SARVAJANIK UNIVERSITY

INCLUSIVE | INTEGRATED | INNOVATIVE

Faculty of Science

Shree Ramkrishna Institute of Computer education and Applied Sciences

Bachelor of Computer Application (B.C.A)

Bachelor of Computer Application 2023-24

Introduction:

The B.C.A. program welcomes students from a variety of academic backgrounds having interest in pursuing study and career in the field of Computer Application. It will empower you to fulfil your academic potential and help you gain the industry-specific and interpersonal skills you need to work as an IT professional.

Your studies will combine theoretical concepts of computer field with technical skills. The student will learn how Information and Communications Technology (ICT) systems are developed, made live and managed. In addition, you will gain a practical understanding of the latest professional and ethical norms in the field.

Objectives of the programme:

Main objective of the program is to impart knowledge of fundamentals, latest theories, concepts, methods, techniques and tools related to various areas of computer and technology applications which emphasizes on problem solving, computer programming, mobile based, web based application development, software engineering, data management.

Credit Structure: (Annexure-1)

COURSE GROUP WISE CREDIT AT UNDERGRADUATE PROGRAM

Subject group	BCA (3 years)	BCA Hons. (4 years)
Major (TH+PR)	60	92
Minor (TH+PR)	24	32
SEC (TH+PR)	9	9
Multidisciplinary	9	9
AEC	8	8
VAC	6	6
Summer Internship	4	4
	120	160

Semester wise course group wise credit allocation for Under Graduate Programme

Semester	Major			Minor			SEC			AEC		Multidisplinary		Value Added		Total
	No. of Courses	Th.	Pr.	No. of Courses	Th.	Pr.	No. of Course	Th.	Pr.	No. of Courses	Th.	No. of Courses	Th.	No. of Courses	Th.	
1	1	4	2	1	3	1	1	2	1	1	3	1	3	1	3	22
2	1	4	2	1	3	1	1	2	1	1	3	1	3	1	3	22
3	2	8	2	1	3	1	1	2	1	*	*	*	*	1	3	20
4	2	8	2	1	3	1	-			1	2 +1	1	3			20
5	2	8	4	1	3	1	IntSp	3	1							20
6	3	12	4	1	3	1										20
Total		**44**	**16**		**18**	**6**		**13**			**8**		**10**		**9**	**124**
7	3	12	4	1	4											20
8	3	12	4	1	4											20
Total		**68**	**24**		**26**	**6**		**13**			**8**		**10**		**9**	**164**

Evaluation Scheme for Semester 3 & 4:

Semester	Subject group	Internal Evaluation				External	Grand Total
		CCE	Attend.	Assign.	Total Int.		
3	Major -3	40	10	20	70	30	100
	Major-4	40	10	20	70	30	100
	Minor-3	40	10	20	70	30	100
	SEC -3	40	10	20	70	30	100
	Practical-3	30	10	30	70	30	100
	Value Added Course-3	40	10	20	70	30	100
				Total	**420**	**180**	**600**
4	Major -5	40	10	20	70	30	100
	Major-6	40	10	20	70	30	100
	Minor-4	40	10	20	70	30	100
	SEC -4	40	10	20	70	30	100
	Practical-4	30	10	30	70	30	100
	Multidisciplinary 3	40	10	20	70	30	100
	Ability Enhancement Course-3	40	10	20	70	30	100
				Total	**490**	**210**	**700**

Name of Program	**Bachelor of Computer Application**
Abbreviation	B.C.A
Duration	3 Years (Regular)
Objective of Program	The objective of the program is to impart knowledge of fundamentals, latest theories, concepts, methods, techniques and tools related to various areas of computer and technology applications which emphasizes on problem solving, computer programming, mobile based, web based application development, software engineering, data management.
Program Outcome	At the successful completion of the program, students will be able to start their career in the IT and software industry.

Name of Program	**Bachelor of Computer Application (Honors)**
Abbreviation	B.C.A (Honors)
Duration	4 Years (Regular)
Objective of Program	The objective of the program is to impart knowledge of fundamentals and / or latest theories, concepts, methods, techniques and tools related to various areas of computer applications and information technology and specifically in the area of Mobile based, cloud based, web based application development, software engineering, data management.
Program Outcome	At the successful completion of the program, students will be able to start their career in the IT and software industry.

