R.P. Gogate College of Arts & Science
And
R.V. Jogalekar College of Commerce (Autonomous), Ratnagiri

Bachelor of Science (Information Technology) (B.Sc. IT)

Programme Three Year Integrated Programme-

Six Semesters

Course Structure

T. Y. B.Sc. (I.T.) Sem-V & VI

Under Choice Based Credit System (CBCS)

To be implemented from Academic Year 2025-26 progressively

Preamble

The Bachelor of Science in Information Technology (BSc IT) program is designed to provide students with a comprehensive understanding of the theory, principles, and practical applications of information technology in contemporary society. Rooted in a commitment to academic excellence, innovation, and professional development, the program aims to prepare students for dynamic careers in the rapidly evolving field of IT.
The main objectives of the programme are:
1. Technical Proficiency: Equip students with a strong foundation in core IT concepts, methodologies, and technologies, empowering them to analyse, design, develop, and implement innovative solutions to real-world problems.

2. Critical Thinking and Problem-Solving: Foster critical thinking skills essential for analysing complex IT issues, evaluating alternative solutions, and making informed decisions to address technological challenges effectively.

3. Communication and Collaboration: Cultivate effective communication skills, both written and oral, and foster collaborative teamwork abilities, essential for successful interaction within multidisciplinary teams and effective dissemination of information.

4. Ethical and Social Responsibility: Instill ethical awareness and social responsibility among students, emphasizing the importance of integrity, respect, and accountability in the ethical use of technology and its impact on individuals, organizations, and society.

5. Professional Development: Provide opportunities for students to develop essential professional skills, including project management, leadership, and lifelong learning habits, preparing them for successful careers and continued personal and professional growth in the field of IT.

The syllabus is restructured according to the New Education Policy 2020 and is aimed to achieve the objectives.
The syllabus spanning three years-Six Semesters covers the industry relevant courses. The students will be ready for the jobs available in different fields like:

- Software Development (Programming)
- Website Development
- Mobile app development
- IoT
- Software Testing
- Networking
- Database Administration
- System Administration
- Cyber Law Consultant
- GIS (Geographic Information Systems)
- IT Service Desk
- Security
- And many others

Name of Programme	**B.Sc. Information Technology**
Level	UG
No of Semesters	06
Year of Implementation	**2025-26**
Programme Specific Outcomes (PSO)	1. Programming Proficiency: a. PSO1: Proficient in Python and Java. b. PSO2: Design real-world applications. c. PSO3: Apply programming libraries for data analysis. 2. Networking, Database, and Data Structures: PSO4: Understand computer networks and databases. PSO5: Configure and troubleshoot networks. PSO6: Implement data structures and algorithms. 3. Applied Mathematics and Statistics: PSO7: Apply math and statistics for problem-solving. 4. Embedded Systems and Real-Time Applications: PSO8: Develop real-time applications. PSO9: Utilize microcontrollers and Sensors.
Relevance of PSOs to the local, regional, national, and global developmental needs (200 words)	The PSOs align with India's growing IT industry, Konkan region's local needs, national development, and global technology demands. Proficient programmers support the country's digital transformation, and networking expertise enhances connectivity. Applied math aids local challenges, while embedded systems find applications in healthcare and smart cities. These PSOs contribute to India's IT leadership, regional industries, and global tech market presence, addressing developmental needs at all levels.

Bachelor of Science (Information Technology) Programme
Under Choice Based Credit System (CBCS)
Course Structure
T.Y.B.Sc. I.T.

Course Code	Semester V	Credit		Course Code	Semester VI	Credits	
	Discipline Specific Courses (DSC)				***Discipline Specific Courses (DSC)***		
	Major Mandatory				***Major Mandatory***		
25_USITM501	Software Project Management	**2**		25_USITM601	Cyber Law and Forensic	**2**	
25_USITM502	Advanced Web Programming	**2**		25_USITM602	Security in Computing	**2**	
25_USITM503	Enterprise Java	**2**		25_USITM603	Software Testing	**2**	
25_USITM504	Advanced Web Programming Practical	**2**		25_USITM604	Security in Computing Practical	**2**	
25_USITM505	Enterprise Java Practical	**2**		25_USITM605	Software Testing Practical	**2**	
	Major Electives (Any 1)				***Major Electives (Any 1)***		
25_USITE506	Artificial Intelligence	**2**	**4**	25_USITE606	Business Intelligence	**2**	**4**
25_USITE507	Artificial Intelligence Practical	**2**		25_USITE607	Business Intelligence Practical	**2**	
OR				**OR**			
25_USITE508	Linux Server Administration	**2**	**4**	25_USITE608	Internet Of Things	**2**	**4**
25_USITE509	Linux Server Administration Practical	**2**		25_USITE609	Internet Of Things Practical	**2**	
	Vocational Skill Course (VSC)				***Vocational Skill Course (VSC)***		
25_USITV510	Advance Mobile Programming Practical	**2**		25_USITV610	Emerging Technologies Practical	**2**	
25_USITV511	Clean Code Practical	**2**		25_USITV611	Javascript Framework Practical	**2**	
	On Job Training (OJT)				***Field Project (FP)***		
25_USITF512	Field Project	**4**		25_USITJ612	On Job Training	**4**	
Total Credits		**22**		**Total Credits**		**22**	

SEMESTER V

Syllabus for Bachelor of Science in Information Technology for the year 2025-26

Nomenclature of the Course	**Software Project Management**
Class	**T.Y.B.Sc.(IT)**
Semester	**V**
Course Code	**25_USITM501**
No. of Credits	**2(2 Hours Per Week)**
Nature	**Theory**
Type	**Major(Mandatory)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Describe the basic concepts of software project management.
CO2: Understand the basic steps of activity planning, risk management and resource allocation.
CO3: Understand the basic steps of controlling cost, managing contracts, closing the project.

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
I	**Introduction to Software Project Management**	Introduction, Why is Software Project Management Important? What is a Project? Software Projects versus Other Types of Project, Contract Management and Technical Project Management, Activities Covered by Software Project Management, Some Ways of Categorizing Software Projects, Project Charter, Stakeholders, Setting Objectives, The Business Case, Project Success and Failure, What is Management? Management Control, Project Management Life Cycle
	Project Evaluation and Programme Management:	Introduction, Business Case, Project Portfolio Management, Evaluation of Individual Projects, Cost–benefit Evaluation Techniques, Programme Management, Creating a Programme, Some Reservations about Programme Management.
	An Overview of Project Planning	Introduction to Step Wise Project Planning, Step 0: Select Project, Step 1: Identify Project Scope and Objectives, Step 2: Identify Project Infrastructure, Step 3: Analyse Project Characteristics, Step 4:Identify Project Products and Activities, Step 5: Estimate Effort for Each Activity, Step 6: Identify Activity Risks, Step 7: Allocate Resources, Step 8:Review/Publicize Plan, Steps 9 and 10: Execute Plan/Lower Levels of Planning

II	**Activity Planning**	Introduction, Objectives of Activity Planning, When to Plan, Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Models, Formulating a Network Model, Adding the Time Dimension, The Forward Pass, Backward Pass, Identifying the Critical Path, Activity Float, Shortening the Project Duration, Identifying Critical Activities, Activity-on-Arrow Networks.
	Risk Management	Introduction, Risk, Categories of Risk, Risk Management Approaches, A Framework for Dealing with Risk, Risk Identification, Risk Assessment, Risk Planning, Risk Management, Evaluating Risks to the Schedule, Boehm's Top 10 Risks and Counter Measures.
	Resource Allocation	Introduction, Nature of Resources, Identifying Resource Requirements, Scheduling Resources, Creating Critical Paths, Counting the Cost, Being Specific, Publishing the Resource Schedule, Cost Schedules, Scheduling Sequence.
III	**Monitoring and Control**	Introduction, Creating the Framework, Collecting the Data, Review, Visualizing Progress, Cost Monitoring, Earned Value Analysis, Prioritizing Monitoring, Getting the Project Back to Target, Change Control, Software Configuration Management (SCM).
	Managing Contracts	Introduction, Types of Contract, Stages in Contract Placement, Typical Terms of a Contract, Contract Management, Acceptance.
	Project Closeout	Introduction, Reasons for Project Closure, Project Closure Process, Performing a Financial Closure, Project Closeout Report.

Prescribed Text/s (If any):

- Software Project Management - Bob Hughes, Mike Cotterell, Rajib Mall,TMH 6th 2018
- Project Management and Tools & Technologies – An overview - Shailesh Mehta, SPD 1st 2017
- Software Project Management - Walker Royce Pearson 2005

Other Learning Resources recommended:

- https://www.geeksforgeeks.org/software-engineering-software-project-management-spm/

Teaching Plan:			
Unit No.	**Unit Title**	**Teaching Methods**	**No. of Lectures**
I	Introduction to Software Project Management, Project Evaluation and Programme Management, An Overview of Project Planning	Chalk and board, Audio – Visual aids, Problem solving sessions	10
II	Activity Planning, Risk Management, Resource Allocation	Chalk and board, Audio – Visual aids, Problem solving sessions	10
III	Monitoring and Control, Managing Contracts, Project Closeout	Chalk and board, Audio – Visual aids, Problem solving sessions	10

Nomenclature of the Course	**Advanced Web Programming**
Class	**T.Y.B.Sc(IT)**
Semester	**V**
Course Code	**25_USITM502**
No. of Credits	**2(2 Hours Per Week)**
Nature	**Theory**
Type	**Major(Mandatory)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Understand the .NET Framework: Gain a solid foundation in .NET technology and C# programming essentials.
CO2: Gain knowledge about how to Develop Web Applications: Learn to create interactive ASP.NET web applications with a focus on user interface and data management.
CO3: Implement Security and AJAX Features: Recognize security requirements in web applications and utilize AJAX for enhanced user experience.

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
I	**Introduction to .NET Framework and C# Programming**	**Overview of .NET Technology** .NET Framework, Common Language Runtime (CLR), and .NET Class Library, .NET Languages: C#, VB **C# Language Fundamentals** Basic syntax, Variables and Data Types, Object-Based Manipulation, Conditional Logic, Loops, Methods **Advanced C# Concepts** Classes and Objects: Building a Basic Class, Value Types vs. Reference Types, Namespaces and Assemblies, Advanced Class Programming
II	**ASP.NET Web Forms and Data Management**	**ASP.NET Web Forms** Anatomy of an ASP.NET Application, Writing Code with Code-Behind, Adding Event Handlers, Server Controls and Form Controls: Overview, List Controls, Validation, User Controls and Graphics, Website Navigation (Site Maps, URL Mapping) **Data Access with ADO.NET** ADO.NET Components and Data Providers,

		SQL Basics: Command and Queries, Direct vs. Disconnected Data Access, Working with Data Source Controls (GridView, DetailsView, FormView)
III	**Application Development and Security**	**Debugging and State Management** Tracing, Error Handling, Debugging Techniques, Exception Handling, Client and Server-Side State Management (View State, Cookies), Using Master Pages and Content Pages **Security Management** Understanding Security Requirements, Authentication and Authorization **AJAX in ASP.NET** Using Partial Refreshes and Progress Notifications, Implementing Timed Refreshes, ASP.NET AJAX Control Toolkit

Prescribed Text/s (If any):

- Beginning Visual C# 2010 - K. Watson, C. Nagel, J.H Padderson, Wrox (Wiley) 2010
- Murach's ASP.NET 4.6 Web Programming in C#2015 - Mary Delamater and Anne Bohem, SPD Sixth 2016
- ASP.NET 4.0 programming - J. Kanjilal, Tata McGraw Hill 2011
- Programming ML.NET - Dino Esposito, Francesco Esposito, Paperback
- Ajax : A Beginner's Guide - Steven Holzner, Paperback 2017
- Introducing Bootstrap 4 - Jörg Krause, Apress 2016

Other Learning Resources recommended:

- https://learn.microsoft.com/en-us/nuget/quickstart/install-and-use-a-package-in-visual-studio

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
I	Introduction to .NET Framework and C# Programming	Chalk and board, Audio – Visual aids, Problem solving sessions	**10**
II	ASP.NET Web Forms and Data Management	Chalk and board, Audio – Visual aids, Problem solving sessions	**10**
III	Application Development and Security	Chalk and board, Audio – Visual aids, Problem solving sessions	**10**

Nomenclature of the Course	**Enterprise Java**
Class	**T.Y.B.Sc(IT)**
Semester	**V**
Course Code	**25_USITM503**
No. of Credits	**2(2 Hours Per Week)**
Nature	**Theory**
Type	**Major(Mandatory)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Proficiently understand Java EE Technology, develop dynamic web applications and manage cookies, sessions effectively.

