Software Testing and Quality Assurance

B. Sc. (Information Technology)		Semester – VI	
Course Name: Software Testing and Quality Assurance		Course Code: USIT601	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		Hours	**Marks**
Evaluation System	Theory Examination	2½	75
	Internal	--	25

Course Objective:

- To understand the effective testing techniques for ensuring high quality software.
- To become familiar with quality assurance metrics and comprehend test tool capabilities.
- To become proficient in test project planning, test case and data design, testing operations.
- To understand the challenges and solutions related to software test automation.
- To understand the taxonomy of testing tools.

Unit	Details	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, 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),	12

	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 lifecycle, 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. **Taxonomy of testing tools**: Functional/Regression testing tools, Source code testing tools, Performance testing tools, Java testing tools, Embedded software testing tools, Network protocol testing tools, Configuration management /Bug tracking tools, Testing management tools. How to select a testing tools?	12

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Software Testing and Continuous Quality Improvement	William E. Lewis	CRC Press	Third	2016

2.	Software Testing: Principles, Techniques and Tools	M. G. Limaye	TMH		2017
3.	Foundations of Software Testing	Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black	Cengage Learning	3rd	
4.	Software Testing: A Craftsman's Approach	Paul C. Jorgenson	CRC Press	4th	2017
5.	Software Testing Tools	Dr.K. V. K. K. Prasad.	Dreamtech Press		

Course Outcome:

After completing the course, the learner will be able to:

CO1: Learners understand various software testing methods.

CO2: Learners can identify defects and manage those defects for improvement in quality.

CO3: Learners analyze and comprehend the use of modern software testing tools and procedures for their projects testing.

CO4: Understand and apply methods for verifying and validating software to ensure it meets requirements and functions correctly.

CO5: Gain comprehensive knowledge of various testing levels and methodologies to ensure thorough software quality assurance from requirements to system testing stages.

B. Sc. (Information Technology)		Semester – VI	
Course Name: Information Security		Course Code: USIT602	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	2½	75
	Internal	--	25

Course Objective:

- To understand the importance of Information protection
- To learn current best practices in storage capacity
- To understand the fundamental security aspects of network devices and learn techniques for hardening network devices against attacks.
- To familiarize Intrusion Detection and Prevention Systems, Voice over IP(VoIP) and PBX security
- To understand the security considerations for virtual machines and security aspects of cloud computing

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

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

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

Course Outcome:
After completing the course, the learner will be able to:
CO1: Understanding the importance of information protection.
CO2: Comprehending the evolution of information security.
CO3: Utilize established methodologies for implementing and managing security
CO4: Analysing Intrusion Detection and Prevention Systems, Voice over IP(VoIP) and PBX security
CO5: Understanding the security considerations for virtual machines and security aspects of cloud computing

Business Intelligence and Data Analytics

B. Sc. (Information Technology)		Semester – VI	
Course Name: Business Intelligence and Data Analytics		Course Code: USIT603	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	2½	75
	Internal	--	25

Course Objective:

- To understand the importance of business intelligence in facilitating effective and timely decision-making processes within organizations.
- Explore different classes of mathematical models and their applications in various decision-making scenarios.
- Understand the concept of classification problems and their applications in various domains.
- Study relational marketing models and their application in building and maintaining customer relationships.
- Study different types of organizational culture, including hierarchical, clan, adhocracy and market cultures.

Unit	Details	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 information systems, Definition of decision support system, Development of a decision support system	12
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.	12

	Data envelopment analysis, The CCR model, Identification of good operating practices	
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

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Business Intelligence: Data Mining and Optimization for Decision Making	Carlo Vercellis	Wiley	First	2009
2.	Fundamental of Business Intelligence	Grossmann W, Rinderle-Ma	Springer F	First	2015
3.	Decision support and Business Intelligence Systems	Efraim Turban, Ramesh Sharda, Dursun Delen	Pearson	Ninth	2011
4.	Machine learning	Saikat Dutt Subramanian Chandramouli	Pearson		

Course Outcome:

After completing the course, the learner will 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

B. Sc. (Information Technology)		Semester – VI	
Course Name: Fundamentals of GIS		Course Code: USIT604 (Elective-I)	
Periods per week (1 Period is 50 minutes)		5	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	2½	75
	Internal	--	25

Course Objective:

- To understand the principles of Geographical Information System
- To learn Data Management and Processing Systems Hardware and Software Trends
- To understand Spatial Referencing and Positioning
- To understand the Classification of analytical GIS Capabilities
- To understand Data visualization and its strategies

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

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Principles of Geographic Information Systems- An Introductory Text Book	Editors: Otto Huisman and Rolf A.	The International Institute of Geoinformation Science and Earth Observation	Fourth	2009
2.	Principles of Geographic Information Systems	P.A Burrough and R.A.McDonnell	Oxford University Press	Third	1999
3.	Introduction to Geographic Information Systems	Chang Kang-tsung (Karl),	McGrawHill	7th	2013

Course Outcome:

After completing the course, the learner will be able to:

CO1: Understanding the importance of Geographical Information System

CO2: Comprehending the Data Management and Processing Systems.