New NEP Credit structure: year 2023-24				
III	Major-3	Web Programming-1	4	2
	Major-4	Software Engineering	4	
	Minor-3	DBMS-2	3	1
	SEC-3	Server side programming with PHP	2	1
	Value added	Health and wellness	3	
		Total=	**20**	
IV	Major-5	Python Prog & Data Science	4	2
	Major-6	O.S. & Computer Networks	4	
	Minor-4	Internet Programming & Web Client Technologies	3	1
	AEC	Professional communication skill 3	2	1
	Multi.	Career Management	3	
		Total=	**20**	

Faculty of Science

Shree Ramkrishna Institute of Computer education and Applied Sciences

Bachelor of Computer Application (B.C.A)

Semester-3

Major-3 :Web Programming-1

Course Code	
Course Title	**Web Programming-1(Asp.net)**
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	------
Purpose of Course	The purpose of the course is to make students capable of developing basic web applications using latest tools and technologies of C#.Net
Course Objective	To provide an in-depth knowledge of most recent server side programming technology.
Pr-requisite	Basic understanding of Web, HTTP, HTML, JavaScript.
Course Out come	After completion of this course, the student will be capable of developing basic web applications using latest tools and technologies of C#.Net.
Course Content	**Unit-1: Overview of .net framework (06)** 1.1 .Net framework & its benefits 1.2 Managed/Unmanaged code, Compilation 1.3 Memory Management, Garbage Collection 1.4 The .Net Framework Class Library. 1.5 ASP.NET - Event Driven Programming 1.6. Files & Directories 1.7 Page Lifecycle 1.8 Concept of Post back **Unit 2: Client Server Communication & Application Management (06)** 2.1 Communications with Web Browser 2.2. Response Object 2.3. Session Management and Variable Scope 2.4 Web.Config File 2.5 Global.asax File **Unit 3: Web Server Control (12)** 3.1 Basic Web Server Controls 3.2 Html Server Controls (basic HTML Server Control) 3.3 Validation Controls

	3.4 Navigation Controls (Treeview, Menu, Sitemap)
	Unit -4: Designing with ASP.NET **(06)** 4.1 Master - Content Page 4.2 Themes & Skin file 4.3 CSS with ASP.NET
	Unit-5: Data Access objects **(08)** 5.1 Overview of ADO.NET 5.2 The Server Explorer 5.3 ADO.NET Architecture- Data provider, Adapter, Reader, command objects 5.4 Disconnected Architecture – Dataset
	Unit -6: Data access controls and operations **(12)** 6.1 Data binding with controls 6.2 Basic CRUD Operations 6.3 Rich Data Controls - Grid View, List Box, Data list, Repeater, Form view

	Unit 7: Exception Handling **(06)**
	7.1 Overview of Exception Handling
	7.2 Types of Exception Handling
	    7.2.1 Unstructured Exception Handling
	    7.2.2 Structured Exception Handling

	Unit 8: Fundamentals of Web service **(04)**
	8.1 Basics of Web Services
	8.2 Building structure of Web service
	    8.2.1 SOAP
	    8.2.2 UDDI
	    8.2.3 WSDL
	8.3 Interacting with web services

Reference book	1. Pro ASP.NET 4 in C# 2010– Matthew MacDonald – Apress 2. ASP.NET 4.0 Unleashed – Stephen Walther – Sams 3. Professional ASP.NET 3.5: In C# and VB (Programmer to Programmer)– by Bill Evjen – Wrox 4. Beginning ASP.NET 3.5 in VB 2008– Matthew MacDonald – Apress 5. ASP.Net 4.0 Black Book – dreamtech press 6. Essential Windows Communication Foundation(WCF) : For .Net Framework 3.5 - Steve Resnick – Pearson 7. Beginning ASP.NET 4.0 in C# and VB by Imar Spaanjaars Wrox Pubs. Web References: http://www.asp.net https://www.c-sharpcorner.com/ http://www.tutorialspoint.com for ASP.NET
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment

Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

Major-4: Software Engineering

Course Code	
Course Title	Software Engineering
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	------
Purpose of Course	The purpose of the course is to make students capable of applying the principles and techniques of computer science, engineering, and mathematical analysis to the design, development, testing, and evaluation of the software and systems that enables them to understand the software engineering process.
Course Objective	1. To make students understand how to develop software. 2. To make students understand various components of the software process model and their working. 3. To make students understand the importance of requirement analysis. 4. To make students understand various approaches of system design.
Pr-requisite	Only those Students who have completed any one of the following courses Application Development 2) Computer Programming
Course Out come	After completion of this course, the student will be capable to develop models and implement predictive analytics on social media platforms
Course Content	**Unit 1 Introduction to Software Engineering 8 hr** 1.1 Software, Software characteristics, Software Engineering 1.2 Software engineering approach 1.2.1 Introduction to phased development approach 1.2.2 Introduction to effort distribution 1.3 Software process models - Linear sequential / waterfall model,Prototype model, RA model, Incremental model, Spiral mode l.1.4 Agile Development Models 1.5 Software quality Assurance **Unit 2 Software Requirement Analysis 8 hr** 2.1 Requirement gathering formal & informal techniques 2.1.1 Introduction to FAST , QFD & JAD 2.2 Requirement modeling 2.2.1 Use case model-identifying & refining actors, scenarios and use cases 2.2.2 Classification- Identifying Classes, Object relationships,attributes And Methods.