CO2: Proficient in understanding and designing applications using Java Server Pages (JSP) , Enterprise Java Beans (EJB), JNDI and Interceptors.

CO3: Possess a thorough understanding of persistence concepts, Hibernate framework, and the ability to develop Java Persistence API (JPA) and Hibernate applications proficiently.

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
I	**Understanding Java EE**	What is an Enterprise Application? What is java enterprise edition? Java EE Technologies, Glassfish server,Java EE Architecture,Java EE Server, Java EE Containers.
	Java Servlets	Introduction to Java Servlets,Java Servlet API,The Need for Dynamic Content, Java Servlet Technology, Why Servlets?, What can Servlets do?,The Servlet Life Cycle, A Simple Welcome Servlet,Using Annotations Instead of Deployment Descriptors,The Servlet GUI and Database Example,introduction to cookies and session.
II	**Introduction To Java Server Pages**	Why use Java Server Pages? JSP v\s Servlets, Life Cycle of a JSP Page,JSP Tag Libraries.
	Introduction To Enterprise Javabeans	Enterprise Bean Architecture, Benefits of Enterprise Bean, Types of Enterprise Bean, Accessing Enterprise Beans,Introduction to Interceptors and JNDI.

III	**Persistence, Object/Relational Mapping**	What is Persistence? Persistence in Java, Current Persistence Standards in Java,Why another Persistence Standards? Object/Relational Mapping
	ORM Tools	Introduction Hibernate,Hibernate Components and Architecture,Introduction Java Persistence API(JPA),JPA Architecture.

Prescribed Text/s (If any):

- Java EE 7 For Beginners,Sharanam Shah, Vaishali Shah,SPD,First,2017
- Advanced Java Programming,Uttam Kumar Roy,Oxford Press,First,2015
- Java EE 8 Application Development,David R. Heffelfinger,Packt, First 2017
- Java EE 8 Cookbook,Elder Moraes,Packt, First 2018

Other Learning Resources recommended:

- Java EE 7 Essentials,Arun Gupta,O'Reilly, First, 2013

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
I	Understanding Java EE, Java Servlets	Chalk and board, Audio – Visual aids, Problem solving sessions	10
II	Introduction To Java Server Pages, Introduction To Enterprise Javabeans	Chalk and board, Audio – Visual aids, Problem solving sessions	10
III	Persistence, Object/Relational Mapping, ORM Tools	Chalk and board, Audio – Visual aids, Problem solving sessions	10

Nomenclature of the Course	**Advanced Web Programming Practical**
Class	**T.Y.B.Sc(IT)**
Semester	**V**
Course Code	**25_USITM504**
No. of Credits	**2(4 Hours Per Week)**
Nature	**Practical**
Type	**Major(Mandatory)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Have practical proficiency in Advanced Web Technologies.
CO2: Capture Advanced Front-End Developer Skills.
CO3: Be a Back-End Developer.
CO4: Be a Full-Stack Web Developer.

Syllabus:

Practical. No.	Title
1	**Working with basic C# and ASP.NET** a. Create an application that obtains four int values from the user and displays the product. b. Create an application to demonstrate string operations
2	**Working with Object Oriented C# and ASP.NET** a. Create simple application to demonstrate use of following concepts i. Function Overloading ii. Inheritance (all types) ii. Constructor overloading iv. Interfaces b. Create simple application to demonstrate use of following concepts i. Using Delegates and events ii. Exception handling
3	**Working with Windows Forms and Controls - 1** **User Interface Design:** Create a user-friendly interface using various controls (buttons, text boxes, labels, etc.). Implement layout management for responsive design. **Data Entry and Validation:** Develop forms for data entry with input validation (e.g., ensuring required fields are filled). Use error providers to give feedback on invalid input. **Event Handling:** Implement event handling for user actions (button clicks, text changes). Create dynamic interactions based on user inputs
4	**Working with Windows Forms and Controls - 2** **Data Storage:** Connect to a database (e.g., SQLite, SQL Server) for data persistence.

	Implement CRUD (Create, Read, Update, Delete) operations for managing data. **Reporting and Data Presentation:** Generate reports based on data entered (e.g., using DataGridView). Implement sorting and filtering features for data display.
5	**Working with Web Forms and Controls** a. Create a simple web page with various server controls to Demonstrate setting and use of their properties. (Example : AutoPostBack) b. Demonstrate the use of Calendar control to perform following operations. i) Display messages in a calendar control ii) Display vacation in a calendar control iii) Selected day in a calendar control using style iv) Difference between two calendar dates c. Demonstrate the use of Treeview control perform following operations. i) Treeview control and datalist ii) Treeview operations
6	**Working with Form Controls** a. Create a Registration form to demonstrate use of various Validation controls. b. Create Web Form to demonstrate use of Adrotator Control. c. Create Web Form to demonstrate use User Control.
7	**Working with Navigation,Beautification and Master page.** a. Create Web Form to demonstrate use of Website Navigation controls and Site Map. b. Create a web application to demonstrate use of Master Page with applying Styles and Themes for page beautification. c. Create a web application to demonstrate various states of ASP.NET Pages.
8	**Working with Database - 1** a. Create a web application bind data in a multiline textbox by querying in another textbox. b. Create a web application to display records by using database. c. Demonstrate the use of Datalist link control.
9	**Working with Database - 2** a. Create a web application to display Data Binding using dropdownlist control. b. Create a web application for to display the phone no of an author using database. c. Create a web application for inserting and deleting record from a database. (Using Execute-Non Query).
10	**Working with data controls** a. Create a web application to demonstrate various uses and properties of SqlDataSource.

	b. Create a web application to demonstrate data binding using DetailsView and FormView Control. c. Create a web application to display Using Disconnected Data Access and Databinding using GridView.
11	**Working with GridView control** a. Create a web application to demonstrate use of GridView control template and GridView hyperlink. b. Create a web application to demonstrate use of GridView button column and GridView events. c. Create a web application to demonstrate GridView paging and Creating own table format using GridView.
12	**Working with AJAX and XML** a. Create a web application to demonstrate reading and writing operations with XML. b. Create a web application to demonstrate Form Security and Windows Security with proper Authentication and Authorization properties. c. Create a web application to demonstrate use of various Ajax controls.
13	**Working With DLL** Programs to create and use DLL
14	**Create Web Application With All Web Methods and Controls - (Validation,DLL,Gridview,Control,Masterpage)**
15	**Create Windows Form Application With All Web Methods and Controls**

Prescribed Text/s (If any):

- Beginning Visual C# 2010 - K. Watson, C. Nagel, J.H Padderson, J.D. Reid, M.Skinner, Wrox (Wiley) 2010
- Murach's ASP.NET 4.6 Web Programming in C#2015 - Mary Delamater and Anne Bohem, SPD Sixth 2016
- ASP.NET 4.0 programming - J. Kanjilal, Tata McGrawHill 2011
- Programming ML.NET - Dino Esposito, Francesco Esposito, Paperback
- Ajax : A Beginner's Guide - Steven Holzner, Paperback 2017
- Introducing Bootstrap 4 - By Jörg Krause, Apress 2016

Other Learning Resources recommended:

- **https://www.w3schools.com/cs/index.php**

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	**Enterprise Java Practical**
Class	**T.Y.B.Sc(IT)**
Semester	**V**
Course Code	**25_USITM505**
No. of Credits	**2(4 Hours Per Week)**
Nature	**Practical**
Type	**Major(Mandatory)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Develop and deploy Java-based web applications using Servlets, JSP, EJB, JPA, and Hibernate.
CO2: Work with databases using JDBC, JPA, and Hibernate ORM for storing and retrieving data.
CO3: Handle user sessions and cookies to manage state in web applications.
CO4: Develop a multi-page web application using multiple Java EE technologies such as Servlets, JSP (JavaServer Pages), EJB (Enterprise JavaBeans), JPA (Java Persistence API).
CO5: Implement frontend-backend integration to provide a seamless user experience and dynamic content generation using technologies like JSP, Servlets, and Hibernate.

Syllabus:

Practical. No.	Title
1	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"
2	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.
3	Using Requestdispatcher 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.
4	a. Create a servlet that uses Cookies to store the number of times a user has visited servlet. b. 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.
5	Create a Servlet application to upload and download a file.
6	Develop Simple Servlet Question Answer Application Using Database.
7	Develop a simple JSP application to display values obtained from the use of intrinsic objects of various types.
8	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).
9	Create a registration and login JSP application to register and authenticate the user based on username and password using JDBC.
10	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
11	a. Create a JSP page to demonstrate the use of Expression language. b. Create a JSP application to demonstrate the use of JSTL.
12	Create a Currency Converter application using EJB.
13	Develop simple EJB application to demonstrate Servlet Hit count using Singleton Session Beans.
14	a. Develop a Simple Room Reservation System Application Using EJB. b. Develop simple Marks Entry Application to Demonstrate accessing Database using EJB.
15	Develop a five page web application site using any two or three Java EE Technologies.

Prescribed Text/s (If any):

- Java EE 7 For Beginners,Sharanam Shah, Vaishali Shah,SPD,First,2017
- Advanced Java Programming,Uttam Kumar Roy,Oxford Press,First,2015
- Java EE 8 Application Development,David R. Heffelfinger,Packt, First 2017
- Java EE 8 Cookbook,Elder Moraes,Packt, First 2018

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	**Artificial Intelligence**
Class	**T.Y.B.Sc(IT)**
Semester	**V**
Course Code	**25_USITE506**
No. of Credits	**2(2 Hours Per Week)**
Nature	**Theory**
Type	**Major(Elective)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Understand AI Fundamentals: Grasp the foundational concepts, history, and current advancements in AI.

CO2: To master logical reasoning and inference methods, including propositional and first-order logic, and apply them to knowledge representation and problem-solving tasks.

CO3: Implement Reasoning and Neural Networks: Explore logical reasoning, neural networks, and planning algorithms in AI systems.

