



**SHRI VILE PARLE KELAVANI MANDAL's
USHA PRAVIN GANDHI COLLEGE OF ARTS, SCIENCE AND COMMERCE**
Bhakti Vedanta Swami Marg, North-South Road No. 1
Juhu Scheme, Vile Parle (West), Mumbai 400 056.
**Accreditation by NAAC A+ Grade with CGPA 3.27
(AUTONOMOUS)**



Affiliated to the

UNIVERSITY OF MUMBAI

**Program: Bachelor of Science
B. Sc. (Information Technology)**

Semester V & VI

**Choice Based Credit System (CBCS)
with effect from the Academic year 2024 - 25**

Academic Council No:

Agenda No:

Preamble

1) Introduction

The Bachelor of Science in Information Technology (BSc IT) program is designed to provide students with a comprehensive understanding of emerging technologies and their practical applications in the IT industry. With a strong emphasis on practical and project-based learning, our curriculum equips students with the necessary skills and knowledge to excel in a dynamic and evolving technological landscape.

The syllabus for the TY BSc IT program is carefully crafted to stay abreast of the latest advancements in the industry. We understand the importance of staying current with emerging technologies, which is why our curriculum is regularly updated to reflect industry trends and demands. By incorporating cutting-edge subjects like Software Project Management, Internet of Things, Artificial Intelligence, and Enterprise Java, we ensure that our students are well-prepared to tackle real-world challenges upon graduation.

At UPG College, we believe in learning by doing. Practical sessions and hands-on projects are integral components of our curriculum, allowing students to apply theoretical knowledge to real-world scenarios. With subjects like Internet of Things Practical, Advanced Web Programming Practical, Linux System Administration Practical, and Principles of Geographic Information Systems Practical, students gain invaluable practical experience that enhances their problem-solving abilities and critical thinking skills.

Our TY BSc IT program is designed to produce industry-ready professionals who are equipped with the skills and expertise required to thrive in today's competitive IT landscape. Through industry-aligned projects and practical sessions, students develop a deep understanding of industry best practices and standards. Additionally, subjects like Software Quality Assurance, Cyber Laws, and Android Programming ensure that our graduates are well-versed in key areas of IT governance, security, and mobile application development. By focusing on practical and project-based learning and staying abreast of industry developments, we ensure that our graduates are well-prepared to embark on successful careers in the field of Information Technology.

2) Aims and Objectives

1. To provide students with a comprehensive understanding of Information Technology principles, theories, and applications.
2. To equip students with the necessary technical skills and knowledge required to analyze, design, implement, and manage IT solutions effectively.
3. To foster critical thinking, problem-solving, and decision-making abilities in students within the context of Information Technology.
4. To prepare students for successful careers in the IT industry by providing them with industry-relevant skills, hands-on experience, and exposure to emerging technologies.

5. To instill ethical values, professionalism, and a commitment to lifelong learning among students in the field of Information Technology.

3) Learning Outcomes

1. Upon completion of the program, students will demonstrate a deep understanding of fundamental concepts and principles in Information Technology.
2. Students will be able to apply their knowledge and skills to analyze, design, develop, and implement IT solutions to address real-world problems and challenges.
3. Students will develop proficiency in using various IT tools, technologies, and methodologies, including programming languages, databases, networking, and software development frameworks.
4. Students will exhibit effective communication, teamwork, and leadership skills necessary for collaborating with multidisciplinary teams and stakeholders in IT projects and initiatives.
5. Graduates will demonstrate professionalism, ethical conduct, and a commitment to continuous learning and professional development in the rapidly evolving field of Information Technology.

4) Credit Structure of the Program (Sem V, & VI)

Credit Distribution Structure for Third Year (B.Sc. (Information Technology))

Year	Sem	Sub Code	SUBJECT		Credit	
THIRD YEAR	Sem V	UUGPRM51	Project Management	TH	2	
		UUGFIT52	Fundamentals of Internet of Things	TH	2	
		UUGFIT52P	Fundamental of Internet of Things Practical	PR	2	
		UUGANC53	ASP .NET with C#	TH	2	
		UUGANC53P	ASP .NET with C# Practical	PR	2	
		UUGFAI54	Fundamentals of Artificial Intelligence	TH	2	
		UUGLAD55	Linux Administration			
		UUGFAI54P	Fundamentals of Artificial Intelligence Practical	PR	2	
		UUGLAD55P	Linux Administration Practical			
		UUGACT56	Advanced Computing Technologies	TH	2	
		UUGADJ57	Advanced Java	PR	2	
		UUGACT56P	Advanced Computing Technologies Practical			
		UUGADJ57P	Advanced Java Practical			
		UUGPRD58	Project Dissertation	PROJ	2	
	Sem VI					
		UUGSQM61	Software Quality Management	TH	2	
		UUGINS62	Information Security	TH	2	
		UUGINS62P	Information Security Practical	PR	2	
		UUGBIA63	Business Intelligence and Applications	TH	2	
		UUGBIA63P	Business Intelligence and Applications Practical	PR	2	
		UUGGIS64	Geographical Information Systems	TH	2	
		UUGENS65	Enterprise Network Systems			
		UUGGIS64P	Geographical Information Systems Practical	PR	2	
UUGENS65P		Enterprise Network Systems Practical				
UUGSMI66		Service Management in IT	TH	2		
UUGLCS67		Laws for Cyber Security				
UUGANP68P	Android Programming	PR	2			
UUGPRI69	Project Implementation	PROJ	2			

Sign of HOD

Prof. Smruti Nanavaty
Dept of Information Technology

Sign of Principal

Prof. Dr. A. Kapoor

Syllabus

B.Sc. (Information Technology)

(Sem. V & VI)

Semester V

Program: B.Sc. – Information Technology		Semester: V	
Course: Project Management		Course Code: UUGPRM51	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
<p>Learning Objectives:</p> <ul style="list-style-type: none"> • Understanding Software Project Management Importance • Learn stepwise project planning, from project selection to execution, including evaluating individual projects, cost-benefit analysis, risk assessment, and program management. • Explore various project methodologies, technologies, and software processes, and develop the ability to select the most appropriate project approach. • Acquire skills in activity planning, network planning models, critical path analysis, risk management approaches, and resource allocation. Understand how to formulate a network model and evaluate risks to the schedule. 			
<p>Course Outcomes: After completion of the course, learners would be able to:</p> <p>CO1: Master strategic software project management, project evaluation, and resource distribution. CO2: Learn to choose suitable project methodologies and software process models for development. CO3: Acquire project planning, risk management, and efficient plan execution skills. CO4: Develop skills in project monitoring, control, cost tracking, and managing changes.</p>			
Outline of Syllabus: (per session plan)			
Modules	Topics		Duration (Lecture)
Module 1	Introduction to SPM, Project Evaluation and Programme Management		15
	<p>Introduction to Software Project Management: Introduction, why is Software Project Management Important? What is a Project? Software Projects versus Other Types of Projects, Contract Management and Technical Project Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Some Ways of Categorizing Software Projects, Project Charter, Stakeholders, Setting Objectives, The Business Case, Project Success, and Failure, what is</p>		

	<p>Management? Management Control, Project Management Life Cycle, Traditional versus Modern Project Management Practices.</p> <p>Project Evaluation and Programme Management: Introduction, Business Case, Project Portfolio Management, Evaluation of Individual Projects, Cost–benefit Evaluation Techniques, Risk Evaluation, Programme Management, Managing the Allocation of Resources within Programmes, Strategic Programme Management, Creating a Programme, Aids to Programme Management, Some Reservations about Programme Management, Benefits Management.</p> <p>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: Analyze 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</p>	
<p>Module 2</p>	<p>Selection of an Appropriate Project Approach and Software Effort Estimation</p>	<p>15</p>
	<p>Selection of an Appropriate Project Approach: Introduction, Build or Buy? Choosing Methodologies and Technologies, Software Processes and Process Models, Choice of Process Models, Structure versus Speed of Delivery, The Waterfall Model, The Spiral Model, Software Prototyping, Other Ways of Categorizing Prototypes, Incremental Delivery, Atern/Dynamic Systems Development Method,</p> <p>Rapid Application Development, Agile Methods, Extreme Programming (XP), Scrum, Lean Software Development, Managing Iterative Processes, Selecting the Most Appropriate Process Model.</p> <p>Software Effort Estimation: Introduction, where are the Estimates Done? Problems with Over- and Under-Estimates, The Basis for Software Estimating, Software Effort Estimation Techniques, Bottom-up Estimating, The Top-down Approach and Parametric Models,</p> <p>Expert Judgement, Estimating by Analogy, Albrecht Function Point Analysis, Function Points Mark II, COSMIC Full Function Points, COCOMO II: A Parametric Productivity Model, Cost Estimation, Staffing Pattern, Effect of Schedule Compression, Capers Jones Estimating Rules of Thumb</p>	

Module 3	Activity Planning, Risk Management and Resource Allocation	15
	<p>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.</p> <p>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, Applying the PERT Technique, Monte Carlo Simulation, Critical Chain Concepts.</p> <p>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</p>	
Module 4	Monitoring and Control, Managing Contracts & Managing People in Software Environments	15
	<p>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).</p> <p>Managing Contracts: Introduction, Types of Contracts, Stages in Contract Placement, Typical Terms of a Contract, Contract Management, Acceptance.</p> <p>Managing People in Software Environments: Introduction, Understanding Behaviors, Organizational Behaviour: A Background, Selecting the Right Person for the Job, Instruction in the Best Methods, Motivation, The Oldham–Hackman Job Characteristics Model, Stress, Stress Management, Health, and Safety, Some Ethical and Professional Concerns.</p> <p>Project Closeout: Introduction, Reasons for Project Closure, Project Closure Process, Performing a Financial Closure, Project Closeout Report.</p>	

Total Lectures	60
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Essential Readings:

1. Software Project Management, Bob Hughes, Mike Cotterell, Rajib Mall, TMH, 6TH Edition ,2018
2. Project Management and Tools & Technologies – An overview, Shailesh Mehta, SPD, 1st Edition,2017

Reference books:

3. Software Project Management, Walker Royce, Pearson,2005

Program: B.Sc. – Information Technology		Semester: V	
Course: Fundamentals of Internet of Things		Course Code: UUGFIT52	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives: <ul style="list-style-type: none"> • Exploring the technological infrastructure and advancements driving IoT. • Analyzing the metaphor of magic in IoT design and its implications. • Understanding the importance of open-source platforms like Arduino and Raspberry Pi in IoT development. • Discussing the role of IoT in addressing societal challenges and advocating for an open and ethical IoT ecosystem 			
Course Outcomes: After completion of the course, learners would be able to: CO1: investigate the entities and stakeholders involved in shaping the IoT landscape CO2: learn prototyping techniques including sketching, laser cutting, 3D printing, and CNC milling CO3: learn memory management and optimization techniques for embedded systems CO4: explore ethical considerations in IoT development such as privacy, control, and environmental impact.			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	IoT Design Principles for Connected Devices	15	
	The Internet of Things: An Overview: The Flavour of the Internet of Things, the “Internet” of “Things,” The Technology of the Internet of Things, Enchanted Objects, who is Making the Internet of Things? Design Principles for Connected Devices: Calm and Ambient Technology, Magic as Metaphor, Privacy, Keeping Secrets, Whose Data Is It Anyway? Web Thinking for Connected Devices, Small Pieces, Loosely Joined, First-Class Citizens on The Internet, Graceful Degradation, Affordances. Internet Principles: Internet Communications: An Overview, IP, TCP, The IP Protocol Suite (TCP/IP), UDP, IP Addresses, DNS, Static IP Address Assignment, Dynamic IP Address Assignment, IPv6, MAC Addresses, TCP and UDP Ports, An Example: HTTP Ports, Other Common Ports, Application		

	<p>Layer Protocols, HTTP, HTTPS: Encrypted HTTP, Other Application Layer Protocols.</p> <p>Thinking About Prototyping: Sketching, Familiarity, Costs versus Ease of Prototyping, Prototypes and Production, Changing Embedded Platform, Physical Prototypes and Mass Personalisation, Climbing into the Cloud, Open Source versus Closed Source, Why Closed? Why Open? Mixing Open and Closed Source, Closed Source for Mass Market Projects, Tapping into the Community.</p>	
Module 2	Prototyping Embedded Devices	15
	<p>Prototyping Embedded Devices: Electronics, Sensors, Actuators, Scaling Up the Electronics, Embedded Computing Basics, Microcontrollers, System-on-Chips, Choosing Your Platform, Arduino, developing on the Arduino, Some Notes on the Hardware, Openness, Raspberry Pi, Cases and Extension Boards, Developing on the Raspberry Pi, Some Notes on the Hardware, Openness.</p> <p>Prototyping the Physical Design: Preparation, Sketch, Iterate, and Explore, Nondigital Methods, Laser Cutting, choosing a Laser Cutter, Software, Hinges and Joints, 3D Printing, Types of 3D Printing, Software, CNC Milling, Repurposing/Recycling.</p> <p>Prototyping Online Components: Getting Started with an API, Mashing Up APIs, Scraping, Legalities, writing a New API, Clockodillo, Security, Implementing the API, Using Curl to Test, Going Further, Real-Time Reactions, Polling, Comet, Other Protocols, MQ Telemetry Transport, Extensible Messaging and Presence Protocol, Constrained Application Protocol.</p>	
Module 3	Writing Embedded Code and Business Models	15
	<p>Techniques for Writing Embedded Code: Memory Management, Types of Memory, Making the Most of Your RAM, Performance and Battery Life, Libraries, Debugging</p> <p>Business Models: A Short History of Business Models, Space and Time, From Craft to Mass Production, The Long Tail of the Internet, Learning from History, The Business Model Canvas, Who Is the Business Model For? Models, Make Thing, Sell Thing, Subscriptions, Customization, be a Key Resource, Provide Infrastructure: Sensor Networks, take a Percentage, Funding an Internet of Things Startup, Hobby Projects and Open Source, Venture Capital, Government Funding, Crowdfunding, Lean Startups.</p>	
Module 4	Manufacturing and Ethics in development IoT project	15
	<p>Moving to Manufacture: What Are You Producing? Designing Kits, Designing Printed circuit boards, Software Choices, The Design Process, Manufacturing Printed Circuit Boards, Etching Boards, Milling Boards. Assembly, Testing, Mass-Producing the Case and Other Fixtures,</p>	