Unit 3 Requirement Modelling   **6 hr**

3.1 Class Based Methods

 3.1.1 Class Notation-Static Structure

3.1.2 Object Diagram

3.1.3 Class Interface Notation - Incorporating Associations,

Association role, qualifier, multiplicity, Association class,Binary and N-ary Association

aggregation andComposition Associations, Generalization

Unit 4: Software Requirement & Use case   **8 hr**

4.1 Use case Diagrams

4.2.Scope, Benefits and Elements

4.3 Identifying Actors, Scenarios and Use cases

4.4 Software Requirement Specification

4.5 Case Study - Payroll System, Inventory System

Unit 5 Software Designing   **10 hr**

5.1 Introduction to Design - Importance of design, Relationship between analysis

& design, Design Principles

 5.2 Design Concepts

5.2.1 System level design concepts – Abstraction, Refinement,Modularity,

Information hiding, Polymorphism and reusability

5.2.2 Module level design concepts – Coupling, Cohesion

5.3.2 Overview of Designing software architecture

5.3.3 UI / UX Design, Web App Design, Mobile AppDesign

Unit 6 Design Modelling   **8 hr**

6.1 Sequence Diagram - Elements and Guidelines

6.2 Collaboration Diagram - Elements and Guidelines

6.3 Activity Diagram - Elements and Guidelines

6.4 State Chart Diagram - Elements and Guidelines

6.5 Case Study - Payroll System, Inventory System

Unit 7 Software Testing   **4 hr**

7.1 Overview of Software Testing

 7.2 Testing practices

7.2.1 Overview of testing types - Ad-hoc testing, Gorilla Testing, random testing

and Systematic testing, Static Testing and dynamic Testing, Functional, Non

Functional And Behavioral Testing, UsabilityTesting,Configuration Testing and

Compatibility Testing

Unit 8 White box & Black box Testing   **8 hr**

8.1 White box testing - Data and code coverage testing techniques

8.2 Black box testing - Equivalence partitioning, Boundary Value

8.3 Levels of testing - Unit, Integration, SystemandAcceptancetesting

8.4 Automation of various testing activities and related test tools–Win runner, JMETER

Test director, IBMRational, Loadrunner

Reference book	1. Software Engineering: A Practitioner's Approach 4e/5e, Roger S. Pressman McGrawHill Publication. 2. Integrated Approach to Software Engineering Pankaj Jalote NarosaPublication. 3. Workbook on System Analysis and Design 1e/2e, Garg, Srinivasan, PHI. 4. Software Engineering K. K. Aggrawal, Yogesh Singh NewAge International Publishers. 5. Fundamentals of Software Engineering Carlo Ghezzi, Mehdi Jazayeri, Dino, Mendrilo PHI. 6. Software Engineering Ian Summwerville Addison Wesley- Pearson Education. 7. Software Engineering K. L. James PHI. 8. System Analysis and Design Elias M. Awad Galgotia Publication. 9. System Analysis and Design in a changing world John W. Stazinger, Robert B.Jacobson, Stephen D Burd, Thomson Learning. 10. Effective DevOps: Building a Culture of Collaboration, Affinity, and Tooling at Scale, Jennifer Davis, Katherine Daniels and O'relly
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

Minor-3 -Database Management System-2

Course Code	
Course Title	**Database Management System-2**
Credit	3+1
Teaching per Week	3 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	------
Purpose of Course	This course imparts the knowledge of Procedural SQL, No SQL and Data Analytics
Course Objective	To give exposure of PL/SQL for handling data, Transaction Management concepts and Advanced database technologies like NoSQL
Pr-requisite	Understanding of basic Database concepts, DDL, and DML
Course Out come	Students will be able to Efficiently use PL/SQL for handling data Create and invoke useer defined procedures, functions and triggers Gain knowledge about various types of NOSQL databases Get the overview of Blockchain technology and Bigdata.
Course Content	**Unit 1 Procedural SQL** **10 hr** 1.1. PL/SQL Block Structure 1.1.1. Using Variables, Constants and Data Type 1.1.2. Control Statements (IF…THEN statement, Loop, FOR...Loop, While Loop) 1.2. User-Defined RECORD and TABLE data types. **Unit 2 PL/SQL Exception Handling** **8 hr** 2.1. What are Exceptions 2.2. User defined Exceptions and Pre-defined Exceptions 2.3. Handling Exceptions 2.4. Raising Exceptions **Unit 3 Stored Procedures** **12 hr** 3.1 Cursors: Implicit, Explicit 3.2 User Defined Function 3.3 Stored Procedure **Unit 4 Triggers** **6 hr** 4.1 Triggers and its benefits 4.2 Before and After Triggers

