College of Arts, Science & Commerce

SIES

R I S E   W I T H   E D U C A T I O N
Sion(West), Mumbai – 400022.
(Autonomous)

Faculty: Science

Program: B.Sc.

Subject:INFORMATION TECHNOLOGY

Academic Year: 2023 – 2024

T.Y.B.Sc.

Credit Based Semester and Grading Syllabi approved by Board of Studies in Information Technology to be brought into effect from June 2023.

Semester V

Course Code	Course Type	Course Title	Credits
SIUSIT51	Skill Enhancement Course	Advanced Web Programming	**2**
SIUSIT52	Skill Enhancement Course	Artificial Intelligence	**2**
SIUSIT53	Skill Enhancement Course	Ethics in Information Technology	**2**
Elective I (Select any one)			
SIUSIT54(a)	Discipline Specific Elective	Security in Computing	**2**
SIUSIT54(b)	Discipline Specific Elective	Linux System Administration	**2**
Elective II (Select any one)			
SIUSIT55(a)	Discipline Specific Elective	Enterprise Java	**2**
SIUSIT55(b)	Discipline Specific Elective	Next Generation Technologies	**2**
SIUSITP51	Skill Enhancement Course Practical	Advanced Web Programming Practical	**2**
SIUSITP52	Skill Enhancement Course Practical	Artificial Intelligence Practical	**2**
SIUSITP53	Skill Enhancement Course Practical	Project Dissertation	**2**
Elective I (Select any one)			
SIUSITP54(a)	Discipline Specific Elective Practical	Security in Computing Practical	**2**
SIUSITP54(b)	Discipline Specific Elective Practical	Linux Administration Practical	**2**
Elective II (Select any one)			
SIUSITP55(a)	Discipline Specific Elective Practical	Enterprise Java Practical	**2**
SIUSITP55(b)	Discipline Specific Elective Practical	Next Generation Technologies Practical	**2**
		TOTAL CREDITS	**20**

SEMESTER V

Course Objective:
To acquaint learners about the importance of web programming which is the lifeline of today's world.

Course outcomes:
Upon completion of this course, student will be able to:
CO1: Gain knowledge about conditional logic, loops, methods, class, delegates, events and exceptions to design a C# program.
CO2: Design forms using server controls for any web application under ASP.NET with C# and also apply the concept of transferring data between web pages using viewstate, cookies, session and application state variables.
CO3: Use Database (SQL Server) and connect the database through C# code and apply database connectivity to store, retrieve and update data in the database and also use AJAX controls in a web application.

Theory Component:

B. Sc (Information Technology)	Semester – V - SIUSIT51
Course Name	**Advanced Web Programming**
Periods per week (1 Period is 50 minutes)	**5**
Credits	**2**

Unit	Contents	No. of Lectures
I	**Introduction to C#:** Reading and writing to a console, Built-in-types, String types, common operators, Nullable types, Datatype conversion, Arrays, if statement, Loops, Method Parameters **Classes:** Static and instance class, Inheritance, Method Hiding, Polymorphism, Method Overloading, Properties, Structures, Interfaces, Abstract class, Delegates, Exception Handling, Enumeration, Access Modifiers, Indexers	**12**

II	**ASP.NET:** What is ASP.NET?, Creating ASP.NET website, What is viewstate?, Events in the lifecycle of a web application, ASP.NET page life cycle events **Server Controls:** Server control Events, IsPostBack, TextBox, RadioButton, CheckBox, HyperLink, Button, LinkButton, ImageButton, Command event of a button control, DropDownList, binding database data and XML data to DropDownList, Mapping virtualpath to physical path using ServerMapPath, CheckBoxList, ListBox, RadioButtonList, BulletedList, FileUpload, Adrotator, Calender, Multiview, Wizard, Panel, User Control	**12**
III	**Validation Controls, Different page navigation techniques:** Response.Redirect, Server.Transfer, Cross page posting, cross page postback **Techniques to send data from one webform to another:** QueryString, Cookies, Session State, Application State **Master Pages:** Why use Master pages? Master Page Basics, Passing data from content page to master page, Menu, SiteMapPath, TreeView Control	**12**
IV	**ADO.NET Fundamentals**: Understanding Databases, Configuring Your Database, Understanding SQL Basics, Understanding the Data Provider Model, Using Direct Data Access, Using Disconnected Data Access. **Data Binding**:Introducing Data Binding, Using Single-Value Data Binding, Using Repeated-Value Data Binding, Working with Data Source Controls, **The Data Controls**: The GridView, Formatting the GridView, Selecting a GridView Row, Editing with the GridView, Sorting and Paging the GridView, Using GridView Templates, The DetailsView and FormView	**12**
V	**Security:** Authentication and Authorization, Anonymous authentication, Forms Authentication, Windows Authentication. **ASP.NET AJAX**: Understanding Ajax, Using Partial Refreshes, Using Progress Notification, Implementing Timed Refreshes, Working with the ASP.NET AJAX Control Toolkit.	**12**

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**	**Year**
1.	Beginning ASP.NET 4.5 in C#	Matthew MacDonald	Apress		2012
2.	C# 2015	Anne Bohem and Joel Murach	Murach	Third	2016
3.	Murach's ASP.NET 4.6 Web Programming in C#2015	Mary Delamater and Anne Bohem	SPD	Sixth	2016
4.	ASP.NET 4.0 programming	J. Kanjilal	Tata McGraw-Hill		2011
5.	Programming ASP.NET	D.Esposito	Microsoft Press (Dreamtech)		2011

| 6. | Beginning Visual C# 2010 | K. Watson, C. Nagel, J.H Padderson, J.D. Reid, M.Skinner | Wrox (Wiley) | | 2010 |

Internal Evaluation: 40 Marks

20 Marks	20 Marks
Class Test	A project using ASP.NET with C#

Advanced Web Programming Practical (SIUSITP51)

B. Sc (Information Technology)	Semester – V - SIUSITP51
Course Name	**Advanced Web Programming Practical**
Periods per week (1 Period is 50 minutes)	3
Credits	2

List of Practical:

Any 10 practical with respect to the syllabus topics.

Artificial Intelligence (SIUSIT52)

Course Objective:

The objective of the course is to present an overview of artificial intelligence (AI) principles and approaches, develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, and learning

Course Outcome:
Upon completion of this course, student will be able to:
CO1: Describe the problem as a state space, graph, design heuristics with
       different search or game based techniques to solve them.
CO2: Describe Artificial Intelligence techniques, such as search algorithms, minimax
       algorithm, neural networks and tracking.
CO3: Apply Artificial Intelligence techniques for problem solving.

B. Sc (Information Technology)	Semester – V –SIUSIT52
Course Name	**Artificial Intelligence**
Periods per week (1 Period is 50 minutes)	**5**
Credits	**2**

Unit	Contents	No. of Lectures
I	**Introduction:** What is Artificial Intelligence? Foundations of AI, history, the state of art AI today. **Intelligent Agents:** agents and environment, good behavior, nature of environment, the structure of agents.	**12**
II	**Solving Problems by Searching:** Problem solving agents, examples problems, searching for solutions, uninformed search, informed search strategies, heuristic functions. **Beyond Classical Search:** local search algorithms, searching with non-deterministic action, searching with partial observations, online search agents and unknown environments.	**12**
III	**Adversarial Search:** Games, optimal decisions in games, alpha-beta pruning, stochastic games, partially observable games, state-of-the-are game programs. **Logical Agents:** Knowledge base agents, The Wumpus world, logic, propositional logic, propositional theorem proving, effective propositional model checking, agents based on propositional logic.	**12**
IV	**First Order Logic:** Syntax and semantics, using First Order Logic, Knowledge engineering in First Order Logic. **Inference in First Order Logic:** propositional vs. First Order, unification and lifting, forward and backward chaining, resolution.	**12**
V	**Planning:** Definition of Classical Planning, Algorithms for planning as state space search, planning graphs, other classical planning approaches, analysis of planning	**12**

approaches, Time, Schedules and resources, hierarchical planning, Planning and Acting in Nondeterministic Domains, multiagent planning,

Knowledge Representation: Categories and Objects, events, mental events and objects, reasoning systems for categories, reasoning with default information, Internet shopping world

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**	**Year**
1.	Artificial Intelligence: A Modern Approach	Stuart Russel and Peter Norvig	Pearson	3rd	2015
2.	A First Course in Artificial Intelligence	Deepak Khemani	TMH	First	2017
3.	Artificial Intelligence: A Rational Approach	Rahul Deva	Shroff publishers	1st	2018
4.	Artificial Intelligence	Elaine Rich, Kevin Knight and Shivashankar Nair	TMH	3rd	2009
5.	Artificial Intelligence & Soft Computing for Beginners	Anandita Das Bhattacharjee	SPD	1st	2013

Internal Evaluation: 40 Marks

20 Marks	**20 Marks**
Class Test	Create project using AI

Artificial Intelligence Practical (SIUSITP52)

B. Sc (Information Technology)	Semester – V –SIUSITP52
Course Name	Artificial Intelligence Practical
Periods per week (1 Period is 50 minutes)	3
Credits	2

List of Practicals:(using C/C++/Java/Python/R/Prolog/LISP)

1	Write a program to implement depth first search algorithm.
	Write a program to implement breadth first search algorithm.
2	Write a program to simulate 4-Queen / N-Queen problem.
	Write a program to solve tower of Hanoi problem.
3	Write a program to implement alpha beta search.
	Write a program for Hill climbing problem.
4	Write a program to implement A* algorithm.
	Write a program to implement AO* algorithm.
5	Write a program to solve water jug problem.
	Design the simulation of tic – tac – toe game using min-max algorithm.
6	Write a program to solve Missionaries and Cannibals problem.
	Design an application to simulate number puzzle problem.
7	Write a program to shuffle Deck of cards.
	Solve traveling salesman problem using artificial intelligence technique.
8	Solve the block of World problem.
	Solve constraint satisfaction problem
9	Derive the expressions based on Associative law
	Derive the expressions based on Distributive law
10	Write a program to derive the predicate. (for e.g.: Sachin is batsman , batsman is cricketer) - > Sachin is Cricketer.
11	Write a program which contains three predicates: male, female, parent. Make rules for following family relations: father, mother, grandfather, grandmother, brother, sister, uncle, aunt, nephew and niece, cousin. Question: i. Draw Family Tree. ii. Define: Clauses, Facts, Predicates and Rules with conjunction and disjunction

Ethics in Information Technology (SIUSIT53)

Course Objective:

Developing awareness on ethical issues related to technology like privacy protection, intellectual property, social networking and cyber ethics

Course Outcome:
Upon completion of this course, student will be able to:
CO1: Understand the concept of ethics, privacy issues and its relevance in intellectual property rights
CO2: Describe the concept of ethics in software development, social networking, working of IT organizations
CO3: Examine and apply the perspectives for identifying and approaching cyberethics issues

B. Sc (Information Technology)	Semester – V –SIUSIT53
Course Name	**Ethics in Information Technology**
Periods per week (1 Period is 50 minutes)	**5**
Credits	**2**

Unit	Contents	No. of Lectures
I	An Overview of Ethics: What Is Ethics?, Ethics in the Business World, Including Ethical Considerations in Decision Making, Ethics in Information Technology. Ethics for IT Workers and IT Users, Computer and Internet Crime: IT Security Incidents, Implementing Trustworthy Computing	12
II	Privacy: Privacy Protection and the Law, Key Privacy and Anonymity Issues. Freedom of Expression: Key Issues Intellectual Property: What Is Intellectual Property?,Copyrights, Patents, Trade Secrets, Key Intellectual Property Issues.	12
III	Software Development: Strategies for Engineering Quality Software, Software Product Liability, Key Issues in Software Development Social Networking: What Is a Social Networking Web Site?,Business Applications of Online Social Networking, Social Networking Ethical Issues, Online Virtual Worlds.	12
IV	The Impact of Information Technology on Productivity and Quality of Life: The Impact of IT on the Standard of Living and Worker Productivity, The Impact of IT on HealthCare Costs Ethics of IT Organizations: Outsourcing, Whistle-Blowing, Green Computing	12
V	Introduction To Cyberethics: Concepts, Perspectives and Methodological Frameworks, Privacy and Cyberspace, Security in Cyberspace, Cybercrimes and Cyber related crimes, Regulating Commerce and Speech in Cyberspace	12

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edit ion**	**Year**

1.	Ethics in Information Technology	George. W. Reynolds	Cengage Learning	5th	2015
2.	Ethics and Technology: Controversies, Questions, and Strategies for Ethical Computing	Herman. T. Tavani	Wiley	4th	2013
3.	Computer Network Security and Cyber Ethics	Joseph Migga Kizza	McFarland & Company, Inc,Publishers	4th	2014

Internal Evaluation: 40 Marks

20 Marks	**20 Marks**
Class Test	Case Studies

Project Dissertation (SIUSITP53)

B. Sc (Information Technology)	**Semester – V -SIUSITP53**
Course Name	**Project Dissertation**
Periods per week (1 Period is 50 minutes)	**3**
Credits	**2**

The details are given in Appendix – I

Security in Computing (SIUSIT54(a))

Course Objective:

The course offers complete, timely coverage of all aspects of computer security, including users, software, devices, operating systems, networks, and data.

