AC 25.04.24 ITEM NO: 2.3

Deccan Education Society's

Kirti M. Doongursee College of Arts, Science and Commerce (AUTONOMOUS)

Affiliated to

UNIVERSITY OF MUMBAI

Syllabus for
Program: Bachelor of Science
Course: T.Y.B.SC.
Subject: Information Technology

Choice Based Credit System (CBCS)
with effect from
Academic Year 2024-2025

Information Technology Department

T.Y.B.Sc. Syllabus (Autonomous)

Academic year 2024-25

Semester	Course Code	Course Title	Vertical	Credit
V	K24IT501	Software Project Management	SEC	2
	K24IT5P1	Project Dissertation	SEC	2
	K24IT502	Internet of Things	SEC	2
	K24IT5P2	Internet of Things Practical	SEC	2
	K24IT503	Advanced Web Development	SEC	2
	K24IT5P3	Advanced Web Development Practical	SEC	2
	K24IT504	Artificial Intelligence	DSE	2
	K24IT5P4	Artificial Intelligence Practical	DSE	2
	K24IT505	Enterprise Java	DSE	2
	K24IT5P5	Enterprise Java Practical	DSE	2
VI	K24IT601	Software Testing and Quality Assurance	SEC	2
	K24IT6P1	Project Implementation	SEC	2
	K24IT602	Information Security	SEC	2
	K24IT6P2	Information Security Practical	SEC	2
	K24IT603	Business Intelligence and Data Analytics	SEC	2
	K24IT6P3	Business Intelligence and Data Analytics Practical	SEC	2
	K24IT604	Fundamentals of GIS	DSE	2
	K24IT6P4	Fundamentals of GIS Practical	DSE	2
	K24IT605	IT Infrastructure Management	DSE	2
	K24IT6P5	Android Programming Practical	SEC	2

SEMESTER-V

Course Code	SEM – V- Course Title	Credits	Lectures/ Week
K24IT501	**Paper I** Software Project Management	**2**	**4**

Course Outcomes:

After successful completion of this course, students would be able to

- (Remember)Describe the basic concepts of software project management with its life cycle
- (Understanding)Apply project estimation and evaluation techniques to real world problem
- (Apply)Apply Key project management system techniques like PERT, CRM
- (Analyze)Identify project risk, monitor and track project deadlines

Unit	Topic	No of Lectures
I	**Introduction to Software Project Management**: Introduction, Why is Software Project Management Important? What is a Project? Software Projects versus Other Types of Project, Contract Management and Technical Project Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Some Ways of Categorizing Software Projects, Project Charter, Stakeholders, Setting Objectives, The Business Case, Project Success and Failure, What is Management? Management Control, Project Management Life Cycle, Traditional versus Modern Project Management Practices. **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. **An Overview of Project Planning:** Introduction to Step Wise Project Planning, Step 0: Select Project, Step 1: Identify Project Scope and Objectives, Step 2: Identify Project Infrastructure, Step 3: Analyse Project Characteristics, Step 4: Identify Project Products and Activities, Step 5: Estimate Effort for Each Activity, Step 6: Identify Activity Risks, Step 7: Allocate Resources, Step 8: Review/Publicize Plan, Steps 9 and 10: Execute Plan/Lower Levels of Planning **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, Rapid Application Development, Agile Methods, Extreme Programming (XP), Scrum, Lean Software Development, Managing Iterative Processes, Selecting the Most Appropriate Process Model.	**12**
II	**Software Effort Estimation:** Introduction, Where are the Estimates Done? Problems with Over- and Under-Estimates, The Basis for Software Estimating, Software Effort Estimation Techniques,	**12**

	Bottom-up Estimating, The Top-down Approach and Parametric Models, 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. **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.	
III	**RiskManagement**: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 Countermeasures, Applying the PERT Technique, Monte Carlo Simulation, Critical Chain Concepts. **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. **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).	**12**
IV	**Managing Contracts**: Introduction, Types of Contract, Stages in Contract Placement, Typical Terms of a Contract, Contract Management, Acceptance. Managing People in Software Environments: Introduction, Understanding Behaviour, 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. **Working in Teams:** Introduction, becoming a Team, Decision Making, Organization and Team Structures, Coordination Dependencies, Dispersed and Virtual Teams, Communication Genres, Communication Plans, Leadership.	**12**

V	**Software Quality:** Introduction, The Place of Software Quality in Project Planning, Importance of Software Quality, Defining Software Quality, Software Quality Models, ISO 9126, Product and Process Metrics, Product versus Process Quality Management, Quality Management Systems, Process Capability Models, Techniques to Help Enhance Software Quality, Testing, Software Reliability, Quality Plans. **Project Closeout**: Introduction, Reasons for Project Closure, Project Closure Process, Performing a Financial Closure, Project Closeout Report.	**12**

Textbooks:

- Software Project Management– Bob Hughes, MikeCotterell, Rajib Mall–TMH-6th-2018
- Project Management and Tools & Technologies – An overview-Shailesh Mehta-SPD-1st-2017

Additional References:

- Software Project Management-Walker Royce-Pearson–2005

Course Code	SEM – V- Course Title	Credits	Lectures/ Week
K24IT502	Paper II Internet of Things	2	4

Course Outcomes:

After successful completion of this course, students would be able to

- CO1- Explain the concept of the Internet of Things and its applications in real-life scenarios.
- CO2- Understand the communication protocols of the internet and design efficient web-connected devices.
- CO3- Apply design principles to create user-friendly and connected devices.
- CO4- Prototype embedded devices and create their physical design using various tools and techniques.

Unit	TopiIT	No of Lectures
I	**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 Layer Protocols, HTTP, HTTPS: Encrypted HTTP, Other Application Layer Protocols.	12
II	**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. **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.	12
III	**Prototyping the Physical Design**: Preparation, Sketch, Iterate, and Explore, Non Digital Methods, Laser Cutting, Choosing a Laser Cutter, Software, Hinges and Joints, 3D Printing, Types of 3D Printing, Software, CNC Milling, Repurposing/Recycling.	12

	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 Protoco**l.**	
IV	**Techniques for WritingEmbeddedCode**: Memory Management, Types of Memory, Making the Most of Your RAM, Performance and Battery Life, Libraries, Debugging **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, Customisation, 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.	**12**
V	**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, Certification, Costs, Scaling Up Software, Deployment, Correctness and Maintainability, Security, Performance, User Community. **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.	**12**

Textbooks:

- Designing the Internet of Things–Adrian McEwen,--Hakim Cassimally–WILEY–First Edition–2014
- Internet of Things – Architecture and Design–Raj Kamal–McGraw Hill–First Edition-2017
- Getting Started with the Internet of Things–Cuno Pfister–O'Reilly–Sixth Edition–2018

Additional References:

- Getting Started with Raspberry Pi–-Matt Richardson and Shawn Wallace–SPD–Third Edition–2016

Course Code	SEM – V- Course Title	Credits	Lectures/ Week
K24IT5P2	Paper II Internet of Things Practicals	2	3

Course Outcomes:

After successful completion of this course, students would be able to

- Explain the concept of the Internet of Things and its applications in real-life scenarios.
- Understand the communication protocols of the internet and design efficient web-connected devices.
- Apply design principles to create user-friendly and connected devices.
- Prototype embedded devices and create their physical design using various tools and techniques.

