॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

'ज्ञानतीर्थ', विष्णुपुरी, नांदेड – ४३१ ६०६ (महाराष्ट्र राज्य) भारत

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA

Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with'B++' grade

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

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विज्ञान व तंत्रज्ञान विद्याशाखे अंतर्गत राष्ट्रीय शैक्षणिक धोरण २०२० च्या अनुषंगाने शैक्षणिक वर्ष २०२३–२४ पासून संलग्न महाविद्यालये व विद्यापीठ संकुलांत पदव्युत्तर पदवी प्रथम वर्ष आणि विद्यापीठ संकुले व न्यू मॉडेल डिग्री कॉलेज मध्ये पदवी प्रथमवर्ष अभ्यासक्रम लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, शासन निर्णय क्र. एनईपी २०२०/प. क्र. ०९/विशि–३/शिकाना, दिनांक २० एप्रिल २०२३ व शासन पत्र. क्र एनईपी २०२०/प. क्र. ०९/विशि–३, दिनांक १६ जून २०२३ अन्वये सूचित केल्यानुसार राष्ट्रीय शैक्षणिक धोरण २०२०च्या अनुषंगाने दिलेल्या आराखडया नुसार दिनांक १६ जून २०२३ रोजी संपन्न झालेल्या मा. विद्यापरिषदेच्या बैठकीत ऐनवेळचा विषय क्र. ०५/५६–२०२३ अन्वये मान्यता दिल्यानुसार प्रस्तुत विद्यापीठाच्या विज्ञान व तंत्रज्ञान विद्याशाखा अंतर्गत खालील पदव्युत्तर पदवी अभ्यासक्रम (AICTE, PCI, BCI, CoA, NCTE) इ. सारख्या नियमक संस्थाची मान्यता आवश्यक असलेले अभ्यासक्रम वगळून) संलग्न महाविद्यालये, विद्यापीठ परिसर व उपपरिसर संकुलांमध्ये आणि पदवी प्रथम वर्ष अभ्यासक्रम विद्यापीठ परिसर व उपपरिसर संकुले व विद्यापीठ संचलित न्यू मॉडेल डिग्री कॉलेज, हिंगोली येथे शैक्षणिक वर्ष २०२३–२४ पासून लागू करण्यात येत आहे.

1) M.Sc. Bioinformatics (1st Year) – Sub-Campus School Latur
2) M.Sc. Mathematics (1st Year) – Campus School
3) M.Sc. Zoology (1st Year) - Campus School
4) M.Sc. Environmental Science (1st Year) –Campus School
5) M.Sc. Environmental Science (1st Year) - Affiliated colleges
6) M.Sc. Information Technology (1st Year) - Affiliated colleges
7) M.Sc. Software Engineering (1st Year) - Affiliated colleges

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या **www.srtmun.ac.in** या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.:शै–१/एनइपी२०२०/S&T/अक/२०२३–२४/133

दिनांक : ०७.०७.२०२३.

सहा.कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत : १) मा. कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ.
३) मा. आधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा, प्रस्तुत विद्यापीठ.
४) मा. संचालक, परीक्षा व मुंल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
१) मा. प्राचार्य, सर्व संबधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
२) मा. संचालक, सर्व संकुले परिसर व उपपरिसर, प्रस्तुत विद्यापीठ
५) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. याना देवून कळविण्यात येते की, सदर परिपत्रक संकेतस्थळावर प्रसिध्द करण्यात यावे.

SWAMI RAMANAND TEERTH

MARATHWADA UNIVERSITY, NANDED - 431 606

(Structure and Syllabus of Two Years PG Degree Program with Multiple Entry and Exit Option)

TWO YEAR MASTERS PROGRAMME IN SCIENCE

Subject: Information Technology

Under the Faculty of

Science and Technology

Effective from Academic year 2023 – 2024

(As per NEP-2020)

Swami Ramanand Teerth Marathwada University

Nanded

Affiliated Colleges

Faculty of Science and Technology

NEP-2020 Oriented Structure of Post Graduate Programs

(as per Govt of Maharashtra GR dated 16-05-2023)

M.Sc. Information Technology

(Affiliated colleges - 2 years full time PG Programs)

Introduced from Academic Year 2023-2024

Swami Ramanand Teerth Marathwada University, Nanded

Faculty of Science and Technology

NEP-2020 oriented Structure of Two years Post Graduate Program

Subject : M.Sc. Information Technology

(2 years full time PG Programs in Affiliated Colleges)

Introduced from Academic Year 2023-2024 **(as per Govt of Maha GR dated 16-05-2023)**

Program Year and Sem	**Level**	**Semester**		**Faculty**			**Other courses**				
First year			**Major / Mandatory /**		**Electives/**		**RM**	**OJT/FP/**	**RP**	**Total Sem. credits**	**Cumu. Credits**
			Theory	**Practical**	**Theory**	**Practical**					
			(04 credits)	**(01credits)**	**(04 credits) (03+01)**		**(03credits)**	**(03 Credits)**	**(04 Credits)**		
			SCMP		**SCMP**						
M.Sc. IT	6.0	First Semester	SITC-401 SITC-402 SITC-403	SITP-401 SITP-402 SITP-403	SITE-401	---------	SVECR-401 Research Methodology Compulsory	---------	---------	**22**	**22**
M.Sc. IT		Second Semester	SITC-451 SITC-452 SITC-453	SITP-451 SITP-452 SITP-453	SITE -451	---------	---------	SITOJ-451	----------	**22**	**44**
PG Diploma			24credits + 06 Credits		06 credits +02 Credits		03credits	03credits	----------	**44 credits**	