Course Outcome:
Upon completion of this course, student will be able to:
CO1: Describe the rapidly evolving attacks, countermeasures, and computing environments.
CO2: Examine encryption, protecting privacy, implementing firewalls and detecting intrusions.
CO3: Explain the concept of Secure network design, Secure application design, virtual machines

Theory Component:

B. Sc (Information Technology)	Semester – V - SIUSIT54(a)
Course Name	**Security in Computing**
Periods per week (1 Period is 50 minutes)	**5**
Credits	**2**

Unit	Details	Lectures
I	**Information Security Overview** : The Importance of Information Protection, The Evolution of Information Security, Justifying Security Investment, Security Methodology, How to Build a Security Program, The Impossible Job, The Weakest Link, Strategy and Tactics, Business Processes vs. Technical Controls. **Risk Analysis**: Threat Definition, Types of Attacks, Risk Analysis. **Secure Design Principles**: The CIA Triad and Other Models, Defense Models, Zones of Trust, Best Practices for Network Defense.	**12**
II	**Authentication and Authorization**: Authentication, Authorization **Encryption**: A Brief History of Encryption, Symmetric-Key Cryptography, Public Key Cryptography, Public Key Infrastructure. **Storage Security**: Storage Security Evolution, Modern Storage Security, Risk Remediation, Best Practices. **Database Security**: General Database Security Concepts, Understanding Database Security Layers, Understanding Database-Level Security, Using Application Security, Database Backup and Recovery, Keeping Your Servers Up to Date, Database Auditing and Monitoring.	**12**
III	**Secure Network Design**: Introduction to Secure Network Design, Performance, Availability, Security. **Network Device Security**: Switch and Router Basics, Network Hardening. **Firewalls**: Overview, The Evolution of Firewalls, Core Firewall Functions, Additional Firewall Capabilities, Firewall Design.	**12**

	Wireless Network Security: Radio Frequency Security Basics, Data-Link Layer Wireless Security Features, Flaws, and Threats, Wireless Vulnerabilities and Mitigations, Wireless Network Hardening Practices and Recommendations, Wireless Intrusion Detection and Prevention, Wireless Network Positioning and Secure Gateways.	
IV	**Intrusion Detection and Prevention Systems**: IDS Concepts, IDS Types and Detection Models, IDS Features, IDS Deployment Considerations, Security Information and Event Management (SIEM). **Voice over IP (VoIP) and PBX Security**: Background, VoIP Components, VoIP Vulnerabilities and Countermeasures, PBX, TEM: Telecom Expense Management. **Operating System Security Models**: Operating System Models, Classic Security Models, Reference Monitor, Trustworthy Computing, International Standards for Operating System Security.	**12**
V	**Virtual Machines and Cloud Computing**: Virtual Machines, Cloud Computing. **Secure Application Design**: Secure Development Lifecycle, Application Security Practices, Web Application Security, Client Application Security, Remote Administration Security. **Physical Security**: Classification of Assets, Physical Vulnerability Assessment, Choosing Site Location for Security, Securing Assets: Locks and Entry Controls, Physical Intrusion Detection.	**12**

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**	**Year**
1.	TheCompleteReference: Information Security	Mark Rhodes-Ousley	McGraw-Hill	2nd	2013
2.	Essential Cybersecurity Science	Josiah Dykstra	O'Reilly	Fifth	2017
3.	Principles of Computer Security: CompTIA Security+ and Beyond	Wm.Arthur Conklin, Greg White	McGraw Hill	Second	2010

Internal Evaluation: 40 Marks

20 Marks	**20 Marks**
Class Test	Presentations

Security in Computing Practical (SIUSITP54(a))

B. Sc (Information Technology)	Semester – V - SIUSITP54(a)
Course Name	Security in Computing Practical
Periods per week (1 Period is 50 minutes)	3
Credits	2

Practical No	Details
1	**Configure Routers**
a	OSPF MD5 authentication.
b	NTP.
c	to log messages to the syslog server.
d	to support SSH connections.
2	**Configure AAA Authentication**
a	Configure a local user account on Router and configure authenticate on the console and vty lines using local AAA
b	Verify local AAA authentication from the Router console and the PC-A client
3	**Configuring Extended ACLs**
a	**Configure, Apply and Verify an Extended Numbered ACL**
4	**Configure IP ACLs to Mitigate Attacks and IPV6 ACLs**
a	Verify connectivity among devices before firewall configuration.
b	Use ACLs to ensure remote access to the routers is available only from management station PC-C.
c	Configure ACLs on to mitigate attacks.
d	Configuring IPv6 ACLs
5	**Configuring a Zone-Based Policy Firewall**
6	Configure IOS Intrusion Prevention System (IPS) Using the CLI
a	Enable IOS IPS.
b	Modify an IPS signature.
7	**Layer 2 Security**
a	Assign the Central switch as the root bridge.
b	Secure spanning-tree parameters to prevent STP manipulation attacks.
c	Enable port security to prevent CAM table overflow attacks.
8	**Layer 2 VLAN Security**
9	**Configure and Verify a Site-to-Site IPsec VPN Using CLI**
10	**Configuring ASA Basic Settings and Firewall Using CLI**
a	Configure basic ASA settings and interface security levels using CLI
b	Configure routing, address translation, and inspection policy using CLI
c	Configure DHCP, AAA, and SSH
d	Configure a DMZ, Static NAT, and ACLs

Course Objective:

To understand Linux concepts, install, maintain and support Linux servers and help students to attempt the LPI level 1 certification Exam.

Course Outcome:
Upon completion of this course, student will be able to:
CO1: Examine the essential Linux commands used for installation of packages, searching and manipulation of files.
CO2: Operate Linux systems by managing the boot process, scheduling jobs, updating the system, monitoring system performance and managing security.
CO3: Create users and groups by adding/deleting/modifying them.
CO4: Explain the configuration of various servers like, Samba server, FTP, NFS, DNS, HTTP.

Theory Component:

B. Sc (Information Technology)	Semester – V - SIUSIT54(b)
Course Name	**Linux System Administration**
Periods per week (1 Period is 50 minutes)	**5**
Credits	**2**

Units	Contents	No. of Lectures
I	**Introduction to Red Hat Enterprise Linux:** Linux, Open Source and Red Hat, Origins of Linux, Distributions, Duties of Linux System Administrator. **Command Line:** Working with the Bash Shell, Getting the Best of Bash, Useful Bash Key Sequences, Working with Bash History, Performing Basic File System Management Tasks, Working with Directories, Piping and Redirection, Finding Files **System Administration Tasks:** Performing Job Management Tasks, System and Process Monitoring and Management, Managing Processes with ps, Sending Signals to Processes with the kill Command, Using top to Show Current System Activity, Managing Process Niceness, Scheduling Jobs, Mounting Devices, Working with Links, Creating Backups, Managing Printers, Setting Up System Logging, Setting Up Rsyslog, Common Log Files, Setting Up Logrotate **Managing Software:** Understanding RPM, Understanding Meta Package Handlers, Creating Your Own Repositories, Managing Repositories, Installing Software with Yum, Querying Software, Extracting Files from RPM Packages	**12**

II	**Configuring and Managing Storage:** Understanding Partitions and Logical Volumes, Creating Partitions, Creating File Systems, File Systems Overview, Creating File Systems, Changing File System Properties, Checking the File System Integrity, Mounting File Systems Automatically Through fstab, Working with Logical Volumes, Creating Logical Volumes, Resizing Logical Volumes, Working with Snapshots, Replacing Failing Storage Devices, Creating Swap Space, Working with Encrypted Volumes **Connecting to the Network:** Understanding NetworkManager, Working with Services and Runlevels, Configuring the Network with NetworkManager, Working with system-config-network, NetworkManager Configuration Files, Network Service Scripts, Networking from the Command Line, Troubleshooting Networking, Setting Up IPv6, Configuring SSH, Enabling the SSH Server, Using the SSH Client, Using PuTTY on Windows Machines, Configuring Key-Based SSH Authentication, Using Graphical Applications with SSH, Using SSH Port Forwarding, Configuring VNC Server Access **Working with Users, Groups, and Permissions:** Managing Users and Groups, Commands for User Management, Managing Passwords, Modifying and Deleting User Accounts, Configuration Files, Creating Groups, Using Graphical Tools for User, and Group Management, Using External Authentication Sources, the Authentication Process, sssd, nsswitch, Pluggable Authentication Modules, Managing Permissions, the Role of Ownership, Basic Permissions: Read, Write, and Execute, Advanced Permissions, Working with Access Control Lists, Setting Default Permissions with umask, Working with Attributes	**12**
III	**Securing Server with iptables:** Understanding Firewalls, Setting Up a Firewall with system-config-firewall, Allowing Services, Trusted Interfaces, Masquerading, Configuration Files, Setting Up a Firewall with iptables, Tables, Chains, and Rules, Composition of Rule, Configuration Example, Advanced iptables Configuration, Configuring Logging, The Limit Module, Configuring NAT **Setting Up Cryptographic Services:** Introducing SSL, Proof of Authenticity: the Certificate Authority, Managing Certificates with openssl, Creating a Signing Request, Working with GNU Privacy Guard, Creating GPG Keys, Key Transfer, Managing GPG Keys, Encrypting Files with GPG, GPG Signing, Signing RPM Files **Configuring Server for File Sharing:** What is NFS? Advantages and Disadvantages of NFS, Configuring NFS4, Setting Up NFSv4, Mounting an NFS Share, Making NFS Mounts Persistent, Configuring Automount, Configuring Samba, Setting Up a Samba File Server, Samba Advanced Authentication Options, Accessing Samba Shares, Offering FTP Services.	**12**
IV	**Configuring DNS and DHCP:** Introduction to DNS, The DNS Hierarchy, DNS Server Types, The DNS Lookup Process, DNS Zone Types, Setting Up a DNS Server, Setting Up a Cache-Only Name Server, Setting Up a Primary Name Server, Setting Up a Secondary Name Server, Understanding DHCP, Setting Up a DHCP Server **Setting Up a Mail Server:** Using the Message Transfer Agent, the Mail Delivery Agent, the Mail User Agent, Setting Up Postfix as an SMTP Server, Working with Mutt, Basic Configuration, Internet Configuration, Configuring Dovecot for POP and IMAP **Configuring Apache on Red Hat Enterprise Linux:** Configuring the Apache Web Server, Creating a Basic Website, Understanding the Apache Configuration Files, Apache Log Files, Working with Virtual Hosts, Securing the Web Server	**12**

	with TLS Certificates, Configuring Authentication, Setting Up Authentication with .htpasswd, Configuring LDAP Authentication, Setting Up MySQL	
V	**Introducing Bash Shell Scripting:** Introduction, Elements of a Good Shell Script, Executing the Script, Working with Variables and Input, Understanding Variables, Variables, Subshells, and Sourcing, Working with Script Arguments, Asking for Input, Using Command Substitution, Substitution Operators, Changing Variable Content with Pattern Matching, Performing Calculations, Using Control Structures, Using if...then...else, Using case, Using while, Using until, Using for, Configuring booting with GRUB. **High-Availability Clustering:** High-Availability Clustering, The Workings of High Availability, High-Availability Requirements, Red Hat High-Availability Add-on Software, Components, Configuring Cluster-Based Services, Setting Up Bonding, Setting Up Shared Storage, Installing the Red Hat High Availability Add-On, Building the Initial State of the Cluster, Configuring Additional Cluster Properties, Configuring a Quorum Disk, Setting Up Fencing, Creating Resources and Services, Troubleshooting a Nonoperational Cluster, Configuring GFS2 File Systems **Setting Up an Installation Server:** Configuring a Network Server as an Installation Server, Setting Up a TFTP and DHCP Server for PXE Boot, Installing the TFTP Server, Configuring DHCP for PXE Boot, Creating the TFTP PXE Server Content, Creating a Kickstart File, Using a Kickstart File to Perform an Automated, Installation, Modifying the Kickstart File with, system-config-kickstart, Making Manual Modifications to the Kickstart File	12

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Red Hat Enterprise Linux6 Administration	Sander van Vugt	John Wiley and Sons		2013
2.	Red hat Linux Networking and System Administration	Terry Collings and Kurt Wall	Wiley	3rd	
3.	Linux Administration: A Beginner's Guide	Wale Soyinka	TMH	Fifth Edition	

Internal Evaluation: 40 Marks

20 Marks	20 Marks
Class Test	Configuration of new features and applications in Linux operating system

Linux System Administration Practical (SIUSITP54(b))

B. Sc (Information Technology)	Semester – V - SIUSITP54(b)
Course Name	Linux System Administration Practical
Periods per week (1 Period is 50 minutes)	3
Credits	2

Practical No	Details
1	**Installation of RHEL 6.X**
2	**Graphical User Interface and Command Line Interface and Processes**
a	Exploring the Graphical Desktop
b	The Command Line Interface
c	Managing Processes
3	**Storage Devices and Links, Backup and Repository**
b	Working with Storage Devices and Links
a	Making a Backup
b	Creating a Repository
4	**Working with RPMsm Storage and Networking**
a	Using Query Options
b	Extracting Files From RPMs
c	Configuring and Managing Storage
d	Connecting to the Network
5	**Working with Users, Groups, and Permissions**
6	**Firewall and Cryptographic services**
a	Securing Server with iptables
b	Setting Up Cryptographic Services
7	**Configuring Server for File Sharing**
a	Configuring NFS Server and Client
b	Configuring Samba
c	Configuring FTP
8	**DNS, DHCP and Mail Server**
a	Configuring DNS
b	Configuring DHCP
c	Setting Up a Mail Server
9	**Web Server**
a	Configuring Apache on Red Hat Enterprise Linux
b	Writing a Script to Monitor Activity on the Apache Web Server
c	Using the select Command

10	**Shell Scripts and High-Availability Clustering**
a	Writing Shell Scripts
b	Configuring Booting with GRUB
c	Configuring High Availability Clustering
11	**Setting Up an Installation Server**
a	Configuring Network Server as an Installation Server
b	Setting Up a TFTP and DHCP Server for PXE Boot

Enterprise Java (SIUSIT55(a))

Course Objective:

To orient the students about advanced concepts in java programming like , servlet programming, JSP and Enterprise Java Beans,Java Persistence API and Hibernate

Course Outcome:
Upon completion of this course, student will be able to:
CO1: Develop server side programs in the form of servlets and write programs to update and retrieve the data from the databases using JDBC and SQL.
CO2: Write programs using Java Server Pages to create text based documents for accessing server-side objects and use Enterprise Java Beans to create reusable modules of code with component based programming approach
CO3: Develop java programs using Java Persistence APIs and ORM tool like Hibernate to map normal java objects to SQL database.

