



Faculty of Science

**Shree Ramkrishna Institute of Computer Education &
Applied Sciences, Surat**

B.Sc. (Computer Science)

SEMESTER- 4



SRKI
Bachelor of Science in Computer Science
Bachelor of Science in Computer Science Honors

Web Application Development - II (ASP.Net)

Course Code	
Course Title	Major: Web Application Development - II (ASP.Net)
Credit	3 (Theory) + 1 (Practical)
Teaching per Week	3 Hrs (Theory) + 2 Hrs (Practical)
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays, etc.)
Last Review / Revision	2021-22
Purpose of Course	The course aims to make students capable of developing basic web applications using the latest tools and technologies of C#.Net.
Course Objective	To provide an in-depth knowledge of the most recent server-side programming technology.
Pre-requisite	Basic understanding of Web, HTTP, HTML, JavaScript
Course Outcome	After completing this course, the student will be capable of developing basic web applications using the latest tools and technologies of C#.Net.
Course Content	Unit-1: Overview of .net framework [5 Hrs] 1.1 .Net framework & its benefits 1.2 Common Language Runtime (CLR) 1.2.1 Common Type System (CTS) 1.2.2 Common Language Specification (CLS) 1.2.3 Garbage Collector (GC) 1.2.4 Microsoft Intermediate Language (MISL) 1.3 ASP.NET - Event Driven Programming 1.4. Files & Directories 1.5 Page Lifecycle 1.6 Concept of Postback – Page.IsPostBack 1.7 Error Handling Concepts – Application Level, Page Level, Code Level Unit 2: Client Server Communication & Application Management [5 Hrs] 2.1 Communications with Web Browser 2.2. Response Object – Response.Write(), Response.Redirect() 2.3. State Management 2.3.1 Client-Side State Management – Cookies, QueryString ViewState, HiddenField 2.3.2 Server-Side State Management – Session, Application 2.4 Web.Config File 2.5 Global.asax File Unit 3: Web Server Control [7 Hrs] 3.1 Basic Web Server Controls 3.2 Validation Controls 3.3 Navigation Control-Menu 3.4 Master - Content Page Unit-4: Data Access objects [8 Hrs] 4.1 The Server Explorer 4.2 Connection Object – Connection string using Web.Config

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	4.3 ADO.NET Architecture- Data provider, Data Adapter, DataReader 4.4 Command objects – ExecuteNonQuery(), ExecuteScalar(), ExecuteReader() 4.5 Disconnected Architecture – Dataset Unit 5: Data access controls and operations [8 Hrs] 5.1 Data binding with controls – DropDown, TextBox, Image 5.2 Basic CRUD Operations 5.3 Rich Data Controls - Grid View, Data list, Repeater Unit 6: ASP.Net MVC Application [7 Hrs] 6.1 Introduction to ASP.Net MVC Framework – Model, View, and Controller 6.2 Web Page Routing 6.3 Data Access and Modeling 6.4 View-ViewBag and ViewData 6.5 CRUD operation in MVC - Entity Data Model
Practical	List of practical will be prepared at the beginning of each semester
Text and Reference Literature	1. Pro ASP.NET 4 in C# 2010– Matthew MacDonald – Apress 2. Learning ASP.NET 3.5 – O'Reilly 3. ASP.Net 4.0 Black Book – dreamtech press 4. ASP.NET 4.0 Unleashed – Stephen Walther – Sams 5. Professional ASP.NET 3.5: In C# and VB (Programmer to Programmer)– by Bill Evjen – Wrox 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. 8. Pro Asp.NET MVC 5 Adam Freeman - Apress Web References for Practical: https://www.aspsnippets.com/ https://www.c-sharpcorner.com/ http://www.tutorialspoint.com for ASP.NET http://www.asp.net
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment, Internal Project Development Practical Assignments 80% (Approximately weekly)
Evaluation Method	50% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% assessment is based on end semester written examination

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Data Structures and Algorithms