Exit Option: After completion of First year as above with 44 credits, student will be awarded PG Diploma in Computer Science and Applications**

****(for students who have done 03 years UG program)**

****(available from AY 2024-2025)**

1. Abbreviations : **S- Science, IT- Information Technology, D**iscipline **S**pecific **C**ore course (C- Core Course)
2. Abbreviations : **SITE- D**iscipline supportive **E**lective **C**ourse (E- Elective Course)
3. Abbreviations : SVECR: Research Methodology course
4. Abbreviations : SITOJ : On Job Training , Internship/ Apprenticeship or Field Project
5. Abbreviations : SITR : Research Project

Syllabus First Semester

Core Courses Code	Title	Remarks Credits
SITC-401	Introduction to Information Technology	04
SITC-402	Linux Operating System	04
SITC-403	Advanced Web Technology	04
SITP-401	Lab 1: IT Lab	01
SITP-402	Lab 2: Linux Lab	01
SITP-403	Lab 3: Advanced Web Technology Lab	01
SITE-401	Chose any one A. C++ Programming B. Database Essentials C. Computer Network	03 Theory and 01 Lab
SVECR-401	Research Methodology	03

Syllabus Second Semester

Core Courses Code	Title	Remarks Credits
SITC-451	Windows Programming with C#.NET	04
SITC-452	Advanced Java Programming	04
SITC-453	Programming in Python	04
SITP-451	Lab 4: C#.NET Lab	01
SITP-452	Lab 5: Java Lab	01
SITP-453	Lab 6: Python Lab	01
SITE-451	Chose any one A. Data Analysis using Spreadsheets B. Mathematical Foundations for Computer Science C. Design and Analysis of Algorithms	03 Theory and 01 Lab
SITOJ-451	On Job Training , Internship/ Apprenticeship or Field Project	03

Note : Contents of the common courses in campus and affiliated colleges shall be different

M. Sc. First Year, Semester I and II *(Level 6.0)* : *Teaching Scheme*

	Course Code	Course Name	Credits Assigned per course			Teaching Scheme (Hrs/ week) per course	
			Theory	Practical	Total	Theory	Practical
Major	SITC-401 to SITC-403 and SITC-451 to SITC-453	All Core Course	04	--	**04**	**04**	**--**
Elective	SITE-401and SITE-451	All Elective Courses	03	--	**03**	**03**	**--**
Special Courses	SVECR-401 and SITOJ-451	Research Methodology and On Job Training	03	--	**03**	**03**	
Major Practical	SITP-401 to SITP-403 and SITP-451 to SITP-453	All Core labs	--	01	**01**	**--**	**02**
Elective Practical	SITEP-401 and SITEP-451	Elective lab	--	01	**01**	**--**	**02**
Total Credits per semester			**18**	**04**	**22**	**18**	**04**
Total credits per year			**36**	**08**	**44**	**36**	**08**

M. Sc. First Year, Semester I and II (Level 6.0) :Examination Scheme

Course Code (2)	**Course Name (3)**	**Theory**				**Practical**		**Total Col (6+7) / Col (8+9)**
		Continuous ASITssment (CA)			**ESA**			
		Test I (4)	**Test II (5)**	**Avg of (T1+T2)/2 (6)**	**Total (7)**	**CA (8)**	**ESA (9)**	**(10)**
SITC401 to SITC-403 and SITC-451 to SITC-453	All core courses	20	20	`20	80	--	--	100
SITE-401 and SITE-451	All elective courses	15	15	15	60	--	--	75
SVECR-401 and SITOJ-451	Research Methodology	15	15	15	60	--	--	75
SITC-401 to SITC-403 and SITC-451 to SITC-451	All Core Labs	--	--	--	--	05	20	25
SITEP-401 and SITEP-451	All Elective labs	--	--	--	--	05	20	25

Note : Teaching scheme and Examination scheme for Second year will be elaborated later, along with detailed syllabus of Second Year

Guidelines for Course Assessment:

A. **Continuous Assessment (CA) (20% of the Maximum Marks):** This will form 20% of the Maximum Marks and will be carried out throughout the semester. It may be done by conducting **Two Tests** (Test I on 40% curriculum) and **Test II** (remaining 40% syllabus). Average of the marks scored by a student in these two tests of the theory paper will make his **CA** score (col. 6).

B. **End Semester Assessment (80% of the Maximum Marks):** ***(For illustration we have considered a paper of 04 credits, 100 marks and need to be modified depending upon credits of an individual paper)***

   1. **ESA Question paper will consists of 6 questions, each of 20 marks.**
   2. **Students are required to solve a total of 4 Questions.**
   3. **Question No.1 will be compulsory and shall be based on entire syllabus.**
   4. Students need to solve **ANY THREE** of the remaining Five Questions (Q.2 to Q.6) and shall be based on entire syllabus.

C. **Question paper for campus PG and PG in affiliated colleges will be different**

Note: **Number of lectures required to cover syllabus of a course depends on the number of credits assigned to a particular course. One credit of theory corresponds to 15 Hours lecturing and for practical course one credit corresponds to 30 Hours. For example, for a course of two credits 30 lectures of one hour duration are assigned, while that for a three credit course 45 lectures.**

%%%%%

First Semester

Course Code: SITC-401

Introduction to Information Technology

Course Objectives:

1. To understand environment of Information technology, its building blocks and applications

Course Outcomes:

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions

Unit-I : basics of IT **06**

Introduction to computers: Computer system concepts, characteristics of computer, generations and types of computer, components of computer system, Booting process , classification of digital computer system, organization of computers. Input and Output devices, Storage devices.