Theory Component:

B. Sc (Information Technology)	Semester – V - SIUSIT55(a)
Course Name	**Enterprise Java**
Periods per week (1 Period is 50 minutes)	**5**
Credits	**2**

Units	Contents	No. of Lectures
I	**Understanding Java EE:** What is an Enterprise Application? What is java enterprise edition? Java EE Technologies, Java EE evolution, Glassfish server **Java EE Architecture, Server and Containers:** Types of System Architecture, Java EE Server, Java EE Containers. **Introduction to Java Servlets:** The Need for Dynamic Content, Java Servlet Technology, Why Servlets? What can Servlets do? **Servlet API and Lifecycle:** Java Servlet API, The Servlet Skeleton, The Servlet Life Cycle, A Simple Welcome Servlet **Working With Servlets:** Getting Started, Using Annotations Instead of Deployment Descriptor. **Working with Databases:** What Is JDBC? JDBC Architecture, Accessing Database, The Servlet GUI and Database Example.	12
II	**Request Dispatcher:** Resquestdispatcher Interface, Methods of Requestdispatcher, Requestdispatcher Application. **COOKIES:** Kinds Of Cookies, Where Cookies Are Used? Creating Cookies Using Servlet, Dynamically Changing The Colors Of A Page **SESSION:** What Are Sessions? Lifecycle Of Http Session, Session Tracking With Servlet API, A Servlet Session Example **Working With Files:** Uploading Files, Creating an Upload File Application, Downloading Files, Creating a Download File Application.	12

	Working With Non-Blocking I/O: Creating a Non-Blocking Read Application, Creating The Web Application, Creating Java Class, Creating Servlets, Retrieving The File, Creating index.jsp	
III	**Introduction To Java Server Pages:** Why use Java Server Pages? Disadvantages Of JSP, JSP v\s Servlets, Life Cycle of a JSP Page, How does a JSP function? How does JSP execute? About Java Server Pages **Getting Started With Java Server Pages:** Comments, JSP Document, JSP Elements, JSP GUI Example. **Action Elements:** Including other Files, Forwarding JSP Page to Another Page, Passing Parameters for other Actions, Loading a Javabean. **Implicit Objects, Scope And El Expressions:** Implicit Objects, Character Quoting Conventions, Unified Expression Language [Unified El], Expression Language. **Java Server Pages Standard Tag Libraries:** What is wrong in using JSP Scriptlet Tags? How JSTL Fixes JSP Scriptlet's Shortcomings? Disadvantages Of JSTL, Tag Libraries.	**12**
IV	**Introduction To Enterprise Javabeans:** Enterprise Bean Architecture, Benefits of Enterprise Bean, Types of Enterprise Bean, Accessing Enterprise Beans, Enterprise Bean Application, Packaging Enterprise Beans **Working With Session Beans:** When to use Session Beans? Types of Session Beans, Remote and Local Interfaces, Accessing Interfaces, Lifecycle of Enterprise Beans, Packaging Enterprise Beans, Example of Stateful Session Bean, Example of Stateless Session Bean, Example of Singleton Session Beans. **Working with Message Driven Beans:** Lifecycle of a Message Driven Bean, Uses of Message Driven Beans, The Message Driven Beans Example. **Interceptors:** Request And Interceptor, Defining An Interceptor, AroundInvoke Method, Applying Interceptor, Adding An Interceptor To An Enterprise Bean, Build and Run the Web Application. **Java Naming and Directory Interface**: What is Naming Service? What is Directory Service? What is Java Naming and Directory interface? Basic Lookup, JNDI Namespace in Java EE, Resources and JNDI, Datasource Resource Definition in Java EE.	**12**
V	**Persistence, Object/Relational Mapping And JPA:** What is Persistence? Persistence in Java, Current Persistence Standards in Java, Why another Persistence Standards? Object/Relational Mapping, **Introduction to Java Persistence API:** The Java Persistence API, JPA, ORM, Database and the Application, Architecture of JPA, How JPA Works? JPA Specifications. **Writing JPA Application:** Application Requirement Specifications, Software Requirements, The Application Development Approach, Creating Database And Tables in Mysql, Creating a Web Application, Adding the Required Library Files, Creating a Javabean Class, Creating Persistence Unit [Persistence.Xml], Creating JSPS, The JPA Application Structure, Running The JPA Application. **Introduction to Hibernate:** What is Hibernate? Why Hibernate? Hibernate, Database and The Application, Components of Hibernate, Architecture of Hibernate, How Hibernate Works? **Writing Hibernate Application:** Application Requirement Specifications, Software Requirements, The Application Development Approach, Creating Database and Tables in Mysql, Creating a Web Application, Adding The Required Library Files, Creating a Javabean Class, Creating Hibernate Configuration File, Adding a Mapping Class, Creating JSPS, Running The Hibernate Application.	**12**

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Java EE 7 For Beginners	Sharanam Shah, Vaishali Shah	SPD	First	2017
2.	Java EE 8 Cookbook: Build reliable applications with the most robust and mature technology for enterprise development	Elder Moraes	Packt	First	2018
3.	Advanced Java Programming	Uttam Kumar Roy	Oxford Press		2015

Internal Evaluation: 40 Marks

20 Marks	20 Marks
Class Test	To develop a java based applications and implement the advanced concepts learnt in the course.

Enterprise Java Practical (SIUSITP55(a))

B. Sc (Information Technology)	**Semester – V - SIUSITP55(a)**
Course Name	**Enterprise Java Practical**
Periods per week (1 Period is 50 minutes)	3
Credits	2

List of Practical:

1.	**Implement the following Simple Servlet applications.**
a.	Create a simple calculator application using servlet.
b.	Create a servlet for a login page. If the username and password are correct then it says message "Hello <username>" else a message "login failed"
c.	Create a registration servlet in Java using JDBC. Accept the details such as Username, Password, Email, and Country from the user using HTML Form and store the registration details in the database.
2.	**Implement the following Servlet applications with Cookies and Sessions.**
a.	Using Request Dispatcher Interface create a Servlet which will validate the password entered by the user, if the user has entered "Servlet" as password, then he will be forwarded to Welcome Servlet else the user will stay on the index.html page and an error message will be displayed.
b.	Create a servlet that uses Cookies to store the number of times a user has visited servlet.
c.	Create a servlet demonstrating the use of session creation and destruction. Also check whether the user has visited this page first time or has visited earlier also using sessions.
3.	**Implement the Servlet IO and File applications.**
a.	Create a Servlet application to upload and download a file.
b.	Develop Simple Servlet Question Answer Application using Database.
c.	Create simple Servlet application to demonstrate Non-Blocking Read Operation.
4.	**Implement the following JSP applications.**
a.	Develop a simple JSP application to display values obtained from the use of intrinsic objects of various types.
b.	Develop a simple JSP application to pass values from one page to another with validations. (Name-txt, age-txt, hobbies-checkbox, email-txt, gender-radio button).
c.	Create a registration and login JSP application to register and authenticate the user based on username and password using JDBC.
5.	**Implement the following JSP JSTL and EL Applications.**
a.	Create an html page with fields, eno, name, age, desg, salary. Now on submit this data to a JSP page which will update the employee table of database with matching eno.
b.	Create a JSP page to demonstrate the use of Expression language.
c.	Create a JSP application to demonstrate the use of JSTL.
6.	**Implement the following EJB Applications.**
a.	Create a Currency Converter application using EJB.
b.	Develop a Simple Room Reservation System Application Using EJB.
c.	Develop simple shopping cart application using EJB [Stateful Session Bean].
7.	**Implement the following EJB applications with different types of Beans.**
a.	Develop simple EJB application to demonstrate Servlet Hit count using Singleton Session Beans.
b.	Develop simple visitor Statistics application using Message Driven Bean [Stateless Session Bean].

c.	Develop simple Marks Entry Application to demonstrate accessing Database using EJB.
8.	**Implement the following JPA applications.**
a.	Develop a simple Inventory Application Using JPA.
b.	Develop a Guestbook Application Using JPA.
c.	Create simple JPA application to store and retrieve Book details.
9.	**Implement the following JPA applications with ORM and Hibernate.**
a.	Develop a JPA Application to demonstrate use of ORM associations.
b.	Develop a Hibernate application to store Feedback of Website Visitor in MySQL Database.
c.	Develop a Hibernate application to store and retrieve employee details in MySQL Database.
10.	**Implement the following Hibernate applications.**
a.	Develop an application to demonstrate Hibernate One- To -One Mapping Using Annotation.
b.	Develop Hibernate application to enter and retrieve course details with ORM Mapping.
c.	Develop a five page web application site using any two or three Java EE Technologies

Next Generation Technologies (SIUSIT55(b))

Course Objective:

To orient the students on Big data technologies, NoSQL and cross-platform document oriented database program like MongoDB

Course Outcome:
Upon completion of this course, student will be able to:
CO1: Explain the features, structure and challenges of BigData technologies and compare SQL databases with NoSQL databases.
CO2: Examine MongoDB Data Model, MongoDB architecture , its storage engine and the shell for querying the databases
CO3: Describe DOM Manipulation with jQuery,Ajax with jQuery, jQuery Plug-ins and JSON.

Theory Component:

B. Sc (Information Technology)	Semester – V - SIUSIT55(b)
Course Name	**Next Generation Technologies**
Periods per week (1 Period is 50 minutes)	**5**
Credits	**2**

Units	Contents	No.of Lectures
I	**Big Data:** Getting Started, Big Data, Facts About Big Data, Big Data Sources, Three Vs of Big Data, Volume, Variety, Velocity, Usage of Big Data, Visibility, Discover and Analyze Information, Segmentation and Customizations, Aiding Decision Making, Innovation, Big Data Challenges, Policies and Procedures, Access to Data, Technology and Techniques, Legacy Systems and Big Data, Structure of Big Data, Data Storage, Data Processing, Big Data Technologies **NoSQL:** SQL, NoSQL, Definition, A Brief History of NoSQL, ACID vs. BASE, CAP Theorem (Brewer's Theorem), The BASE, NoSQL Advantages and Disadvantages, Advantages of NoSQL, Disadvantages of NoSQL, SQL vs. NoSQL Databases, Categories of NoSQL Databases **Introducing MongoDB:** History, MongoDB Design Philosophy, Speed, Scalability, and Agility, Non-Relational Approach, JSON-Based Document Store, Performance vs. Features, Running the Database Anywhere, SQL Comparison	12
II	**The MongoDB Data Model:** The Data Model, JSON and BSON, The Identifier (_id), Capped Collection, Polymorphic Schemas, Object-Oriented Programming, Schema Evolution **Using MongoDB Shell:** Basic Querying, Create and Insert, Explicitly Creating Collections, Inserting Documents Using Loop, Inserting by Explicitly Specifying _id, Update, Delete, Read, Using Indexes, Stepping Beyond the Basics, Using Conditional Operators, Regular Expressions, MapReduce, aggregate(), Designing an Application's Data Model, Relational Data Modeling and Normalization, MongoDB Document Data Model Approach **MongoDB Architecture:** Core Processes, mongod, mongo, mongos, MongoDB Tools, Standalone Deployment, Replication, Master/Slave Replication, Replica Set, Implementing Advanced Clustering with Replica Sets, Sharding, Sharding	12