	Unit 5 Transaction Management **5 hr** 5.1 Transaction and System Concepts 5.2. Desirable Properties of Transactions 5.3 Commit, Savepoint, Rollback **Unit 6 Introduction to NoSQL** **4 hr** 6.1. Basic concept of NoSQL 6.2. Advantages of NoSQL 6.3 Types of NoSQL database - Column based, graph based, document based, key-value 6.4 When to use NoSQL
Reference Book	1. Silberschatz, Korth, Sudarshan ,Database System Concepts, McGraw-Hill computer science series 2. C J Date, An introduction to Database Systems, Addition-Wesley 3. Nilesh shah, Database System using Oracle, PHI. 4. Ramez Elmasri & Shamkant B. Navathe, Fundamentals of Database Systems, Addison-Wesley 5. Hector Gracia-Molina, Jeffrey D. Ullman, and Jennifer Widom, Database System Implementation, Pearson. 6. Ivan Bayross, SQL, PL/SQL, BPB Publications 7. Scott Urman, Oracle9i PL/SQL programming, McGraw-Hill
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

SEC-4: Server side Programming with PHP

Course Code	
Course Title	Server side Programming with PHP
Credit	2 +1
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	------
Purpose of Course	The purpose of the course is to make students capable of developing professional applications using the latest tools and technologies in PHP.
Course Objective	To Provide the necessary knowledge to design and develop dynamic, database-driven web applications using PHP Will learn how to use MYSQL database.
Pr-requisite	HTML/XHTML, CSS, JS or equivalent knowledge Other web programming languages knowledge will be helpful Knowledge of Database & basic queries is recommended
Course Out come	Students will be able to Server-side programming using PHP database-driven web applications knowledge & CRUD operations
Course Content	**Unit 1 Basic Introduction to PHP** **8 hr** 1.1 Important tools and software requirements (like Web Server, Database, Editors etc.) 1.2 Basic Syntax, PHP variables and constants Types of data in PHP, Expressions, scopes of a variable (local, global) 1.3 PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary and MOD operators. PHP operator Precedence and associativity 1.4 PHP IF Else conditional statements (Nested IF and Else) 1.5. Switch case, while, For and Do While Loop 1.6 Goto , Break ,Continue and exit PHP Functions **Unit 2 Arrays, strings in PHP** **6 hr** 2.1 Introduction to Array, Creating index based and Associative array 2.2 Accessing array Looping with Index based array, with associative array using each() and foreach(). 2.3 Some Useful array functions: implode, explode, count, different sorting functions, array_reverse, array_search, array_push, array_pop, array_keys, key, sizeof. 2.4 Creating and accessing String 2.5 Searching & Replacing String formatting, joining and splitting ,String Related Library functions

	2.6 Use of preg_match(), preg_replace(), preg_split() functions in regular Expression **Unit 3. Handling HTML forms with PHP and Database 10 hr** 3.1. Capturing HTML Form Data GET and POST form methods 3.2 Dealing with multiple values including array to redirect data on Another page. 3.2.2 Image / file upload implementation with php. 3.2.3 Dealing with Sessions & Cookies while handling forms (with Database) 3.3 Introduction to MYSQLi and it's datatypes 3.3.1 Creating database, tables, relationships in database. 3.3.2 Storing images/files in database. 3.4 Mysqli various supported database engines **Unit 4 CRUD operation with PHP 6 hr** 4.1 Introduction to database connection functions. 4.2 various queries functions: mysqli_query, mysqli_fetch_arary / row / object, mysqli_num_rows, mysqli_close, mysqli_select_db, mysqli_debug 4.3 Implementing CRUD operations..
Reference book	1. Core PHP Programming; Leon Atkinson; Pearson publishers 2. The Complete Reference PHY; Stever Holzner; McGraw Hill 3. Beginning PHP 5.0 Database; Christopher Scollo, Harish Rawat, Deepak Thomas; Wrox Press 4. PHP – A beginner; Ashok Appu; Wiley 5. PHP 5.0 and MySql Bible; Tim Converse, Joyce Park, Clark Morgan John; Wiley & Sons 6. MySQL Bible; Steve Suehring John; Wiley &Sons 7. PHP Black Book; Peter Moulding – 8. PHP 5 and Mysql; Tim converse, Joyce Park and Clark Morgan; Bible Wiley 9. Beginning PHP 5.3; Matt Doyle; Wrox Publication
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