Unit	Topic
1	Starting Raspbian OS, Familiarizing with Raspberry Pi Components and interface, Connecting to ethernet, Monitor, USB.
2	Displaying different LED patterns with Raspberry Pi.
3	Displaying Time over 4-Digit 7-Segment Display using Raspberry Pi
4	Interfacing 16X2 LCD with Raspberry Pi to display different messages
5	Raspberry Pi Based Oscilloscope
6	Controlling Raspberry Pi with WhatsApp.
7	Fingerprint Sensor interfacing with Raspberry Pi
8	Raspberry Pi GPS Module Interfacing
9	IoT based Web Controlled Home Automation using Raspberry Pi
10	Interfacing Pi Camera with Raspberry Pi
11	Interfacing Raspberry Pi with RFID.
12	Installing Windows 10 IoT Core on Raspberry Pi (Demo Practical)

Textbooks:

- Designing the Internet of Things–Adrian McEwen,--Hakim Cassimally–WILEY–First Edition–2014
- Internet of Things –Architecture and Design–Raj Kamal–McGraw Hill–First Edition-2017
- Getting Started with the Internet of Things–Cuno Pfister–O'Reilly–Sixth Edition–2018

Additional References:

- Getting Started with Raspberry Pi–-Matt Richardson and Shawn Wallace–SPD–Third Edition–2016

Course Code	SEM – V- Course Title	Credits	Lectures/ Week
K24IT503	**Paper III Advanced Web Development**	**2**	**4**

Course Outcomes:

After successful completion of this course, students would be able to

- CO1- (Remember)Learner will explore the foundations of .NET Development, .NET Ecosystem, C# and Fundamental Concepts
- CO2- (Understanding) Comprehensive Understanding and Practical Application using controls.
- CO3- (Apply)ASP.NET Web Development Essentials: Tracing, Debugging, and State Management Techniques
- CO4- (Analyze) Mastering Data Access in ASP.NET: ADO.NET Essentials and Azure Integration

Unit	Topic	No of Lectures
I	NET Technology and 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. Types, Objects, and Namespaces: The Basics About Classes, Building a Basic Class, Value Types and Reference Types, Understanding Namespaces and Assemblies, Advanced Class Programming	**12**
II	ASP.NET Web Forms, Writing Code, Using the Code-Behind Class, Adding Event Handlers, Understanding the Anatomy of an ASP.NET Application, 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, The Chart Control, Website Navigation: Site Maps, URL Mapping and Routing, The SiteMapPath Control, The TreeView Control, The Menu Control.	**12**
III	Tracing, Error Handling, Debugging, Exception Handling, User defined Exceptions, Page Tracing, Client and Server side state management, View State, Transferring Information Between Pages, Cookies- creation, retrieval, reading, Types of Cookies, Using Master Pages and Content Pages	**12**
IV	ADO.NET Components, Data Providers, SQL Basic command and queries, Understanding the Data Provider Model, Using Direct Data Access, Using Disconnected Data Access. Working with Data Source Controls, Data Controls: GridView, DetailsView and FormView.	**12**

V	Understanding Security Requirements, Introduction to Authentication and Authorization NuGet package manager for .NET and Visual Studio- Installation, Basics, framework, Bootstrap basics, Structure of the Page, Typography, Forms Ajax- Using Partial Refreshes, Using Progress Notification, Implementing Timed Refreshes, Working with the ASP.NET AJAX Control Toolkit.	**12**

Textbooks:

- Beginning Visual C# 2010–K. Watson, C. Nagel, J.H Padderson–Wrox (Wiley)-2010
- Murach's ASP.NET 4.6 Web Programming in C#2015–Mary Delamater and Anne Bohem–SPD–Sixth-2016

Additional References:

- Introducing Bootstrap 4–Jörg Krause-Apress–2016

Course Code	SEM – V- Course Title	Credits	Lectures/Week
K24IT5P3	**Paper III Advanced Web Development Practical**	**2**	**3**

Course Outcomes:

After successful completion of this course, students would be able to

- Learner will explore the foundations of .NET Development, .NET Ecosystem, C# and Fundamental Concepts
- Comprehensive Understanding and Practical Application using controls.
- ASP.NET Web Development Essentials: Tracing, Debugging, and State Management Techniques
- Mastering Data Access in ASP.NET: ADO.NET Essentials and Azure Integration

Unit	Topic
1	**Write the program for the following:**
a.	Create an application to print on screen the output of adding, subtracting, multiplying and dividing two numbers entered by the user in C#.
b.	Create an application to print Floyd's triangle till n rows in C#.
c.	Create an application to demonstrate following operations i. Generate Fibonacci series. ii. Test for prime numbers
2.	**Write the program for the following:**
a.	Create a simple application to demonstrate the concepts boxing and unboxing.
b.	Create a simple application to perform addition and subtraction using delegate
c.	Create a simple application to demonstrate use of the concepts of interfaces.
3	**Write the program for the following:**
a.	Create a simple web page with various server controls to demonstrate setting and use of their properties. (Example : AutoPostBack)
b.	Create a simple application to demonstrate your vacation using calendar control.
c.	Demonstrate the use of Treeview operations on the web form.
4	**Write the program for the following:**
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	**Write the program for the following:**
a.	Create Web Form to demonstrate use of Website Navigation controls

b.	Create a web application to demonstrate use of Master Page and content page
c.	Create a web application to demonstrate various states of ASP.NET Pages.
6	**Write the program for the following:**
a.	Create a web application for inserting and deleting records from a database
b.	Create a web application to display Using Disconnected Data Access and Data Binding using GridView
7	**Write the program for the following:**
a	Create a web application to demonstrate the use of different types of Cookies
b	Create a web application to demonstrate Form Security and Windows Security with proper Authentication and Authorization properties
8	**Write the program for the following:**
a.	Create a web application for inserting and deleting records from a database. (Using Execute-Non Query).
b.	Create a web application for user defined exception handling.
9	**Write the program for the following:**
a.	Create a web application to demonstrate use of GridView button column and GridView events along with paging and sorting.
b.	Create a web application to demonstrate data binding using DetailsView and FormView Control.
10	**Write the program for the following:**
a.	Create a web application to demonstrate JS Bootstrap Button.
b.	Create a web application to demonstrate use of various Ajax controls.
c.	Create a web application to demonstrate Installation and use of NuGet package

Textbooks:

- Beginning Visual C# 2010–K. Watson, C. Nagel, J.H Padderson,J.D.Reid, M.Skinner–Wrox (Wiley)-2010
- Murach'sASP.NET 4.6 Web Programming in C#2015–Mary Delamater and Anne Bohem–SPD–SixthEditio**n**–2016

Additional References:

- Ajax : A Beginner's Guide–Steven Holzner–Paperback–2017

Course Code	SEM – V- Course Title	Credits	Lectures/ Week
K24IT504	**Paper IV - Artificial Intelligence**	**2**	**4**

Course Outcomes:

After successful completion of this course, students would be able to

- CO1- (Remember) Articulate the historical development and current trends in Artificial Intelligence, demonstrating a comprehensive understanding of its foundations and principles.
- CO2- (Understanding) Demonstrate proficiency in implementing and analyzing various search algorithms, utilizing both uninformed and informed strategies to solve complex problems efficiently.
- CO3- (Apply) Apply adversarial search techniques to decision-making in competitive environments, including games, and effectively manage uncertainty and partial observability.
- CO4- (Analyze) Demonstrate competency in logical reasoning and inference, utilizing propositional and first-order logic to represent and solve real-world problems in AI applications.