Unit-II : Understanding Computer Systems **06**

Computer software : System software, application software, firmware , Programming languages classification: machine language, assembly language & high-level language. Evolution of programming languages: first generation, second generation, third generation & fourth generation languages, Language translator: Compiler, Interpreter, Assembler. Operating System - Definition, Job, Objective and evolution of operating system, Types of operating systems.

Unit-III : Network Communications **08**

Network Communication : Definition, Criteria, advantages and limitations of computer networking, Communication process, Communication types, Types of computer network ,Network topology, LAN and other network related protocols, OSI model, TCP/IP model, Networking Components.

Unit –IV : Network Applications **10**

Network Applications- Internet: Introduction, Internet basic, Internet protocols, Internet addressing, Browser WWW, E-mail, telnet, ftp, application, benefits and limitation of internet, electronic conferencing, and teleconferencing.

Unit-V : Understanding Latest It Trends **10**

Latest IT Trends:-e-Commerce, M-Commerce, Artificial Intelligence, Computational Intelligence, Geographic Information System (GIS), Data Mining . Role of IT in different Area - Education, Industry, Banking, Marketing, Public Services and others.

References Books:

2. Computer fundamentals: By V. Rajaraman ; PHI
3. Fundamentals of IT: Leon and Leon; Leon Tec World
4. Fundamentals of Information Technology, Alexis Lean and Mathews Leon, Vikas Publication House, Delhi
5. Information Technology - inside and outside, Cyganski, Pearson Publication
6. Introduction to computer Science, ITL ESL, Pearson Education

Course Code: SITC-402

Paper Title: Linux Operating System

Course Objectives:

1. This course shall build a platform for students to start their own enterprise
2. For Making Student Job Ready

Course Outcome:

After completion of this course students will be able to

1. Understand the Linux OS architecture.
2. Install and use different types of distributions available in market.

UNIT I- Introduction to Linux **6**

Introduction to Linux ,Advantages of Linux ,Distributions of Linux ,Linux Installation Process ,Hardware Requirements of Linux ,Linux Partitioning ,virtual Memory Space(swap) ,GNONE & KDE Desktop ,`Boot Loader , Login and shutdown

UNIT II- Linux Shell & file Structure **6**

Linux File System , Linux shell and its types , Text Editor , Working with Linux console-text based and virtual based , File name expansion, concept of Pipe, Job:-Background ,Kill & Interruption , Ending Process-PS & KILL , X window system ,Configuration of X window , File system-EXT-2,EXT-3 .

UNIT III- System user Administration **8**

Linux system user Control:-Root user, Root Password, Root user access , System run Levels: telinit, init tab and shutdown:-Run levels, Run levels in init tab, changing run levels with tel init, run level commands , shutdown , Performance analysis tools and ProceSITs,

UNIT IV- Merging groups **10**

Merging groups - group management tools , Adding and removing user with useradd, usermod and userdel, File permissions, Managing Password-policy& shadow password, Managing disk quotas, Configuration and managing Print services, Local Printer configuration, Network Printer Configuration.

UNIT V-Managing Network Connectivity & security **10**

TCP/IP Network address -IPV4 & IPV6 , Class of IP address ,Difference between IPV4 and IPV6, Domain name service, Monitoring network using ping, netstat, tcpdump , Ether Ape ,Ether cap

UNIT VI-Managing Network Connectivity & security **10**

Dynamic host configuration protocol (DHCP), Concept of Comba, Concept and Installation of Apache win server, Public key encryption, integrity check & Digital signature, Wireless Networking.

Reference books:

1) The Complete Reference of Linux - By Richard Petersen (6th edition)
2) Fedora Unleashes - By Bill Ball & David Pits

Course Code: SITC-403

Paper Title: Advanced Web Technology

Course Objectives

To aware the Students with advanced web technology
To develop a skill to write applications using PHP and Java Script

Course Outcome

Students will be able to develop a dynamic webpage by the use of PHP and java script. On completion of this course, a student will be able to develop a web application using PHP and java script.

Unit-I: Introduction **10**

Web Technology & XML Internet – current state, hardware and software requirement, ISP, an internet account, web home page, URL, browser, security on web, searching tools, search engines, FTP, Gopher, Telnet, emails, TFTP Web browser architecture, web page and multimedia, static dynamic and active web page, simple mail transfer protocol, simple network management protocol, hypertext transfer protocol

Unit-II: Basics of PHP **6**

Introduction to PHP, what does PHP do?, History of PHP, language basics, datatypes, variables, expressions and operators, flow control statements, including code, embedding PHP in web pages.

Unit-III: Functions & Strings **6**

Calling a function, defining a function, variable scope, function parameters, return values, variable functions, and anonymous functions. Strings: Accessing individual characters, cleaning strings, encoding and escaping, comparing strings, manipulating and searching strings, regular expressions.

Unit-IV: Arrays & Objects: **10**

Indexed vs. associative arrays, identifying elements of an array, storing data in arrays, multidimensional arrays, extracting multiple values, converting between arrays and variables, traversing arrays, sorting. Objects: Creating an object, accessing properties and methods, declaring a class, introspection.