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
I	**Introduction to Artificial Intelligence and Intelligent Agents**	**Foundations of AI** What is Artificial Intelligence? History and Current State of AI **Intelligent Agents** Definition of Agents and Environment, Characteristics of Good Behaviour and Types of Environments, Structure and Components of Intelligent Agents
II	**Problem Solving and Search Algorithms**	**Problem Solving Techniques** Problem-Solving Agents: Definition and Role, Searching for Solutions: Uninformed vs. Informed Search Strategies, Heuristic Functions and Their Importance **Advanced Search Methods** Local Search Algorithms and Their Applications, Non-Deterministic Actions and Partial Observations in Search, Online Search Agents and Strategies for Unknown Environments
III	**Reasoning, Logic, and Neural Networks**	**Adversarial Search and Logical Agents** Optimal Decision-Making in Games and Alpha-Beta Pruning, Knowledge Base Agents and Propositional Logic, Probabilistic Reasoning:

		Uncertainty, Conditional Probability, and Bayes Theorem **First Order Logic and Inference** Understanding First Order Logic and Its Necessity, Inference Techniques: Unification, Forward and Backward Chaining, and Resolution **Artificial Neural Networks** Architecture and Types of ANN, Merits and Demerits **Planning in AI** Definition of Classical Planning and Algorithms for Planning as State

Prescribed Text/s (If any):

- Artificial Intelligence: A Modern Approach - Stuart Russel and Peter Norvig, Pearson Third 2015
- A First Course in Artificial Intelligence - Deepak Khemani, TMH First 2017
- Artificial Intelligence: A Rational Approach - Rahul Deva, Shroff Publisher First 2018
- Artificial Intelligence - Elaine Rich, Kevin Knight and Shivashankar Nair, TMH Third 2009
- Artificial Intelligence & Soft Computing for Beginners - Anandita Das Bhattacharjee, SPD First 2013
- Artificial Intelligence & Generative AI for Beginners: The Complete Guide - David M. Patel, GD Publishing, First 2023

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
I	Introduction to Artificial Intelligence and Intelligent Agents	Chalk and board, Audio – Visual aids, Problem solving sessions	10
II	Problem Solving and Search Algorithms	Chalk and board, Audio – Visual aids, Problem solving sessions	10
III	Reasoning, Logic, and Neural Networks	Chalk and board, Audio – Visual aids, Problem solving sessions	10

Nomenclature of the Course	**Artificial Intelligence Practical**
Class	**T.Y.B.Sc(IT)**
Semester	**V**
Course Code	**25_USITE507**
No. of Credits	**2(4 Hours Per Week)**
Nature	**Practical**
Type	**Major(Elective)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Hands-on experience in optimizing solutions with heuristics, pathfinding, and state-space exploration.

CO2: Deep understanding of classic AI problems such as the Tower of Hanoi, 8-Puzzle, and N-Queens problem & also get Practical skills in solving puzzles using search techniques and algorithms like A* and BFS.

CO3: Experience designing real-world problem-solving applications like Missionaries and Cannibals, Water Jug Problem, and more.

CO4: Knowledge of Prolog or similar logic programming languages to derive expressions based on associative and distributive laws, and create inference engines for real-world applications.

Syllabus:

Practical. No.	Title
1	a. Write a program to implement depth first search algorithm. b. Write a program to implement breadth first search algorithm.
2	a. Write a program to simulate 4-Queen / N-Queen problem. b. Write a program to solve tower of Hanoi problem
3	a. Write a program to implement alpha beta search. b. Write a program for a Hill climbing problem.
4	a. Write a program to implement A* algorithm. b. Write a program to implement AO* algorithm.
5	Write a program to solve water jug problem.
6	Design the simulation of tic – tac – toe game using min-max algorithm.
7	Write a program to solve Missionaries and Cannibals problem.
8	Design an application to simulate number puzzle problem.
9	Write a program to shuffle Deck of cards.

10	Solve traveling salesman problem using artificial intelligence technique.
11	Solve the block of World problem.
12	Solve constraint satisfaction problem
13	a. Derive the expressions based on Associative law b. Derive the expressions based on Distributive law
14	Write a program to derive the predicate. (for e.g.: Sachin is batsman , batsman is cricketer) - > Sachin is a Cricketer.
15	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 a Family Tree. ii.Define: Clauses, Facts, Predicates and Rules with conjunction and disjunction

Prescribed Text/s (If any):

- Artificial Intelligence: A Modern Approach - Stuart Russel and Peter Norvig, Pearson Third 2015
- A First Course in Artificial Intelligence - Deepak Khemani, TMH First 2017
- Artificial Intelligence: A Rational Approach - Rahul Deva, Shroff Publisher, First 2018
- Artificial Intelligence - Elaine Rich, Kevin Knight and Shivashankar Nair, TMH Third 2009
- Artificial Intelligence & Soft Computing for Beginners - Anandita Das Bhattacharjee, SPD First 2013

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	**Linux Server Administration**
Class	**T.Y.B.Sc(IT)**
Semester	**V**
Course Code	**25_USITE508**
No. of Credits	**2(2 Hours Per Week)**
Nature	**Theory**
Type	**Major(Elective)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Gain foundational knowledge of Linux, command line skills, and basic system administration and software management capabilities.
CO2: Develop skills in storage management, network configuration, and user and group management on Red Hat systems.
CO3: Configure security measures, implement file sharing and mail services, and write basic Bash scripts while understanding high availability concepts.

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
I	**Introduction to Red Hat Enterprise Linux and System Administration**	**Overview of Linux and Red Hat:** Origins of Linux, Open Source Concept, Distributions, Role of Linux System Administrator. **Command Line Basics:** Working with the Bash Shell, File System Management, Directories, Piping and Redirection, Finding Files. **System Administration:** Job Management, Process Monitoring and Management, Using ps and top, Scheduling Jobs, Mounting Devices, Creating Backups. **Managing Software:** Understanding RPM, Managing Repositories, Installing Software with Yum.
II	**Configuring and Managing Storage and Networking**	**Storage Management:** Understanding Partitions, Logical Volumes, Creating and Resizing File Systems, Checking Integrity, Working with Encrypted Volumes. **Networking:** Configuring NetworkManager, Troubleshooting Networking, Setting Up SSH and VNC Server Access.

		User and Group Management: Managing Users and Groups, Permissions, Authentication Process, Using Graphical Tools.
III	**Security, Services, and Scripting**	**Securing the Server:** Understanding Firewalls (iptables), Setting Up NAT, Configuring Logging. **File Sharing and Mail Services:** Configuring NFS and Samba, Setting Up a Mail Server with Postfix and Dovecot. **Scripting and High Availability:** Introduction to Bash Scripting, Key Concepts, Control Structures, Overview of High-Availability Clustering and Configuration.

Prescribed Text/s (If any):

- Red Hat Enterprise Linux 6 Deployment Guide - Red Hat, Red Hat Content Services, First 2021
- Linux Bible - Christopher Negus, Wiley Tenth 2020
- Red hat Linux Networking and System Administration - Terry Collings and Kurt Wall, Wiley Third 2005
- Red Hat Enterprise Linux6 Administration - Sander van Vugt, Sybex First 2013
- Linux Administration: A Beginner's Guide - Wale Soyinka, TMH Eighth 2020

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
I	Introduction to Red Hat Enterprise Linux and System Administration	Chalk and board, Audio – Visual aids, Problem solving sessions	10
II	Configuring and Managing Storage and Networking	Chalk and board, Audio – Visual aids, Problem solving sessions	10
III	Security, Services, and Scripting	Chalk and board, Audio – Visual aids, Problem solving sessions	10

Nomenclature of the Course	**Linux Server Administration Practical**
Class	**T.Y.B.Sc(IT)**
Semester	**V**
Course Code	**25_USITE509**
No. of Credits	**2(4 Hours Per Week)**
Nature	**Practical**
Type	**Major(Elective)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Learn how to manage and configure storage devices, links, and repositories in RHEL, as well as effectively perform backups and maintain system configurations.& Master the use of Graphical User Interface (GUI) and Command Line Interface (CLI) for system administration tasks, including managing processes and performing system configurations.

CO2: Experience in using RPM packages for querying and managing software installations and updates.

CO3: Acquire proficiency in networking and server configuration, including DNS, DHCP and Mail Servers.

CO4: Acquire skills to automate system administration tasks using shell scripts to streamline operations and reduce manual intervention.

Syllabus:

Sr. No.	Title
0	**Installation of RHEL 6.X**
1	**Graphical User Interface and Command Line Interface and Processes** a Exploring the Graphical Desktop b The Command Line Interface c Managing Processes
2	**Storage Devices and Links, Backup and Repository** b Working with Storage Devices and Links a Making a Backup b Creating a Repository
3	**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
4	**Working with Users, Groups, and Permissions**
5	**Firewall and Cryptographic services** a Securing Server with iptables

	b Setting Up Cryptographic Services
6	**Configuring Server for File Sharing** a Configuring NFS Server and Client b Configuring Samba c Configuring FTP
7	**DNS, DHCP and Mail Server** a Configuring DNS b Configuring DHCP c Setting Up a Mail Server
8	**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
9	**Shell Scripts and High-Availability Clustering** a Writing Shell Scripts b Configuring Booting with GRUB c Configuring High Availability Clustering
10	**Setting Up an Installation Server** a Configuring Network Server as an Installation Server b Setting Up a TFTP and DHCP Server for PXE Boot

Prescribed Text/s (If any):

- Red Hat Enterprise Linux6 Administration - Sander van Vugt, Sybex First 2013
- Red Hat Enterprise Linux 6 Deployment Guide - Red Hat, Red Hat Content Services, First 2021
- Red hat Linux Networking and System Administration - Terry Collings and Kurt Wall, Wiley Third 2005
- Linux Administration: A Beginner's Guide - Wale Soyinka, TMH Eighth 2020
- RedHat certified System Administrator - William Maning, Emero Publishing, Second 2012

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	Advance Mobile Programming Practical
Class	T.Y.B.Sc(IT)
Semester	V
Course Code	25_USITV510
No. of Credits	2(4 Hours Per Week)
Nature	Practical
Type	Vocational Skill Course

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Build enterprise level mobile applications with Kotlin on Android.
CO2: Understand both the basic and advanced concepts of Kotlin.
CO3: Understand why use Kotlin over Java.
CO4: Install and configure Android Studio.
CO5: Explain and use key Android programming concepts.

Syllabus:

Practical. No	Title
1	**Introduction to Android, Introduction to Android Studio IDE, Application Fundamentals:** Creating a Project, Android Components, Activities, Services, Content Providers, Broadcast Receivers, Interface overview, Creating Android Virtual device, USB debugging mode, Android Application Overview. Simple "Hello World" program.
2	**Programming Resources** Android Resources: (Color, Theme, String, Drawable, Dimension, Image)
3	**Programming Activities and fragments** Activity Life Cycle, Activity methods, Multiple Activities, Life Cycle of fragments and multiple fragments.
4	**Programs related to different Layouts** Coordinate, Linear, Relative, Table, Absolute, Frame, List View, Grid View.
5	**Programming UI elements** AppBar, Fragments, UI Components
6	**Programming menus, dialog, dialog fragments**
7	**Programs on Intents, Events, Listeners and Adapters** The Android Intent Class, Using Events and Event Listeners
8	Programs on Services, notification and broadcast receivers
9	Database Programming with SQLite
10	Programming threads, handles and asynchronized programs

11	Programming Media API and Telephone API
12	Programming Security and permissions
13	Programming Network Communications and Services (JSON)

Prescribed Text/s (If any):

- Android Programming for Beginners - John Horton Packt -Third - 2021
- Android System Programming Roger Ye - Packt - First - 2017
- Fundamentals of Android App Development Sujit Kumar Mishra - BPB - First - 2020

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	**Clean Code Practical**
Class	**T.Y.B.Sc(IT)**
Semester	**V**
Course Code	**25_USITV511**
No. of Credits	**2(4 Hours Per Week)**
Nature	**Practical**
Type	**Vocational Skill Course**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Emphasize meaningful naming, simplicity, and eliminating redundant code.
CO2: Use constants or enums for meaningful values to improve readability.
CO3: Write functions that do one thing, are easy to read, and avoid side effects
CO4: Write code that speaks for itself, making documentation supplementary rather than essential.
CO5: Implement SOLID principles.
CO6: Do Error Handling and Logging

Syllabus:

Sr. No.	Title
1	**Refactoring Legacy Code**: Improve readability and maintainability by refactoring existing code. Given a legacy code snippet, identify areas for improvement and rewrite it. Look for: - Long methods - Poor variable names - Lack of comments or documentation
2	**Meaningful Naming:** Choose descriptive and accurate names for variables, methods, and classes. Refactor a piece of code with generic or unclear names. For example, rename variables like `x`, `temp`, or `data` to reflect their actual purpose.
3	**Avoiding Magic Numbers and Strings**: Replace arbitrary constants with named variables or enums. Given a snippet with magic numbers (e.g., `if (status == 3)`), replace them with meaningful constants (e.g., `if (status == STATUS_ACTIVE)`).
4	**Writing Clear Functions**:Functions should be small, specific, and easy to understand. Create a small utility (e.g., `calculateStatistics` for analyzing an array of numbers). Ensure each function within it is single-purpose, and verify functionality.