Unit	Topic	No of Lectures
I	**Introduction**: What is Artificial Intelligence? Foundations of AI, History, the state of art AI today. **Intelligent Agents**: Agents and Environment, Good Behaviour, Nature of Environment, Structure of Agents.	**12**
II	**Solving Problems by Searching**: Problem Solving Agents, Searching for Solutions, Uninformed Search, Informed Search Strategies, Heuristic Functions. **Beyond Classical Search**: Local Search Algorithms, Searching with Non-Deterministic Action, Searching with Partial Observations, Online Search Agents And Unknown Environments	**12**
III	**Adversarial Search**: Games, Optimal Decisions in Games, Alpha-Beta Pruning, Stochastic Games, Partially Observable Games. **Logical Agents:** Knowledge Base Agents, The Wumpus World, Propositional Logic, Propositional Theorem Proving. **Probabilistic Reasoning**: Uncertainty, Conditional Probability, Bayes Theorem	**12**
IV	**First Order Logic**: Need For First Order Logic, Difference between Propositional and First Order Logic, Knowledge Engineering in First Order Logic **Inference in First Order Logi**c: Unification and Lifting, Forward and Backward Chaining, Resolution **Artificial Neural Network:** Architecture of ANN, Merits and Demerits of ANN, Types of ANN.	**12**
V	**Planning:** Definition of Classical Planning, Algorithms for Planning as State Space Search, Planning Graphs, Other Classical Planning	**12**

	Approaches, Analysis of Planning Approaches, Time, Schedules and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multiagent Planning. **Generative AI**: What is Generative AI? Types of Generative AI	

Textbooks:

- Artificial Intelligence: A Modern Approach–Stuart Russel and Peter Norvig–Pearson–Third-2015
- A First Course in Artificial Intelligence–Deepak Khemani–TMH–First-2017
- Artificial Intelligence: A Rational Approach–Rahul Deva–Shroff Publisher–First–2018

Additional References:

- Artificial Intelligence & Generative AI for Beginners: The Complete Guide–David M. Patel–GD Publishing–First–2023

Course Code	SEM – V- Course Title	Credits	Lectures/Week
K24IT5P4	**Paper IV Artificial Intelligence Practical**	**2**	**3**

Course Outcomes:

- CO1- Articulate the historical development and current trends in Artificial Intelligence, demonstrating a comprehensive understanding of its foundations and principles.
- CO2- Understand the proficiency in implementing and analyzing various search algorithms, utilizing both uninformed and informed strategies to solve complex problems efficiently.
- CO3- Apply adversarial search techniques to decision-making in competitive environments, including games, and effectively manage uncertainty and partial observability.
- CO4- Demonstrate competency in logical reasoning and inference, utilizing propositional and first-order logic to represent and solve real-world problems in AI applications.

Unit	Topics
1.	**Write programs for the following:**
a.	Implement depth first search algorithm.
b.	Implement breadth first search algorithm.
2	**Write programs for the following:**
a.	Simulate 4-Queen / N-Queen problem
b.	Solve the Tower of Hanoi problem.
3	**Write programs for the following:**
a	Implement alpha beta search.
b	Implement hill climbing problems.
4	**Write programs for the following:**
a	Implement A* algorithm.
b	Solve the water jug problem.
5	**Write programs for the following:**
a	Simulate tic – tac – toe game using min-max algorithm.
b	Shuffle deck of cards.
6	**Write programs for the following:**
a	Design an application to simulate number puzzle problems.
7	**Write programs for the following:**
a	Solve constraint satisfaction problems.
8	**Write programs for the following:**

a	Derive the expressions based on Associative Law.
b	Derive the expressions based on Associative Law.
9	**Write programs for the following:**
a	Derive the predicate. (for e.g.: Sachin is batsman, batsman is cricketer) - > Sachin is Cricketer
10	**Write programs for the following:**
a	Write a program which contains three predicates: male, female, parent. Make rules for following family relations: father, mother, grandfather, grandmother, brother, sister, uncle, aunt, nephew and niece, cousin. Question: i. Draw a Family Tree. ii. Define: Clauses, Facts, Predicates and Rules with conjunction and disjunction

Course Code	SEM – V- Course Title	Credits	Lectures/ Week
K24IT505	Paper V Enterprise Java	2	4

Course Outcomes:

After successful completion of this course, students would be able to

- CO1- Proficiently understand and apply servlets and database connectivity concepts to develop dynamic web applications.
- CO2- Demonstrate the ability to develop applications capable of managing cookies, sessions, and performing file operations effectively.
- CO3- Proficient in understanding and designing applications using Java Server Pages (JSP), enabling dynamic and interactive web content creation
- CO4- Adapt at comprehending and designing applications utilizing Enterprise Java Beans (EJB), facilitating the development of scalable and distributed enterprise-level applications.

Unit	Topics	No of Lectures
I	**Understanding Java EE:** What is an Enterprise Application? What is java enterprise edition? Java EE Technologies, Java EE evolution, Glassfish server **Java EE Architecture, Server and Containers:** Types of System Architecture, Java EE Server, Java EE Containers. **Introduction to Java Servlets:** The Need for Dynamic Content, Java Servlet Technology, Why Servlets? What can Servlets do? **Servlet API and Lifecycle:** Java Servlet API, The Servlet Skeleton, The Servlet Life Cycle, A Simple Welcome Servlet **Working with Servlets:** Getting Started, Using Annotations Instead of Deployment Descriptor. **Working with Databases:** What Is JDBC? JDBC Architecture, Accessing Database, The Servlet GUI and Database Example.	12
II	**Request Dispatcher:** Requestdispatcher Interface, Methods of Requestdispatcher, Requestdispatcher Application. **COOKIES:** Kinds of Cookies, Where Cookies Are Used? Creating Cookies, Using Servlet, Dynamically Changing the Colors of A Page **SESSION:** What Are Sessions? Lifecycle of HttpSession, 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. **Working with Non-Blocking I/O:** Creating a Non- Blocking Read Application, Creating The Web Application, Creating Java Class, Creating Servlets, Retrieving The File, Creating index.jsp	12
III	**Introduction To Java ServerPages**: 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, JSPDocument, JSPElements, JSP GUI Example. **Action Elements:** Including other Files, Forwarding JSP Page to Another Page, Passing Parameters for other Actions, Loading a Java bean.	12

	Implicit Objects, Scope and El Expressions: Implicit Objects, Character Quoting Conventions, Unified Expression Language [UnifiedEl], 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.	
IV	**Introduction To Enterprise Javabeans:** Enterprise Bean Architecture, Benefits of Enterprise Bean, Types of Enterprise Bean, Accessing Enterprise Beans, Enterprise Bean Application, Packaging Enterprise Beans **Working with Session Beans:** When to use Session Beans? Types of Session Beans, Remote and Local Interfaces, Accessing Interfaces,Lifecycle of Enterprise Beans, Packaging Enterprise Beans, Example of Stateful Session Bean, Example of Stateless Session Bean, Example of Singleton Session Beans. **Working with Message Driven Beans:** Lifecycle of a Message Driven Bean, Uses of Message Driven Beans, The Message Driven Beans Example. **Interceptors:** Request and Interceptor, Defining An Interceptor, AroundInvoke Method, Applying Interceptor, Adding An Interceptor To An Enterprise Bean, Build and Run the Web Application. **Java Naming and Directory Interface:** What is Naming Service? What is Directory Service? What is Java Naming and Directory interface? Basic Lookup, JNDI Namespace in Java EE, Resources and JNDI, Datasource Resource Definition in Java EE	**12**
V	**Persistence, Object/Relational Mapping And JPA:** What is Persistence? Persistence in Java, Current Persistence Standards in Java, Why another Persistence Standards? Object/Relational Mapping. **Introduction to Java Persistence API:** The Java Persistence API, JPA, ORM, Database and the Application, Architecture of JPA, How JPA Works? JPA Specifications. **Writing JPA Application:** Application Requirement Specifications, Software Requirements, The Application Development Approach, Creating Database and Tables in Mysql, creating a Web Application, Adding the Required Library Files, creating a Javabean Class, Creating Persistence Unit [Persistence.Xml], Creating JSP's, The JPA Application Structure, Running the JPA Application. **Introduction to Hibernate:** What is Hibernate? Why Hibernate? Hibernate, Database and The Application, Components of Hibernate, Architecture of Hibernate, How Hibernate Works? **Writing Hibernate Application:** Application Requirement Specifications, Software Requirements, The Application Development Approach, Creating Database and Tables in Mysql, Creating a Web Application, Adding the Required Library Files, Creating a Java bean Class, Creating Hibernate Configuration File, Adding a Mapping Class, Creating JSP's, Running The Hibernate Application	**12**