CO3: Understanding Spatial Referencing and Positioning

CO4: Analysing GIS capabilities

CO5: Understanding Data visualization

B. Sc. (Information Technology)	Semester – VI
Course Name: IT act and Cyber Law	Course Code: USIT607 (Elective-II)
Periods per week (1 Period is 50 minutes)	5
Credits	2

		Hours	Marks
Evaluation System	Theory Examination	2½	75
	Internal	--	25

Course Objective:

- To understand the legal framework for arrests without warrant, penalties, adjudication, and appeals in cybercrime cases under the IT Act, 2000.
- To explore the formation, validity, and jurisdictional issues of contracts in the digital and cyber world.
- To examine legal strategies and protections against cyber-squatting and copyright infringement in the digital realm.
- To analyze the challenges of e-commerce taxation and understand the role of digital signatures, certifying authorities, and e-governance in the digital economy.
- To compare the Indian Evidence Act of 1872 with the IT Act of 2000 and explore protections for cyber consumers in India.

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

	Jurisdiction in the United State of America, Jurisdiction Disputes w.r.t. the Internet in the United State of America.	
III	**Battling Cyber Squatters and Copyright Protection in the Cyber World**: Concept of Domain Name and Reply to Cyber Squatters, Meta-Tagging, Legislative and Other Innovative Moves Against Cyber Squatting, The Battle Between Freedom and Control on the Internet, Works in Which Copyright Subsists and meaning of Copyright, Copyright Ownership and Assignment, License of Copyright, Copyright Terms and Respect for Foreign Works, Copyright Infringement, Remedies and Offences, Copyright Protection of Content on the Internet; Copyright Notice, Disclaimer and Acknowledgement, Downloading for Viewing Content on the Internet, Hyper-Linking and Framing, Liability of ISPs for Copyright Violation in the Cyber World: Legal Developments in the US, Napster and its Cousins: A Revolution on the Internet but a Crisis for Copyright Owners, Computer Software Piracy.	12
IV	**E-Commerce Taxation: Real Problems in the Virtual World**: A Tug of War on the Concept of „Permanent Establishment‟, Finding the PE in Cross Border E-Commerce, The United Nations Model Tax Treaty, The Law of Double Taxation Avoidance Agreements and Taxable Jurisdiction Over Non-Residents, Under the Income Tax Act, 1961, Tax Agents of Non-Residents under the Income Tax Act,1961 and the Relevance to E-Commerce, Source versus Residence and Classification between Business Income and Royalty, The Impact of the Internet on Customer Duties, Taxation Policies in India: At a Glance. **Digital Signature, Certifying Authorities and E-Governance**: Digital Signatures, Digital Signature Certificate, Certifying Authorities and Liability in the Event of Digital Signature Compromise, E-Governance in India: A Warning to Babudom!	12
V	**The Indian Evidence Act of 1872 v. Information Technology Act, 2000**: Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving Electronic Messages, Other Amendments in the Indian Evidence Act by the IT Act, Amendments to the Bankers Books Evidence Act, 1891 and Reserve Bank of India Act, 1934. **Protection of Cyber Consumers in India**: Are Cyber Consumers Covered Under the Consumer Protection Act? Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Reliefs Under CPA, Beware Consumers, Consumer Foras, Jurisdiction and Implications on cyber Consumers in India, Applicability of CPA to Manufacturers, Distributors, Retailers and Service Providers Based in Foreign Lands Whose Goods are Sold or Services Provided to a Consumer in India. Amendments in Indian IT Act 2000.	12

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Cyber Law Simplified	VivekSood	TMH Education	First	2001

2.	Cybersecurity Law	Jeff Kossef	Wiley	First	2017
3.	Cyber Law	Pavan Duggal	Universal	Third	2023
4.	Cyber Crimes & Law	Santosh Kumar	Whitesmann's	First	2024
5.	Information Technology & Cyber Law	Krishna Pal Malik	Allahabad	Second	2023

Course Outcome:

After completing the course, the learner will be able to:

CO1: Gain a detailed understanding of the legal procedures and enforcement mechanisms for cybercrimes, including arrest without warrant, penalties, adjudication, and appeals under the IT Act, 2000.

CO2: understand the legal principles governing digital contracts and jurisdictional challenges in the cyber world.

CO3: Equipped with knowledge of legal remedies and strategies to combat cyber squatting and protect copyrights in the digital world.

CO4: Understand the complexities of e-commerce taxation and the significance of digital signatures, certifying authorities, and e-governance in modern digital transactions.