5	**Writing Self-Documenting Code**: Reduce the need for comments by making the code itself explanatory. Take a small code snippet and rewrite it with meaningful variable names, method names, and clear logic so that comments are mostly unnecessary.
6	**Single Responsibility Principle(SRP)**: Create classes with a single responsibility to ensure each class only has one reason to change. Implement a simple Library System that manages books and users. - Create classes like `Book`, `User`, and `Library`. - Ensure that each class has only one responsibility: - `Book` handles details related to the book (title, author, etc.). - `User` manages user-related actions (borrow, return). - Library` manages the interaction between users and books.
7	**Open/Closed Principle (OCP)**: Write code that is open for extension but closed for modification. Design a Discount System for an e-commerce application. - Create a base `Discount` class. - Implement different discount strategies by extending the `Discount` class (e.g., `SeasonalDiscount`, `HolidayDiscount`, `MemberDiscount`). - Each discount type should calculate the discount differently without modifying the base class.
8	**Liskov Substitution Principle (LSP)**:Ensure that derived classes can be used interchangeably with their base classes. Implement a Shape Drawing Program with shapes like `Rectangle`, `Square`, and `Circle`. - Define a `Shape` interface with methods such as `draw()` and `getArea()`. - Ensure that each subclass adheres to the expectations set by the `Shape` interface without altering the behavior (e.g., a `Square` should not break the `Rectangle` properties).
9	**Interface Segregation Principle (ISP):** Avoid forcing classes to implement interfaces they do not use. Build an Animal Simulation where animals can have different capabilities. - Define interfaces such as `IFlyable`, `ISwimmable`, and `IRunnable` instead of a single `Animal` interface. - Implement classes like `Bird`, `Fish`, and `Dog`, where each class only implements the interfaces relevant to its abilities (e.g., `Bird` implements `IFlyable` and `IRunnable` but not `ISwimmable`).
10	**Dependency Inversion Principle (DIP)**:Depend on abstractions (interfaces) to make the code more flexible and testable. Create a Notification System that can send notifications via email, SMS, or push notifications.

	- Define a `Notifier` interface with a `sendNotification()` method. - Implement classes `EmailNotifier`, `SMSNotifier`, and `PushNotifier` that each provide their own version of `sendNotification()`. - Write a `NotificationService` class that depends on the `Notifier` interface, allowing it to work with any notification type.
11	**Code Reviews and Feedback**: Practice giving and receiving constructive feedback on code. Conduct a code review with a peer or use a mock code snippet. Focus on clarity, simplicity, efficiency, and adherence to clean code principles.
12	**Error Handling and Logging**:Add proper error handling and meaningful logging to your code. Write a program that processes user input. Use clear error messages and log essential information to help identify issues. Avoid generic error handling.

Prescribed Text/s (If any):

- Clean Code-A handbook of Agile Software Craftmanship, Robert C. Martin, PH
- Clean Architecture- A Craftsman's Guide to Software Structure and Design, Robert C. Martin, PH

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	**On the Job Training**
Class	**TYBScIT**
Semester	**V**
Course Code	**25_USITF512**
No. of Credits	**04**
Nature	**Project/OJT/Internship**
Type	**OJT**
Guidelines for On the Job Training	
● This course requires learners to participate in **On the Job Training** generally under any study area related to Information Technology. ● Learners have to work 120 hours in a semester for a ● Students should undergo the training and submit the OJT report **as per Guidelines.**	

SEMESTER VI

Nomenclature of the Course	**Cyber Law and Forensic**
Class	**T.Y.B.Sc.(IT)**
Semester	**VI**
Course Code	**25_USITM601**
No. of Credits	**2(2 Hours Per Week)**
Nature	**Theory**
Type	**Major(Mandatory)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Analyze and Critique Cyber Law: Understand the implications of the IT Act regarding arrest powers and evaluate the efficacy of legal measures against cyber crime.

CO2: Assess Cyber Crimes: Identify various types of cyber crimes, their legal definitions, and the relevant penalties and adjudication processes.

CO3: Evaluate Copyright Issues: Understand the principles of copyright protection in the digital age, including the challenges posed by cyber squatting and the responsibilities of ISPs.

CO4: Advocate for Consumer Rights: Recognize the rights of cyber consumers and the protections available under the Consumer Protection Act, including jurisdictional challenges in e-commerce.

CO5: Understand Digital Forensics Fundamentals: Articulate the principles and importance of digital forensics in modern investigations.

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
I	**Intellectual Property Rights**	Overview of Intellectual Property, Patents, Copyrights, Trademarks, Design, Geographical Indication (GI), Plant Variety Protection, Layout Design Protection
	Cyber Law and Cyber Crime	**Power of Arrest Without Warrant Under the IT Act, 2000** Critique of arrest powers, Section 80 of the IT Act, Necessity and implications of arrest without warrant, Check and balances against arbitrary arrests **Cyber Crime and Criminal Justice** Concepts of cyber crime under the IT Act, Types of cyber crimes (hacking, fraud, harassment, etc.), Adjudication and penalties under the IT Act, Jurisdictional challenges in cyber crime Strategies to combat cyber crimes
II	**Contracts, Copyright, and Consumer**	**Contracts in the Infotech World**

	Protection in the Digital Age	Nature of contracts in the digital context (click-wrap, shrink-wrap), Formation and enforceability of online contracts **Battling Cyber Squatting and Copyright Protection** Concepts of domain names and responses to cyber squatting, Copyright ownership, infringement, and remedies, ISP liability in copyright violations **Consumer Protection in the Cyber Realm** Coverage of cyber consumers under the Consumer Protection Act, Rights and remedies for consumers in the digital marketplace, Jurisdictional issues regarding cross-border e-commerce **Digital Signature and E-Governance** Overview of digital signatures and their legal significance, Role of certifying authorities, E-governance initiatives and challenge
III	**Digital Forensics**	**Introduction to Digital Forensics** Definition and importance of digital forensics, Overview of the digital forensics process **Digital Evidence Collection** Types of digital evidence (e.g., hard drives, mobile devices, cloud storage), Procedures for evidence acquisition and preservation, Chain of custody and its significance **Forensic Analysis Techniques** File system analysis and data recovery, Analysis of internet activity (browsing history, emails, etc.), Malware analysis and detection, Tools and software used in digital forensics (e.g., EnCase, FTK) **Legal and Ethical Considerations** Legal frameworks governing digital forensics (e.g., admissibility of evidence), Ethical issues in digital investigations, Role of digital forensics in criminal and civil cases

Prescribed Text/s (If any):

- Cyber Law Simplified,VivekSood TMH Education,First 2001
- Information Technology & Cyber Law, Krishna Pal Malik, Allahabad, Second, 2023
- Cyber Crimes & Law,Santosh Kumar, Whitesmann's, First, 2024
- Cyber Law, Pavan Duggal, Universal, Third, 2023
- Digital Forensics and Cyber Crime: 10th International Conference, ICDF2C 2018, J. A. M. Dehghantanha,
- Computer Forensics: Principles and Practice, Amanda J. McMurray
- Digital Forensics for Network, Internet, and Cloud Computing: A Forensic Approach, Niranjan S. Kumar and Srinivasan P.
- The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics, John Sammons

Other Learning Resources recommended:
Tools and Software:

- Autopsy: An open-source digital forensics platform that students can practice with.
- FTK Imager: A forensic imaging tool used to acquire data from hard drives and other storage devices.

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
I	Intellectual Property Rights, Cyber Law and Cyber Crime	Chalk and board, Audio – Visual aids, Problem solving sessions	10
II	Contracts, Copyright and Consumer Protection in the Digital Age	Chalk and board, Audio – Visual aids, Problem solving sessions	10
III	Digital Forensics	Chalk and board, Audio – Visual aids, Problem solving sessions	10

Nomenclature of the Course	**Security in Computing**
Class	**T.Y.B.Sc(IT)**
Semester	**VI**
Course Code	**25_USITM602**
No. of Credits	**2(2 Hours Per Week)**
Nature	**Theory**
Type	**Major(Mandatory)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Understand the importance of Information protection.
CO2: Learn current best practices in storage capacity. and understand the fundamental security aspects of network devices and learn techniques for hardening network devices against attacks.
CO3: To familiarize Intrusion Detection and Prevention Systems and learn secure application designs.

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
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, TheImpossible Job, The Weakest Link, Strategy and Tactics, BusinessProcesses vs. Technical Controls. Risk Analysis: Threat Definition, Types of Attacks, Risk Analysis, SecureDesign Principles: The CIA Triad and Other Models, Defense Models,Zones of Trust, Best Practices for Network Defense.
	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
	Encryption	Encryption: A Brief History of Encryption, Symmetric-Key Cryptography, Public Key Cryptography, Public Key Infrastructure.
II	Storage Security & Database Security	Storage Security: Storage Security Evolution, Modern Storage Security, Risk Remediation, Best Practices. General Database Security Concepts, Understanding Database Security Layers, Understanding Database-Level Security,
	Secure Network Design	Introduction to Secure Network Design,Performance, Availability, Security. Network Device Security: Switch and Router Basics, Network Hardening.
	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

III	Intrusion Detection and Prevention Systems	Intrusion Detection and Prevention Systems: IDS Concepts, IDS Types and Detection Models, IDS Features.
	Secure Application Design	Secure Development Lifecycle, Application Security Practices, Web Application Security, Client Application Security, Remote Administration Security.
	Physical Security & Securing Assets	Classification of Assets, Physical Vulnerability Assessment, Choosing Site Location for Security. Locks and Entry Controls, Physical Intrusion Detection.

Prescribed Text/s (If any):

- The Complete Reference:Information Security,Mark Rhodes-Ousley, McGraw-Hill,Second,2013
- Principles of Computer Security: CompTIA Security+ and Beyond,Wm.Arthur Conklin, Greg White,McGraw-Hill,Second,2010
- Essential Cybersecurity Science,Josiah Dykstra,O'Reilly,Fifth,2015.

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
I	Information Security Overview, Risk Analysis, Encryption.	Chalk and board, Audio – Visual aids, Problem solving sessions	10
II	Storage Security & Database Security, Secure Network Design, Wireless Network Security	Chalk and board, Audio – Visual aids, Problem solving sessions	10
III	Intrusion Detection and Prevention Systems, Secure Application Design, Physical Security & Securing Assets.	Chalk and board, Audio – Visual aids, Problem solving sessions	10

Nomenclature of the Course	**Software Testing**
Class	**T.Y.B.Sc(IT)**
Semester	**VI**
Course Code	**25_USITM603**
No. of Credits	**2(2 Hours Per Week)**
Nature	**Theory**
Type	**Major(Mandatory)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Understand various software testing methods.
CO2: Identify defects and manage those defects for improvement in quality.
CO3: Gain comprehensive knowledge of various testing levels and methodologies to ensure thorough software quality assurance from requirements to system testing stages.
CO4: Understand and apply methods for verifying and validating software to ensure it meets requirements and functions correctly.
CO5: Analyze and comprehend the use of modern software testing tools and procedures for their projects testing.