Textbooks:

- Java EE 7 For Beginners–Sharanam Shah,Vaishali Shah–SPD–First Edition–2017
- Java EE 8 Cookbook–Elder Moraes–Packt–First Edition–2018

- Advanced Java Programming–Uttam Kumar Roy–Oxford Press–First Edition–2015

Additional References:

- Java EE 8 Application Development–David R. Heffelfinger–Packt–First Edition–2017

Course Code	SEM – V- Course Title	Credits	Lectures/Week
K24IT5P5	Paper V **Enterprise Java**	2	3

Course Outcomes:

- Proficiently understand and apply servlets and database connectivity concepts to develop dynamic web applications.
- Demonstrate the ability to develop applications capable of managing cookies, sessions, and performing file operations effectively.
- Proficient in understanding and designing applications using Java Server Pages (JSP), enabling dynamic and interactive web content creation
- Adapt at comprehending and designing applications utilizing Enterprise Java Beans (EJB), facilitating the development of scalable and distributed enterprise-level applications.

Unit	Topic
1.	**Implement the following Simple Servlet applications.**
a.	Create a simple calculator application using servlet.
b.	Create a servlet for a login page. If the username and password are correct then it says message “Hello <username>” else a message “login failed”
c.	Create a registration servlet in Java using JDBC. Accept the details such as Username, Password, Email, and Country from the user using HTML Form and store the registration details in the database
2.	**Implement the following Servlet applications with Cookies and Sessions.**
a.	Using Requestdispatcher Interface create a Servlet which will validate the password entered by the user, if the user has entered "Servlet" as password, then he will be forwarded to Welcome Servlet else the user will stay on the index.html page and an error message will be displayed

b.	Create a servlet that uses Cookies to store the number of times a user has visited servlet
c.	Create a servlet demonstrating the use of session creation and destruction. Also check whether the user has visited this page first time or has visited earlier also using sessions.
3	**Implement the Servlet IO and File applications.**
a.	Create a Servlet application to upload and download a file.
b.	Develop a Simple Servlet Question Answer Application using Database.
c.	Create simple Servlet application to demonstrate Non-Blocking Read Operation
4.	**Implement the following JSP applications.**
a.	Develop a simple JSP application to display values obtained from the use of intrinsic objects of various types.
b.	Develop a simple JSP application to pass values from one page to another with validations. (Name-txt, age-txt, hobbies-checkbox, email-txt, gender-radio button).
c.	Create a registration and login JSP application to register and authenticate the user based on username and password using JDBC.
5	**Implement the following JSP JSTL and EL Applications.**
a.	Create an html page with fields, eno, name, age, desg, salary. Now submit this data to a JSP page which will update the employee table of the database with matching eno.
b.	Create a JSP page to demonstrate the use of Expression language.
c.	Create a JSP application to demonstrate the use of JSTL.
6	**Implement the following EJB Applications**
a.	Create a Currency Converter application using EJB.
b.	Develop a Simple Room Reservation System Application Using EJB.
c.	Develop a simple shopping cart application using EJB [Stateful Session Bean].
7	**Implement the following EJB applications with different types of Beans**
a.	Develop simple EJB application to demonstrate Servlet Hit count using Singleton Session Beans
b.	Develop a simple visitor Statistics application using Message Driven Bean [Stateless Session Bean].
c.	Develop simple Marks Entry Application to demonstrate accessing Database using EJB

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

Textbooks:

- Java EE 7 For Beginners–Sharanam Shah,Vaishali Shah–SPD–First Edition–2017
- Java EE 8 Cookbook–Elder Moraes–Packt–First Edition–2018
- Advanced Java Programming–Uttam Kumar Roy–Oxford Press–First Edition–2015

Additional References:

- Java EE 8 Application Development–David R. Heffelfinger–Packt–First Edition–2017

SEMESTER-VI

Course Code	SEM – VI- Course Title	Credits	Lectures /Week
K24IT601	**Paper I Software Testing and Quality Assurance**	**2**	**4**

Course Outcomes:

After successful completion of this course, students would be able to

- Learners understand various software testing methods
- Learners can identify defects and manage those defects for improvement in quality.
- Learners analyze and comprehend the use of modern software testing tools and procedures for their projects testing
- Understand and apply methods for verifying and validating software to ensure it meets requirements and functions correctly

Unit	Topic	No of Lectures
I	**Introduction to Quality:** Historical Perspective of Quality, What is Quality? (Is it a fact or perception?), Definitions of Quality, Core Components of Quality, Quality View, Financial Aspect of Quality, Customers, Suppliers and Processes, Total Quality Management (TQM), Quality Principles of Total Quality Management, Quality Management Through Statistical Process Control, Quality Management Through Cultural Changes, Continual (Continuous) Improvement Cycle, Quality in Different Areas, Benchmarking and Metrics, Problem Solving Techniques, Problem Solving Software Tools. **Software Quality:** Introduction, Constraints of Software Product Quality Assessment, Customer is a King, Quality and Productivity Relationship, Requirements of a Product, Organisation Culture, Characteristics of Software, Software Development Process, Types of Products, Schemes of Criticality Definitions, Problematic Areas of Software Development Life Cycle, Software Quality Management, Why Software Has Defects? Processes Related to Software Quality, Quality Management System Structure, Pillars of Quality Management System, Important Aspects of Quality Management	**12**
II	**Fundamentals of testing:** Introduction, Necessity of testing, What is testing? Fundamental test process, The psychology of testing, Historical Perspective of Testing, Definitions of Testing, Approaches to Testing, Testing During Development Life Cycle, Requirement Traceability Matrix, Essentials of Software Testing, Workbench, Important Features of Testing Process, Misconceptions About Testing, Principles of Software Testing, Salient Features of Good Testing, Test Policy, Test Strategy or Test Approach, Test Planning, Testing Process and Number of Defects Found in Testing, Test Team Efficiency,	**12**

	Mutation Testing, Challenges in Testing, Test Team Approach, Process Problems Faced by Testing, Cost Aspect of Testing, Establishing Testing Policy, Methods, Structured Approach to Testing, Categories of Defect, Defect, Error, or Mistake in Software, Developing Test Strategy, Developing Testing Methodologies (Test Plan), Testing Process, Attitude Towards Testing (Common People Issues) Test Methodologies/Approaches, People Challenges in Software Testing, Raising Management Awareness for Testing, Skills Required by Tester, Testing throughout the software life cycle, Software development models, Test levels, Test types, the targets of testing, Maintenance testing	
III	**Unit Testing**: **Boundary Value Testing:** Normal Boundary Value Testing, Robust Boundary Value Testing, Worst-Case Boundary Value Testing, Special Value Testing, Examples, Random Testing, Guidelines for Boundary Value Testing **Equivalence Class Testing:** Equivalence Classes, Traditional Equivalence Class Testing, Improved Equivalence Class Testing, Edge Testing, Guidelines and Observations **Decision Table–Based Testing:** Decision Tables, Decision Table Techniques, Cause-and-Effect Graphing, Guidelines and Observations **Path Testing:** Program Graphs, DD-Paths, Test Coverage Metrics, Basis Path Testing, Guidelines and Observations, **Data Flow Testing:** Define/Use Testing, Slice-Based Testing, Program Slicing Tools.	**12**
IV	**Software Verification and Validation:** Introduction, Verification, Verification Workbench, Methods of Verification, Types of reviews on the basis of Stage Phase, Entities involved in verification, Reviews in testing life cycle, Coverage in Verification, Concerns of Verification, Validation, Validation Workbench, Levels of Validation, Coverage in Validation, Acceptance Testing, Management of Verification and Validation, Software development verification and validation activities. **V-test Model:** Introduction, V-model for software, testing during Proposal stage, Testing during requirement stage, Testing during test planning phase, Testing during design phase, Testing during coding, VV Model, Critical Roles and Responsibilities.	**12**
V	**Levels of Testing**: Introduction, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big- Bang Testing, Sandwich Testing, Critical Path First, Sub System Testing, System Testing, Testing Stages. **Testing Tools:** Introduction, Features of Test tools, Guidelines for selecting a tool, Tool and skills of a tester, Static Testing tools, Dynamic Testing tools, Advantages of using Tools, Disadvantages of Using Tools, When to use Automated Test tools, Testing Using Automated Tools, Difficulties while introducing new tools.	**12**