	<p>Certification, Costs, Scaling Up Software, Deployment, Correctness and Maintainability, Security, Performance, User Community.</p> <p>Ethics: Characterizing the Internet of Things, Privacy, Control, Disrupting Control, Crowdsourcing, Environment, Physical Thing, Electronics, Internet Service, Solutions, The Internet of Things as Part of the Solution, Cautious Optimism, The Open Internet of Things Definition.</p>	
Total Lectures		60

Essential readings:

1. Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, WILEY, First Edition, 2014
2. Internet of Things – Architecture and Design, Raj Kamal, McGraw Hill, First Edition, 2017

Reference books:

1. Getting Started with the Internet of Things, Cuno Pfister, O'Reilly, Sixth Edition, 2018
2. Getting Started with Raspberry Pi, Matt Richardson and Shawn Wallace, SPD, Third Edition, 2016

Program: B.Sc. – Information Technology		Semester: V	
Course: Fundamental of Internet of Things Practical		Course Code: UUGFIT52P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives:			
<ul style="list-style-type: none"> • Exploring the technological infrastructure and advancements driving IoT. • Analyzing the metaphor of magic in IoT design and its implications. • Understanding the importance of open-source platforms like Arduino and Raspberry Pi in IoT development. • Discussing the role of IoT in addressing societal challenges and advocating for an open and ethical IoT ecosystem 			
Course Outcomes:			
After completion of the course, learners would be able to:			
CO1: investigate the entities and stakeholders involved in shaping the IoT landscape			
CO2: learn prototyping techniques including sketching, laser cutting, 3D printing, and CNC milling			
CO3: learn memory management and optimization techniques for embedded systems			
CO4: explore ethical considerations in IoT development such as privacy, control, and environmental impact.			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Raspberry Pi, LED pattern, 4X7 Display, Oscilloscope, controlling WhatsApp		
	<ul style="list-style-type: none"> a. Starting Raspbian OS, Familiarizing with Raspberry Pi Components and interface, Connecting to ethernet, Monitor, USB. b. Displaying different LED patterns with Raspberry Pi. c. Displaying Time over 4-Digit 7-Segment Display using Raspberry Pi d. Raspberry Pi Based Oscilloscope e. Controlling Raspberry Pi with WhatsApp. 		
Module 2	Wireless Access, Fingerprint Sensor, GPS Module, Home automation using Raspberry Pi		

	<ul style="list-style-type: none"> a. Setting up Wireless Access Point using Raspberry Pi b. Fingerprint Sensor interfacing with Raspberry Pi c. Raspberry Pi GPS Module Interfacing d. IoT based Web Controlled Home Automation using Raspberry Pi 	
Module 3	Raspberry Pi and Camera, RFID, Google Assistant, installation of Windows 10	
	<ul style="list-style-type: none"> a. Visitor Monitoring with Raspberry Pi and Pi Camera b. Interfacing Raspberry Pi with RFID. c. Building Google Assistant with Raspberry Pi. d. Installing Windows 10 IoT Core on Raspberry Pi 	
Total Lectures		30

Essential readings:

1. Designing the Internet of Things, Adrian McEwen, Hakim Cassimally, WILEY, First Edition, 2014
2. Internet of Things – Architecture and Design, Raj Kamal, McGraw Hill, First Edition, 2017

Reference books:

1. Getting Started with the Internet of Things, Cuno Pfister, O'Reilly, Sixth Edition, 2018
2. Getting Started with Raspberry Pi, Matt Richardson and Shawn Wallace, SPD, Third Edition, 2016

Program: B.Sc. – Information Technology		Semester: V	
Course: ASP .NET with C#		Course Code: UUGANC53	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives:			
<ul style="list-style-type: none"> • Learn .NET basics: Framework, C#, VB, CLR, and Class Library. • Gain web form development skills: code classes, events, and ASP.NET setup. • Master error and exception handling, page tracing, and state management techniques. • Explore web development: styles, themes, master pages, and ADO.NET database fundamentals. 			
Course Outcomes:			
<p>CO1: demonstrate expertise in web form development, mastering the use of server controls, event handling, and effective configuration of ASP.NET applications.</p> <p>CO2: implement robust error handling strategies, trace application processes, and proficiently manage state using techniques such as View State, cookies, session state, and application state</p> <p>CO3: master advanced web development skills, including the application of styles, themes, and master pages.</p> <p>CO4: Master ADO.NET fundamentals, data binding, and utilizing various data controls for effective data presentation in web applications.</p>			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Introducing .NET, Types, Objects, and Namespaces	15	
	<p>Introducing .NET: The .NET Framework, C#, VB, and the .NET Languages, The Common Language Runtime, The .NET Class Library. The C# Language: C# Language Basics, Variables and Data Types, Variable Operations, Object-Based Manipulation, Conditional Logic, Loops, Methods.</p> <p>Types, Objects, and Namespaces: The Basics About Classes, building a Basic Class, Value Types and Reference Types, Understanding Namespaces and Assemblies, Advanced Class Programming.</p>		
Module 2	Web Form Fundamentals, Form Controls	15	
	<p>Web Form Fundamentals: Writing Code, Using the Code-Behind Class, Adding Event Handlers, Understanding the Anatomy of an ASP.NET Application,</p>		

	<p>Introducing Server Controls, Using the Page Class, Using Application Events, Configuring an ASP.NET Application. Form Controls: Stepping Up to Web Controls, Web Control Classes, List Controls, Table Controls, Web Control Events and AutoPostBack, Validation, Understanding Validation, Using the Validation Controls, Rich Controls, The Calendar, The AdRotator, Pages with Multiple Views, User Controls and Graphics, User Controls, Dynamic Graphics,</p> <p>The Chart Control, Website Navigation: Site Maps, URL Mapping and Routing, The SiteMapPath Control, The TreeView Control, The Menu Control.</p>	
Module 3	Error Handling, Logging, and Tracing, State Management Styles, Themes, and Master Pages	15
	<p>Error Handling, Logging, and Tracing: Avoiding Common Errors, Understanding Exception Handling, Handling Exceptions, Throwing Your Own Exceptions, Using Page Tracing</p> <p>State Management: Understanding the Problem of State, Using View State, Transferring Information Between Pages, Using Cookies, Managing Session State, Configuring Session State, Using Application State, Comparing State Management Options</p> <p>Styles, Themes, and Master Pages: Styles, Themes, Master Page Basics, Advanced Master Pages,</p>	
Module 4	ADO.NET Fundamentals, Data Binding & The Data Controls:	15
	<p>ADO.NET Fundamentals: Understanding Databases, Configuring Your Database, Understanding SQL Basics, Understanding the Data Provider Model, Using Direct Data Access, Using Disconnected Data Access.</p> <p>Data Binding: Introducing Data Binding, Using Single-Value Data Binding, Using Repeated-Value Data Binding, Working with Data Source Controls,</p> <p>The Data Controls: The Grid View, Formatting the Grid View, selecting a Grid View Row, editing with the Grid View, Sorting and Paging the Grid View, Using Grid View Templates, The Details View and Form View</p>	
Total Lectures		60

References:

1. Beginning ASP.NET 4.5 in C#, Matthew MacDonald, Apress, 2012
2. C# 2015 Anne Bohem and Joel Murach, Murach, Third edition, 2016
3. Murach's ASP.NET 4.6 Web Programming in C# 2015 Mary Delamater and Anne Bohem, SPD, Sixth edition 2016
4. ASP.NET 4.0 programming J. Kanjilal, Tata McGraw- Hill, 2011
5. Programming ASP.NET D. Esposito, Microsoft Press (Dreamtech), 2011
6. Beginning Visual C#, 2010 K. Watson, C. Nagel, J.H Padderson, J.D. Reid, Skinner, Wrox (Wiley), 2010

Program: B.Sc. – Information Technology		Semester: V	
Course: ASP .NET with C# Practical		Course Code: UUGANC53P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives:			
<ul style="list-style-type: none"> • Master C# and ASP.NET fundamentals for developing applications involving arithmetic, string manipulation, and student information systems. • Deepen understanding of object-oriented programming in C# and ASP.NET, tackling complex problems like factorial calculation and temperature conversion, with a focus on inheritance and interfaces. • Master advanced C# and ASP.NET features, such as delegates, events, and handling exceptions, to build robust applications. • Acquire skills in web form creation and manipulation using ASP.NET server controls, including calendar operations and form validations, for dynamic web applications. • Enhance abilities in database integration with web applications, mastering data binding, CRUD operations with SqlDataSource and GridView, and advanced GridView functionalities for interactive data presentation. 			
Course Outcomes:			
After completion of the course, learners would be able to:			
CO1: create applications for basic arithmetic, string operations, and student information management			
CO2: master advanced concepts like function overloading, inheritance, constructor overloading, and interfaces			
CO3: create applications that leverage these concepts for enhanced programming capabilities			
CO4: create web applications with features like form validation, ad rotator controls, user controls, and seamless interaction with databases through data controls and GridView.			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1		10	
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.		

c.	Create an application that receives the (Student Id, Student Name, Course Name, Date of Birth) information from a set of students. The application should also display the information of all the students once the data entered.	
	Create an application to demonstrate following operations i. Generate Fibonacci series. ii. Test for prime numbers. iii. Test for vowels. iv. Reverse a number and find sum of digits of a number.	
2.	Working with Object Oriented C# and ASP .NET	
a.	Create simple application to perform following operations i. Finding factorial Value ii. Money Conversion iii. Quadratic Equation iv. Temperature Conversion	
b.	Create simple application to demonstrate use of following concepts i. Function Overloading ii. Inheritance (all types) iii. Constructor overloading iv. Interfaces	
c.	Create simple application to demonstrate use of following concepts i. Using Delegates and events ii. Exception handling	
3.	Working with Web Forms and Controls	
a.	Create a simple web page with various sever controls to demonstrate setting and use of their properties. (Example: AutoPostBack)	
b.	Demonstrate the use of Calendar control to perform following operations. a) Display messages in a calendar control b) Display vacation in a calendar control c) Selected day in a calendar control using style d) Difference between two calendar dates	
Module 2		10
4.	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 Controls.	
5.	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.	
6.	Working with Database	

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.	
Module 3		10
7.	Working with Database	
a.	Create a web application to display Databinding using dropdown list 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).	
8.	Working with data controls	
a.	Create a web application to demonstrate various uses and properties of SqlDataSource.	
b.	Create a web application to display Using Disconnected Data Access and Databinding using GridView.	
9.	Working with GridView control	
a.	Create a web application to demonstrate use of GridView control template and GridView hyperlink.	
b.	a Create a web application to demonstrate use of GridView button column and GridView events.	
Total Lectures		30

References:

1. Beginning ASP.NET 4.5 in C#, Matthew MacDonald, Apress, 2012
2. C# 2015 Anne Bohem and Joel Murach ,Murach, Third edition,2016
3. Murach's ASP.NET 4.6 Web Programming in C#2015 Mary Delamater and Anne Bohem, SPD, Sixth edition 2016
4. ASP.NET 4.0 programming J. Kanjilal ,Tata McGraw- Hill ,2011
5. Programming ASP.NET D.Esposito, Microsoft Press (Dreamtech) ,2011
6. Beginning Visual C# ,2010 K. Watson, C. Nagel, J.H Padderson, J.D. Reid, M.Skinner ,Wrox (Wiley) ,2010

Program: B.Sc. – Information Technology		Semester: V	
Course: Fundamentals of Artificial Intelligence		Course Code: UUGFAI54	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives:			
<ul style="list-style-type: none"> • To learn the fundamentals of what is AI and its basic components • To learn the basics and advanced searching algorithms for problem solving • To develop the knowledge base and learn logic programming 			
Course Outcomes:			
After completion of the course, learners would be able to:			
CO1: use the basic searching algorithms in problem-solving.			
CO2: understand and use advanced searching algorithms for solving real-world problems			
CO3: design the knowledge base and apply the logic programming			
CO4: understand the planning of the problem			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Introduction	15	
	Introduction: What is Artificial Intelligence? Foundations of AI, history, the state of art AI today. Intelligent Agents: agents and environment, good behavior, nature of environment, the structure of agents.		
Module 2	Solving Problems by Searching:	15	
	Solving Problems by Searching: Problem-solving agents, examples problems, searching for solutions, uninformed search, informed search strategies, heuristic functions. Beyond Classical Search: local search algorithms, searching with non-deterministic action, searching with partial observations, online search agents and unknown environments.		
Module 3	Adversarial Search, First Order Logic:	15	
	Adversarial Search: Games, optimal decisions in games, alpha-beta pruning, stochastic games, partially observable games, state-of-the-art game programs.		