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
I	**Software Quality**	What is Quality?,Total Quality Management (TQM),Continual (Continuous) Improvement Cycle,Constraints of Software Product Quality Assessment,Quality and Productivity Relationship,Types of Products, Schemes of Criticality Definitions,Why Software Has defects?,Processes Related to Software Quality
	Fundamentals of testing	What is testing?,Testing principles, Fundamental test process,The psychology of testing
II	**Testing in the software life cycle**	Software development models ,Test levels,Test types: the targets of testing, Maintenance testing
	Static techniques	Reviews and The test process, Review process, Static analysis by tools
	Test design techniques	Identifying test conditions and designing test cases, Categories of test design techniques, Specification-based or black-box techniques, Structure-based or white-box techniques, Experience-based techniques, Choosing a test technique

III	**Test management**	Test organization, Test plans, estimates and strategies, Test progress monitoring and control, Configuration management Risk and testing, Incident management
	Tool support for testing	Introduction, Features of Test tools, Guidelines for selecting a tool, Tool and skills of a tester, Static Testing tools, Dynamic Testing tools, Advantages of using Tools, Disadvantages of Using Tools, When to use Automated Test tools, Testing Using Automated Tools, Difficulties while introducing new tools. Taxonomy of testing tools: Functional/Regression testing tools, Source code testing tools, Performance testing tools, Java testing tools, Embedded software testing tools, Network protocol testing tools, Configuration management /Bug tracking tools, Testing management tools. How to select a testing tools?

Prescribed Text/s (If any):

- Foundations of Software Testing Dorothy Graham, Erik van Veenendaal,Isabel Evans, Rex Black, Cengage Learning, 3rd Edition
- Software Testing: Principles Techniques and Tools, M. G. Limaye TMH 2017
- Software Testing Tools, Dr.K. V. K. K. Prasad, Dreamtech Press

Other Learning Resources recommended:

- Software Testing: A Craftsman's Approach, Paul C. Jorgenson CRC Press, 4 th 2017

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
I	Software Quality, Fundamentals of testing	Chalk and board, Audio – Visual aids, Problem solving sessions	10
II	Testing in the software life cycle, Static techniques, Test design techniques	Chalk and board, Audio – Visual aids, Problem solving sessions	10
III	Test management, Tool support for testing	Chalk and board, Audio – Visual aids, Problem solving sessions	10

Nomenclature of the Course	**Security in Computing Practical**
Class	**T.Y.B.Sc(IT)**
Semester	**VI**
Course Code	**25_USITM604**
No. of Credits	**2(4 Hours Per Week)**
Nature	**Practical**
Type	**Major(Mandatory)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Configure authentication on networking devices.
CO2: Configure the fundamental security aspects of network devices and learn techniques for preventing network devices against attacks.
CO3: Implement Intrusion Detection and Prevention Systems.

Syllabus:

Sr. No.	Title
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

Prescribed Text/s (If any):

- The Complete Reference:Information Security,Mark Rhodes-Ousley, McGraw-Hill,Second,2013
- Principles of Computer Security: CompTIA Security+ and Beyond,Wm.Arthur Conklin, Greg White,McGraw-Hill,Second,2010

Other Learning Resources recommended:

- **https://www.netacad.com/**

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	Software Testing Practical
Class	T.Y.B.Sc.(IT)
Semester	VI
Course Code	25_USITM605
No. of Credits	2(4 Hours Per Week)
Nature	Practical
Type	Major(Mandatory)

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Design Test case Format.
CO2: Apply Test design techniques.
CO3: understand and Handle testing tools.

Syllabus:

Sr. No.	Title
1	Design Test case Format
2	Black Box Testing – Equivalence Partitioning and Boundary value Analysis
3	Black Box Testing – Equivalence Partitioning and Boundary value Analysis
4	Black Box Testing: Decision table and Cause Effect Graphing
5	Branch – Decision – Condition Coverage
6	State Transition Testing,Data Flow Testing
7	Review the software artifact Requirement document, Design Document, code, etc.
8	Structured Testing – Loop Coverage, Call coverage and Path Coverage.
9	Install Selenium IDE and create a test suite containing a minimum of 4 test cases for different web page formats (e.g., HTML, XML, JSON, etc.).
10	Conduct a test suite for two different websites using Selenium IDE. Perform various actions like clicking links, filling forms, and verifying content.
11	Install Selenium Server (Selenium RC) and demonstrate its usage by executing a script in Java or PHP to automate browser actions.
12	Write a program using Selenium WebDriver to automate the login process on a specific web page. Verify successful login with appropriate assertions.
13	Study of Testing tools -WinRunner, JMeter, Test Director, QTP, etc

Prescribed Text/s (If any):

- Foundations of Software Testing Dorothy Graham, Erik van Veenendaal,Isabel Evans, Rex Black, Cengage Learning, 3rd Edition
- Software Testing: Principles Techniques and Tools, M. G. Limaye TMH 2017
- Software Testing Tools, Dr.K. V. K. K. Prasad, Dreamtech Press

Other Learning Resources recommended:

- **https://www.javatpoint.com/manual-testing**

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	**Business Intelligence**
Class	**T.Y.B.Sc(IT)**
Semester	**VI**
Course Code	**25_USITE606**
No. of Credits	**2(2 Hours Per Week)**
Nature	**Theory**
Type	**Major(Elective)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Understand the importance of business intelligence in facilitating effective and timely decision-making processes within organizations.

CO2: Explore different classes of mathematical models and their applications in various decision-making scenarios and study data mining and data preparation.

CO3: Understand the concept of classification and Clustering problems and their applications in various domains.Study Management Information System.

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
I	**Business Intelligence:**	Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Role of Data Warehousing in BI, Ethics and business intelligence
	Decision support systems:	Definition of system, Representation of the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system
II	**Mathematical models for decision making:**	Structure of mathematical models, Development of a model, Classes of models
	Data mining:	Definition of data mining, Representation of input data, Data mining process, Analysis methodologies
	Data preparation:	Data validation, Data transformation, Data reduction
III	**Classification:**	Classification problems, Evaluation of classification models, Bayesian methods, Logistic regression, Neural networks, Support vector machines
	Clustering:	Clustering methods, Partition methods, Hierarchical methods, Evaluation of clustering models
	Management Information System (MIS) and Marketing models:	Classification and Quality of Information, Relational marketing, Sales force management

Prescribed Text/s (If any):

- Business Intelligence:Data Mining and Optimization for Decision Making by Carlo Vercellis(Wiley Publication,First Edition,2009)
- Fundamental of BusinessIntelligence by Grossmann W,Rinderle(MaSpringer Publication,First Edition,2015)
- Decision support and Business IntelligenceSystems by Efraim Turban,Ramesh Sharda, Dursun Delen(Pearson Publication,Ninth Edition,2011)

Other Learning Resources recommended:

- **https://dl.ebooksworld.ir/motoman/Packt.Practical.Business.Intelligence.www.EBooksWorld.ir.pdf**

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
I	Business Intelligence, Decision support systems	Chalk and board, Audio – Visual aids, Problem solving sessions	10
II	Mathematical models for decision making, Data mining, Data preparation	Chalk and board, Audio – Visual aids, Problem solving sessions	10
III	Classification, Clustering, Management Information System (MIS) and Marketing models	Chalk and board, Audio – Visual aids, Problem solving sessions	10

Nomenclature of the Course	**Business Intelligence Practical**
Class	**T.Y.B.Sc(IT)**
Semester	**VI**
Course Code	**25_USITE607**
No. of Credits	**2(4 Hours Per Week)**
Nature	**Practical**
Type	**Major(Elective)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Apply Data Transformation and Loading process.
CO2: Apply Data-Driven Mathematical Models,Data Mining and Data preparation for Informed Decision Making.
CO3: Manage data through Advanced Data Analysis Techniques: Classification, Clustering and analyzing Management Information System and Marketing models.

Syllabus:

Sr. No.	Title
1	Import the legacy data from different sources such as (Excel , SqlServer, Oracle etc.) and load in the target system. (You can download a sample database such as Adventureworks, Northwind, foodmart etc.)
2	Perform the Extraction Transformation and Loading (ETL) process to construct the database in the Sql Server/Power BI.
3	Create the Data staging area for the selected database.
4	Create the cube with suitable dimension and fact tables based on ROLAP, MOLAP and HOLAP model.
5	Create the ETL map and setup the schedule for execution.
6	Execute the MDX queries to extract the data from the data warehouse.
7	Import the warehouse data in Microsoft Excel and create the Pivot table and Pivot Chart
8	Import the cube in Microsoft Excel and create the Pivot table and Pivot Chart to perform data analysis.
9	Apply the what – if Analysis for data visualization. Design and generate necessary reports based on the data warehouse data.
10	Perform the data classification using a classification algorithm.
11	Perform the data clustering using a clustering algorithm.
12	Perform the Linear regression on the given data warehouse data.
13	Perform the Logistic regression on the given data warehouse data.

Prescribed Text/s (If any):

- Business Intelligence:Data Mining and Optimization for Decision Making by Carlo Vercellis(Wiley Publication,First Edition,2009)
- Fundamental of BusinessIntelligence by Grossmann W,Rinderle(MaSpringer Publication,First Edition,2015)
- Decision support and Business IntelligenceSystems by Efraim Turban,Ramesh Sharda, Dursun Delen(Pearson Publication,Ninth Edition,2011)

Other Learning Resources recommended:

- **https://www.tutorialspoint.com**
- **https://www.excel-easy.com**
- **https://dl.ebooksworld.ir/motoman/Packt.Practical.Business.Intelligence.www.EBooksWorld.ir.pdf**

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	**Internet Of Things**
Class	**T.Y.B.Sc(IT)**
Semester	**VI**
Course Code	**25_USITE608**
No. of Credits	**2(2 Hours Per Week)**
Nature	**Theory**
Type	**Major(Elective)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Understand IoT Fundamentals: Grasp the core concepts and technology behind the Internet of Things, including design principles for connected devices.
CO2: Explore different techniques of prototyping embedded devices and their physical design.
CO3:Navigate Manufacturing and Ethics: Explore the challenges of moving from prototyping to manufacturing while considering ethical implications in IoT development
CO4: To gain knowledge about various business models and funding options for Internet of Things startups.

Syllabus:

Unit No.	Unit Title	Subtitles (Learning Points)
I	**Overview of the Internet of Things**	Overview of the Internet of Things Definition and Scope: The "Flavour" of IoT, Enchanted Objects, Current Stakeholders Technology Foundations: IP, TCP, Protocols (TCP/IP, UDP), IP Addressing (IPv4, IPv6)
	Design Principles for Connected Devices	Calm and Ambient Technology, Privacy, and Data Ownership Web Thinking: Small Pieces, Loosely Joined; Graceful Degradation; Affordances
II	**Prototyping Concepts**	Sketching, Familiarity, Cost-Efficiency, and Embedded Platforms Open Source vs. Closed Source: Pros and Cons, Community Engagement
	Building Prototypes	Embedded Devices: Basics of Electronics, Sensors, Actuators, Microcontrollers, and System-on-Chips Platforms: Arduino and Raspberry Pi - Development, Hardware Considerations
III	**Prototyping and Online Components**	Physical Design: Iteration, 3D Printing, CNC Milling, and Laser Cutting

		API Integration: Mashing Up APIs, Security, and Real-Time Reactions
	Embedded Code and Business Models	Writing Efficient Embedded Code: Memory Management and Debugging Business Models: Evolution, The Business Model Canvas, Funding for IoT Startups
	Manufacturing and Ethical Considerations	Transitioning to Manufacturing: PCB Design, Assembly, and Testing Ethical Issues in IoT: Privacy, Control, Crowdsourcing, and Environmental Impact

Prescribed Text/s (If any):

- **Designing the Internet of Things,Adrian McEwen,Hakim Cassimally,WILEY,First 2014**
- **Programming the Raspberry Pi,Simon Monk, McGraw Hill, Third,2021**

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
I	Overview of the Internet of Things, Design Principles for Connected Devices	Chalk and board, Audio – Visual aids, Problem solving sessions	10
II	Prototyping Concepts, Building Prototypes	Chalk and board, Audio – Visual aids, Problem solving sessions	10
III	Prototyping and Online Components, Embedded Code and Business Models, Manufacturing and Ethical Considerations	Chalk and board, Audio – Visual aids, Problem solving sessions	10

Nomenclature of the Course	**Internet Of Things Practical**
Class	**T.Y.B.Sc(IT)**
Semester	**VI**
Course Code	**25_USITE609**
No. of Credits	**2(4 Hours Per Week)**
Nature	**Practical**
Type	**Major(Elective)**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: prepare Raspberry Pi for physical computing experiments.
CO2: Interface Pi with various sensors.
CO3: Use Pi for prototyping IoT.