	Taxonomy of testing tools: Functional/Regression testing tools, Source code testing tools, Performance testing tools, Java testing tools, Embedded software testing tools, Network protocol testing tools, Configuration management /Bug tracking tools, Testing management tools. How to select testing tools?	

Textbooks:

- Software Testing and Continuous Quality Improvement–William E. Lewis–CRC Press–Third Edition-2016
- Software Testing: Principles, Techniques and Tools-M. G. Limaye-TMH-2017
- Foundations of Software Testing-Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black--Cengage Learning--3rd Edition

Additional References:

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

Course Code	SEM – VI- Course Title	Credits	Lectures /Week
K24IT602	**Paper II Information Security**	**2**	**4**

Course Outcomes:

After successful completion of this course, students would be able to

- Understanding the importance of information protection
- Comprehending the evolution of information security.
- Utilize established methodologies for implementing and managing security
- Analysing Intrusion Detection and Prevention Systems, Voice over IP(VoIP) and PBX security

Unit	Topic	No of Lectures
I	**Information Security Overview:** The Importance of Information Protection, The Evolution of Information Security, Justifying Security Investment, Security Methodology, How to Build a Security Program, The Impossible Job, The Weakest Link, Strategy and Tactics, Business Processes vs. Technical Controls. **Risk Analysis:** Threat Definition, Types of Attacks, Risk Analysis, Secure Design Principles: The CIA Triad and Other Models, Defense Models, Zones of Trust, Best Practices for Network Defense.	**12**
II	**Authentication and Authorization:** Authentication, **Authorization Encryption**: A Brief History of Encryption, Symmetric-Key Cryptography, Public Key Cryptography, Public Key Infrastructure. **Storage Security:** Storage Security Evolution, Modern Storage Security, Risk Remediation, Best Practices.	**12**

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

Textbooks:

- The Complete Reference: Information Security-Mark Rhodes- Ousley McGraw-Hill-Second-2013
- Essential Cybersecurity Science-Josiah Dykstra-O'Reilly-Fifth-2017
- Principles of Computer Security: CompTIA Security+ and Beyond-Wm.Arthur Conklin, Greg White-McGraw Hill-Second-2010

Additional References:

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

Course Code	**SEM – VI - Course Title**	**Credits**	**Lectures/Week**

K24IT6P2	Paper II Information Security	2	3

Course Outcomes:

After successful completion of this course, students would be able to

- Understanding the importance of information protection
- Comprehending the evolution of information security.
- Utilize established methodologies for implementing and managing security
- Analysing Intrusion Detection and Prevention Systems, Voice over IP(VoIP) and PBX security

Unit	Topics
1	**Configure Routers:**
a.	OSPF MD5 authentication.
b.	NTP.
c.	to log messages to the syslog server.
2	**Configure AAA Authentication**
a.	Configure a local user account on Router and configure authenticate on the console and vty lines using local AAA
b.	Verify local AAA authentication from the Router console and the PC-A client
3	**Configuring Extended ACLs**
a.	Configure, Apply and Verify an Extended Numbered ACL
4	**Configure IP ACLs to Mitigate Attacks and IPV6 ACLs**
a.	Verify connectivity among devices before firewall configuration.
b.	Use ACLs to ensure remote access to the routers is available only from management station PC-C.
c.	Configure ACLs to mitigate attacks.
d	Configuring IPv6 ACLs
5	**Configuring a Zone-Based Policy Firewall**
6	**Configure IOS Intrusion Prevention System (IPS) Using the CLI**
a.	Enable IOS IPS.
b.	Modify an IPS signature
7	**Layer 2 Security**
a.	Assign the Central switch as the root bridge
b.	Secure spanning-tree parameters to prevent STP manipulation attacks.

c.	Enable port security to prevent CAM table overflow attacks.
8	**Layer 2 VLAN Security**
9	**Configure and Verify a Site-to-Site IPsec VPN Using CLI**
10	**Configuring ASA Basic Settings and Firewall Using CLI**
a.	Configure basic ASA settings and interface security levels using CLI
b.	Configure routing, address translation, and inspection policy using CLI
c.	Configure DHCP, AAA, and SSH
d.	Configure a DMZ, Static NAT, and ACLs

Textbooks:

- Essential Cybersecurity Science–Josiah Dykstra-O'Reilly–Fifth Edition-2017
- Principles of Computer Security: CompTIA Security+ and Beyond--Wm.Arthur Conklin, Greg White-McGraw Hill--Second Edition-2010

Additional References:

- The Complete Reference: Information Security-Mark Rhodes- Ousley McGraw- Hill-2nd Edition-2013

Course Code	**SEM – VI- Course Title**	**Credits**	**Lectures/ Week**
K24IT603	**Paper III Business Intelligence and Data Analytics**	**2**	**4**

Course Outcomes:

After successful completion of this course, students would be able to

- CO1- Learners can explore the concepts of Strategic Decision Support and Harnessing Data for Informed Business Decisions
- CO2- Application used for Data-Driven Mathematical Models and Data Mining for Informed Decision Making
- CO3- Managing data through Advanced Data Analysis Techniques: Classification, Clustering, and Model Evaluation
- CO4- Analyzing Strategic Information Management: Enhancing Decision-Making Across Marketing, Logistics, and Production
- CO5- Fact findings using Strategic Organizational Intelligence: Bridging Gaps, Cultivating Knowledge, and Embracing Artificial Intelligence

Unit	**Topics**	**No of Lectures**
I	**Business intelligence:** Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Ethics and business intelligence Decision support systems: Definition of system, Representation of the decision-making process, Evolution of	**12**

	information systems, Definition of decision support system, Development of a decision support system	
II	**Mathematical models for decision making**: Structure of mathematical models, Development of a model, Classes of models Data mining: Definition of data mining, Representation of input data, Data mining process, Analysis methodologies Data preparation: Data validation, Data transformation, Data reduction	**12**
III	**Classification:** Classification problems, Evaluation of classification models, Bayesian methods, Logistic regression, Neural networks, Support vector machines Clustering: Clustering methods, Partition methods, Hierarchical methods, Evaluation of clustering models	**12**
IV	**Management Information System (MIS):** Classification and Quality of Information, Marketing models: Relational marketing, Sales force management, Logistic and production models: Supply chain optimization, Optimization models for logistics planning, Revenue management systems.Data envelopment analysis, The CCR model, Identification of good operating practices	**12**
V	**Knowledge Management Metrics,** Organizational Culture-Types and analysis, Organizational maturity model, Artificial Intelligence and Expert Systems: Concepts and Definitions of Artificial Intelligence, Artificial Intelligence Versus Natural Intelligence, Machine Learning- Data Distribution, Machine Learning Process, Tools, TensorFlow	**12**