Course Code	
Course Title	Major: Data Structures and Algorithms
Credit	3(Theory) + 1(Practical)
Teaching per Week	3 Hrs (Theory)+2Hrs (Practical)
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	2021-22
Purpose of Course	This course imparts the knowledge of Data Structure. The concepts of Primitive and non-primitive data structures are covered in this course. It covers concepts of Arrays, Stack, Queue, Link list and sorting searching methods. The course is aimed to give inner depth of non-primitive data structures and its related applications.
Course Objective	To make students understand concepts of Primitive and non-primitive Data structure. To make students understand concepts of stack, queue and types of queues. To make students understand concepts of Link-list and related applications. To make students work with searching and sorting techniques.
Pre-requisite	Students are expected to have understanding of computer programming
Course Out come	At the end of the course, students are expected to have clear concepts about the primitive and non-primitive data structures
Course Content	Unit 1: Introduction to Data Structure [5 Hrs] 1.1 Concept of data, their characteristics, significance and digital storage mechanism, Concept of Data Structure 1.2 Types of data structures 1.2.1 Primitive Data Structures- integer, character, boolean 1.2.2 Non primitive Data structures- Linear Data Structures (Strings, Arrays, Records, Stack, Queue, Linked List), Non-linear Data Structures (Trees, Graphs) 1.3 Need and Applications of Data structure 1.4 Static and Dynamic memory allocation Unit 2: Analysis of Algorithm [8 Hrs] 2.1 Algorithm & Flowchart 2.2 Algorithm performance 2.3 Analysis criteria (Time / Space) 2.4 Concept of Algorithm analysis 2.5 Average case / Best Case / Worst case Scenarios Unit 3: Searching & Sorting [8 Hrs] 3.1 Searching in large amount of data 3.2 Linear search 3.3 Binary search 3.4 Sorting - Internal and external sort 3.5 Bubble sort 3.6 Selection sort 3.7 Insertion sort

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	Unit 4: Stack [8 Hrs] 4.1 Stack data structure - memory organization and implementation 4.2 Operations on stack (Push, Pop, Peep, Display) 4.3 Applications of stack- Function calls, Recursion, Polish Notation (Evaluation to postfix expression) Unit 5: Queue [8 Hrs] 5.1 Simple Queue data structure-memory organization and implementation 5.2 Operations with Queue (insert, delete and view) 5.3 Circular queue(insert,delete and view) 5.4 Introduction to Dequeue and Priority queue 5.5 Applications of queue 5.5.1 Printer queue simulation, 5.5.2 Round robin algorithm simulation Unit 6: Linked list [8 Hrs] 6.1 Linked list - representation, advantages and disadvantages 6.2 Various operations on one way (singly) linked list[insert, delete, view] 6.3 Various operations on two way (doubly) linked list[insert,delete,view] 6.4 Applications of Linked list-Polynomial manipulation, Linked Dictionary
Practical	List of practical will be prepared at the beginning of each semester
Text and Reference Literature	1. An Introduction to Data Structure with Applications: Trembley & Sorenson – McGraw Hill 2. Data Structures & Algorithms in Java , second edition:Robert Lafore SAMS PEARSON 3. Data Structures and Algorithms in Java, 3rd edition: Goodrich and TamassiaJohn Wiley and Sons, Inc. 2004. ISBN 0-471-46983-1. 4. Algorithms, 4th Edition: Robert Sedgewick and Kevin Wayne 5. Fundamentals of Data Structures, Horwith E and Sahni S, Universities Press 6. Data Structure and Algorithms, Aho A.V., Hopcroft and Ullman 7. Data Structures and Algorithms in Java, 6th Edition Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser [ISBN: 978-1-118-77133-4] 8. Data Structures and Algorithms Made Easy in Java, Narasimha Karumanchi [ISBN: 978-8192107554]
Teaching Methodology	The course is composed of readings, discussion, videos and presentation, code competition activity and assignments of computational problem solving. Practical Assignments 80% (Approximately weekly)
Evaluation Method	50% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination, etc. 50% assessment is based on the end semester written examination.