	<p>Logical Agents: Knowledge base agents, The Wumpus world, logic, propositional logic, propositional theorem proving, effective propositional model checking, agents based on propositional logic.</p> <p>First Order Logic: Syntax and semantics, using First Order Logic, Knowledge engineering in First Order Logic. Inference in First Order Logic: propositional vs. First Order, unification and lifting, forward and backward chaining, resolution.</p>	
Module 4	Planning, Knowledge Representation:	15
	<p>Planning: Definition of Classical Planning, Algorithms for planning as state space search, planning graphs, other classical planning approaches, analysis of planning approaches, Time, Schedules and resources, hierarchical planning, Planning and Acting in Nondeterministic Domains, multiagent planning, Knowledge Representation: Categories and Objects, events, mental events and objects, reasoning systems for categories, reasoning with default information, Internet shopping world</p>	
Total Lectures		60

Reference books:

1. Artificial Intelligence: A Modern Approach Stuart Russel and Peter Norvig Pearson 3rd 2015
2. A First Course in Artificial Intelligence Artificial Intelligence: A Rational Approach Deepak Khemani Rahul Deva TMH First 2017 Shroff publishers
3. Artificial Intelligence 1st 2018 Elaine Rich, Kevin Knight and Shivashankar Nair
4. Artificial Intelligence & Soft Computing for Beginners Anandita Das Bhattacharjee TMH SPD 3rd 2009 1st 2013

Program: B.Sc. – Information Technology		Semester: V	
Course: Linux Administration		Course Code: UUGLAD55	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives: <ul style="list-style-type: none"> • Understand Red Hat Linux, command line basics, and system administration tasks. • Master software management, job management, and system monitoring using Linux commands. • Configure and manage storage, network connections, and user permissions effectively. • Secure servers with iptables, set up cryptographic services, and configure file sharing. • Configure DNS and DHCP, set up a mail server, and manage Apache on Red Hat Linux. 			
Course Outcomes: After completion of the course, learners would be able to: <ul style="list-style-type: none"> CO1: Navigate and perform basic tasks using the Red Hat Linux command line. CO2: Execute system administration tasks, manage software, and ensure efficient system operation. CO3: Effectively configure storage, manage network settings, and control user access. CO4: Secure Linux servers, manage cryptographic services, and implement file sharing solutions. Configure and maintain DNS, DHCP, mail servers, and web servers on Red Hat Linux. 			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Introduction to Red Hat Enterprise Linux, Command Line, System Administration Tasks, Managing Software	15	
	Introduction to Red Hat Enterprise Linux: Linux, Open Source and Red Hat, Origins of Linux, Distributions, Duties of Linux System Administrator. Command Line: Working with the Bash Shell, Getting the Best of Bash, Useful Bash Key Sequences, Working with Bash History, Performing Basic File System Management Tasks, Working with Directories, Piping and Redirection, Finding Files System Administration Tasks: Performing Job Management Tasks, System and Process Monitoring and Management, Managing Processes with ps, Sending Signals to Processes with the kill Command, Using top to Show Current System Activity, Managing Process Niceness, Scheduling Jobs, Mounting Devices, Working with Links, Creating Backups, Managing Printers, Setting Up System Logging, Setting Up Rsyslog, Common Log Files, Setting Up Logrotate		

	Managing Software: Understanding RPM, Understanding Meta Package Handlers, Creating Your Own Repositories, Managing Repositories, Installing Software with Yum, Querying Software, Extracting Files from RPM Packages	
Module 2	Configuring and Managing Storage, connecting to the Network, Working with Users, Groups, and Permissions	15
	<p>Configuring and Managing Storage: Understanding Partitions and Logical Volumes, Creating Partitions, Creating File Systems, File Systems Overview, Creating File Systems, Changing File System Properties, Checking the File System Integrity, Mounting File Systems Automatically Through fstab, Working with Logical Volumes, Creating Logical Volumes, Resizing Logical Volumes, Working with Snapshots, Replacing Failing Storage Devices, Creating Swap Space, Working with Encrypted Volumes</p> <p>Connecting to the Network: Understanding Network Manager, Working with Services and Run levels, Configuring the Network with Network Manager, Working with system-config-network, Network Manager Configuration Files, Network Service Scripts, Networking from the Command Line, Troubleshooting Networking, Setting Up IPv6, Configuring SSH, Enabling the SSH Server, Using the SSH Client, Using PuTTY on Windows Machines, Configuring Key-Based SSH Authentication, Using Graphical Applications with SSH, Using SSH Port Forwarding, Configuring VNC Server Access</p> <p>Working with Users, Groups, and Permissions: Managing Users and Groups, Commands for User Management, Managing Passwords, Modifying and Deleting User Accounts, Configuration Files, Creating Groups, Using Graphical Tools for User, and Group Management, Using External Authentication Sources, the Authentication Process, SSDs, nsswitch, Pluggable Authentication Modules, Managing Permissions, the Role of Ownership, Basic Permissions: Read, Write, and Execute, Advanced Permissions, Working with Access Control Lists, Setting Default Permissions with umask, Working with Attributes</p>	
Module 3	Securing Server with iptables, Setting Up Cryptographic Services, Configuring Server for File Sharing	15
	<p>Securing Server with iptables: Understanding Firewalls, Setting Up a Firewall with system-config-firewall, Allowing Services, Trusted Interfaces, Masquerading, Configuration Files, Setting Up a Firewall with iptables, Tables, Chains, and Rules, Composition of Rule, Configuration Example, Advanced iptables Configuration, Configuring Logging, The Limit Module, Configuring NAT</p> <p>Setting Up Cryptographic Services: Introducing SSL, Proof of Authenticity: the Certificate Authority, Managing Certificates with openssl, Creating a Signing Request, Working with GNU Privacy Guard, Creating GPG Keys, Key Transfer, Managing GPG Keys, Encrypting Files with GPG, GPG Signing, Signing RPM Files</p> <p>Configuring Server for File Sharing: What is NFS? Advantages and Disadvantages of NFS, Configuring NFS4, Setting Up NFSv4, Mounting an NFS Share, Making NFS Mounts Persistent, Configuring Automount, Configuring</p>	

	Samba, Setting Up a Samba File Server, Samba Advanced Authentication Options, Accessing Samba Shares, Offering FTP Services.	
Module 4	Configuring DNS and DHCP, Setting Up a Mail Server, Configuring Apache on Red Hat Enterprise Linux	15
	<p>Configuring DNS and DHCP: Introduction to DNS, The DNS Hierarchy, DNS Server Types, The DNS Lookup Process, DNS Zone Types, Setting Up a DNS Server, Setting Up a Cache-Only Name Server, Setting Up a Primary Name Server, Setting Up a Secondary Name Server, Understanding DHCP, Setting Up a DHCP Server</p> <p>Setting Up a Mail Server: Using the Message Transfer Agent, the Mail Delivery Agent, the Mail User Agent, Setting Up Postfix as an SMTP Server, Working with Mutt, Basic Configuration, Internet Configuration, Configuring Dovecot for POP and IMAP</p> <p>Configuring Apache on Red Hat Enterprise Linux: Configuring the Apache Web Server, creating a Basic Website, Understanding the Apache Configuration Files, Apache Log Files, Working with Virtual Hosts, Securing the Web Server with TLS Certificates, Configuring Authentication, Setting Up Authentication with .htpasswd, Configuring LDAP Authentication, Setting Up MySQL</p>	
Total Lectures		60

Essential readings:

1. Red Hat Enterprise Linux 6 Administration by Sander van Vugt, John Wiley and Sons (2013)
2. Red hat Linux Networking and System Administration by Terry Collings and Kurt Wall, Wiley, 3rd Edition

Reference books:

1. Linux Administration: A Beginner's Guide by Wale Soyinka, TMH, fifth edition

Program: B.Sc. – Information Technology		Semester: V	
Course: Fundamentals of Artificial Intelligence Practical		Course Code: UUGFAI54P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives: <ul style="list-style-type: none"> To understand and implement the basic AI algorithm for problem solving Learn to code basic searching algorithms in Python. Create two-player games with min-max and alpha-beta pruning in Python. Solve riddles by writing constraint satisfaction problems in Python. Develop knowledge bases and query solutions using Prolog programming. 			
Course Outcomes: After completion of the course, learners would be able to: <ul style="list-style-type: none"> CO1: Implement the basic searching algorithm in Python programming language. CO2: Develop the two-player game problems using min-max and alpha-beta pruning algorithms. CO3: Write a constraint satisfaction problem for solving simple riddles. CO4: Use logic programming to develop the knowledge base and answer simple queries using Prolog programming. 			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture) 30	
Module 1	Searching, Game solving and Logic programming	10	
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 Hill climbing problem.		
Module 2		10	
4	a. Write a program to implement A* algorithm.		

	b. Write a program to implement AO* algorithm.	
5	a. Write a program to solve water jug problem. b. Design the simulation of tic – tac – toe game using min-max algorithm.	
6	a. Write a program to solve Missionaries and Cannibals problem. b. Design an application to simulate number puzzle problem.	
7	a. Write a program to shuffle Deck of cards. b. Solve traveling salesman problem using artificial intelligence technique.	
Module 3		10
8	a. Solve the block of World problem. b. Solve constraint satisfaction problem	
9	a. Derive the expressions based on Associative law b. Derive the expressions based on Distributive law	
10	a. Write a program to derive the predicate. (for e.g.: Sachin is batsman, batsman is cricketer) - >Sachin is Cricketer. b. Write a program which contains three predicates: male, female, parent. Make rules for following family relations: father, mother, grandfather, grandmother, brother, sister, uncle, aunt, nephew and niece, cousin. Question: i. Draw Family Tree. ii. Define: Clauses, Facts, Predicates and Rules with conjunction and disjunction	
Total Lectures		30

Reference books:

1. Artificial Intelligence: A Modern Approach Stuart Russel and Peter Norvig Pearson 3rd 2015
2. A First Course in Artificial Intelligence Artificial Intelligence: A Rational Approach Deepak Khemani Rahul Deva TMH First 2017 Shroff publishers
3. Artificial Intelligence 1st 2018 Elaine Rich, Kevin Knight and Shivashankar Nair
4. Artificial Intelligence & Soft Computing for Beginners Anandita Das Bhattacharjee TMH SPD 3rd 2009 1st 2013

Program: B.Sc. – Information Technology		Semester: V	
Course: Linux System Administration Practical		Course Code: UUGFAI54P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives: <ul style="list-style-type: none"> • Learn to install RHEL, navigate its GUI and CLI, and manage basic processes. • Master managing RPMs, configuring storage and network settings, and handling user permissions. • Understand and apply server security through iptables and cryptographic services. • Configure and manage file sharing using NFS, Samba, and FTP protocols. • Set up and maintain network services like DNS, DHCP, a mail server, and an Apache web server. 			
Course Outcomes: After completion of the course, learners would be able to: <ul style="list-style-type: none"> CO1: Successfully install RHEL, demonstrating proficiency in both GUI and CLI environments. CO2: Exhibit expertise in RPM management, storage and network configuration, and user permissions setup. CO3: Secure servers effectively using iptables and cryptographic techniques. CO4: Configure NFS, Samba, and FTP for file sharing, showcasing practical skills in server management. CO5: Implement and manage DNS, DHCP, mail services, and an Apache web server, ensuring reliable network services. 			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture) 30	
Module 1	Perform Following Practical:	10	
	<ul style="list-style-type: none"> • Installation of RHEL 6.X • Graphical User Interface and Command Line Interface and Processes <ul style="list-style-type: none"> ○ Exploring the Graphical Desktop ○ The Command Line Interface ○ Managing Processes • Storage Devices and Links, Backup and Repository <ul style="list-style-type: none"> ○ Working with Storage Devices and Links ○ Making a Backup ○ Creating a Repository 		

Module 2	Perform Following Practical's:	10
	<ul style="list-style-type: none"> • Working with RPMsm Storage and Networking <ul style="list-style-type: none"> ○ Using Query Options ○ Extracting Files From RPMs ○ Configuring and Managing Storage ○ Connecting to the Network • Working with Users, Groups, and Permissions • Firewall and Cryptographic services <ul style="list-style-type: none"> ○ Securing Server with iptables ○ Setting Up Cryptographic Services • Configuring Server for File Sharing <ul style="list-style-type: none"> ○ Configuring NFS Server and Client ○ Configuring Samba ○ Configuring FTP 	
Module 3	Perform Following Practicals:	10
	<ul style="list-style-type: none"> • DNS, DHCP and Mail Server <ul style="list-style-type: none"> ○ Configuring DNS ○ Configuring DHCP ○ Setting Up a Mail Server • Web Server <ul style="list-style-type: none"> ○ Configuring Apache on Red Hat Enterprise Linux ○ Writing a Script to Monitor Activity on the Apache Web Server ○ Using the select Command 	
Total Lectures		30

Essential readings:

1. Red Hat Enterprise Linux 6 Administration by Sander van Vugt, John Wiley and Sons (2013)
2. Red hat Linux Networking and System Administration by Terry Collings and Kurt Wall, Wiley, 3rd Edition

Reference books:

1. Linux Administration: A Beginner's Guide by Wale Soyinka, TMH, fifth edition, 2006

Program: B.Sc. – Information Technology		Semester: V	
Course: Advanced Computing Technologies		Course Code: UUGACT56	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives: <ul style="list-style-type: none"> • Learning the fundamentals of Big Data including its definition, sources, characteristics, and usage. • Understanding NoSQL databases, their history, differences from SQL databases, and categories. • Analyzing the MongoDB storage engine, including data storage, namespaces, GridFS, indexing, and limitations. • Learning the evolution of databases towards SSD, in-memory solutions, jQuery fundamentals 			
Course Outcomes: After completion of the course, learners would be able to: <p>CO1: identify sources of Big Data, its usage in various domains, exploring basic MongoDB shell commands for querying, inserting, updating, and deleting documents.</p> <p>CO2: Exploring MongoDB replication, sharding, advanced clustering techniques, indexing types, behaviors, and limitations.</p> <p>CO3: Exploring various SSD-enabled and in-memory databases including TimesTen, Redis, SAP HANA, and VoltDB.</p> <p>CO4: Understanding jQuery, JSON grammar, values, tokens, and syntax</p>			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Big Data , NoSQL, Introducing MongoDB:	15	
	<p>Big Data: Getting Started, Big Data, Facts About Big Data, Big Data Sources, Three Vs of Big Data, Volume, Variety, Velocity, Usage of Big Data, Visibility, Discover and Analyze Information, Segmentation and Customizations, Aiding Decision Making, Innovation, Big Data Challenges, Policies and Procedures, Access to Data, Technology and Techniques, Legacy Systems and Big Data, Structure of Big Data, Data Storage, Data Processing, Big Data Technologies</p> <p>NoSQL: SQL, NoSQL, Definition, A Brief History of NoSQL, ACID vs. BASE, CAP Theorem (Brewer’s Theorem), The BASE, NoSQL Advantages</p>		