Textbooks:

- Business Intelligence: Data Mining and Optimization for Decision Making-Carlo VercellisWiley First –2009
- Fundamental of Business Intelligence Grossman W,Rinderle-MaSpringer FirstEdition –2015
- Decision support and Business Intelligence Systems Efraim Turban, Ramesh Sharda, Dursun Delen–Pearson–Ninth Edition–2011

Additional References:

- Machine learning -Saikat Dutt Subramanian Chandramouli-Pearso**n**

Course Code	**SEM – VI - Course Title**	**Credits**	**Lectures/Week**

K24IT6P3	**Paper III Business Intelligence and Data Analytics Practical**	2	3

Course Outcomes:

After successful completion of this course, students would be able to

- Learners can explore the concepts of Strategic Decision Support and Harnessing Data for Informed Business Decisions
- Application used for Data-Driven Mathematical Models and Data Mining for Informed Decision Making
- Managing data through Advanced Data Analysis Techniques: Classification, Clustering, and Model Evaluation
- Analyzing Strategic Information Management: Enhancing Decision-Making Across Marketing, Logistics, and Production
- Fact findings using Strategic Organizational Intelligence: Bridging Gaps, Cultivating Knowledge, and Embracing Artificial Intelligence

Unit	Topic
1	**Perform the analysis for the following**
a.	Import the data warehouse data in Microsoft Excel and create the Pivot table and Pivot Chart
b.	Import the cube in Microsoft Excel and create the Pivot table and Pivot Chart to perform data analysis
2	Apply the what – if Analysis for data visualization. Design and generate necessary reports based on the data warehouse data. Use Excel.
3	Perform the data classification using classification algorithm using R/Python**.**
4	Perform the data clustering using a clustering algorithm using R/Python.
5	Perform the Linear regression on the given data warehouse data using R/Python
6	Perform the logistic regression on the given data warehouse data using R/Python.
7	Write a Python program to read data from a CSV file, perform simple data analysis, and generate basic insights. (Use Pandas is a Python library).
8	**Perform data visualization**
a.	Perform data visualization using Python on any sales data.
b.	Perform data visualization using PowerBI on any sales data.
9	**Create the Data staging area for the selected database using SQL.**
10	**Create the cube with suitable dimension and fact tables based on the ROLAP, MOLAP and HOLAP model.**

Course Code	SEM – VI- Course Title	Credits	Lectures /Week
K24IT604	**Paper IV Fundamentals of GIS**	**2**	**4**

Course Outcomes:

After successful completion of this course, students would be able to

- Recall the importance of Geographical Information System
- Understanding Spatial Referencing and Positioning
- Comprehending the Data Management and Processing Systems
- Analysing GIS capabilities

Unit	Topics	No of Lectures
I	**A Gentle Introduction to GIS**: The nature of GIS: Some fundamental observations, Defining GIS, GISystems, GIScience and GIApplications, Spatial data and Geoinformation. **The real world and representations of it:** Models and modelling, Maps, Databases, Spatial databases and spatial analysis Geographic Information and Spatial Database Models and Representations of the real world **Geographic Phenomena:** Defining geographic phenomena, types of geographic phenomena, Geographic fields, Geographic objects, Boundaries **Computer Representations of Geographic Information:**Regular tessellations, irregular tessellations, Vector representations, Topology and Spatial relationships, Scale and Resolution, Representation of Geographic fields, Representation of Geographic objects Organizing and Managing Spatial Data The Temporal Dimension	**12**
II	**Data Management and Processing Systems, Hardware and Software Trends Geographic Information Systems:** GIS Software, GIS Architecture and functionality, Spatial Data Infrastructure (SDI) **Stages of Spatial Data handling:** Spatial data handling and preparation, Spatial Data Storage and maintenance, Spatial Query and Analysis, Spatial Data Presentation. **Database management Systems:** Reasons for using a DBMS, Alternatives for data management, The relational data model, Querying the relational database. **GIS and Spatial Databases:** Linking GIS and DBMS, Spatial database functionality.	**12**
III	**Spatial Referencing and Positioning Spatial Referencing**: Reference surfaces for mapping, Coordinate Systems, Map Projections, Coordinate Transformations	**12**

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

Textbooks:

- Principles of Geographic Information Systems- An Introductory Text Book Editors: Otto Huisman and Rolf A-The International Institute of Geoinformation Science and Earth Observation-Fourth Edition--2009
- Principles of Geographic Information Systems-P.A Burrough and R.A.McDonnell Oxford University Press--Third Edition-1999

Additional References:

- Introduction to Geographic Information Systems-Chang Kang-tsung (Karl),-McGrawHill-7th Edition- 2013

Course Code	SEM – VI - Course Title	Credits	Lectures/Week
K24IT6P4	**Paper IV FGIS Practical**	**2**	**3**

Course Outcomes:

After successful completion of this course, students would be able to

- Understanding the importance of Geographical Information System
- Comprehending the Data Management and Processing Systems)
- Understanding Spatial Referencing and Positioning
- Analysing GIS capabilities

Unit	Topic
1	Familiarizing Quantum GIS: Installation of QGIS, datasets for both Vector and Raster data, Maps.
2	Creating and Managing Vector Data: Adding vector layers, setting properties, formatting, calculating line lengths and statistics
3	Exploring and Managing Raster data: Adding raster layers, raster styling and analysis, raster mosaicking and clipping
4	Making a Map, Working with Attributes, Importing Spreadsheets or CSV files Using Plugins, Searching and Downloading OpenStreetMap Data
5	Working with attributes, terrain Data
6	Working with Projections and WMS Data
7	Georeferencing TopoSheets and Scanned Maps Georeferencing Aerial Imagery Digitizing Map Data
8	Managing Data Tables and Spatial dataSets: Table joins, spatial joins, points in polygon analysis, performing spatial queries
9	**Advanced GIS Operations 1:** Nearest Neighbor Analysis, Sampling Raster Data using Points or Polygons, Interpolating Point Data
10	**Advance GIS Operations 2**: Batch Processing using Processing Framework Automating Complex Workflows using Processing Modeler Automating Map Creation with Print Composer Atlas Validating Map data

Textbooks:

- Principles of Geographic Information Systems- An Introductory Text Book--Editors: Otto Huisman and Rolf A.-The International Institute of Geoinformation Science and Earth Observation-Fourth Edition-2009
- Principles of Geographic Information Systems-P.A Burrough and R.A.McDonnell Oxford University-Press--Third Edition-1999

Additional References:

- Introduction to Geographic Information Systems Chang Kang- tsung(Karl), McGrawHill-7th Edition--2013

Course Code	SEM – VI- Course Title	Credits	Lectures /Week
K24IT605	**Paper V IT Infrastructure Management**	**2**	**4**

Course Outcomes:

After successful completion of this course, students would be able to

- CO1- Apply the principles and concepts of ITIL 4 to enhance IT service management practices.
- CO2- Demonstrate proficiency in implementing ITIL management practices
- CO3- Successfully drive stakeholder value and engage in value co-creation
- CO4- Develop the skills to create, deliver, and support services within the ITIL service value system.