Health and Wellness

Course Code	
Course Title	**Health and Wellness**
Credit	3
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	-
Purpose of Course	The courses is designed to create awareness and consciousness among the students towards health and wellness and in developing and maintaining a healthy lifestyle.
Course Objective	The courses is designed to create awareness and consciousness among the students towards health and wellness and in developing and maintaining a healthy lifestyle.
Pre-requisite	
Course Out come	After successful completion of this course, students will be able to 1. Understand basic concepts of health and wellness. 2. Understand the concept and importance of yoga education. 3. Participate in different sports activities.
Course Content	**1. Concept** **25% 11hours** Define and differentiate health and wellness, Importance of health and wellness Education, Local, demographic, societal issues and factors affecting health and wellness. **2. Principles of Exercise Programme** **25% 11hours** Strength – Definition, types & methods of improving Strength – Isometric, Isotonic & Isokinetic Endurance - Definition, types & methods to develop Endurance – Continuous Training, Interval Training & Fartlek Training Speed – Definition, types & methods to develop Speed – Acceleration Run & Pace Run Flexibility – Definition, types & methods to improve flexibility Coordinative Abilities – Definition & types Circuit Training and Weight training **3. Lifestyle Disease and its Management** **25% 11hours** LIFESTYLE/Hypo-kinetic Diseases and its Management - Diabetes - Hypertension - Obesity - Osteoporosis - CHD - Back pain

	Health related Physical Fitness and Assessment Body mass Index/Skin fold Measurement, BMR, Pulse Rate, Blood Pressure Health Related Physical Fitness Test. **4. Yoga and stress management 25% 12hours** Role of Yoga, asanas and meditation in maintaining health and wellness, Role of sleep in maintenance of physical and mental health, Asanas and its effects; Padmasana, Halasana, Bhujangasana, Shalabhasana, Dhanurasana, Shavasana, Vajrasana, Chakrasana **Practical** 1. To organize wealth awareness Programme in society 2. To prepare ones on Health profile 3. To prepare a chart on balance diet
Reference Book	1. Physical Activity and Health by Claude Bouchard, Steven N. Blair, William L. Haskell. 2. Mental Health Workbook by Emily Attached & Marzia Fernandez, 2021. 3. Mental Health Workbook for Women: Exercises to Transform Negative Thoughts and Improve WellBeing by Nashay Lorick, 2022 4. Lifestyle Diseases: Lifestyle Disease Management, by C. Nyambichu & Jeff Lumiri, 2018. 5. Physical Activity and Mental Health by Angela Clow & Sarah Edmunds, 2013.
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment Group projects or case study.
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

Practical-3

Course Code	
Course Title	**Practical-3**
Credit	4
Teaching per Week	8 Hours
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The purpose of course is to make students aware with practical implementation of concept learnt in theory subjects major,minor and SEC
Course Objective	To provide Fundamental knowledge of practical implementation based on Semester subjects
Prerequisite	---
Course Out come	Students should be able to demonstrate skills mentioned in practically.
Teaching Methodology	● Practical demonstration, lab work, problem solving by practical assignments ● Project work (wherever applicable)
Evaluation Method	70% internal assessment is based on lab participation, problem solving assignments, journal work, project and internal practical examination. 30% external assessment is based on semester end practical examination and viva.

Faculty of Science

Shree Ramkrishna Institute of Computer education and Applied Sciences

Bachelor of Computer Application (B.C.A)

Semester-3

Major-4: Python Prog & Data Science

Course Code	
Course Title	**Python Prog & Data Science**
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	------
Purpose of Course	The purpose of the course is to make students capable of implementing concepts, methods and tools related to python programming. And basic data science functions.
Course Objective	This subject aims to cover the python language programming with emphasis on various python data structures and various libraries like Pandas, NumPy, Matplotlib for performing various data science functions.
Pr-requisite	Basic concepts of Programming
Course Out come	After completion of this course, the student will be capable to develop models and implement predictive analytics on social media platforms
Course Content	**Unit 1 Introduction to Python** **5 hr** 1.1 Python History and Usability 1.1.1 Application area's of Python 1.1.2 Technical Strengths of Python 1.2 Program Execution in Python - Program Execution, Python Virtual Machine (PVM) 1.3 IDLE of Python **Unit 2 Python Programming Basics** **10 hr** 2.1 Comments, Indentations, Operators 2.2 Assignment, Expressions and Data Types 2.3 Selection Control 2.4 Iterative Control **Unit 3 Python Functions** **6 hr** 3.1 Function Basics 3.1.1 Definition, Call, Passing Arguments 3.1.2 Lambda Functions 3.2 Function Parameter and Call