	Components, Data Distribution Process, Data Balancing Process, Operations, Implementing Sharding, Controlling Collection Distribution (Tag-Based Sharding), Points to Remember When Importing Data in a ShardedEnvironment, Monitoring for Sharding, Monitoring the ConfigServers, Production Cluster Architecture, Scenario 1, Scenario 2, Scenario 3, Scenario 4	
III	**MongoDB Storage Engine:** Data Storage Engine, Data File (Relevant for MMAPv1), Namespace (.ns File), Data File (Relevant for WiredTiger), Reads and Writes, How Data Is Written Using Journaling, GridFS – The MongoDB File System, The Rationale of GridFS, GridFSunder the Hood, Using GridFS, Indexing, Types of Indexes, Behaviors and Limitations **MongoDB Use Cases:** Use Case 1 -Performance Monitoring, Schema Design, Operations, Sharding, Managing the Data, Use Case 2 – Social Networking, Schema Design, Operations, Sharding **MongoDB Limitations:** MongoDB Space Is Too Large (Applicable for MMAPv1), Memory Issues (Applicable for Storage Engine MMAPv1), 32-bit vs. 64-bit, BSON Documents, Namespaces Limits, Indexes Limit, Capped Collections Limit - Maximum Number of Documents in a Capped Collection, Sharding Limitations, Shard Early to Avoid Any Issues, Shard Key Can't Be Updated, Shard Collection Limit, Select the Correct Shard Key, Security Limitations, No Authentication by Default, Traffi c to and from MongoDB Isn't Encrypted, Write and Read Limitations, Case-Sensitive Queries, Type-Sensitive Fields, No JOIN, Transactions, MongoDB Not Applicable Range **MongoDB Best Practices:** Deployment, Hardware Suggestions from the MongoDB Site, Few Points to be Noted, Coding, Application Response Time Optimization, Data Safety, Administration, Replication Lag, Sharding, Monitoring	**12**
IV	**The End of Disk? SSD and In-Memory Databases:** The End of Disk?, Solid State Disk, The Economics of Disk, SSD-Enabled Databases, In-Memory Databases, TimesTen, Redis, SAP HANA, VoltDB, Oracle 12c "in-Memory Database, Berkeley Analytics Data Stack and Spark, Spark Architecture **jQuery:** Introduction, Traversing the DOM, DOM Manipulation with jQuery, Events, Ajax with jQuery, jQuery Plug-ins, jQuery Image Slider	**12**
V	**JSON:** Introduction, JSON Grammar, JSON Values, JSON Tokens, Syntax, JSON vs XML, Data Types, Objects, Arrays, Creating JSON, JSON Object, Parsing JSON, Persisting JSON, Data Interchange, JSON PHP, JSON HTML, JSONP	12

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**	**Year**
1.	Practical MongoDB	Shakuntala Gupta Edward Navin Sabharwal	Apress		
2.	Beginning jQuery	Jack Franklin Russ Ferguson	Apress	Second	
3.	Next Generation Databases	Guy Harrison	Apress		
4.	Beginning JSON	Ben Smith	Apress		

Internal Evaluation: 40 Marks

20 Marks	20 Marks
Class Test	Projects

Next Generation Technologies Practical (SIUSITP55(b))

B. Sc (Information Technology)	Semester – V - SIUSITP55(b)
Course Name	Next Generation Technologies Practical
Periods per week (1 Period is 50 minutes)	3
Credits	2

List of Practical

Practical No	Details
1	**MongoDB Basics**
A	Write a MongoDB query to create and drop database.
B	Write a MongoDB query to create, display and drop collection
C	Write a MongoDB query to insert, query, update and delete a document.
2	**Simple Queries with MongoDB**
3	**Implementing Aggregation**
A	Write a MongoDB query to use sum, avg, min and max expression.
B	Write a MongoDB query to use push and addToSet expression.
C	Write a MongoDB query to use first and last expression.
4	**Replication, Backup and Restore**
A	Write a MongoDB query to create Replica of existing database.
B	Write a MongoDB query to create a backup of existing database.
C	Write a MongoDB query to restore database from the backup.
5	**Java and MongoDB**
A	Connecting Java with MongoDB and inserting, retrieving, updating and deleting.
6	**PHP and MongoDB**
A	Connecting PHP with MongoDB and inserting, retrieving, updating and deleting.
7	**Python and MongoDB**
A	Connecting Python with MongoDB and inserting, retrieving, updating and deleting.
8	**Programs on Basic jQuery**
A	jQuery Basic, jQuery Events
B	jQuery Selectors, jQuery Hide and Show effects
C	jQuery fading effects, jQuery Sliding effects
9	**jQuery Advanced**

A	jQuery Animation effects, jQuery Chaining
B	jQuery Callback, jQuery Get and Set Contents
C	jQuery Insert Content, jQuery Remove Elements and Attribute
10	**JSON**
A	Creating JSON
B	Parsing JSON
C	Persisting JSON
11	**Create a JSON file and import it to MongoDB**
A	Export MongoDB to JSON.
B	Write a MongoDB query to delete JSON object from MongoDB

Semester VI

Course Code	Course Type	Course Title	Credits
SIUSIT61	Skill Enhancement Course	Introduction to Data Science	**2**
SIUSIT62	Skill Enhancement Course	Ethical Hacking	**2**
SIUSIT63	Skill Enhancement Course	Data Mining for Business Intelligence	**2**
Elective I (Select any one)			
SIUSIT64(a)	Discipline Specific Elective	Principles of Geographic Information Systems	**2**
SIUSIT64(b)	Discipline Specific Elective	Enterprise Networking	**2**
Elective II (Select any one)			
SIUSIT65(a)	Discipline Specific Elective	IT Service Management	**2**
SIUSIT65(b)	Discipline Specific Elective	Cyber Laws	**2**
SIUSITP61	Skill Enhancement Course Practical	Introduction to Data Science Practical	**2**
SIUSITP62	Skill Enhancement Course Practical	Ethical Hacking Practical	**2**
SIUSITP63	Skill Enhancement Course Practical	Data Mining for Business Intelligence Practical	**2**
Elective I Practical (As per theory)			
SIUSITP64(a)	Discipline Specific Elective Practical	Principles of Geographic Information Systems Practical	**2**
SIUSITP64(b)	Discipline Specific Elective Practical	Enterprise Networking Practical	**2**
Elective II Practical			
SIUSIT65	Discipline Specific Elective Practical	Project Implementation	**2**
		TOTAL CREDITS	**20**

SEMESTER VI

Introduction to Data Science (SIUSIT61)

Course Objective:

To develop the skill sets needed to be a data scientist and understand statistical Inference and identify probability distributions commonly used as foundations for statistical modeling.

Course Outcome:
Upon completion of this course, student will be able to:
CO1: Recall Python tool boxes to be used by Data Scientists
CO2: Apply statistical techniques for supervised and unsupervised learning
CO3: Use dataset for network analysis and sentiment analysis

Theory Component:

B. Sc (Information Technology)	Semester – VI – SIUSIT61
Course Name	**Introduction to Data Science**
Periods per week (1 Period is 50 minutes)	**5**
Credits	**2**

Unit	Contents	No. of Lectures
I	Introduction to Data Science, **Toolboxes for Data Scientists:** Get Started with Python for Data Scientists, Reading, Selecting Data, Filtering Data, Filtering Missing Values, Manipulating Data, Sorting, Grouping Data, Rearranging Data, Ranking Data, Plotting	**12**
II	**Descriptive Statistics:** Data Preparation, Exploratory Data Analysis, Summarizing the Data, Data Distributions, Outlier Treatment, Estimation **Statistical Inference:**	**12**
III	**Supervised Learning:** Measuring the Variability in Estimates, Hypothesis Testing, Learning Curves, Learning Models **Regression Analysis:** Simple and Multiple Linear Regression, Logistic Regression	**12**
IV	**Unsupervised Learning:** Clustering, Clustering Techniques **Network Analysis:** Basics in NetworkX, Practical Case: Facebook Dataset **Recommender Systems:** Content-Based Filtering, Collaborative Filtering, Hybrid Recommenders	**12**
V	**Statistical Natural Language Processing for Sentiment Analysis:** Data Cleaning, Text Representation : Bi-Grams and n-Grams	**12**

	Parallel Computing: Architecture, Multicore Programming, Distributed Computing	

Books and References:					
Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Introduction to Data Science A Python Approach to Concepts, Techniques and Applications	Laura Igual, Santi Seguí	Springer International Publishing Switzerland		2017

Internal Evaluation: 40 Marks

20 Marks	**20 Marks**
Class Test	Project

Introduction to Data Science Practical (SIUSITP61)

B. Sc (Information Technology)	Semester – VI – SIUSITP61
Course Name	**Introduction to Data Science Practical**
Periods per week (1 Period is 50 minutes)	3
Credits	2

List of Practical:

Any 10 practicals, related to topics in syllabus

Ethical Hacking (SIUSIT62)

Course Objective:

To introduce the concepts of Ethical Hacking and to learn about different tools and techniques in Ethical hacking and security and practically apply some of the tools.

Course Outcome:
Upon completion of this course, student will be able to:

    CO1: Identify tools and techniques to carry out a penetration testing.
    CO2: Evaluate security techniques used to protect system and user data.
    CO3: Develop a practical understanding of the current cybersecurity issues.

Theory Component:

B.Sc (Information Technology)	Semester – VI– SIUSIT62
Course Name	**Ethical Hacking**
Periods per week (1 Period is 50 minutes)	5
Credits	2

Unit	Contents	No. of Lectures
I	**Introduction to Information Systems:** Introduction, Types of Information Systems, Introduction to Information Security, Need for Information Security. **Application Security :** Introduction, Data Security considerations, Security Technology, Security threats, Security threats to E-commerce, Information warfare, Digital Signature.	**12**
II	**Explore Ethical Hacking:** Information security threats and attack vectors, Hacking and Ethics, Information security policy, Incident management , Vulnerability assessment, Penetration testing **Exploring Reconnaissance /Investigation Techniques:** Reconnaissance and Foot-printing, Reconnaissance procedures, Network scanning, Information aggregation and packet capture tools,Gathering organizational intelligence, Detecting Preventing and Responding to Reconnaissance.	**12**
III	**Gathering Information about target computer systems:** Foot-printing concepts, Foot-printing methodology, Foot-printing tools, Countermeasures ,Foot-printing Penetration testing. **Scanning computer in the networks :** Network scanning, Scanning methodology, Live systems scanning, Port scanning, Banner grabbing, Vulnerability scanning tool, Network mapping, Proxy preparing, Scanning pen testing.	**12**
IV	**Vulnerabilities associated with systems:** Vulnerability assessment, Security vulnerability life cycle, Network vulnerability assessment. **Enumeration-Listing the system/users and connecting them:**Enumeration in ethical hacking, NETBIOS Enumeration, SNMP	**12**

	Enumeration, LDAP Enumeration, NTP Enumeration, Enumeration countermeasures.	
V	**Gaining access to systems-Hacking:** Goals and methodology of Hacking, Password cracking, Escalating privileges, Executing applications, Hiding files, Covering Tracks. **Monitoring and capturing data packets using sniffing:** Network sniffing, MAC attacks, DHCP Attacks, DNS poisoning, Various sniffing tools, Honeypot.	**12**

Books and References

Sr. No.	Title	Author/s	Publisher	Edition	Year
1	Ethical hacking	Rajesh Maurya and Vipul Saluja	STAREDU solutions	--	2018
2	Hacking: The Art of Exploitation	Jon Erickson	Penguin	2nd	2017
3	CEH Certified Ethical Hacker	Matt Walker	TMH	3rd	2017

Internal Evaluation: 40 Marks

20 Marks	20 Marks
Class Test	Project Work/ Case Studies

Ethical Hacking Practical (SIUSITP62)

B. Sc (Information Technology)	Semester – VI – SIUSITP62
Course Name	Ethical hacking Practical
Periods per week (1 Period is 50 minutes)	3
Credits	2

List of Practical: (Implemented using various hacking tools)

1	Utilize the Nessus vulnerability scanner
2	Implement Network scanning
3	Implement NET-BIOS Enumeration.
4	Implement SMTP Enumeration.
5	Implement password cracking.
6	Perform IP scanning
7	Perform network mapping
8	Perform brute force attack

Data Mining for Business Intelligence (SIUSIT63)

Course Objective:

As Business Intelligence is a technology driven process, students will be exposed to various activities like Online Analytical Processing, Data Mining, Querying and Reporting which is prime requisite in business world.

Course Outcomes:
Upon completion of this course, student will be able to:
CO1: Examine the concepts of data preprocessing and data warehousing
CO2: Apply and analyze the techniques of data cubes, pattern mining and associations
CO3: Create classification and clustering models and perform the various analysis on them.

B.Sc (Information Technology)	Semester – VI – SIUSIT63
Course Name	**Data Mining for Business Intelligence**
Periods per week (1 Period is 50 minutes)	5
Credits	2

Unit	Contents	No. of Lectures
I	Introduction: What is Data mining?, Why Data Mining?Major Issues in Data Mining Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization	12
II	Data Preprocessing: Data Cleaning, Data Integration, Data Reduction, Data transformation and discretization Data Warehousing and Online Analytical Processing: Data Warehouse Modeling, Data warehouse Design and Usage, Implementation	12
III	Data Cube Technology : Concepts, Methods,Multidimensional Data Analysis Mining frequent Patterns, Associations and correlations: Basic Concepts and Methods	12
IV	Advanced Pattern Mining, Classification: Basic Concepts, Advanced Methods Cluster Analysis : Basic Concepts and Methods, Advanced Cluster analysis	12
V	Outlier Detection, Data Mining Trends, Mining Complex data types, Data Mining Applications	12

Books and References

Sr. No.	Title	Author/s	Publisher	Edition	Year
1	Data Mining:Concepts and Techniques	Jiawei Han, Micheline Kamber, Jian Pei	Morgan Kaufmann	Third	2012
2	Data Mining for Business Intelligence: Concepts,Techniques and Applications	Galit Shmueli,Nitin Patel,Peter Bruce	Wiley	Second	2010
3	Mining of Massive Datasets	Jure Leskovec , Anand Rajaraman, Jeffrey D. Ullman			2014

Internal Evaluation: 40 Marks

20 Marks	20 Marks
Class Test	Presentations in Applications of Data mining

Data Mining for Business Intelligence Practical (SIUSITP63)

B. Sc (Information Technology)	Semester – VI – SIUSITP63
Course Name	**Data Mining for Business Intelligence Practical**
Periods per week (1 Period is 50 minutes)	**3**
Credits	**2**

List of Practical:

Any 10 practicals, related to topics in syllabus

Principles of Geographic Information Systems (SIUSIT64(a))

Course Objective:

This course will focus on introducing students to the use of geographic information systems in the urban/suburban/metropolitan environment.