Unit	Topic	No of Lectures
I	**Introduction:** IT service management in the modern world, About ITIL 4, The structure and benefits of the ITIL 4 framework. **Key concepts of service management** : Value and value co-creation, Organizations, service providers, service consumers, and other stakeholders, Products and services, Service relationships, Value: outcomes, costs, and risks. **The four dimensions of service management**: Organizations and people, Information and technology, Partners and suppliers, Value streams and processes, External factors. **The ITIL service value system** : Service value system overview, Opportunity, demand, and value, The ITIL guiding principles, Governance, Service value chain, Continual improvement.	**12**
II	**ITIL management practices:** General management practices,Service management practices, Technical management practices.	**12**
III	**Drive Stakeholder Value**: Introduction, The customer journey, Step 1: Explore, Step 2: Engage, Step 3: Offer, Step 4: Agree, Step 5: Onboard, Step 6: Co-create, Step 7: Realize.	**12**
IV	**Create, Delivery and Support (CDS):** Service value system key concepts and challenges, Using a shift-left approach, Plan and manage resources in the service value system, The use and value of technology across the service value system. **Value streams for new services**: Reviewing service value chains and service value streams, ITIL practices and value streams for new services, Change enablement, Service design and software development and management, Service validation and testing, Release management and deployment management **Value streams for user support**: ITIL practices and value streams for user support, Service desk, Incident management, Problem management, Knowledge management, Service level management and Monitoring and event management. **How to create, deliver and support services**	**12**

V	**High-Velocity IT :** Introduction, Key concepts, culture, techniques,Continual improvement	**12**

Textbooks:

- ITIL Foundation 4 Edition-Roman-Jouravlev, Akashay Anand, et. al-TSO, AXELOS-2 Edition-2019
- ITIL 4 High-Velocity IT-AkashayAnand-Dan Ashby, et. al--TSO, AXELOS-1 Edition-2020
- ITIL 4 Create, Delivery and Support (CDS)-Claire Agutter-AXELOS-1 Edition-2021

Additional References:

- ITIL 4 Drive Stakeholder Value-Roman Jouravlev, Pavel Demin, et. al-TSO, AXELOS-1 Editio-2020

Course Code	**SEM – VI - Course Title**	**Credits**	**Lectures/Week**
K24IT6P5	**Paper V Android Programming Practical**	**2**	**3**

Course Outcomes:

After successful completion of this course, students would be able to

- Build enterprise level mobile applications with Kotlin on Android
- Understand both the basic and advanced concepts of Kotlin
- Deploy the application on Google Play
- Become a certified Android developer

Unit	**Topic**
1	**Introduction to Android, Introduction to Android Studio IDE, Application Fundamentals:** Creating a Project, Android Components, Activities, Services, Content Providers, Broadcast Receivers, Interface overview, Creating Android Virtual device, USB debugging mode, Android Application Overview. Simple “Hello World” program.
2	**Programming Resources** Android Resources: (Color, Theme, String, Drawable, Dimension, Image),
3	**Programming Activities and fragments** Activity Life Cycle, Activity methods, Multiple Activities, Life Cycle of fragments and multiple fragments.
4	**Programs related to different Layouts**

	Coordinate, Linear, Relative, Table, Absolute, Frame, List View, Grid View
5	**Programming UI elements** AppBar, Fragments, UI Components
6	**Programming menus, dialog, dialog fragments**
7	**Programs on Intents, Events, Listeners and Adapters** The Android Intent Class, Using Events and Event Listeners
8	**Programs on Services, notification and broadcast receivers**
9	a. Database Programming with SQLite
	b. Programming Network Communications and Services (JSON)
10	**Programming threads, handles and asynchronized programs**
11	a. Programming Media API and Telephone API
	b. Programming Security and permissions

Textbooks:

- Android Programming for Beginners-John Horton Packt-Third Edition- 2021
- Head First Android Development-Dawn Griffiths, David Griffiths-O'Reilly-Second Edition-2017
- Android System Programming Roger Ye Packt-First Edition-2017

Additional References:

- Fundamentals of Android App Development-Sujit Kumar Mishra-BPB-First Edition-2020

Project Dissertation Semester V and Project Implementation Semester VI

Project Dissertation Semester V and Project Implementation Semester VI

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

I. OBJECTIVES

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

- Perform project cost estimates using various techniques.
- Schedule projects using both GANTT and PERT charts.
- Perform coding for the project.
- Documentation requirements and prepare and evaluate systems documentation.
- Perform various systems testing techniques/strategies to include the phases of testing.
- Systems implementation and its key problems.
- Generate various reports.
- Be able to prepare and evaluate a final report.
- Brief the maintenance procedures and the role of configuration management in operations.
- To decide the future scope and further enhancement of the system.
- Plan for several appendices to be placed in support with the project report documentation.
- Decide the various processing systems to include distributed, client/server, online and others.
- Perform project cost estimates using various techniques.
- Schedule projects using both GANTT and PERT charts.
- Perform coding for the project.
- Documentation requirements and prepare and evaluate systems documentation.
- Perform various systems testing techniques/strategies to include the phases of testing.
- Systems implementation and its key problems.
- Generate various reports.
- Be able to prepare and evaluate a final report.
- Brief the maintenance procedures and the role of configuration management in operations.
- To decide the future scope and further enhancement of the system.
- Plan for several appendices to be placed in support with the project report documentation.
- Work effectively as an individual or as a team member to produce correct, efficient, well organized and documented programs in a reasonable time.
- Recognize problems that are amenable to computer solutions, and knowledge of the tools necessary for solving such problems.
- Develop of the ability to assess the implications of work performed.
- Get good exposure and command in one or more application areas and on the software
- Develop quality software using the software engineering principles
- Developing the ability to communicate effectively.

II. Type of the Project

The majority of the students are expected to work on a real-life project preferably in some industry/ Research and Development Laboratories/Educational Institution/Software Company.

Students are encouraged to work in the areas listed below. However, it is not mandatory for a student to work on a real-life project. The student can formulate a project problem with the help of her/his Guide and submit the project proposal of the same. Approval of the project proposal is mandatory. If approved, the student can commence working on it, and complete it. Use the latest versions of the software packages for the development of the project.

III SOFTWARE AND BROAD AREAS OF APPLICATION

FRONT END / GUI Tools	.Net Technologies, Java
DBMS/BACK END	Oracle, SQL Plus, My SQL, SQL Server
LANGUAGES	C, C++, Java, [1] VC++, C#, R, Python
SCRIPTING LANGUAGES	PHP, JSP, SHELL Scripts (Unix), TCL/TK
.NET Platform	F#, C#, .Net Visual [2] C#, ASP.Net
MIDDLEWARE (COMPONENT) TECHNOLOGIES	COM/DCOM, Active-X, EJB
UNIX INTERNALS	Device Drivers, RPC, Threads, Socket programming
NETWORK WIRELESS TECHNOLOGIES	-
REALTIME OPERATING SYSTEM/ EMBEDDED SKILLS	LINUX, Raspberry [3] Pi, Arduino, 8051
APPLICATION AREAS	Financial / Insurance / Manufacturing / Multimedia / Computer Graphics / Instructional Design / Database Management [4] System / Internet / Intranet / Computer Networking-Communication / Software development / E-Commerce / ERP / MRP / TCP-IP programming / Routing protocols programming / Socket programming

IV. Introduction

The project report should be documented with a scientific approach to the solution of the problem that the students have sought to address. The project report should be prepared in order to solve the problem in a methodical and professional manner, making due references to appropriate techniques, technologies and professional standards. The student should start the documentation process from the first phase of software

development so that one can easily identify the issues to be focused upon in the ultimate project report. The student should also include the details from the project diary, in which they will record the progress of their project throughout the course.

The project report should contain enough details to enable examiners to evaluate the work. The important points should be highlighted in the body of the report, with details often referred to appendices.