Syllabus:

Sr. No.	Title
1	Starting Raspbian OS, Familiarizing with Raspberry Pi Components and interface, Connecting to ethernet, Monitor, USB
2	Displaying different LED patterns with Raspberry Pi.
3	Displaying Time over 4-Digit 7-Segment Display using Raspberry Pi
4	Interfacing 16X2 LCD with Raspberry Pi to display different messages
5	Raspberry Pi Based Oscilloscope
6	Controlling Raspberry Pi with WhatsApp.
7	Fingerprint Sensor interfacing with Raspberry Pi
8	Raspberry Pi GPS Module Interfacing
9	Interfacing Pi Camera with Raspberry Pi
10	Interfacing Raspberry Pi with RFID.
11	Installing Windows 10 IoT Core on Raspberry Pi (Demo Practical)

Note : This is a sample Practical list. Course instructor may change the practical as per the syllabus.

Prescribed Text/s (If any):

- **Programming the Raspberry Pi,Simon Monk, McGraw Hill, Third,2021**
- **Getting Started with Raspberry Pi,Matt Richardson and Shawn Wallace, SPD, Third, 2016**

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	**Emerging Technologies Practical**
Class	**T.Y.B.Sc(IT)**
Semester	**VI**
Course Code	**25_USITV610**
No. of Credits	**2(4 Hours Per Week)**
Nature	**Practical**
Type	**Vocational Skill Course**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Understand the principles of NoSQL databases, MongoDB's architecture, and its advantages over relational databases.
CO2: Create, read, update, and delete data in MongoDB and Learn basic MongoDB functions and its implementation.
CO3: Understand how to model data for MongoDB, including using its schema-less approach.
CO4: Import and export databases and effectively utilize jQuery for DOM manipulation.
CO5: Create, parse, and persist JSON objects and arrays and compare JSON with XML for data interchange and effectively use JSON.

Syllabus:

Sr. No.	Title
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 & Mongo DB**
	a. Creating JSON
	b. Parsing JSON
	c. Persisting JSON
	d. Export MongoDB to JSON.
	e. Write a MongoDB query to delete JSON object from MongoDB.

Prescribed Text/s (If any):

- Practical MongoDB,Shakuntala Gupta dwarf, NavinSabharwal,Apress, First, 2015
- Next Generation Databases,Guy Harrison, Apress, First, 2015
- Beginning jQuery,Jack Franklin,Russ Ferguson,Apress, Second, 2017
- Beginning JSON, Ben Smith, Apress, First ,2015

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Nomenclature of the Course	**JavaScript Framework Practical**
Class	**T.Y.B.Sc(IT)**
Semester	**VI**
Course Code	**25_USITV611**
No. of Credits	**2(4 Hours Per Week)**
Nature	**Practical**
Type	**Vocational Skill Course**

Course Outcomes:

On the successful completion of this course, the learner will be able to

CO1: Develop Angular JS programs using basic features.
CO2: Develop Web applications using AngularJS modules.
CO3: Make use of form validations and controls for interactive applications.
CO4: Apply the concepts of Expressions, data bindings and filters in developing AngularJS programs.
CO5: Make use of modern tools to develop Web applications.

Syllabus:

Sr. No.	Title
1	Develop an Angular JS program that allows user to input number in rupees and convert it into dollar and display the amount in dollar.
2	Develop an Angular JS program that allows user to input their first name and last name and display their full name. Note: The default values for first name and last name may be included in the program.
3	Develop an Angular JS application that displays a list of shopping items. Allow users to add and remove items from the list using directives and controllers. Note: The default values of items may be included in the program.
4	Develop a simple AngularJS calculator application that can perform basic mathematical operations (addition ,subtraction ,multiplication ,division) based on user input.
5	Write an Angular JS application that can calculate factorial and compute cube based on given user input.
6	Develop an AngularJS application that displays the details of students and their CGPA. Allow users to read the number of students and display the count. Note: Student details may be included in the program.
7	Develop an AngularJS application that creates a variable named "color" that exists in both the controller's scope and in the rootScope.

8	Develop an AngularJS program to create a simple to-do list application. Allow users to add, edit, and delete tasks.Note: The default values for tasks may be included in the program.
9	Write an AngularJS program to create a simple CRUD application (Create, Read, Update, and Delete) for managing users.
10	Develop AngularJS program to create a login form, with validation for the username and password fields.
11	Create an AngularJS application that displays a list of employees and their salaries. Allow users to search for employees by name and salary. Note: Employee details may be included in the program.
12	Create an AngularJS application that allows users to maintain a collection of items. The application should display the current total number of items, and this count should automatically update as items are added or removed. Users should be able to add items to the collection and remove them as needed. Note: The default values for items may be included in the program.
13	Create an AngularJS application to convert student details to Uppercase using angular filters. Note: The default details of students may be included in the program.
14	Create an AngularJS application that displays the date by using date filter parameters.

NOTE: 1. Include necessary HTML elements and CSS for the above Angular applications.
2. This is a sample Practical list. Course instructor may change the practical as per the syllabus.

Prescribed Text/s (If any):

- "AngularJS: Up and Running: Enhanced Productivity with Structured Web Apps", ShyamSeshadri, Brad Green, Apress, 0'Reilly Media,Inc.
- "AngularJS Programming by Example", AgusKurniawan– First Edition, PE Press, 2014

Other Learning Resources recommended:

- https://www.w3schools.com/angular
- Introduction to Angular JS :https://www.youtube.com/watch?v=HEbphzK-0xE
- Angular JS Modules :https://www.youtube.com/watch?v=gWm0KmgnQkU

Teaching Plan:

Unit No.	Unit Title	Teaching Methods	No. of Lectures
All	Practicals	Hands-on lab practicals with ICT	60

Field Project (FP)

Nomenclature of the Course	**Field Project**
Class	**TYBScIT**
Semester	**VI**
Course Code	**25_USITF512**
No. of Credits	**04**
Nature	**Project**
Type	**Field Project**

Guidelines for Field Project

- This course requires learners to participate in field based learning projects generally under the supervision of faculty.
- Learners have to work 120 hours in a semester for a Field Project.
- Classroom activities include preparation for field activity consisting of deciding the project, planning project activities, schedule the tasks, defining and monitoring milestones, questionnaires for requirement gathering,test designing,testing activity,etc., independent reading and study, preparation of final report etc.
- Field work includes implementation of the planned activities according to the programme schedule, collection of data, meetings, review meetings, Project presentation to stakeholders, acceptance testing,etc.
- Students should study the literature and prepare and submit the project report as per Guidelines.

Guidelines and Evaluation pattern for On Job Training
Course Code: 25_USITJ612

Introduction:

Inclusion of On Job Training in the course curriculum of the B.Sc. programme is one of the ambitious aspects in the programme structure. The main objective of inclusion of On Job Training and Field Project is to inculcate the ability to interpret particular aspects of the study in his/her own words.

Guidelines for On Job Training:

Students will be required to undertake a designated project or tasks in an organization or industry relevant to their field of study. The course aims to provide students with practical exposure and hands-on experience in a professional work environment related to their field of study.

Course Objectives:

By the end of the course, students should be able to:

1. Gain exposure to real-world insights and apply theoretical knowledge to practical situations
2. Enhance his/her skills regarding problem-solving, decision-making, and communication skills.
3. Understand organizational dynamics and work culture.
4. Build industry connections and networking opportunities.

Course Duration:

Minimum 1 months / 120 hours of On Job Training with an Organization/ Startup/ Charitable Organization/ Private firm/ Private Limited Company.

- The theme of the On Job Training should be based on any study area of the Major course
- Experience certificate, Evaluation report, working module and attendance report is Mandatory

Evaluation Scheme:

OJT Evaluation (100 Marks) Credits: 04				
Internal (40 Marks)		**External (60 Marks)**		
Mid –Term Report	**Presentation**	**End –Term Report**	**Working Module**	**Presentation**
30	10	30	20	10

Report Structure:

Mid-Term Report:

The Mid-Term Report will be utilized for internal evaluation. The presentation of work done so far will be presented up to 10 minutes in the form of a powerpoint presentation which will include only the introduction slide and working module/work done/skills earned so far. The Mid-Term report will be submitted at the time of presentation. Please find the format of Mid Term Report in **Annexure A**.

End-Term Report:

The students will be required to submit a comprehensive report at the end of the On-the-Job Training. A project report has to be brief in content and must include the following aspects:

a) Title Page:

Mentioning the title of the report, name of the student, program, institution, and the period of training/project. (Refer **Annexure B)**

b) Certificate of Completion:

1. A certificate issued by the organization or supervisor confirming the successful completion of the training/project. (Refer **Annexure C**)
2. A certificate issued by the institution confirming the successful completion of the training/project (duly signed by internal guide and HOD). (Refer **Annexure D**)

c) Professional Evaluation of intern:

Mentioning the behavior and punctuality of learners in the organization during On Job Training. (Refer **Annexure E**)

d) Declaration:

A statement by the student declaring that the report is their original work and acknowledging any assistance or references used. (Refer **Annexure F**)

e) Acknowledgments:

Recognizing individuals or organizations that provided support, guidance, or resources during the training/project. (Refer **Annexure G**)

f) Table of Contents:

Providing a clear outline of the report's sections and page numbers. (Refer **Annexure H**)

g) Introduction of the Company:

A Concise representation of a company/ organization defining its scope, products / service. (**Refer Annexure I**)

h) Your Role in the Organization during the on-Job Training:

The key aspects handled, the department under which you were deployed and brief Summary report duly acknowledged by the reporting head. (Refer **Annexure J**)

Annexure A

(Proforma for Mid Term Report)

1. Name of the Trainee:_____

2. Academic Roll No.: _____

3. Position (If Any): _____

4. Name of the Company in which OJT is performed: _____

_____

5. Name of Guide from the Company: _____

6. No of Weeks/Hours for which mid-term Report is submitted: _____

7. Duration: From ____/____/_____ to ____/____/_____

8. Submission date: _____

Signature
Internal Guide

Signature
Student

Internship Letter (If Given):

(Proforma for the certificate for internship in official letter head)

This is to certify that Mr/Ms _____
of_____College/Institution worked as an intern as part of his/her B.Sc. course in Information Technology of University of Mumbai. The particulars of internship are given below:

Internship starting date:_____

Internship ending date: _____

Actual number of days worked: _____

Tentative number of hours worked:_____ Hours

Broad area of work: _____

A small description of work done by the intern during the period:
_____
_____
_____

Signature: _____

Name: _____

Designation: _____

Contact number: _____

Email: _____

Tasks & Actions Taken (So far)