	<p>and Disadvantages, Advantages of NoSQL, Disadvantages of NoSQL, SQL vs. NoSQL Databases, Categories of NoSQL Databases</p> <p>Introducing MongoDB: History, MongoDB Design Philosophy, Speed, Scalability, and Agility, Non-Relational Approach, JSON-Based Document Store, Performance vs. Features, Running the Database Anywhere, SQL Comparison</p>	
Module 2	MongoDB Data Model, Shell, Architecture	15
	<p>The MongoDB Data Model: The Data Model, JSON and BSON, The Identifier (<code>_id</code>), Capped Collection, Polymorphic Schemas, Object-Oriented Programming, Schema Evolution</p> <p>Using MongoDB Shell: Basic Querying, Create and Insert, Explicitly Creating Collections, Inserting Documents Using Loop, Inserting by Explicitly Specifying <code>_id</code>, Update, Delete, Read, Using Indexes, Stepping Beyond the Basics, Using Conditional Operators, Regular Expressions, MapReduce, <code>aggregate()</code>, Designing an Application's Data Model, Relational Data Modelling and Normalization, MongoDB Document Data Model Approach</p> <p>MongoDB Architecture: Core Processes, <code>mongod</code>, <code>mongo</code>, <code>mongos</code>, MongoDB Tools, Standalone Deployment, Replication, Master/Slave Replication, Replica Set, Implementing Advanced Clustering with Replica Sets, Sharding, Sharding Components, Data Distribution Process, Data Balancing Process, Operations, Implementing Sharding, Controlling Collection Distribution (Tag-Based Sharding), Points to Remember When Importing Data in a Sharded Environment, Monitoring for Sharding, Monitoring the Config Servers, Production Cluster Architecture, Scenario 1, Scenario 2, Scenario 3, Scenario 4</p>	
Module 3	MongoDB Storage Engine, Use Cases, Limitations, Best Practices	15
	<p>MongoDB Storage Engine: Data Storage Engine, Data File (Relevant for MMAPv1), Namespace (<code>.ns</code> File), Data File (Relevant for WiredTiger), Reads and Writes, How Data Is Written Using Journaling, GridFS – The MongoDB File System, The Rationale of GridFS, GridFS under the Hood, Using GridFS, Indexing, Types of Indexes, Behaviors and Limitations</p> <p>MongoDB Use Cases: Use Case 1 -Performance Monitoring, Schema Design, Operations, Sharding, Managing the Data, Use Case 2 – Social Networking, Schema Design, Operations, Sharding</p> <p>MongoDB Limitations: MongoDB Space Is Too Large (Applicable for MMAPv1), Memory Issues (Applicable for Storage Engine MMAPv1), 32-bit vs. 64-bit, BSON Documents, Namespaces Limits, Indexes Limit, Capped Collections Limit - Maximum Number of Documents in a Capped Collection, Sharding Limitations, Shard Early to Avoid Any Issues, Shard Key Can't Be Updated, Shard Collection Limit, Select the Correct Shard Key, Security Limitations, No Authentication by Default, Traffic to and from MongoDB</p>	

	Isn't Encrypted, Write and Read Limitations, Case-Sensitive Queries, Type-Sensitive Fields, No JOIN, Transactions, MongoDB Not Applicable Range MongoDB Best Practices: Deployment, Hardware Suggestions from the MongoDB Site, Few Points to be Noted, Coding, Application Response Time Optimization, Data Safety, Administration, Replication Lag, Sharding, Monitoring	
Module 4	In-Memory Databases, jQuery, JSON	15
	The End of Disk? SSD and In-Memory Databases: The End of Disk? Solid State Disk, The Economics of Disk, SSD-Enabled Databases, In-Memory Databases, TimesTen, Redis, SAP HANA, VoltDB, Oracle 12c "in-Memory Database, Berkeley Analytics Data Stack and Spark, Spark Architecture jQuery: Introduction, Traversing the DOM, DOM Manipulation with jQuery, Events, Ajax with jQuery, jQuery Plug-ins, jQuery Image Slider 12 JSON: Introduction, JSON Grammar, JSON Values, JSON Tokens, Syntax, JSON vs XML, Data Types, Objects, Arrays, Creating JSON, JSON Object, Parsing JSON, Persisting JSON, Data Interchange, JSON PHP, JSON HTML, JSONP	
Total Lectures		60

Essential readings:

1. Practical MongoDB, Shakuntala Gupta Edward, Navin Sabharwal, Apress
2. Beginning jQuery, Jack Franklin, Russ Ferguson, Apress, Second Edition

Reference books:

1. Next Generation Databases, Guy Harrison, Apress
2. Beginning JSON, Ben Smith, Apress

Program: B.Sc. – Information Technology		Semester: V	
Course: Advanced Java		Course Code: UUGADJ57	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives: <ul style="list-style-type: none"> To understand Java EE: What constitutes an Enterprise Application and Java Enterprise Edition. To learn about request dispatcher, cookies, session, and file handling To get started with Java Server Pages and JSTL To gain knowledge of working with Session Beans, Persistence, Object/Relational Mapping, JPA and Hibernate 			
Course Outcomes: After completion of the course, learners would be able to: <ul style="list-style-type: none"> CO1: understand the concept of enterprise edition of java and its architecture CO2: learn request dispatcher, cookies, session, and file handling CO3: start developing JSP and JSTL based EE JAVA applications CO4: learn the working with Session Beans, Persistence, Object/Relational Mapping, JPA and Hibernate 			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Introduction to EE and Java Servlet	15	
	Understanding Java EE: What is an Enterprise Application? What is java enterprise edition? Java EE Technologies, Java EE evolution, Glassfish server Java EE Architecture, Server, and Containers: Types of System Architecture, Java EE Server, Java EE Containers. Introduction to Java Servlets: The Need for Dynamic Content, Java Servlet Technology, Why Servlets? What can Servlets do? Servlet API and Lifecycle: Java Servlet API, The Servlet Skeleton, The Servlet Life Cycle, A Simple Welcome Servlet Working with Servlets: Getting Started, Using Annotations Instead of Deployment Descriptor		
Module 2	Request Dispatcher, Cookies, Session, File handling	15	
	Request Dispatcher: Resquestdispatcher Interface, Methods of Request dispatcher, Request dispatcher Application. COOKIES: Kinds Of Cookies, Where Cookies Are		

	Used? Creating Cookies Using Servlet, Dynamically Changing the Colors of a Page SESSION: What Are Sessions? Lifecycle Of Http Session, Session Tracking with Servlet API, A Servlet Session Example Working with Files: Uploading Files, Creating an Upload File Application, Downloading Files, Creating a Download File Application.	
Module 3	JSP and JSTL	15
	Introduction To Java Server Pages: Why use Java Server Pages? Disadvantages Of JSP, JSP v\s Servlets, Life Cycle of a JSP Page, how does a JSP function? How does JSP execute? About Java Server Pages Getting Started with Java Server Pages: Comments, JSP Document, JSP Elements, JSP GUI Example. Action Elements: Including other Files, Forwarding JSP Page to Another Page, Passing Parameters for other Actions, Loading a JavaBean. Implicit Objects, Scope, and El Expressions: Implicit Objects, Character Quoting Conventions, Unified Expression Language [Unified El], Expression Language. Java Server Pages Standard Tag Libraries: What is wrong in using JSP Scriptlet Tags? How JSTL Fixes JSP Scriptlet's Shortcomings? Disadvantages Of JSTL, Tag Libraries.	
Module 4	EJB, ORM, JPA, Hibernate	15
	Introduction To Enterprise JavaBeans: Enterprise Bean Architecture, Benefits of Enterprise Bean, Types of Enterprise Bean, Accessing Enterprise Beans, Enterprise Bean Application, Packaging Enterprise Beans Working with Session Beans: When to use Session Beans? Types of Session Beans, Remote and Local Interfaces, Accessing Interfaces, Lifecycle of Enterprise Beans, Packaging Enterprise Beans, Example of Stateful Session Bean, Example of Stateless Session Bean, Example of Singleton Session Beans. Persistence, Object/Relational Mapping And JPA: What is Persistence? Persistence in Java, Current Persistence Standards in Java, why another Persistence Standards? Object/Relational Mapping, Introduction to Java Persistence API: The Java Persistence API, JPA, ORM, Database and the Application, Architecture of JPA, How JPA Works? JPA Specifications. Writing JPA Application: Application Requirement Specifications, Software Requirements, Introduction to Hibernate: What is Hibernate? Why Hibernate? Hibernate, Database and The Application, Components of Hibernate, Architecture of Hibernate, How Hibernate Works?	
Total Lectures		60

Essential readings:

1. Java EE 7 For Beginners Sharanam Shah, Vaishali Shah, SPD, First edition, 2017
2. Java EE 8 Cookbook: Build reliable applications with the most robust and mature technology for enterprise development, Elder Moraes, Packt, First Edition, 2018
3. Advanced Java Programming, Uttam Kumar Roy, Oxford Press, 2015

Reference books:

1. "Java EE 7 Essentials", Arun Gupta, O'Reilly Media, 1st Edition, 2013
2. "Java Persistence with Hibernate", Christian Bauer, Gavin King, and Gary Gregory, Manning Publications, 1st Edition, 2007
3. "Pro EJB 3: Java Persistence API", Mike Keith, Merrick Schincariol, Apress, 1st Edition, 2006

Program: B.Sc. – Information Technology (2024 - 25)		Semester: V	
Course: Advanced Computing Technologies Practical		Course Code: UUGACT56P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives:			
<ul style="list-style-type: none"> • Learning the fundamentals of Big Data including its definition, sources, characteristics, and usage. • Understanding NoSQL databases, their history, differences from SQL databases, and categories. • Analyzing the MongoDB storage engine, including data storage, namespaces, GridFS, indexing, and limitations. • Learning the evolution of databases towards SSD, in-memory solutions, jQuery fundamentals 			
Course Outcomes:			
After completion of the course, learners would be able to:			
CO1: identify sources of Big Data, its usage in various domains, exploring basic MongoDB shell commands for querying, inserting, updating, and deleting documents.			
CO2: Exploring MongoDB replication, sharding, advanced clustering techniques, indexing types, behaviors, and limitations.			
CO3: Exploring various SSD-enabled and in-memory databases including TimesTen, Redis, SAP HANA, and VoltDB.			
CO4: Understanding jQuery, JSON grammar, values, tokens, and syntax			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	MongoDB Basics, Simple Queries, Implementing Aggregation, Replication, Backup and Restore, Replication, Backup and Restore	10	
	<ul style="list-style-type: none"> 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. d. Write a MongoDB query to use sum, avg, min and max expression. e. Write a MongoDB query to use push and dataset expression. f. Write a MongoDB query to use first and last expression. g. Write a MongoDB query to create Replica of existing database. 		

	<p>h. Write a MongoDB query to create a backup of existing database. Write a MongoDB query to restore database from the backup.</p>	
Module 2	Java and MongoDB, PHP and MongoDB, Python and MongoDB, Programs on Basic jQuery	10
	<p>a. Connecting Java with MongoDB and inserting, retrieving, updating, and deleting. b. Connecting PHP with MongoDB and inserting, retrieving, updating, and deleting. c. Connecting Python with MongoDB and inserting, retrieving, updating, and deleting. d. jQuery Basic, jQuery Events e. jQuery Selectors, jQuery Hide and Show effects jQuery fading effects, jQuery Sliding effects</p>	
Module 3	jQuery Advanced, JSON, create a JSON file and import it to MongoDB	10
	<p>a. jQuery Animation effects, jQuery Chaining b. jQuery Callback, jQuery Get and Set Contents c. jQuery Insert Content, jQuery Remove Elements and Attribute d. Creating JSON e. Parsing JSON f. Persisting JSON g. Create a JSON file and import it to MongoDB h. Export MongoDB to JSON. Write a MongoDB query to delete JSON object from MongoDB</p>	
Total Lectures		30

Essential readings:

1. Practical MongoDB, Shakuntala Gupta Edward, Navin Sabharwal, Apress
2. Beginning jQuery, Jack Franklin, Russ Ferguson, Apress, Second Edition

Reference books:

1. Next Generation Databases, Guy Harrison, Apress
2. Beginning JSON, Ben Smith, Apress

Program: B.Sc. – Information Technology		Semester: V	
Course: Advanced Java Practical		Course Code: UUGADJ57P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives:			
<ul style="list-style-type: none"> To understand Java EE: What constitutes an Enterprise Application and Java Enterprise Edition. To learn about request dispatcher, cookies, session, and file handling To get started with Java Server Pages and JSTL To gain knowledge of working with Session Beans, Persistence, Object/Relational Mapping, JPA and Hibernate 			
Course Outcomes:			
After completion of the course, learners would be able to:			
CO1: understand the concept of enterprise edition of java and its architecture.			
CO2: learn request dispatcher, cookies, session, and file handling.			
CO3: start developing JSP and JSTL based EE JAVA applications.			
CO4: learn the working with Session Beans, Persistence, Object/Relational Mapping, JPA and Hibernate			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)3 0	
Module 1	Implement the following Simple Servlet applications.	10	
	<ul style="list-style-type: none"> a. Create a simple calculator application using servlet. b. Create a servlet for a login page. If the username and password are correct then it says message “Hello <username>” else a message “login failed” c. Create a registration servlet in Java using JDBC. Accept the details such as Username, Password, Email, and Country from the user using HTML Form and store the registration details in the database. 		
Module 2	Implement the following Servlet applications with Cookies, Sessions, and file handling.	10	

	<ul style="list-style-type: none"> a. Using Request Dispatcher Interface create a Servlet which will validate the password b. 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. c. Create a servlet that uses Cookies to store the number of times a user has visited servlet. d. 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. e. Create a Servlet application to upload and download a file 	
Module 3	Implement the following JSP and JSTL applications.	10
	<ul style="list-style-type: none"> a. 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). b. Create a registration and login JSP application to register and authenticate the user based on username and password using JDBC. c. Create a JSP application to demonstrate the use of JSTL. d. Create a Currency Converter application using EJB. e. Develop a Simple Room Reservation System Application Using EJB. f. Develop simple shopping cart application using EJB [Stateful Session Bean]. g. Develop simple EJB application to demonstrate Servlet Hit count using Singleton Session Beans. 	
Total Lectures		30