Name of College: Shree Ramkrishna Institute of Computer Education and Applied Sciences						
Faculty	Science		Program	B.Sc. Computer Science		
Year	2025		Version	1.0		
Semester	IV		Effective From	April, 2025		
Course Code	BSCS31414	Course Name	Python Programming- II			
Teaching Scheme				Examination Scheme		
Credits	Lecture (L)	Tutorial (T)	Practical (P)	Continuous Assessments (CCE)	Semester end examinations (SEE)	Total
3	3	-	-	40	35	75

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 operations.
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 operations.
Pre-requisite	Basic concepts of Programming
Course Outcome	After completion of this course, the student will be capable of performing application level programming using python language with basic data science operations.
Course Content	Unit 1 Python for Data Science [5 hrs] 1.1 Python Libraries for Data Science 1.2 Data operations: Reading, selecting, filtering, manipulating, sorting, grouping, rearranging, ranking, and plotting. 1.3 Descriptive statistics, data preparation. Exploratory Data Analysis data summarization, data distribution Unit 2 Numerical Python - NumPy [5 hrs] 2.1 Introduction to Numpy 2.2 Array Operations using Numpy 2.3 Array Broadcasting 2.4 N-dimensional Array Processing 2.5 Numpy Functions Unit 3 Data Analysis with Pandas [9 hrs] 3.1 Introduction to Pandas 3.2 Pandas Objects - Series and Dataframes 3.3 Dataframe Operations

	3.4 Reading and Writing Files 3.5 Aggregation, Grouping, Join Operations with Dataframe Unit 4 Data Visualization with Matplotlib [6 hrs] 4.1 Type of Graphs 4.2 Plot Creation 4.3 Plot Routine 4.4 Saving, Showing and Clearing Graphs 4.5 Parameters of Graph and Customize Matplotlib Implementation Unit 5 Fundamentals of NLP [5 hrs] 5.1 Concepts of Natural Language Processing 5.2 Tokenization 5.3 Lemmatization 5.4 Part of Speech Tagging (POS) 5.5 Word Frequency Analysis (TF-IDF) Unit 6 Natural Language Toolkit - NLTK [8 hrs] 6.1 Text Processing and Transformation with NLTK 6.2 Word and Sentence Token Extraction 6.3 Stop Word Removal 6.4 Stemmer Packages 6.5 WordNet Lemmatizer
Practical	List of practical will be prepared at the beginning of each semester
Reference Books	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 ISBN-13 978-8126556014 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

Name of College: Shree Ramkrishna Institute of Computer Education and Applied Sciences						
Faculty	Science		Program	B.Sc. Computer Science		
Year	2025		Version	1.0		
Semester	IV		Effective From	April, 2025		
Course Code	BSCS31415	Course Name	Python Programming- II(PR)			
Teaching Scheme				Examination Scheme		
Credits	Lecture (L)	Tutorial (T)	Practical (P)	Continuous Assessments (CCE)	Semester end examinations (SEE)	Total
1	–	-	1	15	10	25

Purpose of Course	The purpose of the course is to make students capable of implementing concepts, methods, tools and techniques studied in courses of semester 3
Course Objective	The objective of these course is to enable students to learn practical implementation of Python Programming
Pre-requisite	As per theory papers of Major - Python Programming
Course Out come	After completion of this course, the student will be capable of performing practical application of subject - Python Programming
Course Content	The students will be required to carry out practical on S Python Programming using the methods and tools discussed A Journal must be prepared for the practical work done.
Practical	List of practical will be prepared at the beginning of each semester
Reference Books	As per paper Major - Python Programming

