • Able to differentiate different testing methodologies • Able to understand and apply the basic project management practices in real life projects • Ability to work in a team as well as independently on software projects 				
Units	U1	U2	U3	U4	U5
Hours Split: Total: 60	10	12	14	10	14
Internal valuation: 40marks	8	8	8	8	8

Resource Material:	<p>Study Material(Handouts): https://www.scaler.com/topics/software-engineering/html</p> <p>Reference Books: 1. R.Fairley, Software Engineering Concepts, Tata McGraw-Hill, 1997. 2. R.S. Pressman, Software Engineering, Fourth Ed., McGraw Hill, 1997. 3. Software Engineering, H. Sommerville Ian , Addition Wesley Pub. Co. 4. Software Engineering: An object Oriented Perspective by Braude, E.J., Willey, 2001</p> <p>YouTube Links: https://m.youtube.com/watch?v=FLtqAi7WNBY&t=1s</p> <p>Power Point Presentations: https://www.youtube.com/watch?v=8PhBL0LsnnI</p>
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UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	Introduction to Software Engineering: Definitions - Size Factors - Quality and Productivity Factors – Managerial Issues. Planning a software project: Defining the problem - Developing a Solution Strategy - Planning the Development Process - Planning an Organization structure - Other Planning Activities.	P1,P2,P3	PQ,P6,PT
II	Software Cost Estimation: Software cost factors - Software Cost. Estimation Techniques – Staffing level Estimation- Estimating Software Maintenance Costs - The Software Requirements, Specification - Formal Specification Techniques - Languages and Processors for Requirements Specification.	P1,P2,P3,P5	P6,PT
III	. Software design: Fundamental Design Concepts - Modules and Modularization Criteria – Design Notations -Design Techniques - Detailed Design Considerations. Real-Time and Distributed System Design - Test Plans - Milestones, walkthroughs, and Inspections.	P1,P2,P3,P5	PQ,PT
IV	User interface design and real time systems: User interface design - Human factors - Human computer interaction - Human - Computer Interface design - Interface design - Interface standards.	P1,P2,P4	PQ,P6,PT
V	Software quality and testing: Software Quality Assurance - Quality metrics - Software Reliability - Software testing - Path testing – Control Structures testing - Black Box testing - Integration, Validation and system testing - Reverse Engineering and Reengineering. CASE Tools: Projects management, tools - analysis and design tools – programming tools - integration and testing tool - Case studies.	PQ,P6,PT, P8	PQ,PT

Course: B.C.A	Year:II	Semester:IV			
Subject	Python Programming				
Units	1.Getting Started with Python and Strings 2.Functions and Python and OOP , Exception Handling 3.List and Tuples and Dictionaries 4.Introduction to NumPy and Data Handling using Pandas 5.Plotting Data using Matplotlib and GUI Programming and Database Connectivity				
Duration	60hours				
Learning Objectives	1.Learn Syntax and Semantics and create Functions in Python. 2.Handle Strings and Files in Python. 3.Understand Lists, Dictionaries and Regular expressions in Python. 4. Implement Object Oriented Programming concepts in Python. 5. Build Web Services and introduction to Network and Database Programming in Python..				
Units	U1	U2	U3	U4	U5
Hours Split: Total: 60	10	12	14	10	14
Internal valuation:40marks	8	8	8	8	8

**Resource
Material:**

Study Material(Handouts):

https://youtu.be/KORd0jTI_kU

<https://youtu.be/eWRfhZUzrAc>

Reference Books:

1. Mark Lutz, Learning Python,5th Ed. O'REILLY
2. Core Python Programming by Dr. R. Nageswara Rao
3. Problem Solving and Python Programming by E. Balaguru Swamy
4. Python programming: using problem solving approach by Reema Thareja.
5. Albert Lukaszewski ,MySQL for Python,Packet Publishing.

YouTube Links:

<https://youtu.be/N4mEzFDjqtA>

<https://youtu.be/Z1Yd7upQsXY>

Power Point Presentations:

<https://youtu.be/y86s6xgYaAI>

<https://youtu.be/IMMfwGiKFqw>

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	Getting Started with Python: Introduction to Python , Python Keywords , Identifiers , Variables , Comments, Data Types , Operators, Input and Output , Type Conversion , Debugging . Flow of Control, Selection , Indentation , Repetition , Break and Continue Statement , Nested Loops . Strings- String Operations , Traversing a String , String handling Functions. Case Study: 1. Study the features that make Python different from Procedural Languages.	P1,P2,P3	PQ,P6,PT
II	Functions: Functions, Built-in Functions, User Defined Functions, recursive functions, Scope of a Variable Python and OOP: Defining Classes, Defining and calling functions passing arguments, Inheritance, polymorphism, Modules – date time, math, Packages. Exception Handling- Exception in python, Types of Exception, User-defined Exceptions. Case Study: 1. Present a report of how Exception handling is different from JAVA Exceptional Handling.	P1,P2,P3,P5	P6,PT
III	List: Introduction to List, List Operations, Traversing a List, List Methods and Built-in Functions. Tuples and Dictionaries, Introduction to Tuples, Tuple Operations, Tuple Methods and Built-in Functions, Nested Tuples. Introduction to Dictionaries, Dictionaries are Mutable, Dictionary Operations, Traversing a Dictionary, Dictionary Methods and Built-in functions. Case Study: 1. What are the special features of dictionaries and try to analyze about the same features in any other language.	P1,P2,P3,P5	PQ,PT
IV	Introduction to NumPy, Array , NumPy Array , Indexing and Slicing , Operations on Arrays , Concatenating Arrays , Reshaping Arrays , Splitting Arrays , Statistical Operations on Arrays. Data Handling using Pandas , Introduction to Python Libraries, Series, DataFrame, Importing and Exporting Data between CSV Files and DataFrames, Pandas Series Vs NumPy ndarray. Case Study: 1. Present a paper on advanced features of NumPy and Pandas.	P1,P2,P4	PQ,P6,PT

V	Plotting Data using Matplotlib: Introduction, Plotting using Matplotlib –Line chart, Bar chart, Histogram, Scatter Chart, Pie Chart. GUI Programming and Database Connectivity Using Python. Graphical User Interfaces. Using the Tkinter Module, Creating Label, Text, Buttons, info Dialog Boxes, Radiobutton, Checkbutton, Getting Input, Importing MySQL for Python , Connecting with a database, Forming a query in MySQL, Passing a query to MySQL. Case Study: 1. Present a paper on the features and advantages of MySQL compared to other commercial Databases.	PQ,P6,PT,P8	PQ,PT
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Course: B.C.A	Year:II	Semester:IV			
Subject	OPERATING SYSTEMS				
Units	1.Introduction and System Structures 2.Process Management and Process Scheduling 3.Synchronization and Deadlocks 4.Memory Management 5.Files and Directories in UNIX				
Duration	60hours				
Learning Objectives	1. Understand the main components and Structure of Operating System & their functions. 2. Analyze various ways of Process Management & CPU Scheduling Algorithms. 3. Evaluate various device and resources like Memory, Time and CPU Management techniques in distributed systems. 4. Apply different methods for Preventing Deadlocks in a Computer System. 5. Create and build an Application/Service over the UNIX operating system.				
Units	U1	U2	U3	U4	U5
Hours Split: Total: 60	10	12	14	10	14
Internal valuation:40marks	8	8	8	8	8
Resource Material:	<p>Study Material(Handouts): https://youtu.be/eP_P4KOjwhs https://youtu.be/8XBtAjKwCm4</p> <p>Reference Books: 1. Operating System Principles, Abraham Silberchatz, PeterB.Galvin, GregGagne 8thEdition, WileyStudentEdition. 2. Principles of Operating Systems by Naresh Chauhan, OXFORD University Press. 3. Tanenbaum A S, Woodhull A S, Operating System Design and Implementation,3rd edition, PHI 2006. 4. Unix Shell Programming-YashwantKanetkar</p> <p>YouTube Links: https://youtu.be/3obEP8eLsCw https://youtu.be/xw_OuOhjauw</p> <p>Power Point Presentations: https://youtu.be/GLuofbpH9K8 https://youtu.be/hmbg4dAUWWg</p>				

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	Introduction: What is Operating System? ,History and Evolution of OS, Basic OS Functions, Computer System Architecture, Operating System Structure. System Structures: Operating System Services, User Operating System Interface, System Calls, Types of System Calls, Overview of UNIX Operating System, Basic Features of Unix Operating System. Case Study : 1. Understanding and listing the basic differences between UNIX OS and Windows OS in usage, user interface, features etc.	P1,P2,P3	PQ,P6,PT
II	Process Management: Process Concept, Operation on Processes, Communication in ClientServer Systems. Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, CPU Scheduling in UNIX Case Study: 1. Present your understanding on how CPU Scheduling is different in WINDOWS compared to UNIX/LINUX.	P1,P2,P3,P5	P6,PT
III	Synchronization: Process Synchronization, Semaphores: Usage, Implementation, The Critical Section Problem., Classic problems of synchronization. Deadlocks: Introduction, Deadlock Characterization, Necessary and Sufficient conditions for Deadlock, Deadlock Handling Approaches : Deadlock prevention, Deadlock Avoidance and Deadlock detection and Recovery . Case Study: 1. Present your understanding of Deadlocks and new methodologies available in new Operating Systems released in the market.	P1,P2,P3,P5	PQ,PT
IV	Memory Management: Overview, Swapping, Contiguous Memory Allocation, Paging, Paging Examples, Segmentation, Page Replacement Algorithms, Memory management in UNIX. Case Study: 1. Present a paper on new methods used in Memory management in the present day Operating Systems .	P1,P2,P4	PQ,P6,PT