Unit-V: Database Structure **10**

Overview Introduction, connecting to and disconnecting from the server, Entering queries , Creating and using a database , Creating and selecting a database , creating a table , loading data into a table , Retrieving information from a table, selecting all data, selecting particular rows, selecting particular columns , sorting rows, date calculations, working with NULL values , pattern matching , counting rows , using more than one tables.

Unit-VI: MySQL Database **8**

MySQL databases in PHP: Introduction, connecting to a MySQL database, querying the database, Retrieving and displaying the results, modifying data, deleting data.

Course Code: SITP-401

Course Title: Lab 1: IT Lab

- At least 15 Practical Based on Information Technology Elective subject.

Course Code: SITP-402

Course Title: Lab 2: Linux Lab

- At least 15 Practical Based on Elective Subject.

Course Code: SITP-403

Course Title: Lab 3: Advanced Web Technology Lab

- At least 15 Practical Based on Elective Subject.

Course Code: SITE-401A

Paper Title: Programming with C++

Course Objectives:

7. To learn the features of an object-oriented programming language viz., data abstraction, data encapsulation, information hiding, inheritance, and dynamic binding of the messages to the methods.
8. To learn and implement inheritance and enhance problem solving skills in C++ with extensive programming projects.

Course Outcomes:

1. Describe the procedural and object oriented paradigm with the basic concepts of streams, claSITs, functions, data and objects.
2. Describe the concept of function overloading, operator overloading, static members, friend functions, friend claSITs etc.

Unit I: Introduction to OOPs & C++ **6**

Introduction to OOPs and its basic features, Basic Components of OOPs, Procedure oriented v/s Object oriented programming, Benefits of OOPs, Applications of OOPs Structure of a C++ program, Decision making, Looping constructs, Arrays, Pointers

Unit II: Functions

Functions, Function prototype, Call by value, Call by reference, Call by address, Return by reference , Inline function, Default arguments, Function overloading.

Unit III: ClaSITs & Objects **6**

Introduction to ClaSITs & Objects, Access modifiers – private, public, protected Constructors & Destructor, Types of Constructors, Static member data and functions, Friend function and class, Nested claSITs, Operator Overloading, Operator Overloading through member function and , friend function, Overloading special operators.

Unit IV: Inheritance & Polymorphism **8**

Introduction to Inheritance, Types of Inheritance, Constructors in Inheritance, Multiple Inheritance, Constructors in Multiple Inheritance Ambiguities in Multiple Inheritance, Introduction to Polymorphism, Virtual Functions & ClaSITs, Pure virtual function and Abstract claSITs.

Unit V: Templates, Namespaces, Exception Handling and File Handling **10**

Function Template and Class Templates, Introduction to STL, Components of STL Creating namespaces, Nesting of namespaces, Exception Handling, Throwing and catching exceptions, Throwing multiple Exceptions

Unit VI: File Handling and graphics **10**

File Handling, Opening and Closing Files, Reading and Writing data, Random access files, File pointers, Dynamic Memory Allocation for Arrays, Dynamic Memory Allocation for Objects, graphics using c++, Draw a line,

Reference Books:-

1. The C++ Complete Reference, IV Edition, Herbert Schildt, McGraw Hill Publication, 2002, ISBN 0071502394, 9780071502399.
2. Object-Oriented Programming with C++, VI Edition, E Balgurusamy, McGraw Hill, 2013, ISBN 125902993X, 9781259029936.

Course Code: SITE-401 B
Paper Title: Database Essentials

Course Objectives:
1. To introduce students about the concepts of database systems
2. To teach students about different types of databases.

Course Outcomes: After completion of this course students will be able to
1. Ability to create their own databases as solution to problems

Unit- I : Overview **06**

Overview of Database Management : Data processing versus data management , File oriented approach versus verses database oriented approach to data management ,Data independence , Database administration, DBMS architecture, Importance of data dictionary ,Contents of data dictionary, Data Models, Object oriented database

Unit-II : Modeling aspects **06**

Design Theory for Relational Database: E-R Model, Concept of Keys, Normalization, Functional Dependencies, Decomposition of Relation schemes, Normal Forms for Relations, Multivalued and other kinds of Dependencies.

UNIT-III : Handing Queries **08**

Query Optimization: Relational algebra Queries , SQL Queries ,Basic Optimization Strategies, Algebraic Manipulation, Optimization of Selections in System, Exact Optimization for a Subset of Relational Queries, Optimization under Weak Equivalence.

Unit-IV : Security Aspects **10**

Database Protection: Protecting the database- Integrity, Security and recovery Security in query-by-Example, Domain constraints, Referential integrity, Assertion, Triggers, Security and authorization in SQL. Concurrent Operations on the Database: Basic Concepts, A simple Transaction Model, Model with Read and Write-Locks, Read-only, Write-only Model, Concurrency for Hierarchically Structured Items, Protection against Crashes, Optimistic Concurrency Control.

UNIT-V : Distributed databases **10**

Principles of Distributed Data Bases: Framework for distribution. Translation of global queries into fragment queries. Query optimization and management of distributed transaction. Concurrency control and reliability in distributed databases. Administration of Distributed Data Bases.