Essential readings:

1. Java EE 7 For Beginners Sharanam Shah, Vaishali Shah, SPD, First edition, 2017
2. Java EE 8 Cookbook: Build reliable applications with the most robust and mature technology for enterprise development, Elder Moraes, Packt, First Edition, 2018
3. Advanced Java Programming, Uttam Kumar Roy, Oxford Press, 2015

Program: B.Sc. – Information Technology	Semester: V
Course: Project Dissertation	Course Code: UUGPRD58
Refer annexure II	

Semester VI

Program: B.Sc. – Information Technology (2024 - 25)		Semester: VI	
Course: Software Quality Management		Course Code: UUGSQM61	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives: <ul style="list-style-type: none"> • Learn quality management, TQM, statistical controls, and customer satisfaction in software development. • Understand software testing importance, processes, and human factors in testing strategies. • Master software testing techniques, including boundary and data flow testing for software reliability. • Grasp verification, validation roles, and the V-Model in enhancing software quality assurance. • Apply testing strategies across SDLC phases, focusing on unit to acceptance testing techniques. 			
Course Outcomes: After completion of the course, learners would be able to: CO1: Apply TQM and continuous improvement methodologies to software quality management effectively. CO2: Formulate comprehensive testing strategies, balancing manual, and automated testing approaches. CO3: Utilize advanced testing techniques for comprehensive software evaluation and quality improvement. CO4: Integrate verification and validation seamlessly into software QA practices, following the V-Model. CO5: Execute efficient testing across all SDLC phases, improving software quality and customer satisfaction.			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Quality Fundamentals and Management	15	
	Evolution of quality management concepts, Definitions of Quality-Subjective vs. objective definitions, Customer-centric views of quality Core Components of Quality- Product features, reliability, and performance, Customer satisfaction and expectations		

	Total Quality Management (TQM)- Principles of TQM, Continuous improvement methodologies Quality Principles and Statistical Process Control- Statistical tools for quality management, Process control techniques Benchmarking, Metrics, and Continual Improvement Cycle, Benchmarking methodologies, Quality metrics and performance measurement, Continual improvement strategies	
Module 2	Testing Fundamentals	15
	<p>Introduction to Software Testing and its Necessity- Importance of software testing, Objectives, and goals of testing</p> <p>Test Process and Psychology of Testing- Phases of the testing process, Human factors in testing.</p> <p>Approaches and Strategies to Software Testing- Manual vs. automated testing, Test strategy development, Test Planning, Test Policy, and Test Team Efficiency, Test planning process, Formulating test policies. Team organization and efficiency</p> <p>Challenges in Testing and Misconceptions About Testing- Common testing challenges, testing myths</p>	
Module 3	Software Testing Techniques	15
	<p>Boundary Value Testing and Equivalence Class Testing- Techniques for boundary value testing, Equivalence class partitioning</p> <p>Decision Table-Based Testing and Path Testing- Decision table creation and testing, Path testing methodologies</p> <p>Data Flow Testing and Slice-Based Testing- Testing data flow within software, Slice-based testing approaches</p> <p>Methods for Unit Testing and Test Coverage Metrics- Unit testing strategies</p> <p>Coverage metrics for test evaluation Testing Throughout Software Development Life Cycle-Testing in different SDLC phases, Importance of early testing</p>	
Module 4	Mod Verification, Validation, and Testing Models	15
	<p>Introduction to Verification and Validation- Definitions and distinctions, Roles in software quality assurance</p> <p>Methods, Types, and Levels of Verification-Formal verification methods, Levels of verification (unit, integration, system, acceptance)</p> <p>Software Development Verification and Validation Activities- Activities and tasks involved, Integration with development processes</p> <p>V-Model and its Application in Testing- Overview of the V-model, Testing activities at each stage</p>	

	Levels of Testing and Specialized Testing Techniques- Different testing levels (unit, integration, system, acceptance), Specialized testing techniques (GUI testing, performance testing, security testing)	
Total Lectures		60

Essential readings:

1. Software Testing and Continuous Quality Improvement, William E. Lewis, CRC Press, 3rd Ed, 2018
2. Software Testing: Principles, Techniques and Tools, M. G. Limaye, TMH, 2017
3. Software Testing: A Craftsman’s Approach, Paul C. Jorgenson, CRC Press, 4th Ed, 2017

Reference books:

1. Software Testing: Principles and Practices, Srinivasan Desikan and Gopaldaswamy Ramesh, Pearson Education, 2011.
2. Introduction to Software Testing, by Paul Ammann and Jeff Offutt, Cambridge University Press, 2008.
3. Software Testing Techniques, by Boris Beizer, International Thomson Computer Press, 1990.
4. Foundations of Software Testing: ISTQB Certification, by Dorothy Graham, Erik Van Veenendaal, Isabel Evans, and Rex Black, Cengage Learning, 2012.

Program: B.Sc. – Information Technology		Semester: VI	
Course: Information Security		Course Code: UUGINS62	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives: <ul style="list-style-type: none"> • Explore the evolution of information security, risk analysis, secure design principles, and security methodologies. • Learn about authentication, encryption, and securing data in storage and databases for information protection. • Study network device hardening, firewall design, intrusion detection systems, and security information management. • Understand operating system security models, secure cloud computing, application security practices, and physical security measures. 			
Course Outcomes: After completion of the course, learners would be able to: CO1: Develop a thorough understanding of core principles, concepts, and frameworks in information security, covering areas such as confidentiality, integrity, availability, risk management CO2: Gain insights on working of firewalls, intrusion detection/prevention systems, encryption algorithms CO3: Develop the skills necessary to be proficient information security practitioners capable of designing, implementing, and managing security measures in various organizational contexts			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Foundations of Information Security and Risk Management	15	
	Information Security Overview : The Importance of Information Protection, The Evolution of Information Security, Justifying Security Investment, Security Methodology, How to Build a Security Program, The Impossible Job, The Weakest Link, Strategy and Tactics, Business Processes vs. Technical Controls. Risk Analysis: Threat Definition, Types of Attacks, Risk Analysis. Secure Design Principles: The CIA Triad and Other Models, Defense Models, Zones of Trust, Best Practices for Network Defense.		
Module 2	Authentication, Encryption, and Data Security	15	

	<p>Authentication and Authorization: Authentication, Authorization</p> <p>Encryption: A Brief History of Encryption, Symmetric-Key Cryptography, Public Key Cryptography, Public Key Infrastructure.</p> <p>Storage Security: Storage Security Evolution, Modern Storage Security, Risk Remediation, Best Practices.</p> <p>Database Security: General Database Security Concepts, Understanding Database Security Layers, Understanding Database-Level Security, Using Application Security, Database Backup and Recovery, Keeping Your Servers Up to Date, Database Auditing and Monitoring.</p>	
Module 3	Network Security and Intrusion Detection	15
	<p>Network Device Security: Switch and Router Basics, Network Hardening.</p> <p>Firewalls: Overview, The Evolution of Firewalls, Core Firewall Functions, Additional Firewall Capabilities, Firewall Design.</p> <p>Intrusion Detection and Prevention Systems: IDS Concepts, IDS Types and Detection Models, IDS Features, IDS Deployment Considerations, Security Information and Event Management (SIEM).</p>	
Module 4	Operating System and Application Security, Including Physical Security Measures	15
	<p>Operating System Security Models: Operating System Models, Classic Security Models, Reference Monitor, Trustworthy Computing, International Standards for Operating System Security.</p> <p>Virtual Machines and Cloud Computing: Virtual Machines, Cloud Computing.</p> <p>Secure Application Design: Secure Development Lifecycle, Application Security Practices, Web Application Security, Client Application Security, Remote Administration Security.</p> <p>Physical Security: Classification of Assets, Physical Vulnerability Assessment, Choosing Site Location for Security, Securing Assets: Locks and Entry Controls, Physical Intrusion Detection.</p>	
Total Lectures		60

Essential readings:

1. The Complete Reference: Information Security by Mark Rhodes-Ousley, McGraw-Hill, 2nd Edition, 2013
2. Essential Cybersecurity Science by Josiah Dykstra, O'Reilly, Fifth, 2017

Reference books:

1. Principles of Computer Security: CompTIA Security+ and Beyond by Wm.Arthur Conklin, Greg White, McGraw Hill, Second, 2010

Program: B.Sc. – Information Technology		Semester: VI	
Course: Information security Practical		Course Code: UUGINS62P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives:			
<ul style="list-style-type: none"> • Master configuring and securing routers with OSPF MD5, NTP, syslog, SSH, and AAA authentication for robust network management. • Develop expertise in configuring and applying extended and IPv6 ACLs to protect networks against unauthorized access and attacks. • Implement zone-based policy firewalls and IOS Intrusion Prevention Systems (IPS) using CLI to enhance network security layers. • Set up and verify secure site-to-site IPsec VPNs, ensuring encrypted inter-site communications and data protection. 			
Course Outcomes:			
After completion of the course, learners would be able to:			
<ul style="list-style-type: none"> • CO1: Configure secure access to network devices using techniques such as MD5 authentication, SSH, AAA • CO2: Understand and implement access control lists (ACLs) and firewall rules to enhance network security. • CO3: Configure Intrusion Prevention System • CO4: Set up Virtual Private Network (VPN) solutions 			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Perform following practical:	10	
	<ul style="list-style-type: none"> • Configure Routers <ul style="list-style-type: none"> ○ OSPF MD5 authentication ○ NTP ○ to log messages to the syslog server ○ to support SSH connections • Configure AAA Authentication <ul style="list-style-type: none"> ○ Configure a local user account on Router and configure authenticate on the console and vty lines using local AAA ○ Verify local AAA authentication from the Router console and the PC-A client 		

Module 2	Perform following practical:	10
	<ul style="list-style-type: none"> • Configuring Extended ACLs • Configure, Apply and Verify an Extended Numbered ACL • Configure IP ACLs to Mitigate Attacks <ul style="list-style-type: none"> ○ Verify connectivity among devices before firewall configuration ○ Use ACLs to ensure remote access to the routers is available only from management station PC-C. ○ Configure ACLs on to mitigate attacks 	
Module 3	Perform following practicals:	10
	<ul style="list-style-type: none"> • Configuring IPv6 ACLs • Configuring a Zone-Based Policy Firewall • Configure IOS Intrusion Prevention System (IPS) Using the CLI <ul style="list-style-type: none"> ○ Enable IOS IPS. ○ Modify an IPS signature • Configure and Verify a Site-to-Site IPsec VPN Using CLI 	
Total Lectures		30

1. CCNA Security 2.0 Lab Manual

Program: B.Sc. – Information Technology		Semester: VI	
Course: Business Intelligence and Applications		Course Code: UUGBIA63	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives:			
<ul style="list-style-type: none"> • Understand the principles of business intelligence, decision support systems, and their role in strategic decision-making. • Master data mining techniques, including classification, regression, and clustering for insightful data analysis. • Apply advanced analytical models in marketing, logistics, and production to optimize business operations. • Explore knowledge management and artificial intelligence applications to enhance business processes and decision-making. 			
Course Outcomes:			
After completion of the course, learners would be able to:			
CO1: Effectively utilize business intelligence tools and techniques for improved decision support and strategic planning.			
CO2: Analyze and interpret complex datasets using data mining to inform business strategies and actions.			
CO3: Implement analytical models for solving real-world marketing and logistics challenges, optimizing business outcomes.			
CO4: Integrate knowledge management and artificial intelligence solutions to drive innovation and efficiency in business operations.			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Foundations of Business Intelligence and Decision Support Systems	15	
	Business intelligence: Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Ethics, and business intelligence		

	<p>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</p> <p>Mathematical models for decision making: Structure of mathematical models, Development of a model, Classes of models</p>	
Module 2	Data Mining Techniques and Data Preparation Methods	15
	<p>Data mining: Definition of data mining, Representation of input data , Data mining process, Analysis methodologies</p> <p>Data preparation: Data validation, Data transformation, Data reduction</p>	
Module 3	Supervised and Unsupervised Learning	15
	<p>Classification: Classification problems, Evaluation of classification models, Bayesian methods, Logistic regression, Neural networks, Support vector machines</p> <p>Clustering: Clustering methods, Partition methods, Hierarchical methods, Evaluation of clustering models</p>	
Module 4	Advanced Analytical Models in Marketing and Logistics	15
	<p>Marketing models: Relational marketing, Sales force management,</p> <p>Logistic and production models: Supply chain optimization, Optimization models for logistics planning, Revenue management systems.</p>	
Total Lectures		60

Reference Books:

1. Decision support and Business Intelligence Systems, Efraim Turban, Ramesh Sharda, Dursun Delen, Person, 9th Ed, 2011
2. Business Intelligence: Data Mining and Optimization for Decision Making, Carlo Verrellis, Wiley, 2009
3. Fundamental of Business Intelligence, Grossmann W, Rinderle-Ma, Springer, 2015

Program: B.Sc. – Information Technology		Semester: VI	
Course: Business Intelligence and Applications Practical		Course Code: UUGBIA63P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives: <ul style="list-style-type: none"> • Master the ETL process, importing data from various sources to construct and stage a database. • Utilize MDX queries, pivot tables, and charts in Excel for in-depth data analysis from data warehouses. • Apply classification, clustering, and regression algorithms for predictive modeling and data insights. 			
Course Outcomes: After completion of the course, learners would be able to: CO1: ability to successfully import and transform data from diverse sources, creating a structured and efficient database. CO2: Analyze warehouse data using pivot tables, charts, and MDX queries to uncover actionable insights. CO3: Perform predictive analytics using machine learning algorithms to guide strategic business decisions.			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Module Title to be written here	10	
	1. Import the legacy data from different sources such as (Excel , SqlServer, Oracle etc.) and load in the target system. (You can download sample database such as Adventure works, Northwind, food Mart etc.) 2. Perform the Extraction Transformation and Loading (ETL) process to construct the database in the SQL server. 3. a. Create the Data staging area for the selected database. b. Create the cube with suitable dimension and fact tables based on ROLAP, MOLAP and HOLAP model.		
Module 2	Module Title to be written here	10	
	4. a. Create the ETL map and setup the schedule for execution. b. Execute the MDX queries to extract the data from the Datawarehouse.		