Course Outcome:

Upon completion of this course, student will be able to:

CO1: Comprehend fundamental concepts and practices of Geographic Information Systems.

CO2: Apply basic graphic and data visualization concepts such as color theory, symbolization, and use of white space.

CO3: Demonstrate organizational skills in file and database management, relate GIS with remote sensing technologies and analyse spatial data using GIS tools.

B. Sc (Information Technology)	Semester – VI -SIUSIT64(a)
Course Name	**Principles of Geographic Information Systems**
Periods per week (1 Period is 50 minutes)	**5**
Credits	**2**

Unit	Details	Lectures
I	**A Gentle Introduction to GIS** **The nature of GIS:** Some fundamental observations, Defining GIS, GISystems, GIScience and GIApplications, Spatial data and Geoinformation. **The real world and representations of it:** Models and modelling, Maps, Databases, Spatial databases and spatial analysis **Geographic Information and Spatial Database** **Models and Representations of the real world** **Geographic Phenomena:** Defining geographic phenomena, types of geographic phenomena, Geographic fields, Geographic objects, Boundaries **Computer Representations of Geographic Information:** Regular tessellations, irregular tessellations, Vector representations, Topology and Spatial relationships, Scale and Resolution, Representation of Geographic fields, Representation of Geographic objects **Organizing and Managing Spatial Data** **The Temporal Dimension**	**12**
II	**Data Management and Processing Systems** **Hardware and Software Trends** **Geographic Information Systems:** GIS Software, GIS Architecture and functionality, Spatial Data Infrastructure (SDI) **Stages of Spatial Data handling:** Spatial data handling and preparation, Spatial Data Storage and maintenance, Spatial Query and Analysis, Spatial Data Presentation.	**12**

	Database management Systems: Reasons for using a DBMS, Alternatives for data management, The relational data model, Querying the relational database. **GIS and Spatial Databases:** Linking GIS and DBMS, Spatial database functionality.	
III	**Spatial Referencing and Positioning** **Spatial Referencing:** Reference surfaces for mapping, Coordinate Systems, Map Projections, Coordinate Transformations **Satellite-based Positioning:** Absolute positioning, Errors in absolute positioning, Relative positioning, Network positioning, code versus phase measurements, Positioning technology **Data Entry and Preparation** **Spatial Data Input:** Direct spatial data capture, Indirect spatial data captiure, Obtaining spatial data elsewhere **Data Quality:** Accuracy and Positioning, Positional accuracy, Attribute accuracy, Temporal accuracy, Lineage, Completeness, Logical consistency **Data Preparation:** Data checks and repairs, Combining data from multiple sources **Point Data Transformation:** Interpolating discrete data, Interpolating continuous data	**12**
IV	**Spatial Data Analysis** **Classification of analytical GIS Capabilities** **Retrieval, classification and measurement:** Measurement, Spatial selection queries, Classification **Overlay functions:** Vector overlay operators,Raster overlay operators **Neighbourhood functions:** Proximity computations, Computation of diffusion, Flow computation, Raster based surface analysis **Analysis:** Network analysis, interpolation, terrain modeling **GIS and Application models:** GPS, Open GIS Standards, GIS Applications and Advances **Error Propagation in spatial data processing:** How Errors propagate, Quantifying error propagation	**12**
V	**Data Visualization** **GIS and Maps, The Visualization Process** **Visualization Strategies: Present or explore?** **The cartographic toolbox:** What kind of data do I have?, How can I map my data? **How to map?:** How to map qualitative data, How to map quantitative data, How to map the terrain elevation, How to map time series **Map Cosmetics, Map Dissemination**	**12**

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Principles of Geographic Information Systems-An Introductory Text Book	Editors: Otto Huisman and Rolf A.	The International Institute of Geoinformation Science and	Fourth	2009

				Earth Observation		
2.	Principles of Geographic Information Systems	P.A Burrough and R.A.McDonnell	Oxford University Press	Third	1999
3.	Fundamentals of Spatial Information Systems,	R.Laurini and D. Thompson,	Academic Press		1994
4.	Fundamentals of Geographic Information Systems	Michael N.Demers	Wiley Publications	Fourth	2009
5.	Introduction to Geographic Information Systems	Chang Kang-tsung (Karl),	McGrawHill	Any above 3rd Edition	2013 7th Edition
6.	GIS Fundamentals: A First Text on Geographic Information Systems	Paul Bolsatd	XanEdu Publishing Inc	5th Edition	

Internal Evaluation: 40 Marks

20 Marks	**20 Marks**
Class Test	GIS project for a given area.

Principles of Geographic Information Systems Practical (SIUSITP64(a))

B. Sc (Information Technology)	Semester – VI -SIUSITP64(a)
Course Name	Principles of Geographic Information Systems Practical
Periods per week (1 Period is 50 minutes)	3
Credits	2

Practical No	Details
1	Familiarizing Quantum GIS: Installation of QGIS, datasets for both Vector and Raster data, Maps.
2	Creating and Managing Vector Data: Adding vector layers, setting properties, formatting, calculating line lengths and statistics
3	Exploring and Managing Raster data: Adding raster layers, raster styling and analysis, raster mosaicking and clipping
4	Making a Map, Working with Attributes, Importing Spreadsheets or CSV files Using Plugins, Searching and Downloading OpenStreetMap Data
5	Working with attributes, terrain Data
6	Working with Projections and WMS Data
7	Georeferencing Topo Sheets and Scanned Maps Georeferencing Aerial Imagery Digitizing Map Data
8	Managing Data Tables and Spatial data Sets: Table joins, spatial joins, points in polygon analysis, performing spatial queries
9	Advanced GIS Operations 1: Nearest Neighbor Analysis, Sampling Raster Data using Points or Polygons, Interpolating Point Data
10	Advance GIS Operations 2: Batch Processing using Processing Framework Automating Complex Workflows using Processing Modeler Automating Map Creation with Print Composer Atlas
11	Validating Map data

Enterprise Networking (SIUSIT64(b))

Course Objective:

To orient the students on general network design, LAN Designs, Data center designs, W-LAN Designs and WAN Designs. The course also gives an exposure to the various networking protocols.

Course Outcome:
Upon completion of this course, student will be able to:
CO1: Analyse state-of-the-art real-world enterprise-wide networks
CO2: Design, build, and implement advanced enterprise-wide computer networks
CO3: Manage, configure, troubleshoot, and maintain typical enterprise-wide computer networks

Theory Component:

B. Sc (Information Technology)	Semester – VI - SIUSIT64(b)
Course Name	Enterprise Networking
Periods per week (1 Period is 50 minutes)	5
Credits	2

Unit	Details	Lectures
I	**General Network Design:** Network Design Methodology, Architectures for the Enterprise, Borderless Networks Architecture, Collaboration and Video Architecture, Data Center and Virtualization Architecture, Design Lifecycle: Plan, Build, Manage Plan Phase Build Phase Manage Phase Prepare, Plan, Design, Implement, Operate, and Optimize Phases Prepare Phase Plan Phase Design Phase Implement Phase Operate Phase Optimize Phase Summary of PPDIOO Phases Project Deliverables Design Methodology Identifying Customer Design Requirements Characterizing the Existing Network Steps in Gathering Information Network Audit Tools Network Checklist Designing the Network Topology and Solutions Top-Down Approach Pilot and Prototype Tests Design Document **Network Design Models:** Hierarchical Network Models Benefits of the Hierarchical Model, Hierarchical Network Design, Core Layer, Distribution Layer, Access Layer, Hierarchical Model Examples, Hub-and-Spoke, Design Collapsed Core, Design Enterprise Architecture Model, Enterprise Campus Module, Enterprise Edge Area, E-Commerce Module, Internet Connectivity Module, VPN/Remote Access, Enterprise WAN, Service Provider Edge Module, Remote Modules, Enterprise Branch Module, Enterprise Data Center Module, Enterprise Teleworker Module, High Availability Network Services, Workstation-to-Router Redundancy and LAN, High Availability Protocols, ARP Explicit Configuration, RDP, RIP, HSRP, VRRP, GLBP, Server Redundancy, Route Redundancy, Load Balancing, Increasing Availability, Link Media Redundancy	12

II	**Enterprise LAN Design:** LAN Media, Ethernet Design Rules, 100Mbps Fast Ethernet Design Rules, Gigabit Ethernet Design Rules, 1000BASE-LX Long-Wavelength Gigabit Ethernet, 1000BASE-SX Short-Wavelength Gigabit Ethernet, 1000BASE-CX Gigabit Ethernet over Coaxial Cable, 1000BASE-T Gigabit Ethernet over UTP 86, 10 Gigabit Ethernet Design Rules, 10GE Media Types, EtherChannel, Comparison of Campus Media LAN Hardware, Repeaters, Hubs, Bridges, Switches, Routers, Layer 3 Switches, Campus LAN Design and Best Practices Best Practices for Hierarchical Layers, Access Layer Best Practices, Distribution Layer Best Practices, Core Layer Best Practices, STP Design Considerations, STP Toolkit, PortFast, UplinkFast, BackboneFast, Loop Guard, Root Guard, BPDU Guard, BPDU Filter, VLAN and Trunk Considerations, Unidirectional Link Detection (UDLD) Protocol, Large-Building LANs, Enterprise Campus LANs, Edge Distribution, Medium-Size LANs, Small and Remote Site LANs, Server Farm Module, Server Connectivity Options, Enterprise Data Center Infrastructure, Campus LAN QoS Considerations, Multicast Traffic Considerations, CGMP, IGMP Snooping. **Data Center Design:** Enterprise DC Architecture, Data Center Foundation Components, Data Center Topology Components, Data Center Network Programmability, SDN, Controllers, APIs, ACI, Challenges in the DC, Data Center Facility Aspects, Data Center Space, Data Center Power, Data Center Cooling, Data Center Heat, Data Center Cabling, Enterprise DC Infrastructure, Data Center Storage, Data Center Reference Architecture, Defining the DC Access Layer, Defining the DC Aggregation Layer, Defining the DC Core Layer, Security in the DC, Fabric Extenders, Virtualization Overview, Challenges, Defining Virtualization and Benefits, Virtualization Risks, Types of Virtualization, Virtualization Technologies, VSS, VRF, vPC, Device Contexts, Server Virtualization, Server Scaling, Virtual Switching, Network Virtualization Design Considerations, Access Control, Path Isolation, Services Edge, Data Center Interconnect, DCI Use Cases, DCI Transport Options, DCI L2 Considerations, Load Balancing in the DC, Application Load Balancing, Network Load Balancing.	**12**
III	**Wireless LAN Design:** Wireless LAN Technologies, WLAN Standards, ISM and UNII Frequencies, Summary of WLAN Standards, Service Set Identifier, WLAN Layer 2 Access Method, WLAN Security, Unauthorized Access, WLAN Security Design Approach, IEEE 802.1X-2001 Port-Based Authentication, Dynamic WEP Keys and LEAP, Controlling WLAN Access to Servers, WLAN Authentication, Authentication Options, WLAN Controller Components, WLC Interface Types, AP Controller Equipment Scaling, Roaming and Mobility Groups, Intracontroller Roaming, Layer 2 Intercontroller Roaming, Layer 3 Intercontroller Roaming, Mobility Groups, WLAN Design, Controller Redundancy Design: Deterministic vs. Dynamic, N+1 WLC Redundancy, N+N WLC Redundancy, N+N+1 WLC Redundancy, Radio Management and Radio Groups, RF	**12**