References Books:

1. An Introduction to Data base Systems , C J Dates, / Kannan, Pearson Education.
2. Database system concepts By H.Korth and A. Silberschatz ,TMH Publication
3. Data Base Systems , J.D.Ullman, Galgotia, New Delhi.
4. Distributed Databases ,S.Ceri and G. Relagatti, McGraw-Hill.
5. The Theory of Database concurrency Control C.Papadimitriou , , Computer Science Press.

Course Code: SITE-401 C
Paper Title: Computer Network

Course Objectives:
1. To introduce students about the concepts of Computer Network
2. To teach students about Data communications and various network models.

Course Outcomes: After completion of this course students will be able to
1. Establishing computer Networking
2. Explain the concept of Multiplexing, TCP Sockets, UDP Sockets

UNIT I: Introduction **8**

Introduction: Goal and application Network Hardware and Software , Protocol hierarchies, Design Issue of the layers, Interfaces and services, Connection oriented and connection less services, Service Primitives, Reference Models – The OSI Reference model, The TCP/IP Reference Model ,Types of computer Network :LAN,MAN,WAN, Topologies, Transmission mode .Physical Layer: Transmission Media ,Concept of data transmission ,Switching Techniques ,Communication Satellites – Geosynchronous Satellite – VSAT, Low Orbit Satellites, ISDN and ATM. Digital Modulation and Demodulation Techniques

UNIT II: Data link Layer **6**

Data Link Layer: Data Link Layer design issues, Framing, Flow control, Error Detection and Correction DLL Protocol: Stop and Wait Protocol, Sliding window protocol, A Simplex protocol for noisy channel, Medium access sublayer: Channel allocation –static and dynamic ,Multiple access protocol FDDI, Data Link Layer in the Internet – SLIP,PPP.

UNIT III: Network Layer **6**

Network Layer: The Network Layer Design Issue, comparison of virtual circuits and datagram subnets, connectionless internetworking, Tunnelling, Internetwork routing, Routing algorithm , Fragmentation, The Network Layer in the Internet – The IP Protocol, IP Address, subnets, Internet control protocols, internet multicasting.

UNIT IV: Transport Layer **10**

Transport Layer: The Transport layer services, The concept of client and server in terms of socket addressing Quality, of service, Transport service primitives and buffering, Multiplexing, Crash Recovery. The Internet Transport Protocols (TCP/IP) – The TCP Service Model, The TCP protocol, The TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management, UDP.

UNIT V: Presentation and Application Layers **10**

Presentation and Application Layer: Network Security – Traditional Cryptography, Two fundamental Cryptographic Principles, Secret Key Algorithms Public key Algorithms, Authentication protocols, DNS,E-mail.

Reference books :

1. Computer Networks ,A.S. Tanenbaum, Pearson Education
2. Data Communications and Networking ,Forouzan, Tata McGraw Hill Company
3. Computer Network , S.S.Shinde ,New Age International Publisher.
4. Data and computer Communication , Shashi banzal ,Firewall media
5. Data & Computer communication, William Stallings, Pearson

Course Code: SVECR-401

Paper Title: Research methodology

Course Objectives

The main objective of this course is to introduce the basic concepts in research methodology in Social science. This course addreSITs the issues inherent in selecting a research problem and discuss the techniques and tools to be employed in completing a research project. This will also enable the students to prepare report writing and framing Research proposals.

Course Outcomes

- Students who complete this course will be able to understand and comprehend the basics in research methodology and applying them in research/ project work.
- This course will help them to select an appropriate research design.
- With the help of this course, students will be able to take up and implement a research project/ study.
- The course will also enable them to collect the data, edit it properly and analyse it accordingly. Thus, it will facilitate students' prosperity in higher education.
- The Students will develop skills in qualitative and quantitative data analysis and presentation.
- Students will be able to demonstrate the ability to choose methods appropriate to research objectives.

Syllabus: As per the common syllabus circulated by the university for all affiliated colleges

OR

UNIT I: Introduction, the Purpose and Product of Research **10**

What is research?, Evaluating Research, The 6Ps of research, Reasons for doing Research, possible products, Finding and choosing research topics, evaluating the purpose and product of research.

UNIT II: Overview of the Research Process, Internet Research **10**

A model of the research process, Alternative models of the research process, evaluating the research process, Background of the Internet and WWW, Internet research topics, The Internet and a literature review, The Internet and research strategies and methods, Internet research, the law and ethics.

UNIT III: Reviewing the literature, Surveys and Design Creation **10**

Purpose of literature review, literature resources, The Internet and literature reviews, conducting literature reviews, evaluating literature reviews, Define Surveys, Planning and Designing surveys, the internet and surveys, Example of Surveys, Defining design and creation, Planning and conducting design and creation research, Creative computing and digital art.

UNIT IV: Experiments, Case studies, Action Research **10**

Defining experiments, Planning and conducting experiments, The internet and experiments, Defining case studies, Planning and conducting case studies, The internet case studies, Defining Action research, Planning and conducting Action research, The internet and Action research

UNIT V: Interviews, Observations, Questionnaires **10**

Defining Interviews, Planning and conducting Interviews, Group Interviews Internet based Interviews, Defining Observations, Planning and conducting systematic Observations, Planning and conducting participant Observations, The internet and Observations.