V	Files and Directories in UNIX: Files, Directory Structure, File Operations, File System Implementation: File Allocation Methods, Comparison of UNIX and Windows. Case Study: 1. Present a Paper on how UNIX treats regular files and directories differently from other operating systems.	PQ,P6,PT, P8	PQ,PT
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Course: B.C.A	Year:II	Semester:IV			
Subject	MOBILE APPLICATION DEVELOPMENT USING ANDROID				
Units	1.Introduction to Android 2.Android Application Design Essentials 3.Android User Interface Design Essentials and Input Controls 4.Testing Android applications 5.Using Common Android APIs				
Duration	60hours				
Learning Objectives	1. Identify various concepts and features of Android operating system. 2. Configure Android environment and development tools. 3. Develop rich user Interfaces by using layouts and controls. 4. Use User Interface components for android application development. 5. Create Android application using database. 6. Publish Android applications.				
Units	U1	U2	U3	U4	U5
Hours Split: Total: 60	10	12	14	10	14
Internal valuation:40marks	8	8	8	8	8
Resource Material:	<p>Study Material(Handouts): https://youtu.be/2zC6I24Hp2o https://youtu.be/FjrKMcKahY</p> <p>Reference Books: 1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd 2. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd 3. “Android Application Development All in one for Dummies” by Barry Burd, Edition: I 4. “Android”, Dixit, Prasanna Kumar Vikas Publications, New Delhi 2014, ISBN: 9789325977884 5. Maclean David, Komatineni Satya,Allen Grant , “Pro Android 5”, Apress Publications2015 ISBN: 978-1-4302-4680-0 6.” Android Programming for Beginners” by Hortan, John, Packet Publication, 2015 ISBN: 978-1-78588-326-2</p> <p>https://youtu.be/fis26HvvDII https://youtu.be/gNO8PwI2arI</p> <p>Power Point Presentations: https://youtu.be/ACWQaiWUerw https://youtu.be/tZviSI9dswg</p>				

UNIT	DESCRIPTION	PEDAGOGY	INTERNAL EVALUATION
I	Introduction to Android: - Overview, History, Features of Android, The Android Platform, Understanding the Android Software Stack – Android Application Architecture –The Android Application Life Cycle – The Activity Life Cycle, Creating Android Activity -Views- Layout Android SDK, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file. Case Study: i. Give a brief description of Android Architecture and its parts. ii. List out the challenges we face while using Android? iii. List the new features of Android in the latest version.	P1,P2,P3	PQ,P6,PT
II	Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Creating User Interfaces with basic views-Application Context, Activities, Services, Intents, linking activities with Intents,, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions. Case Study: i. Present an idea that you would like to convert it into an application in the future.	P1,P2,P3,P5	P6,PT
III	Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation. Layouts, Recycler View, List View, Grid View and Web view Input Controls: Buttons, Checkboxes, Radio Buttons, Toggle Buttons, Spinners, Input Events, Menus, Toast, Dialogs, Styles and Themes, Creating lists, and Custom lists Case Study: i. Present detail report on the features of Check Boxes, Radio Buttons and Toggle Buttons.	P1,P2,P3,P5	PQ,PT
IV	Testing Android applications: Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources. Case Study: 1. List out the special features of Android with its counterparts.	P1,P2,P4	PQ,P6,PT

<p>V</p>	<p>Using Common Android APIs: Internal Storage, External Storage , SQLite Databases , Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, JSON Parsing, Using Android Telephony APIs, Deploying Android Application to the World. Google maps, Using GPS to find current location, Sensors, bluetooth/Wi-Fi Connectivity. Case Study: i. List out the points to keep in mind to make you application more attractive. ii. List the controls that make you application attractive.</p>	<p>PQ,P6,PT,P8</p>	<p>PQ,PT</p>
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