	Groups, RF Site Survey, Using EoIP Tunnels for Guest Services, Wireless Mesh for Outdoor Wireless, Mesh Design Recommendations, Campus Design Considerations, Power over Ethernet (PoE), Wireless and Quality of Service (QoS), Branch Design Considerations, Local MAC, REAP, Hybrid REAP, Branch Office Controller Options. **WAN Technologies and the Enterprise Edge:** WAN and Enterprise Edge Overview, Definition of WAN, WAN Edge Module, Enterprise Edge Modules, WAN Transport Technologies, ISDN, ISDN BRI Service, ISDN PRI Service, Digital Subscriber Line, Cable, Wireless, Frame Relay, Time-Division Multiplexing, Metro Ethernet, SONET/SDH, Multiprotocol Label Switching (MPLS), Dark Fiber, Dense Wavelength-Division Multiplexing, Ordering WAN Technology and Contracts, WAN and Edge Design Methodologies, Response Time, Throughput, Reliability, Bandwidth Considerations, WAN Link Categories, Optimizing Bandwidth Using QoS, Queuing, Traffic Shaping and Policing, Classification, Congestion Management, Priority Queuing, Custom Queuing, Weighted Fair Queuing, Class-Based Weighted Fair Queuing, Low-Latency Queuing, Traffic Shaping and Policing, Link Efficiency, Window Size, DMZ Connectivity, Segmenting DMZs, DMZ Services, Internet Connectivity, Centralized Internet (Branch) vs. Direct Internet (Branch), High Availability for the Internet Edge, VPN Network Design. **WAN Design** Traditional WAN Technologies Hub-and-Spoke Topology Full-Mesh Topology Partial-Mesh Topology Point-to-Point Topology Remote Site Connectivity Enterprise VPN vs. Service Provider VPN Enterprise Managed VPN: IPsec IPsec Direct Encapsulation Generic Routing Encapsulation IPsec DMVPN IPsec Virtual Tunnel Interface Design GETVPN Service Provider–Managed Offerings ,Metro Ethernet Service Provider VPNs: L2 vs. L3 ,Virtual Private Wire Services VPWS L2 VPN Considerations ,Virtual Private LAN Services VPLS L2 VPN Considerations ,MPLS, MPLS Layer 3 Design Overview MPLS L3 VPN Considerations ,VPN Benefits WAN Backup Design WAN Backup over the Internet Enterprise WAN Architecture Cisco Enterprise MAN/WAN Enterprise WAN/MAN Architecture Comparison ,Enterprise WAN Components Comparing Hardware and Software Enterprise Branch Architecture Branch Design Branch Connectivity Redundancy for Branches Single WAN Carrier vs. Dual WAN Carriers Single MPLS Carrier Site ,Dual MPLS Carriers Hybrid WAN: L3 VPN with IPsec VPN ,Internet for Branches Flat Layer 2 vs. Collapsed Core ,Enterprise Branch Profiles Small Branch Design Medium Branch Design Large Branch Design Enterprise Teleworker Design ,ISRs for Teleworkers	
IV	Internet Protocol Version 4 Design,IPv4 Header ToS IPv4 Fragmentation IPv4 Addressing ,IPv4 Address Classes Class A	**12**

Addresses Class B Addresses ,Class C Addresses Class D Addresses Class E Addresses ,IPv4 Address Types IPv4 Private Addresses NAT ,IPv4 Address Subnets Mask Nomenclature IP Address Subnet Design Example Determining the Network Portion of an IP Address Variable-Length Subnet Masks, Loopback Addresses IP Telephony Networks ,IPv4 Addressing Design Goal of IPv4 Address Design , Plan for Future Use of IPv4 Addresses , Performing Route Summarization , Plan for a Hierarchical IP Address Network , Private and Public IP Address and NAT Guidelines , Steps for Creating an IPv4 Address Plan

Case Study: IP Address Subnet Allocation , Address Assignment and Name Resolution , Recommended Practices of IP Address Assignment , BOOTP DHCP DNS , Internet Protocol Version 6 Design, IPv6 Header IPv6 Address Representation IPv4-Compatible IPv6 Addresses IPv6 Prefix Representation IPv6 Address Scope Types and Address Allocations IPv6 Address Allocations IPv6 Unicast Address Global Unicast Addresses Link-Local Addresses , Unique Local IPv6 Address Global Aggregatable IPv6 Address , IPv4-Compatible IPv6 Address IPv6 Anycast Addresses , IPv6 Multicast Addresses IPv6 Mechanisms ICMPv6 , IPv6 Neighbor Discovery Protocol IPv6 Name Resolution , Path MTU Discovery IPv6 Address-Assignment Strategies , Manual Configuration SLAAC of Link-Local Address , SLAAC of Globally Unique IPv6 Address DHCPv6 , DHCPv6 Lite IPv6 Security IPv6 Routing Protocols

RIPng OSPFv3 , BGP4 Multiprotocol Extensions (MP-BGP) for IPv6 , IPv6 Addressing Design , Planning for Addressing with IPv6 , Route Summarization with IPv6 IPv6 Private Addressing

IPv6 for the Enterprise IPv6 Address Allocation , Partly Linked IPv4 Address into IPv6, Whole IPv4 Address Linked into IPv6

IPv6 Addresses Allocated Per Location and/or Type , IPv4-to-IPv6 Transition Mechanisms and Deployment Models , Dual-Stack Mechanism IPv6 over IPv4 Tunnels , Protocol Translation Mechanisms IPv6 Deployment Models , Dual-Stack Model Hybrid Model Service Block Model ,IPv6 Deployment Model Comparison IPv6 Comparison with IPv4 ,OSPF, BGP, Route Manipulation, and IP Multicast,OSPFv2 OSPFv2 Metric OSPFv2 Adjacencies and Hello Timers , OSPFv2 Areas OSPF Area Design Considerations OSPF Router Types OSPF DRs LSA Types Autonomous System External Path Types OSPF Stub Area Types Stub Areas Totally Stubby Areas , NSSAs Virtual Links OSPFv2 Router Authentication , OSPFv2 Summary OSPFv3 OSPFv3 Changes from OSPFv2, OSPFv3 Areas and Router Types OSPFv3 LSAs OSPFv3 Summary

BGP BGP Neighbors eBGPiBGP Route Reflectors Confederations BGP Administrative Distance , BGP Attributes, Weight, and the BGP Decision Process

BGP Path Attributes Next-Hop Attribute Local Preference Attribute Origin Attribute Autonomous System Path Attribute

MED Attribute Community Attribute Atomic Aggregate and Aggregator Attributes Weight BGP Decision Process , BGP Summary , Route Manipulation PBR Route Summarization

		Route Redistribution Default Metric OSPF Redistribution Route Filtering Transit Traffic Routing Protocols on the Hierarchical Network Infrastructure IP Multicast Review , Multicast Addresses Layer 3 to Layer 2 Mapping IGMP , IGMPv1 IGMPv2 IGMPv3 CGMP IGMP Snooping , Sparse Versus Dense Multicast Multicast Source and Shared Trees PIM PIM-SM PIM DR Auto-RP PIMv2 Bootstrap Router , DVMRP IPv6 Multicast Addresses	
V		Managing Security Network Security Overview Security Legislation Security Threats Reconnaissance and Port Scanning Vulnerability Scanners Unauthorized Access Security Risks Targets Loss of Availability Integrity Violations and Confidentiality Breaches , Security Policy and Process Security Policy Defined , Basic Approach of a Security Policy Purpose of Security Policies, Security Policy Components Risk Assessment , Risk Index Continuous Security Integrating Security Mechanisms into Network Design Trust and Identity Management , Trust Domains of Trust Identity Passwords Tokens Certificates , Network Access Control Secure Services Encryption Fundamentals Encryption Keys VPN Protocols , Transmission Confidentiality Data Integrity Threat Defense , Physical Security Infrastructure Protection Security Management Solutions Security Solution Network Security Platforms , Trust and Identity Technologies Firewall Fundamentals , Types of Firewalls Next-Gen Firewalls NAT Placement , Firewall Guidelines Firewall ACLs , Identity and Access Control Deployments Detecting and Mitigating Threats IPS/IDS Fundamentals IPS/IDS Guidelines , Threat Detection and Mitigation Technologies , Threat-Detection and Threat-Mitigation Solutions , FirePOWER IPS Security Management Applications , Security Platform Solutions Security Management Network Integrating Security into Network Devices IOS Security , ISR G2 Security Hardware Options Securing the Enterprise , Implementing Security in the Campus Implementing Security in the Data Center Implementing Security in the Enterprise Edge Network Management Protocols, Simple Network Management Protocol SNMP Components , MIB SNMP Message Versions SNMPv1 SNMPv2 SNMPv3 , Other Network Management Technologies RMON , RMON2 NetFlow Compared to RMON and SNMP , CDP LLDP Syslog	**12**

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	CCDA200-310Official Cert Guide	ANTHONY BRUNO, CCIE No. 2738 STEVE JORDAN, CCIE No. 11293	**Cisco Press**		
2.	Network Warrior	Gary A Donabue	**O Reilly**	2nd	2011

Internal Evaluation:40 Marks

20 Marks	**20 Marks**
Class Test	Case Studies

Enterprise Networking Practical (SIUSITP64(b))

B. Sc (Information Technology)	**Semester – VI - SIUSITP64(b)**
Course Name	**Enterprise Networking Practical**
Periods per week (1 Period is 50 minutes)	**3**
Credits	**2**

Practical No	Details
1	**Configuring OSPF – I**
a	Single-Area OSPF Link Costs and Interface Priorities
b	Multi-Area OSPF with Stub Areas and Authentication
2	**Configuring OSPF – II**
a	OSPF Virtual Links and Area Summarization
b	OSPF over Frame Relay
3	**Redistribution and Administrative Distances**
a	Redistribution Between RIP and OSPF
b	Manipulating Administrative Distances
4	**BGP**
a	Configuring BGP with Default Routing
b	Using the AS_PATH Attribute
c	BGP Route Reflectors and Route Filters

5		**IPv6**
a		Configuring OSPF for IPv6
b		Configuring 6to4 Tunnels
6		**VLANs and EtherChannel**
a		Static VLANS, VLAN Trunking, and VTP Domains and Modes
b		Configuring EtherChannel
7		**Spanning Tree Protocol**
a		Spanning Tree Protocol (STP) Default Behavior
b		Modifying Default Spanning Tree Behavior
8		**VLAN and Spanning Tree**
a		Per-VLAN Spanning Tree Behavior
b		Multiple Spanning Tree
9		**Internal VLAN Routing**
a		Inter-VLAN Routing with an External Router
b		Inter-VLAN Routing with an Internal Route Processor
10		**Configure NAT Services**

IT Service Management (SIUSIT65(a))

Course Objective:

To orient the standards on service design principles and processes along with service transitions and operations

Course Outcome:
Upon completion of this course, student will be able to:
CO1: Explain aspects of implementing ITIL processes to create a cycle of continuous improvement.
CO2: Describe services strategy, design, transition and operation.
CO3: Apply clear strategy for providing IT services.

Theory Component:

B. Sc (Information Technology)	Semester – VI - SIUSIT65(a)
Course Name	IT Service Management
Periods per week (1 Period is 50 minutes)	5
Credits	2

Unit	Details	Lectures
I	**IT Service Management:** Introduction, What is service management? What are services? Business Process, Principles of Service management: Specialisation and Coordination, The agency principle, Encapsulation, Principles of systems, The service Life Cycle, Functions and processes across the life cycle. **Service Strategy Principles:** Value creation, Service Assets, Service Provider Service Structures, Service Strategy Principles. **Service Strategy:** Define the market, Develop the offerings, Develop Strategic Assets, Prepare for execution. **Challenges, Critical Success factors and risks:** Complexity, Coordination and Control, Preserving value, Effectiveness in measurement, Risks.	12
II	**Service Design:** Fundamentals, **Service Design Principles:** Goals, Balanced Design, Identifying Service requirements, identifying and documenting business requirements and drivers, Design activities, Design aspects, Subsequent design activities, Design constraints, Service oriented architecture, Business Service Management, Service Design Models **Service Design Processes:** Service Catalogue Management, Service Level Management, Capacity Management, Availability Management, IT Service Continuity Management, Information Security Management, Supplier Management **Challenges, Critical Success factors and risks:** Challenges, Risks	12
III	**Service Transition:** Fundamentals, **Service Transition Principles:** Principles Supporting Service Transition, Policies for Service Transition **Service Transition Processes:** Transition planning and support, Change Management, Service Asses Configuration Management,	12

		Service and Deployment Management, Service Validation and Testing, Evaluation, Knowledge Management. **Challenges, Critical Success factors and risks:**Challenges, Critical Success factors, Risks, Service Transition under difficult Conditions.	
IV	**Service Operation:** Fundamentals, **Service Operation Principles:**Functions, groups, teams, departments and divisions, Achieving balance in service operations, Providing service, Operation staff involvement in service design and service transition, Operational Health, Communication, Documentation **Service Operation Processes:**Event Management, Incident Management, Request fulfilment, Problem Management, Access Management, Operational activities of processes covered in other lifecycle phases. **Challenges, Critical Success factors and risks:**Challenges, Critical Success factors, Risks	12
V	**Continual Service Improvement(CSI) Principles:** CSI Approach, CSI and organizational change, Ownership, CSI register, External and Internal drivers, Service level management, Knowledge management, The Deming cycle, Service Measurement, IT governance, Frameworks, models, standards and quality Systems, CSI inputs and outputs. **CSI Process:** The seven step improvement process. **CSI Methods nad Techniques:** Methods and techniques, Assessments, benchmarking, Service Measurement, Metrics, Return on Investment, Service reporting, CSI and other service management processes, **Organising for CSI:**Organisational development, Functions, roles, Customer Engagement, Responsibility model - RACI, Competence and training. **Technology considerations:** Tools to support CSI activities. **Implementing CSI:**Critical Considerations for implementing CSI,The start, Governance, CSI and organisational change, Communication Strategy and Plan	12

Books and References:					
Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	ITIL v3 Foundation Complete Certification Kit				2009
2.	ITIL v3 Service Strategy		OGC/TSO		
3.	ITIL v3 Service Transition		OGC/TSO		
4.	ITIL v3 Service Operation		OGC/TSO		
5.	ITIL Continual Service Improvement		TSO	2011	2011

Internal Evaluation:40 Marks

20 Marks	20 Marks
Class Test	Presentations

Cyber Laws (SIUSIT65(b))

Course Objective:

To orient the students to the existing laws related to cyber world.

Course Outcome:
Upon completion of this course, student will be able to:
CO1: Analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
CO2: Analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
CO3: Apply case law and common law to current legal dilemmas in the technology field.