UNIT VI: Quantitative data analysis, Qualitative data analysis and Presentation of Research **10**

Defining Quantitative data analysis, Types of Quantitative data analysis, Data coding, Visual aids for Quantitative data analysis, Using statistics for Quantitative data analysis, Qualitative data analysis- Introduction, Analysis textual data, Analyzing non-textual qualitative data, Grounded theory, Presentation of Research- writing up the research, conference paper presentations, Posters and exhibitions, software demonstrations, Presenting yourself, PhD vivas, Research Ethics, Plagiarism, software to detect plagiarism

References:

1. Researching Information System and Computing by Briony J Oates, SAGE Publications, ISBN 978-81-7829-759-0

Second Semester

Course Code: SITC-451
Paper Title: Windows Programming with C#.NET

Course Objectives:

1. To provide the knowledge of .Net framework along with C#.Net language
2. To skill the students for developing windows base applications.

Course Outcome:

1. Students will able to develop simple as well as complex applications using .Net framework
2. Students will learn to use web applications for creating GUI based programs.

Unit-I: Introduction to C# and .NET Framework **10**

Overview of C# language features, Introduction to .NET Framework and its components, Setting up the development environment (Visual Studio), What is Event-Driven Programming?, Installing Visual Studio Creating a Simple .Net Application, Overview of Visual Studio IDE, The Menu, The Toolbars, The Toolbox Intellisense windows Common Language Runtime(CLR)

Unit-II: Working with Forms and Controls. **8**

Creating and Customizing Windows Form, Form Controls: Label and TextBox Control, Button, CheckBox, RadioButton, ListBox, ComboBox, DataGridView, MenuStrip, Panel, PictureBox, Tab Control, TreeView Control, DateTimePicker control, Dialog Boxes: ColorDialog, FileDialog, FontDialog, OpenFileDialog, PageSetupDialog, PrintDialog, PrintPreviewDialog, SaveFileDialog,

Unit- III: Functions and Arrays **6**

C# built in Functions, Custom Functions, String Functions, Call by Value & Call by Reference, Out Parameter, Array and ArrayList and Jagged Array, Sorting Arrays

Unit-VI: Controlling the programming flow **6**

The If, If-else, Else-if Statement, Switch Case Statement, Looping: While, Do while, The For loop, For Each Loop, Nested Loops

Unit-V: Advanced Programming & ADO.Net **10**

Reusable libraries: C# Data collection claSITs, interfaces, Creating & using Namespace(DLL library), Properties, Indexers, Delegates, Multicast Delegates, Custom Events, Multithreading, Exception Handling through Try-Catch-Finally Block, Printing in C#, MDI forms,

Unit-VI: ADO.Net **10**

Architecture of ADO.NET, Advantages of ADO.Net, Developing a Simple ADO.NET Based Application, Data binding: Displaying data in a data grid, Performing Select, Insert, Update and Delete operations on windows form, Create a simple application with Connected Data Access, Create a application with Disconnected Data Access Through Dataset Objects, Database connectivity with MS Sql Server

Reference Books:

1. Windows Forms Programming with C#, Author By ERIK BROWN, Published by MANNING - ISBN 1930110-28-6
2. Programming in C#, Autor By E Balagurusamy, Published by Mc Graw Hill
3. Visual C#.Net, Author By C Muthu, Published by Mc Graw Hill

Course Code: SITC-452
Paper Title: Advanced Java Programming

Course Objectives:
1. To develop background knowledge as well as core expertise AWT, Frames, Applet etc.
2. To understand the dynamic web page creation and provide knowledge for creating Dynamic websites.

Course outcome:
After completion of this course students will be able to
1. Impart the knowledge on basics concepts of multithreading programming.
2. Outline the various AWT claSITs.

UNIT-I: Introduction to Java and Object Oriented Programming **10**

Why Java is important for Internet, Java Magic: Byte Code, Java Buzzwords, Simple program of java, Using super keyword, Dynamic method dispatch, Final class and Methods, Packages, Access Protections, Interfaces, Exception Handling Fundamentals, Working with finally clause.

UNIT-II: Multithreading, Applet and Event Handling **10**

Multithreading Basics, Creating and Running a Thread, Thread life cycle, Thread Priorities, Thread synchronization, Applet Fundamentals, Applet Architectures, An Applet skeleton, The HTML APPLET tag, Passing parameters to Applet, Event class, Event Types and Listener, Action Event, Mouse Event, Key Event, Windows Event.

UNIT-III: Network Management (SNMP) **8**
Managing an Internet, The Danger of Hidden Features, Network Management Software, Clients, Servers, Managers and Agents, Simple Network Management Protocol, Fetch-Store Paradigm, The MIP and Object Names, The Variety of MIB Variables, MIB variables that correspond to arrays.

UNIT-IV: Java technologies **6**
Graphics, JFC-JAVA foundation claSITs, swing, images, java 2d graphics, internationalization, Communication and Networking, TCP Sockets, UDP Sockets, java.net, java security, Object serialization, Remote method serialization.

UNIT V: Introduction to AWT & SWING **8**

AWT ClaSITs, Windows Fundamentals, Working with Frame window, Working with Graphics, Working with Colors & Fonts, Layout Managers, Swing & Its Features, JApplet, Icons & Labels Button & Label, Text Field& Toggle Buttons, Checkboxes, Radio buttons, Combo Box & Lists, Scroll panes, Trees, Tables, Menu Bars & Menus, Tool Bars, Dialog Boxes, File Dialog, Progress Bar, Choosers

UNIT VI: Java Beans & JDBC **10**

Introduction & Advantages of JavaBeans, Application Building Tools, Bean Development Kit, JAR Files, Developing Simple Bean Using the BDK, The Java Bean API, Introduction to JDBC, Types Of JDBC Connectivity, Accessing Relational Database from java Programs, Establishing database Connection.