CO5: Comprehend the interplay between the Indian Evidence Act of 1872 and the Information Technology Act of 2000, and gain insights into the legal safeguards for cyber consumers in India.

Information Security Practical

B. Sc. (Information Technology)		Semester – VI	
Course Name: Information Security Practical		Course Code: USIT6P2	
Periods per week (1 Period is 50 minutes)		3	
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	2½	50
	Internal	--	--

List of Practical	
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 on to mitigate attacks.
d.	Configuring IPv6 ACLs
5.	**Configuring a Zone-Based Policy Firewall**
6.	**Configure IOS Intrusion Prevention System (IPS) Using the CLI**
a.	Enable IOS IPS.
b.	Modify an IPS signature.
7.	**Layer 2 Security**
a.	Assign the Central switch as the root bridge.
b.	Secure spanning-tree parameters to prevent STP manipulation attacks.
c.	Enable port security to prevent CAM table overflow attacks.
8.	**Layer 2 VLAN Security**

9.	Configure and Verify a Site-to-Site IPsec VPN Using CLI
10.	Configuring ASA Basic Settings and Firewall Using CLI
a.	Configure basic ASA settings and interface security levels using CLI
b.	Configure routing, address translation, and inspection policy using CLI
c.	Configure DHCP, AAA, and SSH
d.	Configure a DMZ, Static NAT, and ACLs

Books and References:

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

Business Intelligence and Data Analytics Practical

B. Sc. (Information Technology)		Semester – VI	
Course Name: Business Intelligence and Data Analytics Practical		Course Code: USIT6P3	
Periods per week (1 Period is 50 minutes)		3	
Credits		2	
		Hours	**Marks**
Evaluation System	Practical Examination	2½	50
	Internal	--	--

List of Practical	
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 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 ROLAP, MOLAP and HOLAP model.

Sr. No.	E-references
1.	https://www.tutorialspoint.com
2.	https://www.excel-easy.com
3.	https://dl.ebooksworld.ir/motoman/Packt.Practical.Business.Intelligence.www.EBooksWorld.ir.pdf

Fundamentals of GIS Practical

B. Sc. (Information Technology)		Semester – VI	
Course Name: Fundamentals of GIS Practical		**Course Code: USIT6P4 (Elective-I)**	
Periods per week (1 Period is 50 minutes)		3	
Credits		2	
		Hours	**Marks**
Evaluation System	**Practical Examination**	2½	50
	Internal	--	--

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

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Principles of Geographic Information Systems- An Introductory Text Book	Editors: Otto Huisman and Rolf A.	The International Institute of Geoinformation Science and Earth Observation	Fourth	2009
2.	Principles of Geographic Information Systems	P.A Burrough and R.A.McDonnell	Oxford University Press	Third	1999
3.	Introduction to Geographic Information Systems	Chang Kang-tsung (Karl),	McGrawHill	7th	2013

Android Programming Practical

B. Sc (Information Technology)		Semester – VI	
Course Name: Android Programming Practical		Course Code: USIT6P6	
Periods per week (1 Period is 50 minutes)		3	
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	2½	50
	Internal	--	20

Practical No	Details
0	**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.
1	**Programming Resources** Android Resources: (Color, Theme, String, Drawable, Dimension, Image),
2	**Programming Activities and fragments** Activity Life Cycle, Activity methods, Multiple Activities, Life Cycle of fragments and multiple fragments.
3	**Programs related to different Layouts** Coordinate, Linear, Relative, Table, Absolute, Frame, List View, Grid View.
4	**Programming UI elements** AppBar, Fragments, UI Components
5	**Programming menus, dialog, dialog fragments**
6	**Programs on Intents, Events, Listeners and Adapters** The Android Intent Class, Using Events and Event Listeners
7	**Programs on Services, notification and broadcast receivers**
8	a. **Database Programming with SQLite** b. **Programming Network Communications and Services (JSON)**
9	**Programming threads, handles and asynchronized programs**
10	a. **Programming Media API and Telephone API** b. **Programming Security and permissions**

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Android Programming for Beginners	John Horton	Packt	Third	2021
2.	Head First Android Development	Dawn Griffiths, David Griffiths	O'Reilly	Second	2017
3.	Android System Programming	Roger Ye	Packt	First	2017
4.	Fundamentals of Android App Development	Sujit Kumar Mishra	BPB	First	2020

Project Dissertation Semester V and Project Implementation Semester VI

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

I. OBJECTIVES

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

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

II. Type of the Project

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

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

III. SOFTWARE AND BROAD AREAS OF APPLICATION

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

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IV. Introduction

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

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

1.1 PROJECT REPORT:

Title Page

Original Copy of the Approved Proforma of the Project Proposal

Certificate of Authenticated work

Role and Responsibility Form

Abstract

Acknowledgement

Table of Contents

Table of Figures

CHAPTER 1: INTRODUCTION

       1.1 Background

       1.2 Objectives

       1.3 Purpose, Scope, and Applicability

       1.3.1 Purpose

       1.3.2 Scope

       1.3.3 Applicability

       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

CHAPTER 6: RESULTS AND DISCUSSION

CHAPTER 7: CONCLUSIONS

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 re-statement of the original project outline. A suggested flow is background, project aims and main achievements. From the abstract, a reader should be able to ascertain if the project is of interest to them and, it should present results of which they may wish to know more details.