	3.2.1 Calling value returning function 3.2.2 Calling non-value returning function 3.2.3 Parameter Passing 3.2.4 Function arguments and variable scope **Unit 4 Python Strings and List Object 8 hr** 4.1 String : Indexing, Slicing, Text Parsing 4.2 String Methods 4.3 List : Indexing, Slicing and Merging List 4.4 List Methods **Unit 5 Python Dictionary, Tupple and Sets 12 hr** 5.1 Dictionary Structure 5.2 Dictionary Methods 5.3 Manipulating, Sorting and Searching in Dictionary 5.4 Nested Dictionary 5.5 Tuples and Sets **Unit 6 Python Modules 6 hr** 6.1 Modules 6.2 Modules and Name-spaces 6.3 Module Import, Load and execution 6.4 Top-Down Design 6.5 Built-in name-spaces in python **Unit 7 Python Arrays 6 hr** 7.1 Numeric Python - NumPy 7.1.1 Introduction to Numpy 7.1.2 Array Operations using Numpy 7.1.3 N-dimensional Array Processing **Unit 8 GUI with Tkinter 8 hr** 8.1 introduction 8.2 Import Tkinter Libraries 8.3 Tkinter Widgets 8.4 Widgets Attributes
Reference book	1. Learning Python -Mark Lutz : O'Reilly Media 2. Core Python Programming – by Wesley J Chun ISBN-13: 978- 0132269933 3. Introduction to Computer Science using Python - A computational problem solving focus - Charles Dierbach, Wiley 4. Python for Everybody: Exploring Data in Python 3, by Charles Severance (Author), Aimee Andrion (Illustrator), Elliott Hauser (Editor), Sue Blumenberg (Editor) 5. An Introduction to Python - by van Rossum Guido ISBN: 9780954161767, 0954161769 6. Core Python Application Programming – by Wesley J Chun Prentice Hall 7. Introduction to Computer Science using Python

Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

Major-5- O.S. & Computer Networks

Course Code	
Course Title	Operating System & Computer Networks
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	------
Purpose of Course	To make student understand about basic of network and how one can design the same.
Course Objective	1. Learn about how computer networks are organized and it's protocol with the concept of layered approach 2. Learn concept of network management & it's tool 3. Learn more about basic of Information & network security
Pr-requisite	Knowledge of basics of operating systems and any programming language.
Course Out come	After successful completion of the course students should be able to: analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies; Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure Analyze the requirements of company or organization security and its purpose and select to apply appropriate tools needed for the same; Evaluate the authentication and encryption needs of an information system
Course Content	**Unit- 1: Operating System Concepts 7hr** 1.1. Operating system fundamental and its types 1.2. Components of operating system 1.3. BIOS, Booting process and kernel 1.4. Functions of operating systems 1.5. Interrupt and System call, Data bus and Address bus **Unit- 2: Files structure 7 hr** 2.1 File storage mechanism, File allocation table, Directory and File structure, Attributes, Types, Access, Operations, Protection, and sharing and remote access. 2.2 File system management and optimization - Disk space management, backup, consistency, Performance, Defragmentation **Unit- 3: Memory Management 10 hr** 3.1 Address space, Contiguous and non contiguous allocation, Managing free space SRKI Bachelor of Science Information Technology

3.2 Virtual memory - Paging, Page size, Page table, Page fault, Demand Paging, Page replacement algorithms (FIFO, LRU, 2nd Chance NRU Optimal), Shared page

3.3 Segmentation - Implementation of pure segmentation, segmentation with paging.

Unit- 4: Process Management   **8hr**

4.1 Process, Process states, PCB, Process scheduling
4.2 Scheduling Algorithms
4.3 Study of Round-robin, FCFS, SJF, SRTF and priority algorithms
4.4 Overview of deadlock
4.5 Deadlock avoidance, prevention and recovery
4.6 Overview of Inter process communication
4.7 Deadlocks - Overview of Deadlock Avoidance, Prevention and Recovery

Unit 5. Introduction to Computer Networks   **10 hr**

5.1.Basics of computer network, advantages, disadvantages, Analogue and Digital Signals, Frequency, bandwidth, datagram , packets, frames, message, Synchronous and Asynchronous communication, Simplex, half-duplex and full-duplex transmission
5.2.Connecting devices: NIC, Bridges, router, switches, Repeater, Access Points
5.3.Network types: LAN, MAN, PAN, WAN
5.4.Network topology: Bus, Star, Ring, Mesh, Hybrid
5.5.Different Types of Transmission Media, Guided and unguided data transmission

Unit 6. Reference Model   **8 hr**

6.1.Physical Layer: End to end data transmission
6.2.Data Link Layer - MAC & LLC Sub layers
6.3.Error classification-Delay distortion Attenuation, noise
6.4.Types of errors – Single bit error and burst errors.
6.5.Error detection – Parity check (VRC) , LRC, CRC
6.6.CSMA/CD, CSMA/CA, IEEE Standards

Unit 7 Upper Level Layers   **5 hr**

7.1 Network Layer: Addressing - IP Address, subnet, gateway , Physical and logical address , Class A to E, IP Binding and IP cloning, Proxy, Static IP address and its benefits, routing table
7.2 Concept of Unicast, Broadcast, Multicast and anycast
7.3 Protocols: NAT, ARP, RARP, ICMP, IPv4, IPv6, DHCP

Unit 8. Transport layer   **5 hr**

8.1 UDP and TCP-packet heads, services, communication, Flow and Error & congestion control
8.2 Session, Presentation, and Application Layers: SMTP, IMAP, SNMP, HTTP, FTP, DNS, VOIP.