1.1 PROJECT REPORT:

Title Page

Original Copy of the Approved Proforma of the Project Proposal

Certificate of Authenticated work

Role and Responsibility Form Abstract

Acknowledgement Table of Contents Table of Figures

CHAPTER 1: INTRODUCTION

1.1 Background

1.2 Objectives

1.3 Purpose, Scope, and Applicability

1.3.1 Purpose

1.3.2 Scope

1.3.3 Applicability

1.4 Achievements

1.5 Organisation 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

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

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

GLOSSARY APPENDIX A APPENDIX B

V. EXPLANATION OF CONTENTS

Title Page

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

Original Copy of the Approved Proforma of the Project Proposal

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

Certificate of Authenticated work

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

Role and Responsibility Form

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

Abstract

This should be one/two short paragraphs (100-150 words total), summarising the project work. It is important that this is not just a restatement 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 the student‟s gratitude to those who have helped in the preparation of the project.

Table of Contents:

The table of contents gives the readers a view of the detailed structure of the report. The students would need to provide section and subsection headings with associated pages. The formatting details of these sections and subsections are given below. Table of Figures: List of all Figures, Tables, Graphs, Charts etc. along with their page numbers in a table of figures.

Chapter 1: Introduction

The introduction has several parts as given below:

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

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

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

- Purpose: Description of the topic of the project that answers questions on why this project is being done. How the project could improve the system's significance and theoretical framework.
- Scope: A brief overview of the methodology, assumptions and limitations. The students should answer the question: What are the main issues being covered in the project? What are the main functions of the project?
- Applicability: The student should explain the direct and indirect applications of their work. Briefly discuss how this project will serve the computer world and people.
- Achievements: Explain what knowledge the student achieved after the completion of the work. What contributions has the project made to the chosen area? Goals achieved - describes the degree to which the findings support the original objectives laid out by the project. The goals may be partially or fully achieved, or exceeded.
- Organisation of Report: 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 students awareness and understanding of Available Technologies related to the topic of the project. The student should give the details 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 into subproblems. Define each sub- problem clearly.

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

Planning and Scheduling: Planning and scheduling is a complicated part of software

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

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

- Hardware Requirement: In this section, the equipment, graphics card, numeric coprocessor, 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 a project.

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

Chapter 4: System Design

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

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

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

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

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

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

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

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

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

User Interface Design: Define user, task, environment analysis and how to map those requirements in order to develop a "User Interface". Describe the external and internal

components and the architecture of the user interface. Show some rough pictorial views of the user interface and its components.

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

Test Cases Design: Define test cases, which will provide easy detection of errors and mistakes within a minimum period of time and with the least effort. Explain the different conditions in which the students wish to ensure the correct working of 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 do not need to include full source code, instead, include only the important codes (algorithms, applets code, forms code etc). The program code should contain comments needed for explaining the work a piece of code does. Comments may be needed to explain why it does it, or why it does a particular way. The student can explain the function of the code with a shot of the output screen of that program code.

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

- Testing Approach: Testing should be according to the scheme presented in the system design chapter and should follow some suitable model – e.g., category partition,

state machine-based. Both functional testing and user-acceptance testing are appropriate. Explain the approach of testing.

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

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

Modifications and Improvements: Once the students finish the testing they are bound to be faced with bugs, errors and they will need to modify your source code to improve the system. Define what modifications 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 is capable of facing any problematic situation and that it works fine in different conditions. Take the different sample inputs and show the outputs.

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

Chapter 7: Conclusions

Conclusion: The conclusions can be summarised in a fairly short chapter (2 or 3 pages). This chapter brings together many of the points that would have been made in the other chapters. Limitations of the System: Explain the limitations encountered during the testing of the project that the students were not able to modify. List the criticisms accepted during the demonstrations of the project.

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

REFERENCES

It is very important that the students acknowledge the work of others that they have used or adapted in their own work, or that provides the essential background or context to the project.

The use of references is the standard way to do this. Please follow the given standard for the references for books, journals, and online material. The citation is mandatory in both the reports.

E.g:

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

https://doi.org/doi:10.1080/03640210701703725

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

ISBN 9780226484648.

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

GLOSSARY

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

APPENDICES

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

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

VI. SUMMARY

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

VII. FURTHER READINGS

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

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

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

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

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

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

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

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

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

PNR No.: ..... Rollno: _____

1. Name of the Student

_____

2. Title of the Project

_____

3. Name of the Guide-
4. Teaching experience of the Guide _____
5. Is this your first submission? Yes No

Signature of the Student
Date: .....

Signature of the Guide
Date: .....

Signature of the Coordinator
Date: .....

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

TITLE OF THE PROJECT
(NOT EXCEEDING 2 LINES, 24 BOLD, ALL CAPS) **A Project Report (12 Bold)**

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

BACHELOR OF SCIENCE
(INFORMATION TECHNOLOGY) (14 BOLD, CAPS)
By(12 Bold)

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

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

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

YEAR (12 bold)

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) **Coordinator**

(Don‟t write names of lecturers or HOD)

External Examiner

Date: **College Seal**

COMPANY CERTIFICATE (if applicable)

(Project Abstract page format)

Abstract (20bold, caps, centered)

Content (12, justified)

Note: Entire document should be with 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, 12 font with 1.5 line spacing, justified.

(Declaration page format)

DECLARATION (20 bold, centered, allcaps)

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)** to be submitted as final semester project as part of our curriculum.

Name and Signature of the Student

TABLE OF CONTENTS (20 bold, caps, centered)

Should be generated automatically using word processing software.

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

Should be generated automatically using word processing software.

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

Should be generated automatically using word processing software.

***** The plagiarism should be maintained as per the UGC guidelines.***

**** NOTE ABOUT PROJECT VIVA VOCE:**

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

Evaluation Scheme for Third Year (UG) under AUTONOMY

I. Internal Evaluation for Theory Courses – 40 Marks

(i) Continuous Internal Assessment 1 (Assignment-Tutorial) – 20 Marks

(ii) Continuous Internal Assessment 2 – 20 Marks (Class Test with Fill in the Blanks, True or False & Answer the following)

II. External Evaluation for Theory Courses – 60 Marks

Duration: 2 Hours

Theory question paper pattern:

All questions are compulsory.

Qn.	Based on	Type	Options	Marks
Q.1	Unit I	Descriptive	*Any 3 out of 5*	12
Q.2	Unit II	Descriptive	*Any 3 out of 5*	12
Q.3	Unit III	Descriptive	*Any 3 out of 5*	12
Q.4	Unit IV	Descriptive	*Any 3 out of 6*	12
Q.5	Unit V	Descriptive	*Any 3 out of 6*	12

- All questions shall be compulsory with internal choice within the questions.
- Each Question may be subdivided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

III. Practical Examination

- Each core subject carries 50 Marks (30 marks External + 20 marks Internal)

Sr. No.	Undergraduate Practical Internal Evaluation:	Marks
1	Short Experiment/Field Trip/Excursion/Industrial Visit Report	15
2	Journal	5

Sr. No.	Undergraduate Practical External Evaluation:	Marks
1	Experiment/s	25
2	Viva	5

- Duration: 2 Hours for each practical course.
- Minimum 80% practical from each core subjects are required to be completed.
- Certified Journal is compulsory for appearing at the time of Practical Exam.

Note:
Two short field excursions for habitat studies are compulsory. Field work of not less than eight hours duration is equivalent to one period per week for a batch of 15 students.

- A candidate will be allowed to appear for the practical examinations only if he/she submits a certified journal of S.Y.B.Sc. or a certificate from the Head of the department / Institute to the effect that the candidate has completed the practical course of S.Y.B.Sc. as per the minimum requirements. In case of loss of journal, a candidate must produce a certificate from the Head of the department/Institute that the practicals for the academic year were completed by the student. However, such a candidate will be allowed to appear for the practical examination, but the marks allotted for the journal will not be granted.

****