	<p>5. a. Import the Datawarehouse data in Microsoft Excel and create the Pivot table and Pivot Chart.</p> <p>b. Import the cube in Microsoft Excel and create the Pivot table and Pivot Chart to perform data analysis.</p> <p>6. Apply the what – if Analysis for data visualization. Design and generate necessary reports based on the data warehouse data.</p>	
Module 3	Module Title to be written here	10
	<p>7. Perform the data classification using classification algorithm.</p> <p>8. Perform the data clustering using clustering algorithm.</p> <p>9. Perform the Linear regression on the given data warehouse data.</p> <p>10. Perform the logistic regression on the given data warehouse data.</p>	
Total Lectures		30

Reference Books:

1. Decision support and Business Intelligence Systems, Efraim Turban, Ramesh Sharda, Dursun Delen, Person, 9th Ed, 2011
2. Business Intelligence: Data Mining and Optimization for Decision Making, Carlo Verzellis, Wiley, 2009
3. Fundamental of Business Intelligence, Grossmann W, Rinderle-Ma, Springer, 2015

Program: B.Sc. – Information Technology (2024 - 25)		Semester: VI	
Course: Geographical Information Systems		Course Code: UUGGIS64	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives: <ul style="list-style-type: none"> To introduce students to the fundamental principles and components of GIS. To familiarize students with GIS software tools and techniques. To enable students to acquire, manage, and analyze spatial data. To develop students' skills in creating maps and visualizations for decision-making and problem-solving. 			
Course Outcomes: After completion of the course, learners would be able to: CO1: Comprehensive understanding of GIS fundamentals. CO2: Proficiency in spatial data management techniques. CO3: Application of spatial analysis methods for decision-making. CO4: Ability to create effective maps and visualizations and gain practical experience in GIS software for real-world applications.			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Introduction to GIS	15	
	Overview of Geographic Information Systems (GIS): Definition and scope of GIS, Historical development and evolution, Applications, and significance in various fields Components and Functions of GIS: Hardware components, Software components, Data components, spatial data, attribute data, metadata Types of Spatial Data and Their Sources: Vector data- points, lines, polygons; Raster data- grid cells, pixels; Remote sensing data- GPS data, survey data Coordinate Systems and Map Projections: Cartesian coordinate systems- Cartesian coordinates, map scale; Geographic coordinate systems- latitude, longitude, ellipsoids; Map projections- types, properties, distortion., IS Software and Tools: ArcGIS, QGIS, GRASS GIS		
Module 2	Spatial Data Management	15	

	<p>Data Models and Structures in GIS: Vector data model- point, line, polygon topology; Raster data model- grid, image structure; Hybrid data models and object-oriented databases</p> <p>Data Acquisition and Digitization: Sources of spatial data- field surveys, satellite imagery, aerial photography; Data digitization techniques- heads-up digitizing, coordinate digitizing; Data editing, cleaning, and validation</p> <p>Data Formats and Standards: Common GIS data formats- Shapefile, GeoTIFF, KML, GeoJSON; Metadata standards: FGDC, ISO 19115; Geospatial Databases and Data Integration</p> <p>Spatial data querying and indexing: Data integration techniques- data fusion, data aggregation</p> <p>Quality Assurance and Metadata: Data quality standards and metrics, Error detection and correction</p>	
Module 3	Spatial Analysis	15
	<p>Spatial Data Analysis Techniques: Spatial overlay operations- intersection, union, difference; Buffering and proximity analysis; Spatial interpolation methods- IDW, Kriging, Thiessen polygons</p> <p>Overlay and Buffer Operations: Point-in-polygon analysis; Buffering-creation of buffer zones around features</p> <p>Spatial Queries and Geoprocessing: Spatial query operators- Within, Contains, Intersects; Geoprocessing tools- clip, merge, dissolve</p> <p>Network Analysis and Routing: Network dataset creation and analysis</p> <p>Geostatistics and Interpolation: Spatial statistics: mean center, standard deviation, Moran's I; Interpolation techniques- spatial interpolation, trend surface analysis</p>	
Module 4	Cartography and Visualization	15
	<p>Map Design and Layout: Map elements: title, legend, scale bar, north arrow, Typography and font selection, Color theory and map symbology</p> <p>Symbolization and Thematic Mapping: Symbolization techniques- proportional symbols, choropleth maps; Thematic mapping- population density, land use, elevation</p> <p>Map Production and Printing: Cartographic output formats: paper maps, digital maps, Printing considerations- resolution, scale, page layout</p> <p>3D Visualization and Terrain Modeling: 3D visualization techniques; Terrain modeling- digital elevation models, contour lines</p> <p>Web-Based Mapping and Interactive Maps: Web mapping technologies- Open Layers, Leaflet, Google Maps API; Creation of interactive maps- zooming, panning, feature highlighting</p>	
Total Lectures		60

Essential readings:

1. Geographic Information Systems: Concepts, Methodologies, Tools, and Applications" by Information Resources Management Association, 2012
2. GIS Fundamentals: A First Text on Geographic Information Systems, Sixth Edition, XanEdu Publishing Inc, 2019
3. QGIS Official Training Manual: https://docs.qgis.org/3.16/en/docs/training_manual/index.html
4. QGIS Tutorials and Tips: <https://www.qgistutorials.com/>
5. Principles of Geographic Information Systems, P.A Burrough and R.A.McDonnell, Oxford University Press, 2016

Reference books:

1. Principles of Geographic Information Systems- An Introductory Text Book, Otto Huisman and Rolf, The International Institute of Geoinformation Science and Earth Observation, 2009
2. Introduction to Geographic Information Systems, Chang Kang-tsung, McGraw-Hill, 2018
3. Fundamentals of Geographic Information Systems, Michael N.Demers, Wiley Publications, 2019
4. Learn QGIS, Andrew Cutts, Packt publishing, 2018

Program: B.Sc. – Information Technology		Semester: V	
Course: Enterprise Network Systems		Course Code: UUGENS65	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives: <ul style="list-style-type: none"> • Understand and apply network design principles, including architectures, lifecycle, and high availability protocols. • Master enterprise LAN and data center design, focusing on Ethernet rules, storage, and data center infrastructure. • Explore wireless LAN technologies, including design considerations, security, and quality of service for scalable networks. • Delve into Internet Protocol design, security management, and integrating security mechanisms into network infrastructure. 			
Course Outcomes: After completion of the course, learners would be able to: CO1: Understand the working of Network design models CO2: describe Enterprise LAN Design, and data center design CO3: remember and describe various WAN technologies CO4: Understand Internet Protocol and describe how to manage security			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Network Design	15	
	General Network Design: Network Design Methodology, Foundation Topics, Cisco Architectures for the Enterprise, Cisco Design Lifecycle: Plan, Build, Manage, Prepare, Plan, Design, Implement, Operate, and Optimize Phases, Identifying Customer Design Requirements, Characterizing the Existing Network, Designing the Network Topology and Solutions Network Design Models: Hierarchical Network Models, Enterprise Architecture Model, High Availability Network Services		
Module 2	Enterprise LAN Design, and data center design	15	
	Enterprise LAN Design: LAN Media, LAN Hardware, Campus LAN Design and Best Practices, VLAN and Trunk Considerations		

	Data Center Design: Enterprise DC Architecture, Challenges in the DC, Enterprise DC Infrastructure, Virtualization Overview, Virtualization Technologies	
Module 3	Wireless LAN Design	15
	<p>Wireless LAN Design: Wireless LAN Technologies, Unified Wireless Network, WLAN Authentication, WLAN Controller Components, Roaming and Mobility Groups, WLAN Design</p> <p>WAN Technologies and the Enterprise Edge: WAN and Enterprise Edge Overview, WAN Transport Technologies, WAN and Edge Design Methodologies, DMZ Connectivity, Internet Connectivity, VPN Network Design</p> <p>WAN Design: Traditional WAN Technologies, Remote Site Connectivity, Enterprise VPN vs. Service Provider VPN, WAN Backup Design, Enterprise WAN Architecture, Enterprise WAN Components, Enterprise Branch Architecture, Enterprise Teleworker Design</p>	
Module 4	Internet Protocol and Managing Security	15
	<p>Internet Protocol Version 4 Design: IPv4 Header, IPv4 Addressing, IPv4 Address Subnets, IPv4 Addressing Design, Address Assignment and Name Resolution</p> <p>Case Study: IP Address Subnet Allocation</p>	
Total Lectures		60

Reference Books

1. CCDA200-310 Official Cert Guide ANTHONY BRUNO, CCIE No. 2738 STEVE JORDAN, CCIE No. 11293 Cisco Press
2. Network Warrior Gary A Donabue, O Reilly, 2nd Edition, 2011

Program: B.Sc. – Information Technology		Semester: VI	
Course: Geographical Information Systems Practical		Course Code: UUGGIS64P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives: <ul style="list-style-type: none"> To introduce students to the fundamentals of Geographic Information Systems (GIS) and its components. To familiarize students with spatial data management techniques and tools. To provide students with practical skills in spatial analysis and interpretation using GIS software. To develop students' proficiency in cartographic design and map production. To enable students to apply GIS techniques to address real-world problems in various domains. 			
Course Outcomes: After completion of the course, learners would be able to: CO1: Introduce GIS fundamentals and components. CO2: Familiarize with spatial data management techniques. CO3: Develop practical spatial analysis skills. CO4: Enhance proficiency in cartographic design and apply GIS techniques to real-world problems.			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	QGIS, vector data, raster data	10	
	Introduction to QGIS: <ul style="list-style-type: none"> Familiarizing with QGIS: Installation of QGIS, setting up datasets for both Vector and Raster data. Exploring QGIS interface and basic tools. Loading and navigating maps. Creating and Managing Vector Data: <ul style="list-style-type: none"> Adding and managing vector layers. Setting layer properties and styling. Calculating line lengths and statistics. Working with attributes and importing spreadsheets or CSV files. 		

	Exploring and Managing Raster Data <ul style="list-style-type: none"> • Adding and managing raster layers. • Styling and analyzing raster data. • Mosaicking and clipping raster datasets. 	
Module 2	Maps, attributes, Projections and Georeferencing	10
	Making Maps and Working with Attributes <ul style="list-style-type: none"> • Creating maps using QGIS Print Composer. • Working with attribute tables. • Importing and managing attribute data. • Exploring plugins and accessing OpenStreetMap data. Working with Projections and Georeferencing: <ul style="list-style-type: none"> • Understanding projections and coordinate systems. • Working with Web Map Services (WMS) data. • Georeferencing topo sheets and scanned maps. • Digitizing map data and aerial imagery. Managing Data Tables and Spatial Data Sets: <ul style="list-style-type: none"> • Performing data management tasks such as table joins and spatial joins, Conducting points in polygon analysis. • Executing spatial queries for data extraction. 	
Module 3	GIS Operations	10
	Advanced GIS Operations <ul style="list-style-type: none"> • Exploring advanced GIS operations such as nearest neighbor analysis and interpolating point data. • Using batch processing techniques with the Processing Framework, automating complex workflows using the Processing Modeler. Mini Project Work <ul style="list-style-type: none"> • Application of learned concepts in individual or group projects. • Implementing advanced GIS techniques for real-world scenarios. 	
Total Lectures		30

Essential readings:

1. Geographic Information Systems: Concepts, Methodologies, Tools, and Applications" by Information Resources Management Association, 2012
2. GIS Fundamentals: A First Text on Geographic Information Systems, Sixth Edition, XanEdu Publishing Inc, 2019
3. QGIS Official Training Manual: https://docs.qgis.org/3.16/en/docs/training_manual/index.html
4. QGIS Tutorials and Tips: <https://www.qgistutorials.com/>
5. Principles of Geographic Information Systems, P.A Burrough and R.A.McDonnell, Oxford University Press, 2016

Reference books:

1. Principles of Geographic Information Systems- An Introductory Text Book, Otto Huisman and Rolf, The International Institute of Geoinformation Science and Earth Observation, 2009
2. Introduction to Geographic Information Systems, Chang Kang-tsung, McGraw-Hill, 2018
3. Fundamentals of Geographic Information Systems, Michael N.Demers, Wiley Publications, 2019
4. Learn QGIS, Andrew Cutts, Packt publishing, 2018

Program: B.Sc. – Information Technology		Semester: VI	
Course: Enterprise Network Systems Practical		Course Code: UUGENS65P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives: <ul style="list-style-type: none"> • To learn the advanced networking • Master configuration of OSPF for both single-area and multi-area networks, including authentication and stub areas. • Understand and implement BGP configurations, focusing on default routing, AS_PATH attributes, and route filters. • Configure IPv6 in OSPF environments and establish 6to4 tunnels for IPv6 to IPv4 connectivity. • Master VLAN configurations, EtherChannel setup, and Spanning Tree Protocol adjustments for optimized network performance. 			
Course Outcomes: After completion of the course, learners would be able to: CO1: Successfully configure OSPF in various scenarios, ensuring efficient routing in single and multi-area networks. CO2: Implement BGP effectively, manage AS_PATH attributes, and utilize route reflectors for scalable networks. CO3: Configure OSPFv3 for IPv6 networks and establish seamless 6to4 tunneling for IPv4-IPv6 interoperability. CO4: Optimize network performance and redundancy with advanced VLAN, EtherChannel, and Spanning Tree configurations.			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture) 30	
Module 1	OSPF	10	
1.	Configuring OSPF – I a. Single-Area OSPF Link Costs and Interface Priorities b. Multi-Area OSPF with Stub Areas and Authentication		
2.	Configuring OSPF – II a. OSPF Virtual Links and Area Summarization b. OSPF over Frame Relay		
3.	Redistribution and Administrative Distances a. Redistribution Between RIP and OSPF b. Manipulating Administrative Distances		