Reference book	1. Operating System Concepts, James Peterson McGrawHill 2. An OS Concept ,Silberschatz AdditionWesley Publication 3. An Operating Systems, W.Stallings Pearson Education 4. Understanding Operating Systems, I.M.Flinn, A.M. Mchoes – Thomson Learning 5. Operating Systems, Donovan M McGrawHill Publication 6. Data communications and network Behrouz A Forouzan, McGraw Hill 7. Data communications and networks, Achyut S Godbole, McGraw Hill 8. Fundamentals of computer networks, Sudakshina Kundu, PHI 9.. Data communications and networking, Jain, BPB 10.. Introduction to networking, McMahon, McGraw Hill 11. Data communications and networks, D B Rathod, K R Vishwa Jhananic, Himaliya publishing
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

Minor-4- Internet Programming & Web Client Technologies

Course Code	
Course Title	**Internet Programming & Web Client Technologies**
Credit	3
Teaching per Week	3 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	------
Purpose of Course	The purpose of the course is to make students capable of developing basic web applications using latest tools and technologies.
Course Objective	● To develop programming ability of students to create dynamic web applications using server-side technology with Java Database Connectivity. ● To provide fundamental knowledge of Web page design with javascript, jquery and Bootstrap
Pr-requisite	Basic Understanding of HTTP, HTML, Programming in Core Java, OOPS concept.
Course Out come	After completion of this subject, student will be able to Gain the knowledge of J2EE architecture The student will be capable of designing effective and interactive web applications using javascript, jquery and Bootstrap Design and develop various application by Integrating any of Servlets, JSPs by analyzing requirements and evaluating existing system. (Analysis, Synthesis, Evaluation)
Course Description	Advanced Java is everything that goes beyond Core Java – most importantly the APIs defined in Java Enterprise Edition includes Servlet programming, JDBC connectivity, etc. It is a Web application development platform for designing effective and interactive web applications.
Course Content	**Unit 1 JavaScript** **7 hr** 1.1 Structure of JavaScript 1.2 Data Types and Variables in JavaScript 1.3 Operators: Arithmetic Operator, Assignment Operator, Comparison Operator, Logical Operator, Conditiona Operator in JavaScript 1.4 Control Structure: If…Else, While, Do…While, For and Functions in JavaScript 1.5 Handling events in JavaScript-Windows event, Event object 1.5 Basic concept of ECMAScript **Unit 2 Fundamentals of JQuery** **6 hr** 2.1 Introduction to JQuery, features 2.2 JQuery Structure

2.3 JQuery Attributes, Traversing, DOM methods, Events
2.4 JQuery Utilities
2.5 JQuery with CSS
2..6 Overview of JQuery UI widgets

Unit 3 Introduction to Design Framework   9 hr
3.1 Bootstrap Basics, Need, Advantages and Disadvantages
3.2 Bootstrap Grid System Structure
3.3 Bootstrap Basic Classes – Tables, Forms, Buttons, Images, Helper classes,
Responsive Utilities, Bootstrap Layout Components-Dropdowns, Button Groups,
Dropdown Button Pagination, Alerts
3.4 Overview of Bootstrap design framework

Unit 4 Fundamentals of J2EE   6 hr
4.1 Java Platform,
4.2 J2EE Architecture Types,
4.3 Explore Java EE Containers,
4.4 Types of Servers in J2EE Application

Unit 5 JDBC Programming   9 hr
5.1 JDBC Architecture
5.2 Types of JDBC Drivers,
5.3 Introduction to major JDBC Classes and Interface,
5.4 Creating simple JDBC Application,
5.5.Types of Statement (Statement Interface, PreparedStatement,
CallableStatement)
5.7 Exploring ResultSet Operation
5.8 Creating CRUD Application

 Unit 6 JDBC Programming   8 hr
6.1 JDBC Architecture
6.2 Types of JDBC Drivers,
6.3 Introduction to major JDBC Classes and Interface,
6.3 Creating simple JDBC Application,
6.4 Types of Statement (Statement Interface, PreparedStatement,
CallableStatement)
6.6 Exploring ResultSet Operation
6.7 Creating CRUD Application