1. Assigned Task:

_____
_____
_____
_____
_____

2. Research work performed so far (Min 100 words):

_____
_____
_____
_____
_____
_____

3. Any new skills learned(Min 100 words):

_____
_____
_____
_____
_____
_____

4. Action taken on assigned task(Min 100 words):

Note: Mention in points

Do not mention module / working script

_____
_____
_____
_____
_____
_____

Annexure B

(Proforma for the Title Page of OJT End Term Report)

On-the-Job Training Report (OJT Report)

Student Information

Full Name:
Course/Program Name: BSc (Information Technology - Major)
Student Exam Seat Number:
Contact Information (Mobile Number):

OJT Details

Company Name:
Company Address:
OJT Department/Division:
OJT Supervisor Name and Position:
Duration of OJT:

Academic Information

Institution Name:
Department/Faculty Name:
Instructor/Advisor Name:
Course Code:
Date of Submission (Month, Year):

Annexure C

(Proforma for the certificate for OJT End Term Report on official letter head of Company)

Certificate

This is to certifythatMr/Ms_____

of _____ College/Institution worked as an intern as part of his/her B.Sc course in Information Technology of R. P. Gogate College of Arts and Science & R. V. Jogalekar College of Commerce(Autonomous), Ratnagiri. The particulars of internship are given below:

On Job Training starting date: _____

On Job Training ending date: _____

Actual number of days worked: _____

Tentative number of hours worked: _____Hours

Broad area of work:_____

A small description of work done by the Student during the period:

_____

_____

Signature: _____

Name: _____

Designation: _____

Contact number: _____

Email: _____ (Seal of the organization)

Annexure D

(Proforma for the certificate issued by institution)

R. E. Society's
R. P. Gogate College of Arts and Science and
R. V. Jogalekar College of Commerce (Autonomous), Ratnagiri

Department of Information Technology

CERTIFICATE

This is to certify that Mr./Ms. _____ of T.Y.B.Sc. (Sem V) class bearing examination seat no._____ has satisfactorily completed On Job Training in _____ , as laid by the Board of Studies of Information Technology for the year 20__ in Major Information Technology. His/ Her bonafide work is completed under the guidance of Mr./Mrs._____.

Signature of Guide | Examiner | Head of Department
Information Technology

Date:
Place:

(Seal of the organization)

Annexure E

(Proforma for Professional Evaluation of Intern)

Professional Evaluation of intern

Name of intern: _____

College/institution: _____

[Note: Give a score in the 1 to 5 scale by putting √ in the respective cells]

No	Particular	Excellent	Very Good	Good	Moderate	Satisfactory
1	Attendance & Punctuality					
2	Ability to work in a team					
3	Written and oral communication skills					
4	Problem solving skills					
5	Ability to grasp new concepts					
6	Technical skill in terms of technology, programming, etc					
7	Ability to complete the task					
8	Quality of overall work done					

Comments:

_____

_____

Signature: _____

Name: _____

Designation: _____

Contact number: _____

Email:_____ (Seal of the organization)

Annexure F

(Proforma for the Declaration in OJT End Term Report)

DECLARATION BY STUDENT

I, **[Full Name]**, hereby declare that this On-the-Job Training (OJT) report titled **"[Title of the Report]"** is my own work and has been written and prepared in compliance with the guidelines and requirements set by **[Institution Name]**. All information and references from external sources have been properly cited and acknowledged.

This report has not been submitted for any other academic or professional purpose, and no part of it has been plagiarized or copied from other sources without appropriate citations. I understand the consequences of academic dishonesty, and I assure the authenticity of the content presented in this report.

I further declare that I have completed the OJT at **[Company Name]** during the period from **[Start Date]** to **[End Date]**, under the supervision of **[OJT Supervisor's Name]**, and the activities and experiences discussed in this report accurately reflect my involvement during the training.

Sign
[Full Name of Student]
Date: [Month, Year]

Annexure G

(Proforma for the acknowledgments in OJT End Term Report)

ACKNOWLEDGMENTS

I would like to express my sincere gratitude to all the individuals who contributed to the successful completion of my On-the-Job Training (OJT) and this report.

First and foremost, I would like to extend my deepest thanks to **[OJT Supervisor's Name]**, **[Position]** at **[Company Name]**, for his/her invaluable guidance, mentorship, and support throughout my training. His/her expertise and encouragement significantly enhanced my learning experience.

I would also like to express my appreciation to the **Head of the Department (HOD)**, **[HOD's Name]**, for his/her continuous support and for providing me with the opportunity to undergo this OJT program. His/her leadership and direction have played a significant role in shaping my academic and professional development.

My sincere thanks go to **[Vice Principal's Name]**, Vice Principal of Science Faculty for his/her support and for facilitating the training opportunities that enriched my learning experience. I am grateful for the opportunities provided under his/her leadership.

I would also like to express my heartfelt appreciation to **[Principal's Name]**, Principal of **[Institution Name]**, for his/her encouragement, and for ensuring that the institution maintains strong ties with industry partners, allowing students like me to gain practical experience in the field.

I am equally grateful to my academic advisor, **[Instructor/Advisor's Name]**, for providing me with the academic guidance and knowledge that prepared me for the challenges and opportunities during my OJT.

Special thanks are due to the entire team at **[Department/Division Name]** at **[Company Name]**, particularly **[Names of colleagues or team members, if applicable]**, for their collaboration and support, and for creating a positive and learning-focused environment during my training.

Lastly, I would like to thank my family and friends for their unwavering support and encouragement, which motivated me to give my best during this experience.

Sign

[Your Full Name]
Date: [Month, Year]

Annexure H

(Proforma for the table of contents of OJT End Term Report)

TABLE OF CONTENTS

Annexure I

(Proforma for Company Introduction of OJT End Term Report)

Company Introduction

- **Company Name**: [Insert the full name of the company]
- **Industry**: [What industry does the company belong to? For example, manufacturing, marketing, IT, healthcare, etc.]
    - **Location**: [Where is the company based? Include main offices or branches, if relevant.]
    - **Year Established**: [When was the company founded?]
    - **Founders**: [If applicable, mention who founded the company.]
- **Mission Statement (If Any):** [Include the company's mission or vision statement if available. This provides insight into the company's core values and objectives.]
- **Company Structure:** Explain the organizational structure of the company, particularly highlighting the departments or divisions where you worked or interacted.
- **Products/Services Offered**: [List the key products or services offered by the company. Focus on what was relevant to your training.]
- **Target Market**: [Who are the company's primary customers? For example, businesses, consumers, governments, etc.]
- **Clients**: [If relevant, mention some key clients or partners the company works with.]

Annexure J

(Proforma for role in organization during OJT of OJT End Term Report)

Role in the Organization during On-the-Job Training Position/Title

- Position/Title: [Your official position or title during the OJT, e.g., OJT Trainee, Marketing Assistant, IT Intern, etc.]
- Department/Division: [The department where you were assigned, e.g., Marketing, HR, IT, Production, etc.]
- Supervisor: [Name of your OJT supervisor, position, and department]

Primary Responsibilities and Tasks

Provide a detailed description of the key tasks and responsibilities you were given during your OJT. Mention any specific projects or activities you worked on, and describe how these contributed to the organization's objectives.

- Task 1: [Description of the first key responsibility or task. Explain what you did, how you did it, and why it was important.]
- Task 2: [Description of the second responsibility, and so on.]

Skills and Knowledge Applied

Explain the specific skills and knowledge you applied during your OJT, and how your academic background helped you in your role. This shows the connection between theory and practice.

- Skills Applied: [Mention the technical, professional, and soft skills you utilized. For example, communication skills, data analysis, project management, technical skills, etc.]
- Knowledge Applied: [Describe the theoretical knowledge you applied, such as principles from your coursework in marketing, engineering, business management, etc.]

Challenges and Problem-Solving

Briefly mention any challenges or problems you faced in your role and how you addressed or overcame them. This demonstrates your ability to adapt and problem-solve in a professional environment.

Contribution to the Organization

Highlight how your work and efforts contributed to the success of the organization during your OJT. This could include improvements in processes, successful projects, or other positive outcomes as a result of your involvement.

Guidelines for Field Project (25_USITF512)

- **Evaluation Scheme:**

Field Project Evaluation (100 marks)			**Credits:04**				
Internal (40 Marks)			**External (60 Marks)**				
Project Proposal	Project proposal Presentation	Attendance and Behavior	Quality of the Project	Working of the Project	Documentation	Project Presentation	Viva
20	10	10	15	15	10	10	10

The evaluation of the project will assess the project based on the following parameters:

- **Project Proposal - 20 Marks:** Submit a detailed two to three page proposal outlining the project's objectives, timeline, resources needed, expected outcomes, and a plan for assessment.
- **Project proposal Presentation – 10 Marks:** Present a clear, concise overview of your project, including objectives, methodology, timeline, and expected outcomes, while engaging your audience with professional delivery, visual aids, and confident communication.
- **Attendance and Behavior - 10 Marks:** Students are expected to attend all scheduled sessions, and project-related activities. It is crucial to be present unless there is an unavoidable conflict (e.g., illness or emergency).
- **Quality of the Project – 15 Marks:** The overall quality of the project, including its design, implementation, and user experience, will be evaluated.
- **Working of the Project – 15 Marks**: The functionality and performance of the project will be assessed to determine how well it meets the specified requirements and objectives.
- **Documentation – 10 Marks:** The completeness, accuracy, and professionalism of the project documentation, including the project report and supporting materials, will be considered.
- **Project Presentation – 10 Marks:** The clarity, organization, and effectiveness of the project presentation will be evaluated.
- **Viva – 10 Marks:** The viva voce session will provide an opportunity for the student to demonstrate their knowledge and understanding of the project, as well as to answer questions and engage in a discussion with the evaluators.

Field Project Guidelines

Aim:

Learners have to work 120 hours in a semester for a Field Project. The Field Project Work provides students with practical experience in applying their knowledge and skills to real-world projects, emphasizing hands-on experience in industry- standard project practices. It focuses on project development, implementation, and deployment using Information Technology principles and techniques. Students will work individually or in teams to design, develop, and present a substantial software project, gaining exposure to real-life project scenarios. It also covers project planning, requirements gathering, software design, coding, testing, debugging, documentation, and project management, following industry best practices. Through these projects, students will enhance their problem-solving abilities, gain proficiency in software development methodologies, and strengthen their practical skills in Information Technology.

Objectives:

● Apply interdisciplinary knowledge to effectively solve real-life problems using acquired skills and concepts.

● Gain hands-on experience in the software development life cycle, encompassing requirements analysis, design, implementation, testing, and deployment.

● Familiarize students with global IT industry standards, ethics, and professional practices to thrive in a professional environment.

● Develop teamwork and project management skills through structured collaboration, effective communication, and task delegation.

● Produce professional technical documentation aligning with industry practices, ensuring clarity, accuracy, and usability.

● Acquire time management, resource allocation, and personnel coordination skills for efficient project execution.

Project Types:

a) Developing a solution for a real-life problem: The project can be developed as per commercial problems or according to industry demands or outsourced modules to meet current trend and market needs. In this case, the project focuses on addressing an existing requirement for a computer-based solution that has practical applications. The project should successfully implement the different stages of the system development life cycle. Examples: Secure Online Banking System, Machine Learning- based Disease Diagnosis System, Cloud-based Document Management System.

b) Innovative Product Development: These projects involve exploring and developing a computer- based solution with a unique and innovative utility. Examples: Cybersecurity

Monitoring and Threat Detection System, Machine Learning-powered Predictive Maintenance System for Industrial Equipment, IoT-based Smart Energy Management System, Customized Database application.