4.	Understanding BGP <ul style="list-style-type: none"> a. Configuring BGP with Default Routing b. Using the AS_PATH Attribute c. BGP Route Reflectors and Route Filters 	
Module 2	IPv6	10
5.	Working with IPv6 <ul style="list-style-type: none"> a. Configuring OSPF for IPv6 b. Configuring 6to4 Tunnels 	
6.	VLANs and EtherChannel <ul style="list-style-type: none"> a. Static VLANs, VLAN Trunking, and VTP Domains and Modes b. Configuring EtherChannel 	
7.	Spanning Tree Protocol <ul style="list-style-type: none"> a. Spanning Tree Protocol (STP) Default Behavior b. Modifying Default Spanning Tree Behavior 	
Module 3	VLAN	10
8.	VLAN and Spanning Tree <ul style="list-style-type: none"> a. Per-VLAN Spanning Tree Behavior b. Multiple Spanning Tree 	
9.	Internal VLAN Routing <ul style="list-style-type: none"> a. Inter-VLAN Routing with an External Router b. Inter-VLAN Routing with an Internal Route Processor 	
10.	Configure NAT Services	
Total Lectures		30

Reference Books

1. CCDA200-310 Official Cert Guide ANTHONY BRUNO, CCIE No. 2738 STEVE JORDAN, CCIE No. 11293 Cisco Press
2. Network Warrior Gary A Donabue, O Reilly, 2nd Edition, 2011

Program: B.Sc. – Information Technology		Semester: VI	
Course: Service Management in IT		Course Code: UUGSMI66	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives: <ul style="list-style-type: none"> • To explore the principles of service management including specialization, coordination, encapsulation, and system principles. • To understand the fundamentals and principles of service transition including policies and principles supporting service transition. • To learn the fundamentals and principles of service operation • To understand CSI principles including the CSI approach, organizational change, ownership, drivers, measurement, governance, frameworks, and models. 			
Course Outcomes: After completion of the course, learners would be able to: <p>CO1: Explore the principles of service management including specialization, coordination, encapsulation, and system principles.</p> <p>CO2: Understand the fundamentals and principles of service transition including policies and principles supporting service transition.</p> <p>CO3: Learn the fundamentals and principles of service operation</p> <p>CO4: Understand CSI principles including the CSI approach, organizational change, ownership, drivers, measurement, governance, frameworks, and models.</p>			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Introduction to IT Service Management, Challenges, Service Design	15	
	IT Service Management: Introduction, what is service management? What are services? Business Process, Principles of Service management: Specialization and Coordination, The agency principle, Encapsulation, Principles of systems, The service Life Cycle, Functions, and processes across the life cycle. Service Strategy Principles: Value creation, Service Assets, Service Provider Service Structures, Service Strategy Principles., Service Strategy: Define the market, Develop the offerings, Develop Strategic Assets, prepare for		

	<p>execution., Challenges, Critical Success factors and risks: Complexity, Coordination and Control, Preserving value, Effectiveness in measurement, Risks.</p> <p>Service Design: Fundamentals, Service Design Principles: Goals, Balanced Design, Identifying Service requirements, identifying and documenting business requirements and drivers, Design activities, Design aspects, Subsequent design activities, Design constraints, Service oriented architecture, Business Service Management, Service Design Models</p>	
Module 2	Service Design Processes, service transition process	15
	<p>Service Design Processes: Service Catalogue Management, Service Level Management, Capacity Management, Availability Management, IT Service Continuity Management, Information Security Management, Supplier Management, Challenges, Critical Success factors and risks: Challenges, Risks</p> <p>Service Transition: Fundamentals, Service Transition Principles: Principles Supporting Service Transition, Policies for Service Transition</p> <p>Service Transition Processes: Transition planning and support, Change Management, Service Asses Configuration Management, Service and Deployment Management, Service Validation and Testing, Evaluation, Knowledge Management.</p> <p>Challenges, Critical Success factors and risks: Challenges, Critical Success factors, Risks, Service Transition under difficult Conditions.</p>	
Module 3	Service Operation and processes	15
	<p>Service Operation: Fundamentals, Service Operation Principles: Functions, groups, teams, departments, and divisions, achieving balance in service operations, Providing service, Operation staff involvement in service design and service transition, Operational Health, Communication, Documentation</p> <p>Service Operation Processes: Event Management, Incident Management, Request fulfilment, Problem Management, Access Management, Operational activities of processes covered in other lifecycle phases.</p> <p>Challenges, Critical Success factors and risks: Challenges, Critical Success factors, Risks</p>	
Module 4	Continual Service Improvement (CSI) Principles, CSI Process	15
	<p>Continual Service Improvement (CSI) Principles: CSI Approach, CSI and organizational change, Ownership, CSI register, External and Internal drivers, Service level management, Knowledge management, The Deming cycle, Service Measurement, IT governance, Frameworks, models, standards and quality Systems, CSI inputs and outputs.</p>	

	<p>CSI Process: The seven-step improvement process. CSI Methods and Techniques: Methods and techniques, Assessments, benchmarking, Service Measurement, Metrics, Return on Investment, Service reporting, CSI and other service management processes, Organizing for CSI: Organizational development, Functions, roles, Customer Engagement, Responsibility model - RACI, Competence, and training.</p> <p>Technology considerations: Tools to support CSI activities. Implementing CSI: Critical Considerations for implementing CSI, The start, Governance, CSI and organizational change, Communication Strategy and Plan</p>	
		60

Essential readings:

1. ITIL v3 Foundation Complete Certification Kit, 2009
2. ITIL v3 Service Strategy, OGC/TSO
3. ITIL v3 Service Transition, OGC/TSO

Reference books:

1. ITIL v3 Service Operation, OGC/TSO
2. ITIL Continual Service Improvement, TSO, 2011

Program: B.Sc. – Information Technology		Semester: VI	
Course: Laws for Cyber Security		Course Code: UUGLCS67	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75)
4	2	25	75
Learning Objectives: <ul style="list-style-type: none"> • To understand necessity of Arrest Without Warrant, Penalties, Adjudication, and Appeals Under the IT Act, 2000 • To analyze the implications of contract formation and jurisdictional issues on businesses operating in the cyber world • To analyze the legal and regulatory frameworks governing intellectual property rights and electronic transactions in India and globally. • To understand Indian Technology act and its amendments 			
Course Outcomes: After completion of the course, learners would be able to: <ul style="list-style-type: none"> CO1: Understand necessity of Arrest Without Warrant, Penalties, Adjudication, and Appeals Under the IT Act, 2000 CO2: Analyse the implications of contract formation and jurisdictional issues on businesses operating in the cyber world CO3: Analyse the legal and regulatory frameworks governing intellectual property rights and electronic transactions in India and globally. CO4: Understand Indian Technology act and its amendments 			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture)	
Module 1	Power of Arrest Without Warrant Under the IT Act, 2000	15	
	A Critique, Crimes of this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce? Forgetting the Line Between Cognizable and Non-Cognizable Offences, Necessity of Arrest without Warrant from Any Place, Public or Otherwise, Check and Balances Against Arbitrary Arrests, Arrest for “About to Commit” an Offence Under the IT Act: A Tribute to Draco, Arrest, But NO Punishment!		

	Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000: Concept of “Cyber Crime “ and the IT Act , 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cyber Cheating, Virus on the Internet, Defamation, Harassment and E-mail Abuse, Cyber Pornography, Other IT Act Offences, Monetary Penalties, Adjudication and Appeals Under IT Act , 2000, Network Service Providers, Jurisdiction and Cyber Crime, Nature of Cyber Criminality, Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications on Cyber Crime.	
Module 2	Contracts in the Infotech World, Jurisdiction in the Cyber World	15
	Contracts in the Infotech World, Click-Wrap and Shrink-Wrap Contract: Status under the Indian Contract Act, 1872, Contract Formation Under the Indian Contract Act, 1872, Contract Formation on the Internet, Terms and Conditions of Contracts. Jurisdiction in the Cyber World: Questioning the Jurisdiction and Validity of the Present Law of Jurisdiction, Civil Law of Jurisdiction in India, Cause of Action, Jurisdiction and the Information Technology Act,2000, Foreign Judgements in India, Place of Cause of Action in Contractual and IPR Disputes, Exclusion Clauses in Contracts, Abuse of Exclusion Clauses, Objection of Lack of Jurisdiction, Misuse of the Law of Jurisdiction, Legal Principles on Jurisdiction in the United State of America, Jurisdiction Disputes w.r.t. the Internet in the United State of America.	
Module 3	Cyber Squatters and Copyright Protection in the Cyber World	15
	Concept of Domain Name and Reply to Cyber Squatters, Meta-Tagging, Legislative and Other Innovative Moves Against Cyber Squatting, The Battle Between Freedom and Control on the Internet, Works in Which Copyright Subsists and meaning of Copyright, Copyright Ownership and Assignment, License of Copyright, Copyright Terms and Respect for Foreign Works, Copyright, Infringement, Remedies and Offences, Copyright Protection of Content on the Internet; Copyright Notice, Disclaimer and Acknowledgement, Downloading for Viewing Content on the Internet Digital Signature, Certifying Authorities and E-Governance: Digital Signatures, Digital Signature Certificate, Certifying Authorities and Liability in the Event of Digital Signature Compromise, E-Governance in India: A Warning to Babudom!	
Module 4	Information Technology act in India	15
	The Indian Evidence Act of 1872 v. Information Technology Act, 2000: Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements,	

	<p>Proving Electronic Messages, Other Amendments in the Indian Evidence Act by the IT Act, Amendments to the Bankers Books Evidence Act, 1891 and Reserve Bank of India Act, 1934.</p> <p>Protection of Cyber Consumers in India: Are Cyber Consumers Covered Under the Consumer Protection Act? Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Reliefs Under CPA, Beware Consumers, Consumer Foras, Jurisdiction and Implications on cyber-Consumers in India, Applicability of CPA to Manufacturers, Distributors, Retailers and Service Providers Based in Foreign Lands Whose Goods are Sold or Services Provided to a Consumer in India.</p> <p>Amendments in Indian IT Act 2000</p>	
Total Lectures		60

Essential readings:

1. Cyber Law Simplified, Vivek Sood, TMH Education, 2001

Reference books:

1. Cybersecurity Law, Jeff Kosseff, Wiley, 2017

Program: B.Sc. – Information Technology		Semester: VI	
Course: Android Programming		Course Code: UUGANP68P	
Teaching Scheme		Evaluation Scheme	
Lecture (Hours per week)	Credit	Continuous Assessment (CA)	Semester End Examinations (SEE) (Marks-50)
2	2	-	50
Learning Objectives: <ul style="list-style-type: none"> • Understand Kotlin syntax, data types, and control flow statements. • Learn about functions, collections, null safety, and coroutines in Kotlin. • Set up Android Studio, create, and run Android applications on virtual and physical devices. • Learn to store and manage data using various persistence mechanisms in Android. • Design user interfaces, handle images, implement menus, and integrate media playback. 			
Course Outcomes: After completion of the course, learners would be able to: <p>CO1: Apply Kotlin fundamentals to develop efficient and robust Android applications.</p> <p>CO2: Implement advanced Kotlin features like lambda expressions, exception handling, and annotations in Android development.</p> <p>CO3: Develop functional Android applications using Android Studio and deploy them on physical devices.</p> <p>CO4: Understand and implement data persistence mechanisms such as Shared Preferences, SQLite databases, and Firebase Real-Time Database in Android applications.</p> <p>CO5: Design visually appealing user interfaces, handle media resources, and implement navigation features in Android applications.</p>			
Outline of Syllabus: (per session plan)			
Modules	Topics	Duration (Lecture) 30	
Module 1	Introduction to Kotlin and Android Studio	10	
	App Development with Android Studio: Overview of Android architecture, setting up Android Studio and Android Virtual Device, Creating and running the first Android application, Working with physical Android devices Designing Android UI: User Interface (UI) fundamentals, Layouts, views, and UI controls, Styles, themes, and event handling, Dialogs, and screen navigation,		

	Handling Images, List View, and Menu: Working with Image View and Image Switcher, Implementing List View, and RecyclerView, creating various types of menus, Implementing screen navigation and interaction of views	
Module 3	Implementing Data Persistence and Integrating Media	10
	<p>Implementing Data Persistence: Storing data using Shared Preferences, Internal and external storage options</p> <p>Working with databases: Working with SQLite databases and Content Providers, Utilizing Firebase Real-Time Database for data storage</p> <p>Graphics, Animations, and Integrating Media: Drawing graphics with the Drawable class, implementing animations in Android, integrating media playback with Media Player API, Capturing images with Android Camera and handling input gestures</p>	
Module 4	Managing Background Tasks and Deployment	10
	<p>Interacting with Camera and Input Gestures: Implementing gestures like multi-touch, swipe, and zoom, Recording and managing media input</p> <p>Managing Background Tasks and Deployment: Handling background tasks with Broadcast Receivers and Services, Managing threads and processes with Sanctus and Job Scheduler,</p> <p>Deploying applications: Deploying Android applications on Google Play Store, including versioning and signing applications, Mini Project based on learned concept.</p>	
Total Lectures		30

Essential readings:

1. How to Build Android Apps with Kotlin: A hands-on guide to developing, testing, and publishing your first apps with Android, Alex Forrester, Packt Publishing, 2021
2. Android Programming: Crafting UI/UX using Kotlin, SYBGEN Learning, 2021
3. Android Programming with Kotlin for Beginners, John Horton, Packt Publishing, 2019
4. Android Development with Kotlin: Enhance your skills for Android development using Kotlin, Marcin Moskala, Packt Publishing

Reference books:

1. Head First Android Development: A Learner's Guide to Building Android Apps with Kotlin Dawn Griffiths, 3rd Edition, O'Reilly Media, 2021
2. Android Studio 4.2 Development Essentials - Kotlin Edition: Developing Android Apps Using Android Studio 4.2, Kotlin and Android Jetpack, Neil Smyth, Payload Media, 2021

Program: B.Sc. – Information Technology	Semester: VI
Course: Project Implementation	Course Code: UUGPRI69
Refer annexure II	

Annexure I

EVALUATION PATTERN

1. Details of Continuous Assessment (CA)- Theory (25 Marks)

Continuous Assessment	Details	Marks
Component 1 (CA-1)	2 Test of 10 Marks each. Average of two will be considered. Written Examination will be based on the syllabus (Includes subjective questions, problem solving etc.)	10
Component 2 (CA-2)	Assignments / Projects / Presentations / Open Book Tests / Quizzes etc.	15

2. Details of Practical Examination (Total 50 Marks)

a. ICA Practical Examination (20 Marks)

End Semester Exam	Details	Marks
Component 1 (CA-1)	Mini Project / Case Studies / Field Visit / Class Presentation etc.	15
Component 2 (CA-2)	Report	05

Rubrics for Practical					
	Performance Indicator	Poor	Average	Good	Excellent
1	Knowledge (Factual /Conceptual/Procedural/cognitive)	1	2	3	4
2	Describe and Demonstration (Factual /Conceptual/procedural/cognitive)	1	2	3	4
3	Strategy (Analyze &/or Evaluate) (Factual /Conceptual/procedural/cognitive)	1	2	3	4
4	Interpret/Develop/ Attitude towards Learning (Factual /Conceptual/procedural/cognitive/ receiving, attending, responding,	1	2	3	4

	valuing, organizing, Characterization by value)				
5	Nonverbal communication skills/Behavior skills (motor skills, hand-eye coordination, speech behavior)	1	2	3	4

b. End Semester Practical Examination (30 Marks)

End Semester Exam	Details	Marks
Component 1 (CA-1)	Practical Questions based on the practical conducted covering prescribed syllabus /Practical List (Computer Based Test)	20
Component 2 (CA-2)	Journal	05
Component 3 (CA-3)	Viva	05

3. Theory Examination-Semester End Examination (SEE) – (75 Marks)

The semester end examination shall be conducted for **75 marks** based on the syllabus covered during the semester. The following pattern for the question paper shall be followed.

There shall be **five questions** of **15 marks** each. Each question will have **five sub questions of 05 marks** each within it. Learner should attempt **ANY THREE** sub-questions from each question. The template for question paper is given in the Annexure I.

Time :2 ½ Hours

[Total Marks: 75]

- N.B:**
- (1) **All questions are compulsory.**
 - (2) Figures to the **right** indicate full marks.
 - (3) **Assume additional data if necessary** but state the same clearly.
 - (4) **Symbols** have their usual meanings and **tables** have their usual standard design unless stated otherwise.

Q.1	Attempt ANY THREE of the following [From Unit 1]	(15)
a)		05
b)		05
c)		05
d)		05
e)		05

Q.2	Attempt ANY THREE of the following [From Unit 2]	(15)
a)		05
b)		05
c)		05
d)		05
e)		05
Q.3	Attempt ANY THREE of the following [From Unit 3]	(15)
a)		05
b)		05
c)		05
d)		05
e)		05
Q.4	Attempt ANY THREE of the following [From Unit 4]	(15)
a)		05
b)		05
c)		05
d)		05
e)		05
Q.5	Attempt ANY THREE of the following [From Unit 1,2,3,4]	(15)
a)		05
b)		05
c)		05
d)		05
e)		05

Annexure II

Project Dissertation Semester V and Project Implementation Semester VI

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

Types of the Project

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

project.

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

Format of the Project Report

Title Page

Original Copy of the Approved Proforma of the Project

Proposal Certificate of Authenticated work

Role and Responsibility

Form Abstract

Acknowled

gement Table of

Contents Table

of Figures

CHAPTER 1: INTRODUCTION

1.1 Background

1.2 Objectives

1.3 Purpose, Scope, and Applicability

1.3.1 Purpose

1.3.2 Scope

1.3.3 Applicability

1.4 Achievements

1.5 Organization of Report

CHAPTER 2: SURVEY OF TECHNOLOGIES

CHAPTER 3: REQUIREMENTS AND ANALYSIS

- 3.1 Problem Definition
- 3.2 Requirements Specification
- 3.3 Planning and Scheduling
- 3.4 Software and Hardware Requirements
- 3.5 Preliminary Product Description
- 3.6 Conceptual

Models

CHAPTER 4: SYSTEM DESIGN

- 4.1 Basic Modules
- 4.2 Data Design
 - 4.2.1 Schema Design
 - 4.2.2 Data Integrity and Constraints
- 4.3 Procedural Design
 - 4.3.1 Logic Diagrams
 - 4.3.2 Data Structures
 - 4.3.3 Algorithms Design
- 4.4 User interface design
- 4.5 Security Issues
- 4.6 Test Cases Design

CHAPTER 5: IMPLEMENTATION AND TESTING

- 5.1 Implementation Approaches
- 5.2 Coding Details and Code Efficiency
 - 5.2.1 Code Efficiency
- 5.3 Testing Approach
 - 5.3.1 Unit Testing
 - 5.3.2 Integrated Testing
 - 5.3.3 Beta Testing
- 5.4 Modifications and Improvements

5.5 Test Cases

CHAPTER 6: RESULTS AND DISCUSSION

6.1 Test Reports

6.2 User Documentation

CHAPTER 7: CONCLUSIONS

7.1 Conclusion

7.1.1 Significance of the System

7.2 Limitations of the System

7.3 Future Scope of the Project

REFERENCES

GLOS

SARY

APPENDIX A

APPENDIX B

Explanation of the Content

Title Page

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

Original Copy of the Approved Proforma of the Project Proposal

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

Certificate of Authenticated work

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

Role and Responsibility Form

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

Abstract

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

Acknowledgements

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

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

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

Chapter 1: Introduction

The introduction has several parts as given below:

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

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

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

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

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

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

Achievements: Explain what knowledge the student achieved after the completion of

the work. What contributions has the project made to the chosen area? Goals achieved - describes the degree to which the findings support the original objectives laid out by the project. The goals may be partially or fully achieved, or exceeded.

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

Chapter 2: Survey of Technologies

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

Chapter 3: Requirements and Analysis

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

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

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

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

- Hardware Requirement: In this section, the equipment, graphics card, numeric co-processor, mouse, disk capacity, RAM capacity etc. necessary to run the software must be noted.
- Software Requirements: In this section, the operating system, the compiler, testing tools, linker, and the libraries etc. necessary to compile, link and install the software must be listed. Preliminary Product Description: Identify the requirements and objectives of the new system. Define the functions and operation of the application/system the students are developing as project.

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

Chapter 4: System Design

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

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

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

- Schema Design: Define the structure and explanation of schemas used in the project.
- Data Integrity and Constraints: Define and explain all the validity checks and constraints provided to maintain data integrity.

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

- Logic Diagrams: Define the systematical flow of procedure that improves its comprehension and helps the programmer during implementation. e.g., Control Flow Chart, Process Diagrams etc.
- Data Structures: Create and define the data structure used in procedures.
- Algorithms Design: With proper explanations of input data, output data, logic of processes, design and explain the working of algorithms.

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

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

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

Chapter 5: Implementation and Testing

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

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

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

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

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

- Unit Testing: Unit testing deals with testing a unit or module. This would test the interaction of many functions but, do confine the test within one module.
- Integrated Testing: Brings all the modules together into a special testing environment, then checks for errors, bugs, and interoperability. It deals with tests for the entire application. Application limits and features are tested here.

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

Chapter 6: Results and Discussion

Test Reports: Explain the test results and reports based on the test cases, which should show that the project can face any problematic situation and that it works fine in different conditions. Take the different sample inputs and show the outputs.

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

Chapter 7: Conclusions

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

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

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

REFERENCES

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

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

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

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

GLOSSARY

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

APPENDICES

These may be provided to include further details of results, mathematical derivations, certain illustrative parts of the program code (e.g., class interfaces), user documentation etc. If there are technical details of the work done that might be useful to others who wish to build on this work, but that are not sufficiently important to the project to justify being discussed in the main body of the project, then they should be included as appendices.

SUMMARY

Project development usually involves an engineering approach to the design and development of a software system that fulfils a practical need. Projects also often form an important focus for discussion at interviews with future employers as they provide a detailed

example of what the students can achieve. In this course the students can choose your project topic from the lists given in Unit 4: Category-wise Problem Definition.

FURTHER READINGS

1. Modern Systems Analysis and Design; Jeffrey A. Hoffer, Joey F. George, Joseph, S. Valacich; Pearson Education; Third Edition; 2002.
2. ISO/IEC 12207: Software Life Cycle Process
(<http://www.software.org/quagmire/descriptions/iso-iec12207.asp>).
3. IEEE 1063: Software User Documentation (<http://ieeexplore.ieee.org>).
4. ISO/IEC: 18019: Guidelines for the Design and Preparation of User Documentation for Application Software.
5. <http://www.sce.carleton.ca/squall>.
6. <http://en.tldp.org/HOWTO/Software-Release-Practice-HOWTO/documentation.html>.
7. <http://www.sei.cmu.edu/cmm/>

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

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

PNR No.:

Rollno: _____

1. Name of the Student _____

2. Title of the Project _____

3. Name of the Guide _____

4. Teaching experience of the Guide _____

5. Is this your first submission? Yes No

Signature of the Student

Signature of the Guide

Date:

Date:

Signature of the reerdinater

Date:

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

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

A Project Report (12 Bold)

Submitted in partial fulfillment of the Requirements for the award of the
Degree of (size-12)

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

By(12 Bold)

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

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

COLLEGE LOGO

DEPARTMENT OF INFORMATION TECHNOLOGY(12 BOLD, CAPS)

COLLEGE NAME (14 BOLD, CAPS)

(Affiliated to University of Mumbai) (12, Title case, bold, italic) CITY, PIN

CODE(12 bold, CAPS) MAHARASHTRA (12 bold, CAPS)

YEAR (12 bold)

COLLEGE NAME (14 BOLD, CAPS)
(Affiliated to University of Mumbai) (13, bold, italic)
CITY-MAHARASHTRA-PINCODE(13 bold, CAPS)

DEPARTMENT OF INFORMATION TECHNOLOGY (14 BOLD, CAPS)

College Logo

CERTIFICATE (14 BOLD, CAPS, underlined, centered)

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

Internal Guide (12 bold)

(Don't write names of lecturers or HOD)

Coordinator

External Examiner

Date:

College Seal

COMPANY CERTIFICATE (if applicable)

(Project Abstract page format)

Abstract (20bold, caps, centered)

Content (12, justified)

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

ACKNOWLEDGEMENT

(20, BOLD, ALL CAPS, CENTERED)

**The acknowledgement should be in times new roman,
line spacing, justified.**

12 fonts with 1.5

(Declaration page format)

DECLARATION (20 bold, centered, all caps)

Content (12, justified)

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

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

Name and Signature of the Student

TABLE OF CONTENTS (20bold, caps, centered)

Should be generated automatically using word processing software.

Chapter 1: Introduction	01(no bold)
1.1 Background	02(no bold)
1.2 Objectives
1.3 Purpose and Scope
1.2.1 Purpose
1.2.2 Scope	

.....
.....

Chapter 2: System Analysis	
2.1 Existing System	
2.2 Proposed System	
2.3 Requirement Analysis	
2.4 Hardware Requirements	
2.5 Software Requirements	
2.6 Justification of selection of Technology	

Chapter 3: System Design	
3.1 Module Division	
3.2 Data Dictionary	
3.3 ER Diagrams	
3.4 DFD/UML Diagrams	

Chapter 4: Implementation and Testing	
4.1 Code (Place Core segments)	
4.2 Testing Approach	
4.2.1 Unit Testing (Test cases and Test Results)	
4.2.2 Integration System (Test cases and Test Results)	

Chapter 5: Results and Discussions (Output Screens)	
Chapter 6: Conclusion and Future Work	
Chapter 7: References	

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

Should be generated automatically using word processing software.

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

Should be generated automatically using word processing software.

(Project Introduction page format)

Chapter 1

Introduction (20 Bold, centered)

Content or text (12, justified)

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

Chapter 2

System Analysis (20 bold, Centered)

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

2.1 Existing System (16 Bold)

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

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

2.2 Proposed System

2.3 Requirement Analysis

2.4 Hardware Requirements

2.5 Software Requirements

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

Table 2.1: Caption

Chapter 3

System Design (20 bold, centered)

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

Specify figures as Fig 11.1 – caption

3.1 Module Division

3.2 Data Dictionary

3.3 E-R Diagrams

3.4 Data Flow Diagrams / UML

Note: write brief description at the bottom of all diagrams

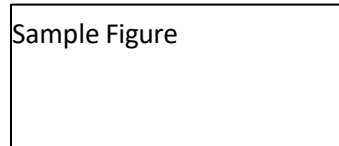


Fig. 3.1: Caption

Chapter 4

Implementation and Testing (20 bold, centered)

4.1 Code (Place Core segments)

Content includes description about coding phase in your project (Font-12)

(* do not include complete code-----just description)

4.2 Testing Approach

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

4.2.1 Unit Testing

4.2.2 Integration Testing

Note:

- Explain about above testing methods
- Explain how the above techniques are applied in your project

Provide Test plans, test cases, etc. relevant to your project

Chapter 5

Results and Discussions(20 bold, centered)

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

Chapter 6

Conclusion and Future Work (20 bold, centered)

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

Chapter 7

References (20 bold, centered)

Content (12, LEFT)

[1] Title of the book, Author

[2] Full URL of online references

*** NOTE ABOUT PROJECT VIVA VOCE:**

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

Marks Distribution:

Semester V: 50

Marks

Documentation:

50 marks

Semester VI: 150

Marks

Documentation:

50 Marks:

Implementation and Viva Voce: 100 Marks

The plagiarism should be maintained as per the UGC guidelines.