Reference book	1. Programming in HTML5 with JavaScript and CSS3 Training Guide, Johnson G, PHI 2. JavaScript in easy Steps, Mike McGrath, McGrawHill. 3. jQuery, jQuery UI and jQuery Mobile, Adriaan de Jonge, Pearson 4. Jquery and Jquery UI, Jay Balchand, Pearson 5. Jquery in Action, Dreamtech Press 6. Jumpstart Bootstrap, Syed Fazle Rahman , SPD 7. Extending Bootstrap, Christoffer Niska, Packt Publishing 8. Learning Web Development with React and Bootstrap by Harmeet Singh 9. Black Book "Java server programming" J2EE, 1st ed., Dream Tech Publishers, 2008. 3. Kathy walrath"

	10. Complete Reference J2EE by James Keogh mcgraw publication 11. Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric BuestWiley Publication 12. Core Java, Volume II: Advanced Features by Cay Horstmann and Gary CornellPearson Publication. 13. Java Persistence with Hibernate by Christian Bauer, Gavin King 14. JDBC™ API Tutorial and Reference, Third Edition, Maydene Fisher, Jon Ellis, JonathanBruce, Addison Wesley 20. Beginning JSP, JSF andTomcat, Giulio Zambon, Apress Web Links:https://react-bootstrap.github.io/
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

AEC:English for oral communication and writting

Course Code	
Course Title	**English for oral communication and writting**
Credit	2+1
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	-
Purpose of Course	
Course Objective	The course will help students learn how to write natural and clear sentences and enable them to compose their own content as well as writing.
Pre-requisite	

Course Out Come	After successful completion of the course, students will be able to
	    1. Understand the Importance and need of English as a language
	    2. Improve their writing content and to write professional reports
	    3. Communicate fluently in speaking general English

Course Content	1. Introduction - understanding the importance English language, **30% 15hours**
	2. Style of writing and use of graphics **35% 15hours**
	    a. writing clear sentences and paragraphs
	    b. remove jargons redundancy and wordiness
	    c. kinds of graphics and their messages
	3. oral communication **35% 15hours**
	    a. general speaking practice
	    b. developing interactive skill in speaking

Reference Book	1.Communication Skills in English: Orient Blackswan 2 .Advanced Communicative English, Krishna Mohan and Meenakshi Raman : Macmillan Education. 3.Business Communication -Techniques and Mehtods .OmP. Juneja. Aarti Mujumdar, OrientBlackswan. 4. Tengse, Ajay. Sodt-Skills -A Textbook for Undergraduates:OrientBlackswan 2015.
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment Group projects or case study.
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

Course Code	**Multidisciplinary**
Course Title	**Career Management**
Credit	3
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	--
Purpose of Course	The course will help students gain a deeper understanding of their skills, strengths, interests, and values in order to identify suitable career paths and make informed career decisions
Course Objective	The course will help students gain a deeper understanding of their skills, strengths, interests, and values in order to identify suitable career paths and make informed career decisions
Pre-requisite	
Course Out come	After completing the course, the student shall be able to: 1. Students will be able to define career management and explain its significance in achieving professional success and satisfaction. 2. Students will be able to understand the significance of career development in achieving personal fulfillment, professional growth, and long-term success. 3. Students will recognize career planning as an ongoing process that involves setting goals, making informed decisions, and taking action to achieve desired outcomes.
Course Content	Career management • Meaning and importance • Career personality test. • Career ladders and career path Weight 35%, 15 Hours Career development • Importance of career development • Objectives of career development • Components of Career development Weight 35%, 15 Hours Career planning • Concept, nature, objectives, steps, different faces in the career of employee. Weight 30%, 15 Hours
Reference Book	1. "The Pathfinder: How to Choose or Change Your Career for a Lifetime of Satisfaction and Success" by Nicholas Lore 2. "Career Management for Life" by Jeffrey H. Greenhaus, Gerard A. Callanan, and Veronica M. Godshalk 3. "Career Development and Planning: A Comprehensive Approach" by Robert C. Reardon, Janet G. Lenz, and James P. Sampson Jr.

	4. "What Color Is Your Parachute? 2022: A Practical Manual for Job-Hunters and Career-Changers" by Richard N. Bolles
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment Group projects or case study.
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

Practical-4

Course Code	
Course Title	**Practical-4**
Credit	4
Teaching per Week	8 Hours
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The purpose of course is to make students aware with practical implementation of concept learnt in theory subjects major,minor and SEC
Course Objective	To provide Fundamental knowledge of practical implementation based on Semester subjects
Pre-requisite	
Course Out come	Students should be able to demonstrate skills mentioned in practically.
Teaching Methodology	● Practical demonstration, lab work, problem solving by practical assignments ● Project work (wherever applicable)
Evaluation Method	70% internal assessment is based on lab participation, problem solving assignments, journal work, project and internal practical examination. 30% external assessment is based on semester end practical examination and viva.