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Computer Networks

Course Code	
Course Title	Major: Computer Networks
Credit	04(Theory)
Teaching per week	4 Hrs
Minimum weeks per semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	2021-22
Purpose of Course	The purpose of the course is to make students understand the basics of networking 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 & its tool 3. Learn more about basic of Information & network security
Pre-requisite	Knowledge of basics of operating systems and any programming language.
Course Outcome	After successful completion of the course students should be able to: • Analyse the requirements for a given organizational structure and select the most appropriate networking architecture and technologies; • Analyse, specify and design the topological and routing strategies for an IP based networking infrastructure • Analyse 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: Introduction to Computer Networks [6 Hrs] 1.1 Basics of computer network, 1.1.1 Advantages and Disadvantages 1.1.2 Analogue and Digital Signals, Frequency, bandwidth, datagram, packets, frames, message, 1.1.3 Synchronous and Asynchronous communication, 1.1.4 Simplex, half-duplex and full-duplex transmission 1.2 Connecting devices: NIC, Bridges, router, switches, Repeater, Access Points 1.3 Network types: LAN, MAN, PAN, WAN 1.4 Network topology: Bus, Star, Ring, Mesh, Hybrid 1.5 Different Types of Transmission Media 1.5.1 Guided and unguided data transmission Unit 2: Reference Model [8 Hrs] 2.1 Physical Layer: End to end data transmission 2.2 Data Link Layer - MAC & LLC Sub layers 2.3 Error classification-Delay distortion Attenuation, noise 2.4 Types of errors – Single bit error and burst errors. 2.5 Error detection – Parity check (VRC) , LRC, CRC 2.6 CSMA/CD, CSMA/CA, IEEE Standards Unit 3: Upper Level Layers [7 Hrs] 3.1 Network Layer: Addressing - IP Address, subnet, gateway

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	3.1.1 Physical and logical address, IP address Classes A to E 3.1.2 Use of different class at various places 3.1.3 IP Binding and IP cloning, Proxy, Static IP address and its benefits, routing table 3.2 Concept of Unicast, Broadcast, Multicast and anycast 3.3 Protocols and its use: NAT, ARP, RARP, ICMP, IPv4, IPv6, DHCP Unit 4: Transport layer [7 Hrs] 4.1 UDP and TCP-packet heads, services, communication, Flow and Error & congestion control 4.2 Session, Presentation, and Application Layers: SMTP, IMAP, HTTP, FTP, DNS, VOIP. Unit 5: Network Management Concepts [8 Hrs] 5.1 Creating and Managing ACL 5.2 VPN: Concept, Protocols, Applications 5.3 VLAN: Concept, Protocols, Applications 5.4 Concept of Broadcasting, Looping, Routing Unit 6: Network Management Models [8 Hrs] 6.1 OSI Network Management Model (FCAPS) 6.1.1 SNMP (Simple Network Management Protocol) 6.1.2 SNMP Working and Tools 6.2 overview of Performance Management 6.2.1 Performance metrics and monitoring 6.2.2 Performance tuning and optimization Unit 7: Configuring servers with Server OS [8 Hrs] 7.1 PDC, BDC and File server 7.2 Configuration of web server 7.3 Configuration of DHCP Server 7.4 Configuring Proxy Server 7.5 Configuring print server Unit 8: Network Security [8 Hrs] 8.1 Network security issues 8.1.1 Sniffing, IP spoofing, Common threats, E-Mail security, IPSec, SSL, TLS, PGP, Intruders, Virus, Worms 8.2 Firewalls-need and features of firewall, Types of firewalls 8.3 Overview: Symmetric Key Cryptography, Asymmetric Key Cryptography, Authentication
Text and Reference Literature	1. Data communications and network Behrouz A Forouzan, McGraw Hill 2. Data communications and networks, Achyut S Godbole, McGraw Hill 3. Fundamentals of computer networks, Sudakshina Kundu, PHI 4. Data communications and networking, Jain, BPB 5. Introduction to networking, McMahan, McGraw Hill 6. Data communications and networks, D B Rathod, K R Vishwa Jhananic, Himaliya publishing 7. Computer Security: Principles and Practice, 4th Edition, William Stallings, Lawrie Brown, Pearson

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	8. Introduction to Computer Security, Matt Bishop, Addison Wesley 9. Information security, Dhiren Patel
Teaching Methodology	Class lecture and discussions, independent study, assignments. Seminar, expert lectures, group projects and / or case studies (wherever applicable)
Evaluation Method	50% internal assessment is based on class attendance and participation, unit test, quiz, assignments, seminar, group project / case study evaluation, internal examination etc. 50% external assessment is based on semester end written examination.