Tools & Technologies:

In the field project work, students are granted complete freedom to select platforms, tools, and programming languages without any imposed restrictions. This approach encourages creativity, flexibility, and exploration of various technologies. By prioritizing open-source technologies, students can leverage a vast array of resources and community support. Commonly employed tools include IDEs, version control systems (e.g., Git), programming languages (e.g., Python, Java), databases (e.g., MySQL), and web frameworks (e.g., Django, Ruby on Rails). The evaluation process focuses on the project's content and implementation rather than the specific tools chosen, ensuring a fair assessment of the students' skills and problem-solving abilities.

Project Guide:

Assigning a project guide to each project or group is a mandatory requirement to ensure the successful completion of the project work. The guide plays a crucial role as a mentor and technical expert, providing invaluable support and guidance to students. They are expected to facilitate effective communication and teamwork, review project proposals, assign schedules, and monitor progress on a regular basis. Additionally, guides are expected to offer timely feedback, provide guidance on project planning and implementation strategies, evaluate the quality of work, and promote professionalism and ethical conduct. Their expertise and involvement are essential in helping students navigate challenges, make informed decisions, and achieve their project goals effectively.

Project Team Size: 1 member or team of max. 2 members

Project Proposal:

The project proposal will be considered for internal evaluation. The project proposal is a mandatory document that serves as a foundation for the project. It helps students define their project idea, receive early evaluation and feedback, establish clear communication with the project guide, and take ownership of the project's successful execution. A formal proposal ensures systematic and professional project planning, fostering critical thinking, effective communication, and project management skills. The proposal provides a roadmap and increases the chances of a successful outcome. Before initiating a project, it is mandatory to submit a project proposal for approval. The original duly approved project proposal should be attached to the final project report. The project proposal for UG Information Technology projects should include the following contents:

- **Title**: It should be clear, concise, and reflect the core objective or theme of the project.

- **Introduction:** Introduces the project topic with general area of interest (field, industry, or problem the project addresses) and relevance or importance of the topic in the current scenario.

- **Objectives:** It should explain the goals and desired outcomes of the project.

● **Scope:** It should define the boundaries of the project, explaining what will and won't be covered.

● **Methodology:** Briefly introduces a high-level overview of the methods, techniques, or tools used to achieve the objectives of the project.

● **Tools and Technologies:** The Tools and Technologies section should list and justify the specific software, hardware, programming languages, frameworks, and platforms used in the project

● **Timeline:** The Project Timeline should outline the key milestones, tasks, and deadlines, providing a clear schedule for project activities and ensuring timely completion of objectives.

● **Resources:** Mention different stakeholders, equipment, materials, and budget required to complete a project successfully.

● **Expected Outcomes:** Outline specific outcomes of a project, measurable results or benefits that the project aims to achieve upon completion.

● **References:** Mention Name of the books, journal, or websites referenced for project development throughout the development.

Project Report:

The Certified Copy of Hard Bound Project Report must adhere to the following guidelines:

● No of Copies: 1 Hard copy + Soft copy (College / Department)
● The project report should include the following

- o **Title Page**
  Mentioning the title of the report, name of the student, program, institution, and the period of Field project. (Refer Annexure B)

- o **Certificate**
  A **Certificate of Completion** for a field project is an official document issued to acknowledge that a participant or student has successfully completed a specific field project. It typically includes:
  Participant's Name: The individual who completed the project.
  Project Title: The name or description of the field project.
  Institution/Organization: The entity overseeing the project.
  Completion Acknowledgment: Confirmation that the project was successfully completed, often with a brief description of the work done.

  Signature and Seal: The supervisor's signature and, if applicable, the institution's seal or stamp to authenticate the certificate.
  (Refer Annexure C)

- o **Table of Contents**
  Providing a clear outline of the report's sections and page numbers. (Refer Annexure D)

- **Acknowledgement**
  Recognizing individuals or organizations that provided support, guidance, or resources during the training/project. (Refer Annexure E)
- **Self-attested copy of Plagiarism Report from any open-source tool.** Use an open-source plagiarism detection tool (such as **PlagScan**, **Quetext**, or **DupliChecker, etc**) to run the field project report through the software. The tool will highlight any text that matches other sources and provide a similarity percentage.

- **Gantt chart**
  It shows the start and finish dates of various elements or tasks within a project, allowing stakeholders to track progress, allocate resources, and ensure deadlines are met.

- **System Requirements**
  Hardware Requirements:-List all physical equipment required for the fieldwork, such as Processor Type, RAM and Hard Disk Capacity, GPS units, survey instruments, etc. **Software Requirements:-**Data Collection and Analysis Software**,** Internet Connectivity, Operating System Version, Server Type etc.

- **System Design**
  System Design section typically outlines how the system will be structured and how various components will interact to achieve the project's objectives. It may include **UML (Unified Modeling Language) diagrams**, **database, screenshots** of user interfaces or system components, and **code snippets** to give a clear picture of the technical architecture, workflows, and implementation details.

- **Conclusion and Future Work**
  The **Conclusion and Future Work** section in a Information Technology field project report provides a summary of the key findings and outcomes from the project, along with suggestions for further development or research. It serves to wrap up the project and point to areas that could benefit from future improvements or further investigation.

- The text of the report should be set in 12 pt, Times New Roman font, and single-spaced.

- Chapter headings should be centered, written in 20pt, Times New Roman font, bold, and in all caps.

- These guidelines ensure a standardized format for the project report, promoting clarity and readability.

Annexure A

(Proforma for the Field Project Proposal in Field Project Report)

R. E. Society's
Gogate- Jogalekar College (Autonomous), Ratnagiri.
Department of Information Technology
Field Project Proposal

Academic Year: 20_ - 20_ Semester: VI

Date of submission:-

Name of the learner:-

Academic seat number:-

- **Title of the project :**
- **Introduction project topic :**
- **Objectives :**
- **Scope :**
- **Methodology :**
- **Tools and Technology :**
- **Timeline :**
- **Resources :**
- **Expected Outcomes :**
- **References :**

Signature of Student **Signature of Internal Guide**

Roll Number:

Annexure B

(Proforma for the Sample Title Page Format in Field Project Report)

(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)

Annexure C

(Proforma for the Certificate in Field Project Report)

R. E. Society's

R. P. Gogate College of Arts and Science and R. V. Jogalekar College of Commerce (Autonomous), Ratnagiri

Department of Information Technology

<<College Logo>>

CERTIFICATE (14 BOLD, CAPS, underlined, centered)

This is to certify that Mr. /Ms. of **T.Y.B.Sc. (I.T.) (Sem VI)** class bearing examination seat no. _____ has satisfactorily carried out Project on _____, as laid by the Board of Studies of Information Technology Major for the year 202_ . His/Her bonafide work is completed under the guidance of Mr. /Mrs._____. *(12, times new roman, justified,1.5 spacing)*

Signature of Guide **Examiner** **Head of Department InformationTechnology**

Date:
Place:

(Seal of the organization)

Annexure D

(Proforma for the Table of Contents in Field Project Report)

Index

Sr. No.	Title	Page No.
1	**Acknowledgement**	
2	**Plagiarism Report**	
3	**Preliminary Investigation**	
	A. Organizational Overview	
	B. Advantages of proposed system	
	C. Feasibility Study	
	D. Stake Holders	
	E. Gantt Chart	
4	**System Analysis**	
	A. Event Table	
	B. ER Diagram	
	C. Class Diagram	
	D. Use-case Diagram	
5	**System Design**	
	A. Design Class Diagram	
	B. Database Design	
	C. Package Diagram	
6	**System Coding**	
	A. Screen Layout	
	B. Code	
7	**References**	

Annexure E

(Proforma for the Acknowledgment in Field Project Report)

ACKNOWLEDGMENT

It is my prime duty to offer my sincere gratitude to the University of Mumbai to include the field project work in the syllabus of Third Year Bachelor's degree so as to develop interest about research work among the students like us.

I wish to express my sincere thanks to **[HOD's Name],** Head of the Department of Information Technology for giving me the opportunity to complete the project work by providing facilities in the department and providing valuable guidance to complete the task.

I am greatly obliged to [**Field Project Guide Name]**, Lecturer in the Department of Information Technology who provided valuable guidelines and conceptual guidance throughout the project work and also helped out in clearing concepts about the project.

I am also grateful to **[Principal's Name]**, Principal of Gogate Jogalekar College, Ratnagiri and **[Vice Principal's Name],**Vice Principal of Science Faculty for all necessary facilities of laboratory and library at Gogate Jogalekar College, Ratnagiri.

Last but not the least, my special thanks to my parents, my friends and all those people who have encouraged me, helped me to complete this course successfully in time.

Evaluation Pattern- (Theory courses)

A) Continuous Internal Evaluation: Maximum Marks: 20

Method	Marks
Unit Test (MCQ / Descriptive – Based on Theory and/or Problems Online/Offline	**10**
Assignments	**05**
Attendance and active participation in classroom	**05**

A) Semester End Examination: Maximum Marks: 30

Question No. and Sub questions (If any)	Unit	Type of Question (Essay / short note / Objective / Diagram, etc.)	Marks
Q.1) A)	Unit 1	Short Note / Diagram	06
Q.1) B)	Unit 1	Short Note / Diagram	04
Q.2) A)	Unit 2	Short Note / Diagram	06
Q.2) B)	Unit 2	Short Note / Diagram	04
Q.3) A)	Unit 3	Short Note / Diagram	06
Q.3) B)	Unit 3	Short Note / Diagram	04

Evaluation Pattern-(Practical courses)

A) Continuous Internal Evaluation: Maximum Marks: 20

Method	Marks
Certified Journal	10
Attendance and active participation in both Laboratory	10

B) Semester End Examination: Maximum Marks: 30

Question No	Unit	Marks
1	One Practical Question **OR** Combination of Practical Questions **OR** Combination of Practical Question and Theory Question	25
3	Viva	05

Standard of Passing

The learner to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment & Semester End Examination. The learner shall obtain minimum of 40% marks (i.e. 8 out of 20) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 12 out of 30) separately to pass the course and minimum of Letter Grade "P" in the project component, wherever applicable to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment & Semester End Examination together.

Performance Grading:

Letter Grades and Grade Points Semester GPA/ Program CGPA Semester/Program	% of Marks	Alpha-Sign / Letter Grade Result
9.00-10.00	**90.0 -100**	**O (Outstanding)**
8.00 ≤ 9.00	**80.0 ≤ 90.0**	**A+ (Excellent)**
7.00 ≤ 8.00	**70.0 ≤ 80.0**	**A (Very Good)**
6.00 ≤ 7.00	**60.0 ≤ 70.0**	**B+ (Good)**
5.50 ≤ 6.00	**55.0 ≤ 60.0**	**B (Above Average)**
5.00 ≤ 5.50	**50.0 ≤ 55.0**	**C (Average)**
4.00 ≤ 5.00	**40.0 ≤ 50.0**	**P (Pass)**
Below 4.00	**Below 40**	**F (Fail)**
Ab (Absent)	**-**	**Absent**

Date:
Place:-Ratnagiri

Chairperson
BoS of Information Technology

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The learner to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment & Semester End Examination. The learner shall obtain minimum of 40% marks (i.e. 8 out of 20) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 12 out of 30) separately to pass the course and minimum of Letter Grade "P" in the project component, wherever applicable to pass a particular semester. A learner will be said to have passed the course if the learner passes the Internal Assessment & Semester End Examination together.

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5.00 ≤ 5.50	**50.0 ≤ 55.0**	**C (Average)**
4.00 ≤ 5.00	**40.0 ≤ 50.0**	**P (Pass)**
Below 4.00	**Below 40**	**F (Fail)**
Ab (Absent)	**-**	**Absent**

Date:
Place: Ratnagiri

Chairperson
Board of Studies Information Technology