Reference Books:

1. Java Complete Reference by Herbert Schildt Tata McGraw-Hill.Publisher: Sams 2000.
2. Mastering Java2 J2SE1.4 by John Zukouski PBP Publication
3. Java How to Program By H.M Deitel, P.J. Deitel 6th Edition.

Course Code: SITC-453
Paper Title: Programming in Python

Course Objectives:
1. To understand why Python is a useful scripting language for developers.
2. To define the structure and components of a Python program.
3. To understand programming constructs in Python.
4. To acquire Object Oriented Skills in Python
5. To develop the ability to write database applications in Python

Course Outcomes:
After successful completion of this course, learner will be able to
1. Write programs using Python programming constructs.
2. Design and Develop applications using Python programming.
3. Design object oriented programs with Python claSITs.
4. Use exception handling in Python applications for error handling.
5. Design and Develop applications connecting with database.

UNIT-I: Introduction and basic control structure of Python **10**
Introduction and Features of Python, Data Types, Variables, Operators, Control Structures: Loops and Decision.

UNIT II: Data Types and ClaSITs **10**
Data Types: Numerical, String, Set, Dictionary, List, Tuple, ClaSITs and Objects, Functions and Arguments, Inheritance, Polymorphism.

UNIT III: Modularization and Exceptions **10**
Standard Modules, Packages, Exception raising, Exception Handling, Error Processing.

UNIT IV: Object Oriented Design **10**
Programming types, Object Oriented Programming, Inheritance and types of inheritance, Polymorphism.

UNIT V: Database Connectivity with MySQL **10**
Getting MySQL for Python, connecting with database, Passing Query to MySQL. GUI using Tkinter Module, Creating Label, Text, Button, Info Dialog Boxes, Radio button, Check button, Importing MySQL for Python, connecting with database, Passing a query to MySQL.

UNIT VI: Web Development using Python **10**
Django Installation, Creating Project, Creating Application, Templates and Models, Data Manipulation, Django Admin, Django Syntax- variables, tags, if-else, loops, Database Connection with MySQL.

Reference Books: -
1. Learning Python-Mark Lutz-O‟Reilly 5th edition
2. MySQL for Python-Albert Lukaszewskc-Packet publication 1st edition
3. Django 2 by Example (Build powerful and reliable Python web applications from scratch)-Antonio Mele

Course Code: SITP-451

Course Title: Lab 1: C# .NET Lab

- At least 15 Practical Based on Elective Subject.

Course Code: SITP-452

Course Title: Lab 2: Java Lab

- At least 15 Practical Based on Elective Subject.

Course Code: SITP-453

Course Title: Lab 3: Python Lab

- At least 15 Practical Based on Elective Subject.

Course Code:	SITE-451 A Elective	Data Analysis using spreadsheets	Credits: 3 Theory and 01 Lab	Hours required
Pre requisite				
1. Knowledge of Use of computers for storing and retrieving data				
Course Objectives:				
1. Making students habitual of using computers for data storing and data analysis				
Course Outcome:				
1. Learn how to use spreadsheets built-in data analysis features, create charts and visualizations, and discover multiple ways to tell the stories hidden in the numbers				
Unit-1:	**Introduction to MS Excel**			
1.1	About Excel & Microsoft, Uses of Excel, Excel software, Spreadsheet window pane, Title Bar, Menu Bar, Standard Toolbar, Formatting Toolbar, the Ribbon, File Tab and Backstage View, Formula Bar, Workbook Window, Status Bar, Task Pane, Workbook & sheets			**08**
1.2	Selecting Columns & Rows, Changing Column Width & Row Height, Autofitting Columns & Rows, Hiding/Unhiding Columns & Rows, Inserting & Deleting Columns & Rows, Cell, Address of a cell, Components of a cell – Format, value, formula, Use of paste and paste special			**08**
Unit-2:	**Using Ranges and Formulas**			
2.1	Using Ranges, Selecting Ranges, Entering Information Into a Range, Using AutoFill			**08**
2.2	Using Formulas, Formula Functions – Sum, Average, if, Count, max, min, Proper, Upper, Lower, Using AutoSum, Advanced formulas			**08**
Unit-3:	**Spreadsheet Charts and Data Analysis**			
3.1	Creating Charts, Different types of chart, Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table			**04**
3.2	Sorting, Filter, Text to Column, Data Validation Creating PivotTables, Manipulating a PivotTable, Using the PivotTable Toolbar, Changing Data Field, Properties, Displaying a PivotChart, Setting PivotTable Options, . Adding Subtotals to PivotTables			**04**
Unit-4:	**Advanced operations for data analysis**			
4.1	Moving between Spreadsheets, Selecting Multiple Spreadsheets, Inserting and Deleting Spreadsheets Renaming Spreadsheets, Splitting the Screen, Freezing Panes, Copying and Pasting Data between Spreadsheets, Hiding , Protecting worksheets			**04**
4.2	Recording Macros, Running Macros, Deleting Macros			**04**
Lab	**Actual hands on for data analysis**			**12**
01 Credit Lab	Data analysis case studies leading to independent projects where students collect data, use Excel for recording data and create their own individual data analysis reports			
Reference Books				
1.	Excel Data Analysis For Dummies, 5th Edition, Paul McFedries			