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Software Testing

Course Code	
Course Title	SEC: Software Testing
Credit	2
Teaching per Week	1 Hr (Theory) + 2 Hrs (Practical)
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	2021-22
Purpose of Course	This course imparts the knowledge of Software Testing. The concepts of software testing, role of testing, testing tools and reporting are covered in this course. The course is aimed to give inner depth of Software testing.
Course Objective	• To make students understand concepts of testing and testing practices. • To make students understand test automation process. • To make students understand Testing tools. • To make students writing and tracking test cases.
Prerequisite	Basic knowledge of Computer Programming and Application Development
Course Out come	After completion of this course, the student will be capable of understanding software development principles, processes to develop and design software systems.
Course Content	Unit 1: Testing for Applications [8 Hrs] 1.1 Testing life cycle, Test Exit criteria 1.2 Component level Testing 1.3 Navigation Testing 1.4 Configuration Testing 1.4.1 Server-side issues 1.4.2 Client-side issues 1.5 Security Testing 1.6 Performance Testing 1.6.1 Performance testing objectives 1.6.2 Load Testing 1.6.3 Stress Testing Unit 2: Software Testing Oracles [6 Hrs] 2.1 Role and objective of Testing 2.2 Testing Principles 2.3 Central Issue in Testing, Testing Activities 2.4 Testing Approaches- Whitebox, Blackbox and Grey box 2.5 Levels of testing: Unit, Integration, System and Acceptance Unit 3: Test Automation Tools - I [8 Hrs] 3.1 Manual Testing Vs. Automated Testing 3.2 Unit Testing with Microsoft.Net

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	3.2.1 MStest, NUnit, xUnit 3.2.2. NUnit framework, Test Fixture, Test, Setup & Tear Down, Asserts and Exception 3.3 Test case generation Tool-case study of TestCaseGenerator 3.4 Tool for Bug Tracking- case study of Bugzilla Unit 4: Test Automation Tools - II [8 Hrs] 4.1 Tool for Test Management-case study of Tlink 4.2 Renorex - Desktop and Web Automation 4.3 Jmeter / LoadRunner - Load & Stress Testing 4.4 Selenium - Web Application Test automation tool 4.5 Appium - Mobile Automation 4.6 Test Sigma – Scriptless Test Automation 4.7 Jira – Project Management Tool
	1. Ron Patton —Software Testing, Techmedia Publication, 2000 2. Dr. K.V.K.K prasad, —Software Testing Tools , Dreamtech, 2006 3. Srinivas D and Gopalswamy R, —Software Testing: Principles and Practices. Pearson Education, 2013 4. K. Mustafa and R.A Khan, —Software Testing -concepts and practices, Narosa, 2012 5. Bill Hamilton, —NUnit: pocket Reference, SDP-OReilly, 2004 6. Andrew Hunt and David Thomas, —Pragmatic Unit Testing in Java with JUnit, PD, 2006 7. Testing with JUnit by Frank appeal PACKT Publishing 8. Software testing Principal and practices by Naresh Chauhan – OXFORD 9. Software testing (A Practical approach) by Rajiv Chopra – S K Kataria & Sons (KATSON Books) 10 Software testing and quality assurance Theory and practice by Kashirasagar Naik and Priyadarshini Tripathy – Wiley india Pvt Ltd.
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	50% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 50% assessment is based on end semester written examination

Program: B.Sc. (Hons)	Type: Ability Enhancement Course (AEC)
Semester: I / II	
Subject: Environment Studies	
Credit: 02	Total learning hours: 30
Prerequisite: Efficacy towards understanding natural systems and its sustainability. Rationale: Sustainability is the prime goal of today's modern world. Transformation and pro-conservation actions is the prime approach to conserve the environmental values. Honourable Supreme Court of India has made it 'mandatory' to introduce a basic course on environment at the undergraduate level.	