Theory Component:

B.Sc (Information Technology)	Semester – VI -SIUSIT65(b)
Course Name	Cyber Laws
Periods per week (1 Period is 50 minutes)	5
Credits	2

Unit	Details	Lectures
I	**Power of Arrest Without Warrant Under the IT Act, 2000:** A Critique, Crimes of this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce? Forgetting the Line Between Cognizable and Non-Cognizable Offences, Necessity of Arrest without Warrant from Any Place, Public or Otherwise, Check and Balances Against Arbitrary Arrests,Arrest for "About to Commit" an Offence Under the IT Act: A Tribute to Draco, Arrest, But NO Punishment! **Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act,2000:** Concept of "Cyber Crime " and the IT Act , 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cyber Cheating, Virus on the Internet, Defamation, Harassment and E-mail Abuse, Cyber Pornography, Other IT Act Offences, Monetary Penalties, Adjudication and Appeals Under IT Act , 2000, Network Service Providers, Jurisdiction and Cyber Crime, Nature of Cyber Criminality, Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications on Cyber Crime.	12
II	**Contracts in the Infotech World:** Contracts in the Infotech World, Click-Wrap and Shrink-Wrap Contract: Status under the Indian Contract Act, 1872, Contract Formation Under the Indian Contract Act, 1872, Contract Formation on the Internet, Terms and Conditions of Contracts. **Jurisdiction in the Cyber World:** Questioning the Jurisdiction and Validity of the Present Law of Jurisdiction, Civil Law of Jurisdiction in India, Cause of Action, Jurisdiction and the Information Technology Act,2000, Foreign Judgements in India, Place of Cause of Action in Contractual and IPR Disputes, Exclusion Clauses in Contracts, Abuse of Exclusion Clauses, Objection of Lack of Jurisdiction, Misuse of the Law of Jurisdiction, Legal Principles on Jurisdiction in the United State	12

	of America, Jurisdiction Disputes w.r.t. the Internet in the United State of America.	
III	**Battling Cyber Squatters and Copyright Protection in the Cyber World:** Concept of Domain Name and Reply to Cyber Squatters, Meta-Tagging, Legislative and Other Innovative Moves Against Cyber Squatting, The Battle Between Freedom and Control on the Internet, Works in Which Copyright Subsists and meaning of Copyright, Copyright Ownership and Assignment, License of Copyright, Copyright Terms and Respect for Foreign Works, Copyright Infringement, Remedies and Offences, Copyright Protection of Content on the Internet; Copyright Notice, Disclaimer and Acknowledgement, Downloading for Viewing Content on the Internet, Hyper-Linking and Framing, Liability of ISPs for Copyright Violation in the Cyber World: Legal Developments in the US, Napster and its Cousins: A Revolution on the Internet but a Crisis for Copyright Owners, Computer Software Piracy.	**12**
IV	**E-Commerce Taxation: Real Problems in the Virtual World:** A Tug of War on the Concept of 'Permanent Establishment', Finding the PE in Cross Border E-Commerce, The United Nations Model Tax Treaty, The Law of Double Taxation Avoidance Agreements and Taxable Jurisdiction Over Non-Residents, Under the Income Tax Act, 1961, Tax Agents of Non-Residents under the Income Tax Act,1961 and the Relevance to E-Commerce, Source versus Residence and Classification between Business Income and Royalty, The Impact of the Internet on Customer Duties, Taxation Policies in India: At a Glance. **Digital Signature, Certifying Authorities and E-Governance:** Digital Signatures, Digital Signature Certificate, Certifying Authorities and Liability in the Event of Digital Signature Compromise, E-Governance in India: A Warning to Babudom!	**12**
V	**The Indian Evidence Act of 1872 v. Information Technology Act, 2000:** Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving Electronic Messages, Other Amendments in the Indian Evidence Act by the IT Act, Amendments to the Bankers Books Evidence Act, 1891 and Reserve Bank of India Act, 1934. **Protection of Cyber Consumers in India:** Are Cyber Consumers Covered Under the Consumer Protection Act? Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Reliefs Under CPA, Beware Consumers, Consumer Foras, Jurisdiction and Implications on cyber Consumers in India, Applicability of CPA to Manufacturers, Distributors, Retailers and Service Providers Based in Foreign Lands Whose Goods are Sold or Services Provided to a Consumer in India. Amendments in Indian IT Act 2000	**12**

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Cyber Law Simplified	VivekSood	TMH Education		2001
2.	Cybersecurity Law	Jeff Kosseff	Wiley		2017

Internal Evaluation:40 Marks

20 Marks	20 Marks
Class Test	Case studies

Project Implementation (SIUSITP65)

B. Sc (Information Technology)	Semester – VI –SIUSITP65
Course Name	**Project Implementation**
Periods per week (1 Period is 50 minutes)	3
Credits	2

The details are given in Appendix – I

APPENDIX – 1

Project Dissertation Semester V and Project Implementation Semester VI

Chapter 1 to 4 should be submitted in Semester V in spiral binding. These chapter have also to be included in Semester VI report. Semester VI report has to be hard bound with golden embossing. Students will be evaluated based on the dissertation in semester V and dissertation and viva voce in Semester VI.

I. OBJECTIVES

- Describe the Systems Development Life Cycle (SDLC).
- Evaluate systems requirements.
- Complete a problem definition.
- Evaluate a problem definition.
- Determine how to collect information to determine requirements.
- Perform and evaluate feasibility studies like cost-benefit analysis, technical feasibility, time feasibility and Operational feasibility for the project.
- Work on data collection methods for fact finding.
- Construct and evaluate data flow diagrams.
- Construct and evaluate data dictionaries.
- Evaluate methods of process description to include structured English, decision tables and decision trees.
- Evaluate alternative tools for the analysis process.
- Create and evaluate such alternative graphical tools as systems flow charts and state transition diagrams.
- Decide the S/W requirement specifications and H/W requirement specifications.
- Plan the systems design phase of the SDLC.
- Distinguish between logical and physical design requirements.
- Design and evaluate system outputs.
- Design and evaluate systems inputs.
- Design and evaluate validity checks for input data.
- Design and evaluate user interfaces for input.
- Design and evaluate file structures to include the use of indexes.

- Estimate storage requirements.

- Explain the various file update processes based on the standard file organizations.

- Decide various data structures.

- Construct and evaluate entity-relationship (ER) diagrams for RDBMS related projects.

- Perform normalization for the unnormalized tables for RDBMS related projects

- Decide the various processing systems to include distributed, client/server, online and others.

- Perform project cost estimates using various techniques.

- Schedule projects using both GANTT and PERT charts.

- Perform coding for the project.

- Documentation requirements and prepare and evaluate systems documentation.

- Perform various systems testing techniques/strategies to include the phases of testing.

- Systems implementation and its key problems.

- Generate various reports.

- Be able to prepare and evaluate a final report.

- Brief the maintenance procedures and the role of configuration management in operations.

- To decide the future scope and further enhancement of the system.

- Plan for several appendices to be placed in support with the project report documentation.

- Decide the various processing systems to include distributed, client/server, online and others.

- Perform project cost estimates using various techniques.

- Schedule projects using both GANTT and PERT charts.

- Perform coding for the project.

- Documentation requirements and prepare and evaluate systems documentation.

- Perform various systems testing techniques/strategies to include the phases of testing.

- Systems implementation and its key problems.

- Generate various reports.

- Be able to prepare and evaluate a final report.

- Brief the maintenance procedures and the role of configuration management in operations.

- To decide the future scope and further enhancement of the system.

- Plan for several appendices to be placed in support with the project report documentation.

- Work effectively as an individual or as a team member to produce correct, efficient, well-organized and documented programs in a reasonable time.
- Recognize problems that are amenable to computer solutions, and knowledge of the tool necessary for solving such problems.
- Develop of the ability to assess the implications of work performed.
- Get good exposure and command in one or more application areas and on the software
- Develop quality software using the software engineering principles
- Develop of the ability to communicate effectively.

II. Type of the Project

The majority of the students are expected to work on a real-life project preferably in some industry/ Research and Development Laboratories/Educational Institution/Software Company. Students are encouraged to work in the areas listed below. However, it is *not mandatory* for a student to work on a real-life project. The student can formulate a project problem with the help of her/his Guide and submit the project proposal of the same. **Approval of the project proposal is mandatory**. If approved, the student can commence working on it, and complete it. Use the latest versions of the software packages for the development of the project.

III. SOFTWARE AND BROAD AREAS OF APPLICATION

FRONT END / GUI Tools	.Net Technologies,Java
DBMS/BACK END	Oracle, SQL Plus, MY SQL, SQL Server,
LANGUAGES	C, C++, Java, VC++, C#, R,Python
SCRIPTING LANGUAGES	PHP,JSP, SHELL Scripts (Unix), TcL/TK,
.NET Platform	F#,C#. Net, Visual C#. Net, ASP.Net
MIDDLE WARE (COMPONENT) TECHNOLOGIES	COM/DCOM, Active-X, EJB
UNIX INTERNALS	Device Drivers, RPC, Threads, Socket programming
NETWORK/WIRELESS TECHNOLOGIES	-
REALTIME OPERATING SYSTEM/ EMBEDDED SKILLS	LINUX, Raspberry Pi, Arduino, 8051

APPLICATION AREAS	Financial / Insurance / Manufacturing / Multimedia / Computer Graphics / Instructional Design/ Database Management System/ Internet / Intranet / Computer Networking-Communication Software development/ E-Commerce/ ERP/ MRP/ TCP-IP programming / Routing protocols programming/ Socket programming.

IV.Introduction

The project report should be documented with scientific approach to the solution of the problem that the students have sought to address. The project report should be prepared in order to solve the problem in a methodical and professional manner, making due references to appropriate techniques, technologies and professional standards. The student should start the documentation process from the first phase of software development so that one can easily identify the issues to be focused upon in the ultimate project report. The student should also include the details from the project diary, in which they will record the progress of their project throughout the course. The project report should contain enough details to enable examiners to evaluate the work. The important points should be highlighted in the body of the report, with details often referred to appendices.

1.1 PROJECT REPORT:

Title Page

Original Copy of the Approved Proforma of the Project Proposal

Certificate of Authenticated work

Role and Responsibility Form

Abstract

Acknowledgement

Table of Contents

Table of Figures

CHAPTER 1: INTRODUCTION

1.1 Background

1.2 Objectives

1.3 Purpose, Scope, and Applicability

1.3.1 Purpose

1.3.2 Scope

1.3.3 Applicability

The documentation should use tools like star UML, Visuo for windows, Rational Rose for design as part of Software Project Management Practical Course. The documentation should be spiral bound for semester V and the entire documentation should be hard bound during semester VI.

V. EXPLANATION OF CONTENTS

Title Page

Sample format of Title page is given in Appendix 1 of this block. Students should follow the given format.

Original Copy of the Approved Proforma of the Project Proposal

Sample Proforma of Project Proposal is given in Appendix 2 of this block. Students should follow the given format.

Certificate of Authenticated work

Sample format of Certificate of Authenticated work is given in Appendix 3 of this block. Students should follow the given format.

Role and Responsibility Form

Sample format for Role and Responsibility Form is given in Appendix 4 of this block. Students should follow the given format.

Abstract

This should be one/two short paragraphs (100-150 words total), summarising the project work. It is important that this is not just a re-statement of the original project outline. A suggested flow is background, project aims and main achievements. From the abstract, a reader should be able to ascertain if the project is of interest to them and, it should present results of which they may wish to know more details.

 Acknowledgements

This should express student's gratitude to those who have helped in the preparation of project.

Table of Contents: The table of contents gives the readers a view of the detailed structure of the report. The students would need to provide section and subsection headings with associated pages. The formatting details of these sections and subsections are given below.

Table of Figures: List of all Figures, Tables, Graphs, Charts etc. along with their page numbers in a table of figures.

Chapter 1: Introduction

The introduction has several parts as given below:

Background: A description of the background and context of the project and its relation to work already done in the area. Summarise existing work in the area concerned with the project work.

Objectives: Concise statement of the aims and objectives of the project. Define exactly what is going to be done in the project; the objectives should be about 30 /40 words.

Purpose, Scope and Applicability: The description of Purpose, Scope, and Applicability are given below:

• Purpose: Description of the topic of the project that answers questions on why this project is being done. How the project could improve the system its significance and theoretical framework.

• Scope: A brief overview of the methodology, assumptions and limitations. The students should answer the question: What are the main issues being covered in the project? What are the main functions of the project?

• Applicability: The student should explain the direct and indirect applications of their work. Briefly discuss how this project will serve the computer world and people.

Achievements: Explain what knowledge the student achieved after the completion of the work. What contributions has the project made to the chosen area? Goals achieved - describes the degree to which the findings support the original objectives laid out by the project. The goals may be partially or fully achieved, or exceeded.

Organisation of Report: Summarising the remaining chapters of the project report, in effect, giving the reader an overview of what is to come in the project report.

Chapter 2: Survey of Technologies

In this chapter Survey of Technologies should demonstrate the students awareness and understanding of Available Technologies related to the topic of the project. The student should give the detail of all the related technologies that are necessary to complete the project. The should describe the technologies available in the chosen area and present a comparative study of all those Available Technologies. Explain why the student selected the one technology for the completion of the objectives of the project.