Course Code:	SITE-451 B Elective	Mathematical Foundations for Computer Science	Credits: 3 Theory and 01 Lab	Hours required
Pre requisite				
1. Basic knowledge of mathematical concepts				
Course Objectives:				
1. Cultivate clear thinking and creative problem solving. 2. Thoroughly train in the construction and understanding of mathematical proofs. 3. Exercise common mathematical arguments and proof strategies.				
Course Outcome:				
1. At the end of the course student will be able to understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving.				
Unit-1:	**Introduction**			
1.1	Sets, Venn diagrams, Operations on Sets, Laws of set theory, Power set and Products, Partitions of sets, The Principle of Inclusion and Exclusion.			**08**
Unit-2:	**Propositions and Logical Operations**			
2.1	Propositions &logical operations, Truth tables , Equivalence, Implications , Laws of logic, Normal Forms, Predicates & Quantifiers, Math.Induction.			**08**
Unit-3:	**Relations, Paths and Digraphs**			
3.1	Relations, Paths and Digraphs, Properties and types of binary relations , Operations on relations, Closures, Warshalls algorithm, Equivalence and partial ordered relations, Poset, Hasse diagram and Lattice			**08**
3.2	Functions: Types of functions – Injective, Surjective and Bijective Composition of functions , Identity and Inverse function, Pigeon-hole principle.			**08**
Unit-4:	**Permutations and Combinations**			
4.1	Permutations, Combinations, Elements of Probability, Discrete Probability and Conditional Probability,			**04**
4.2	Generating Functions and Recurrence Relations, Recursive Functions, Introduction to Functional Programming,			**04**
4.3	Graphs Definitions, Paths and circuits: Eulerian and Hamiltonian, Types of graphs, Sub Graphs Isomorphism of graphs.			**08**
Lab	**Use of Programming language / Packages for actual hands on**			
01 Credit Lab	Case studies leading to independent projects where students implement above mathematical concepts using a programming language or a package leading to a Lab Book			**12**
Text Book				
1	Discrete Mathematical Structures- C. L. Liu, Second Edition, McGraw-Hill			
Reference Books				
1.	Discrete Mathematical Structures- Y N Singh, Wiley-India Press.			
2.	Discrete Mathematics for Computer Scientists and Mathematicians- J. L. Mott, A.Kandel, Prentice Hall of India.			
3.	Discrete Mathematical Structures with Applications to Computer Science- Discrete Mathematics for Computer Scientists and Mathematicians, Tata Mcgraw-Hill.			

Course Code:	SITE-451 B Elective	Design and Analysis of Algorithms	Credits: 3 Theory and 01 Lab	Hours required
Pre requisite				
1. Knowledge of Data structures				
Course Objectives:				
1. Reinforce basic design concepts (e.g., pseudo code, specifications, top-down) 2. Knowledge of algorithm design strategies 3. Familiarity with an assortment of important algorithms 4. Ability to analyze time and space complexity				
Course Outcome:				
1. Ability to analyze algorithm 2. Ability to propose efficient algorithms 3. Ability to think on complexity issues				
Unit-1:	**Review of Algorithms and elementary data structures**			
1.1	Understanding basic data structures and their applications with more emphasis on graphs and trees, knowledge of algorithm and their complexity notations, emphasis on asymptotic notations			**08**
1.2	Complexity analysis for algorithms on graphs including DFS,BFS , shortest path algorithms like, the Bellman-ford algorithm, the Dijkstra algorithm ,the Floyd-Warshall algorithm, the Johnsons algorithm.			
1.3	Complexity analysis for algorithms on trees including, tree searching, inseartion of node / deletion of nodes in trees, traversing trees, binary search trees trees, AVL trees			
Unit-2:	**Divide and conquer mechanism**			
2.1	Introduction, general method, algorithm complexity analysis for binary search, merger sort, quick sort, Strassen s matrix multiplication.			**08**
Unit-3:	**Advanced algorithm design methods-1**			
3.1	Greedy method, general method, container loading knapsack problem, job sequence, introduction to spanning trees , minimum spanning trees ,growing a minimum spanning tree, the algorithms of Kruskal and Prim.			**08**
3.2	Dynamic programming, general method, applications 0/1 knapsack problem, travelling sales person problem			**08**
Unit-4:	**Advanced algorithm design methods-2**			
4.1	General Backtracking method, Applications- n-queen problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles			**04**
4.2	Introduction to String matching, Robin – Karp algorithm, Knuth – Morris Pratt algorithm,			**04**
4.3	Introduction to NP completeness , polynomial time , polynomial time verification , reducibility, NP completeness proofs ,NP completeness problems			**08**
Lab	**Use of Programming language / Packages for actual hands on**			
01	Case studies / experiments leading to independent projects / work out where			**12**

Credit Lab	students implement above analysis of algorithm concepts leading to a Lab Book	
Text Book		
1	Introduction to Algorithms, Corman , Leiserson and others , 2nd edition , PHI	
Reference Books		
1.	Data Structures, Lipschutz , Tata McGraw Hills	
2.	Design Methods and Analysis of Algorithms , S.K.Basu , PHI.	
3.	The Art of Computer Programming, Vol 1,2,3 , Dr.Kunth , Addison Wesley	

Course Code:	**SITOJ-451**	On Job Training , Internship/ Apprenticeship or Field Project	**Credits: 03**
Course Objectives: As per the University rules and policy			
Course Outcome: As per the University rules and policy			
Experiments As per the University rules and policy			