Unit 1: Introduction to environmental studies and Natural Resources: Renewable & Non---renewable Resources • Multidisciplinary nature of environmental studies; • Scope and importance; Concept of sustainability and sustainable development. • Energy Resources: Renewable and non-renewable energy sources, use of alternate energy sources.	(6 lectures)
Unit 2 : Ecosystems & Biodiversity • Ecosystems: Basic concepts. • Forest, Grassland, Desert and Aquatic Ecosystems. • Introduction to Biodiversity. • Biodiversity Conservation.	(7 lectures)
Unit 3: Environmental Pollution & Environmental Issues • Environmental pollution : Air, water, soil and noise pollution; effects and controls • Nuclear hazards and human health risks. • Climate change, global warming, ozone layer depletion, acid rain. • Impacts on human communities and agriculture.	(7 lectures)
Unit 4: Environmental Policies/ Practices & Role of Human Communities • Environment Laws: Environment Protection Act: Air (Prevention & Control of Pollution) Act: Water (Prevention and control of Pollution) Act • Wildlife Protection Act: Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD) • Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan. • Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Field work • Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc. • Visit to a local polluted site---Urban/Rural/Industrial/Agricultural.	(10 lectures)

Reference Books:

Sr. No	Title of book /article	Author(s)	Publisher and details like ISBN	Year of Publication	Publication Edition
1.	Textbook of Environmental Studies for Undergraduate Courses	Erach Bharucha	Universities Press (India) Private Ltd, Hyderabad ISBN: 978-8173718625	2013	2 ⁿ
2.	Environmental Studies	Dr. Suresh K Dhameja	S K Kataria & Sons New Delhi ISBN: 978-93-5014-385-8	2018	4th
3.	Basics of Environmental Studies	Prof Dr N S Varandani	LAP -Lambert Academic Publishing ,Germany ISBN: 978-3-8473-2102-6	2013	1st
4.	Environmental Studies	Anindita Basak	Darling Kindersley (India) Pvt. Ltd Pearson ISBN: 978-8131721186	2009	1st
5.	Basics of Environmental Studies	U K Khare	Tata McGraw Hill ISBN: 978-0071077781	2011	1st
6.	A Textbook of Environmental Studies	Dr. K Raghvan Nambiar	Scitech ISBN: 9788183711111	2009	1st
7.	Environmental Studies	Dr. B S Chauhan	University Science Press ISBN: 9788131803288	2008	1st
8.	Environmental Sciences	Daniel B Botkin & Edward A Keller	John Wiley & Sons ISBN: 9788126534142	2011	8th
9.	Environmental Studies	R. Rajagopalan	Oxford University Press ISBN: 978-0199459759	2015	3rd

Sarvajanik University
Faculty of Science

Faculty: Science	Department: Computer Sci.
Program: B.Sc. (Hons)	Type: Value Added Course (VAC)
Subject: Indian Knowledge System (Tark evam Krutrim Buddhimata)	Credits: 2
Semester: 4	

References:

1. Introduction to Indian Knowledge Systems - Concepts and Application, B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pava R.N., PHI Publication
2. Sivananda S. All about hinduism. Sivananda literature research institute; 1988.
3. Dharampal G. Essential Writings of Dharampal. Publications Division Ministry of Information & Broadcasting; 2017 Nov 3.
4. Bajaj J, Śrīnivāsa MD. Sanatana Bharat, jagrita Bharat= Timeless India, resurgent India: a celebration of the land and people of India. (No Title).

Unit 1: Knowledge and Logic (08 hours)

- Tarka : Indian Art of Debate
- The Knowledge Triangle
- Prameya - Dravyas, Attributes, Action
- Pramana - Means of Valid Knowledge
- Samasya - AMbiguities in existing knowledge

Unit 2: Knowledge Frameworks (07 hours)

- Deductive/Inductive KF
- Potential Fallacies in Reasoning Process
- Established Tanets in field of Study

Unit 3: Sanskrit Linguistic - I (07 hours)

- Components of Language
- Panini's work on Sanskrit Grammar
- Computational Concepts in Ashtadhyayi
- Phonetics in Sanskrit

Unit 4: Sanskrit and NLP (08 hours)

- Patterns in Sanskrit Vocabulary
- Logic for Sentence Construction
- Importance of Verbs
- Role of Sanskrit in NLP