Chapter 3: Requirements and Analysis

Problem Definition: Define the problem on which the students are working in the project. Provide details of the overall problem and then divide the problem in to sub-problems. Define each sub-problem clearly.

Requirements Specification: In this phase the student should define the requirements of the system, independent of how these requirements will be accomplished. The Requirements Specification describes the things in the system and the actions that can be done on these things. Identify the operation and problems of the existing system.

Planning and Scheduling: Planning and scheduling is a complicated part of software development. Planning, for our purposes, can be thought of as determining all the small tasks that must be carried out in order to accomplish the goal. Planning also takes into account, rules, known as constraints, which, control when certain tasks can or cannot happen. Scheduling can be thought of as determining whether adequate resources are available to carry out the plan. The student should show the Gantt chart and Program Evaluation Review Technique (PERT).

Software and Hardware Requirements: Define the details of all the software and hardware needed for the development and implementation of the project.

• Hardware Requirement: In this section, the equipment, graphics card, numeric co-processor, mouse, disk capacity, RAM capacity etc. necessary to run the software must be noted.

• Software Requirements: In this section, the operating system, the compiler, testing tools, linker, and the libraries etc. necessary to compile, link and install the software must be listed.

Preliminary Product Description: Identify the requirements and objectives of the new system. Define the functions and operation of the application/system the students are developing as project.

Conceptual Models: The student should understand the problem domain and produce a model of the system, which describes operations that can be performed on the system, and the allowable sequences of those operations. Conceptual Models could consist of complete Data Flow Diagrams, ER diagrams, Object-oriented diagrams, System Flowcharts etc.

Chapter 4: System Design

Describes desired features and operations in detail, including screen layouts, business rules, process diagrams, pseudocode and other documentation.

Basic Modules: The students should follow the divide and conquer theory, so divide the overall problem into more manageable parts and develop each part or module separately. When all modules are ready, the student should integrate all the modules into one system. In this phase, the student should briefly describe all the modules and the functionality of these modules.

Data Design: Data design will consist of how data is organised, managed and manipulated.

• Schema Design: Define the structure and explanation of schemas used in the project.

• Data Integrity and Constraints: Define and explain all the validity checks and constraints provided to maintain data integrity.

Procedural Design: Procedural design is a systematic way for developing algorithms or procedurals.

• Logic Diagrams: Define the systematical flow of procedure that improves its comprehension and helps the programmer during implementation. e.g., Control Flow Chart, Process Diagrams etc.

• Data Structures: Create and define the data structure used in procedures.

• Algorithms Design: With proper explanations of input data, output data, logic of processes, design and explain the working of algorithms.

User Interface Design: Define user, task, environment analysis and how to map those requirements in order to develop a "User Interface". Describe the external and internal components and the architecture of user interface. Show some rough pictorial views of the user interface and its components.

Security Issues: Discuss Real-time considerations and Security issues related to the project and explain how the student intends avoiding those security problems. What are the security policy plans and architecture?

Test Cases Design: Define test cases, which will provide easy detection of errors and mistakes with in a minimum period of time and with the least effort. Explain the different conditions in which the students wish to ensure the correct working of theproject.

Chapter 5: Implementation and Testing

Implementation Approaches: Define the plan of implementation, and the standards the students have used in the implementation.

Coding Details and Code Efficiency: Students not need include full source code, instead, include only the important codes (algorithms, applets code, forms code etc). The program code should contain comments needed for explaining the work a piece of code does. Comments may be needed to explain why it does it, or, why it does a particular way.

The student can explain the function of the code with a shot of the output screen of that program code.

• Code Efficiency: The student should explain how the code is efficient and how the students have handled code optimisation.

Testing Approach: Testing should be according to the scheme presented in the system design chapter and should follow some suitable model – e.g., category partition, state machine-based. Both functional testing and user-acceptance testing are appropriate. Explain the approach of testing.

• Unit Testing: Unit testing deals with testing a unit or module as a whole. This would test the interaction of many functions but, do confine the test within one module.

• Integrated Testing: Brings all the modules together into a special testing environment, then checks for errors, bugs and interoperability. It deals with tests for the entire application. Application limits and features are tested here.

Modifications and Improvements: Once the students finish the testing they are bound to be faced with bugs, errors and they will need to modify your source code to improve the system. Define what modification are implemented in the system and how it improved the system.

Chapter 6: Results and Discussion

Test Reports: Explain the test results and reports based on the test cases, which should show that theproject is capable of facing any problematic situation and that it works fine in different conditions. Take the different sample inputs and show the outputs.

User Documentation: Define the working of the software; explain its different functions, components with screen shots. The user document should provide all the details of the product in such a way that any user reading the manual, is able to understand the working and functionality of the document.

Chapter 7: Conclusions

Conclusion: The conclusions can be summarised in a fairly short chapter (2 or 3 pages). This chapter brings together many of the points that would have made in the other chapters.

Limitations of the System: Explain the limitations encountered during the testing of the project that the students were not able to modify. List the criticisms accepted during the demonstrations of the project.

Future Scope of the Project describes two things: firstly, new areas of investigation prompted by developments in this project, and secondly, parts of the current work that was not completed due to time constraints and/or problems encountered.

REFERENCES

It is very important that the students acknowledge the work of others that they have used or adapted in their own work, or that provides the essential background or context to the project. The use of references is the standard way to do this. Please follow the given standard for the references for books, journals, and online material. The citation is mandatory in both the reports.

E.g:

Linhares, A., & Brum, P. (2007). Understanding our understanding of strategic scenarios: What role do chunks play? *Cognitive Science*, *31*(6), 989-1007. https://doi.org/doi:10.1080/03640210701703725

Lipson, Charles (2011). Cite right : A quick guide to citation styles; MLA, APA, Chicago, the sciences, professions, and more (2nd ed.). Chicago [u.a.]: University of Chicago Press. p. 187. ISBN 9780226484648.

Elaine Ritchie, J Knite. (2001). *Artificial Intelligence, Chapter 2 ,p.p 23 - 44.* Tata McGrawHill.

GLOSSARY

If you the students any acronyms, abbreviations, symbols, or uncommon terms in the project report then their meaning should be explained where they first occur. If they go on to use any of them extensively then it is helpful to list them in this section and define the meaning.

APPENDICES

These may be provided to include further details of results, mathematical derivations, certain illustrative parts of the program code (e.g., class interfaces), user documentation etc.

In particular, if there are technical details of the work done that might be useful to others who wish to build on this work, but that are not sufficiently important to the project as a whole to justify being discussed in the main body of the project, then they should be included as appendices.

VI. SUMMARY

Project development usually involves an engineering approach to the design and development of a software system that fulfils a practical need. Projects also often form an important focus for discussion at interviews with future employers as they provide a detailed example of what the students are capable of achieving. In this course the students can choose your project topic from the lists given in Unit 4: Category-wise Problem Definition.

VII. FURTHER READINGS

1. Modern Systems Analysis and Design; Jeffrey A. Hoffer, Joey F. George, Joseph,S. Valacich; Pearson Education; Third Edition; 2002.

2. ISO/IEC 12207: Software Life Cycle Process
   (http://www.software.org/quagmire/descriptions/iso-iec12207.asp).

3. IEEE 1063: Software User Documentation (http://ieeexplore.ieee.org).

4. ISO/IEC: 18019: Guidelines for the Design and Preparation of User Documentation for Application Software.

5. http://www.sce.carleton.ca/squall.

6. http://en.tldp.org/HOWTO/Software-Release-Practice-HOWTO/documentation.html.

7. http://www.sei.cmu.edu/cmm/

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

(Note:All entries of the proforma of approval should be filled up with appropriate and complete information. Incomplete proforma of approval in any respect will be summarily rejected.)

PNR **No.:** …………………   Rollno**:** _____

1. Name of the Student

   _____

2. Title of the Project

   _____

3. Name of the Guide

   _____

4. Teaching experience of the Guide

   _____

5. Is this your first submission? Yes ☐ No ☐

Signature of the Student   Signature of the Guide

Date: …………………   Date: …………………….

Signature of the Coordinator

Date: …………………

(All the text in the report should be in times new roman)

TITLE OF THE PROJECT
(NOT EXCEEDING 2 LINES, 24 BOLD, ALL CAPS)

A Project Report (12 Bold)
Submitted in partial fulfillment of the
Requirements for the award of the Degree of (size-12)

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)(14 BOLD, CAPS)

By(12 Bold)

Name of The Student (size-15, title case)
Seat Number (size-15)

Under the esteemed guidance of (13 bold)
Mr./Mrs. Name of The Guide (15 bold, title case)
Designation (14 Bold, title case)

COLLEGE LOGO

DEPARTMENT OF INFORMATION TECHNOLOGY(12 BOLD, CAPS)
COLLEGE NAME (14 BOLD, CAPS)
(Affiliated to University of Mumbai) (12, Title case, bold, italic)
CITY, PIN CODE(12 bold, CAPS)
MAHARASHTRA (12 bold, CAPS)
YEAR (12 bold)

DEPARTMENT OF INFORMATION TECHNOLOGY (14 BOLD, CAPS)

College Logo

CERTIFICATE (14 BOLD, CAPS, underlined, centered)

This is to certify that the project entitled, **"Title of The Project "**, is bonafied work of **NAME OF THE STUDENT** bearing Seat.No: (**NUMBER**) submitted in partial fulfillment of the requirements for the award of degree of BACHELOR OF SCIENCE in INFORMATION TECHNOLOGY from University of Mumbai. (12, times new roman, justified)

Internal Guide (12 bold)   **Coordinator**

(Don't write names of lecturers or HOD)

External Examiner

Date: **College Seal**

COMPANY CERTIFICATE (if applicable)

(Project Abstract page format)

Abstract (20bold, caps, centered)

Content (12, justified)

**Note: Entire document should be with <u>1.5</u>
<u>line spacing and all paragraphs should start with 1 tab space.</u>**

ACKNOWLEDGEMENT
(20, BOLD, ALL CAPS, CENTERED)

The acknowledgement should be in times new roman, 12 font with 1.5 line spacing, justified.

(Declaration page format)

DECLARATION (20 bold, centered, allcaps)

Content (12, justified)

I here by declare that the project entitled, "**Title of the Project**" done at **place where the project is done**, has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other university.

The project is done in partial fulfillment of the requirements for the award of degree of **BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)** tobe submitted as final semester project as part of our curriculum.

Name and Signature of the Student

TABLE OF CONTENTS (20bold, caps, centered)

Should be generated automatically using word processing software.

List of Tables (20 bold, centered, Title Case)

Should be generated automatically using word processing software.

List of Figures (20 bold, centered, Title Case)

Should be generated automatically using word processing software.

(Project Introduction page format)
Chapter 1

Introduction (20 Bold, centered)

Content or text (12, justified)

Note: Introduction has to cover brief description of the project with minimum 4 pages.

Chapter 2

System Analysis (20 bold, Centered)

Subheadings are as shown below with following format (16 bold, CAPS)

2.1 Existing System (16 Bold)

2.1.1 ------------ (14 bold, title case)

2.1.1.1 ------------ (12 bold, title case)

2.2 Proposed System

2.3 Requirement Analysis

2.4 Hardware Requirements

2.5 Software Requirements

2.6 Justification of Platform – (how h/w & s/w satisfying the project)

Table 2.1: Caption

Chapter 3

System Design (20 bold, centered)

Subheadings are as shown below with following format (16 bold, CAPS)
Specify figures as Fig 11.1 – caption

3.1 Module Division
3.2 Data Dictionary
3.3 E-R Diagrams
3.4 Data Flow Diagrams / UML

Note: write brief description at the bottom of all diagrams
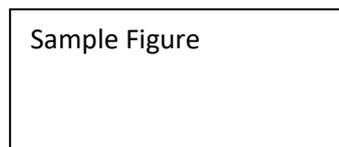
Sample Figure

Fig. 3.1: Caption

Chapter 4

Implementation and Testing (20 bold, centered)

4.1 Code (Place Core segments)
Content includes description about coding phase in your project (Font-12)
(* don't include complete code-----just description)

4.2 Testing Approach
Subheadings are as shown below with following format (16 bold, CAPS)

4.2.1 Unit Testing
4.2.2 Integration Testing

Note:

➢ Explain about above testing methods
➢ Explain how the above techniques are applied in your project
    Provide Test plans, test cases, etc relevant to your project

Chapter 5

Results and Discussions(20 bold, centered)

Note: Place Screen Shots and write the functionality of each screen at the bottom

Chapter 6

Conclusion and Future Work (20 bold, centered)

The conclusions can be summarized in a fairly short chapter around 300 words. Also include limitations of your system and future scope (12, justified)

Chapter 7

References (20 bold, centered)

Content (12, LEFT)

[1] Title of the book, Author

[2] Full URL of online references

[3] ------------

* NOTE ABOUT PROJECT VIVA VOCE:

Student may be asked to write code for problem during VIVA to demonstrate his coding capabilities and he/she may be asked to write any segment of coding used in the in the project. The project can be done in group of at most four students. However, the length and depth of the project should be justified for the projects done in group. A big project can be modularised and different modules can be assigned as separate project to different students.

Marks Distribution:

Semester V: 50 Marks

Documentation: 50 marks

Semester VI: 150 Marks

Documentation: 50 Marks:

Implementation and Viva Voce: 100 Marks

The plagiarism should be maintained as per the UGC guidelines.