Acknowledgements:

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

Table of Contents:

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

Chapter 1: Introduction

The introduction has several parts as given below:

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

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

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

- Purpose: Description of the topic of the project that answers questions on why this project is being done. How the project could improve the system its significance and theoretical framework.
- Scope: A brief overview of the methodology, assumptions and limitations. The students should answer the question: What are the main issues being covered in the project? What are the main functions of the project?

- Applicability: The student should explain the direct and indirect applications of their work. Briefly discuss how this project will serve the computer world and people.
- Achievements: Explain what knowledge the student achieved after the completion of the work. What contributions has the project made to the chosen area? Goals achieved - describes the degree to which the findings support the original objectives laid out by the project. The goals may be partially or fully achieved, or exceeded.
- Organisation of Report: 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 detail of all the related technologies that are necessary to complete the project. The should describe the technologies available in the chosen area and present a comparative study of all those Available Technologies. Explain why the student selected the one technology for the completion of the objectives of the project.

Chapter 3: Requirements and Analysis

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

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

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

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

- Hardware Requirement: In this section, the equipment, graphics card, numeric co-processor, mouse, disk capacity, RAM capacity etc. necessary to run the software must be noted.
- Software Requirements: In this section, the operating system, the compiler, testing tools, linker, and the libraries etc. necessary to compile, link and install the software must be listed.

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

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

Chapter 4: System Design

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

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

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

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

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

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

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

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

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

Chapter 5: Implementation and Testing

Implementation Approaches: Define the plan of implementation, and the standards the students have used in the implementation. Coding Details and Code Efficiency: Students not need include full source code, instead, include only the important codes (algorithms, applets code, forms code etc). The program code should contain comments needed for explaining the work a piece of code does. Comments may be needed to explain why it does it, or, why it does a particular way. The student can explain the function of the code with a shot of the output screen of that program code.

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

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

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

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

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

Chapter 6: Results and Discussion

Test Reports: Explain the test results and reports based on the test cases, which should show that 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 screen shots. The user document should provide all the details of the product in such a way that any user reading the manual, is able to understand the working and functionality of the document.

Chapter 7: Conclusions

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

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

REFERENCES

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

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

E.g:

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

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

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

GLOSSARY

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

APPENDICES

These may be provided to include further details of results, mathematical derivations, certain

illustrative parts of the program code (e.g., class interfaces), user documentation etc.

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

VI. SUMMARY

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

VII. FURTHER READINGS

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

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

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

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

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

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

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

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

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

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

1. Name of the Student

_____

2. Title of the Project

_____

3. Name of the Guide

4. Teaching experience of the Guide _____

5. Is this your first submission? Yes   No

Signature of the Student   Signature of the Guide

Date: …………………   Date: ……………………
Signature of the Coordinator
Date: …………………

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

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

A Project Report (12 Bold)

Submitted in partial fulfillment of the

Requirements for the award of the Degree of (size-12)

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

(14 BOLD, CAPS)

By(12 Bold)

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

Seat Number (size-15)

Under the esteemed guidance of (13 bold)

Mr./Mrs. Name of The Guide (15 bold, title case)

Designation (14 Bold, title case)

COLLEGE LOGO

DEPARTMENT OF INFORMATION TECHNOLOGY(12 BOLD, CAPS)

COLLEGE NAME (14 BOLD, CAPS)

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

CITY, PIN CODE(12 bold, CAPS)

MAHARASHTRA (12 bold, CAPS)

YEAR (12 bold)

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

<u>CERTIFICATE (14 BOLD, CAPS, underlined, centered)</u>

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)

<div align="center">

(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)
</div>

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

<div align="center">

(Declaration page format)

DECLARATION (20 bold, centered, allcaps)

Content (12, justified)
</div>

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.

<div align="right">

Name and Signature of the Student
</div>

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:**

Student may be asked to write code for problem during VIVA to demonstrate his coding capabilities and he/she may be asked to write any segment of coding used in the in the project.

The project can be done in group of at most four students. However, the length and depth of the project should be justified for the projects done in group. A big project can be modularised and different modules can be assigned as separate project to different students.

Marks Distribution:

Semester V: 50 Marks

Documentation: 50 marks

Semester VI: 150 Marks

Documentation: 50 Marks:

Implementation and Viva Voce: 100 Marks