

PSIT301: Technical Writing and Entrepreneurship Development

M. Sc (Information Technology)		Semester – III	
Course Name: Technical Writing and Entrepreneurship Development		Course Code: PSIT301	
Periods per week (1 Period is 60 minutes)		4	
Credits		4	
		Hours	Marks
Evaluation System	Theory Examination	2½	60
	Internal	--	40

Course Objectives:

- This course aims to provide conceptual understanding of developing strong foundation in general writing, including research proposal and reports.
- It covers the technological developing skills for writing Article, Blog, E-Book, Commercial web Page design, Business Listing Press Release, E-Listing and Product Description.
- This course aims to provide conceptual understanding of innovation and entrepreneurship development.

Unit	Details	Lectures	Outcome
I	<p>Introduction to Technical Communication: What Is Technical Communication? The Challenges of Producing Technical Communication, Characteristics of a Technical Document, Measures of Excellence in Technical Documents, Skills and Qualities Shared by Successful Workplace Communicators, How Communication Skills and Qualities Affect Your Career?</p> <p>Understanding Ethical and Legal Considerations: A Brief Introduction to Ethics, Your Ethical Obligations, Your Legal Obligations, The Role of Corporate Culture in Ethical and Legal Conduct, Understanding Ethical and Legal Issues Related to Social Media, Communicating Ethically Across Cultures, Principles for Ethical Communication</p> <p>Writing Technical Documents: Planning, Drafting, Revising, Editing, Proofreading</p> <p>Writing Collaboratively: Advantages and Disadvantages of Collaboration, Managing Projects, Conducting Meetings, Using Social Media and Other Electronic Tools in Collaboration, Importance of Word Press Website, Gender and Collaboration, Culture and Collaboration.</p>	12	CO1
II	<p>Introduction to Content Writing: Types of Content (Article, Blog, E-Books, Press Release, Newsletters Etc), Exploring Content Publication Channels. Distribution of your content across various channels. Blog Creation: Understand the psychology behind your web traffic,</p>	12	CO2

	Creating killing landing pages which attract users, Using Landing Page Creators, Setting up Accelerated Mobile Pages, Identifying UI UX Experience of your website or blog. Organizing Your Information: Understanding Three Principles for Organizing Technical Information, Understanding Conventional Organizational Patterns, Emphasizing Important Information: Writing Clear, Informative Titles, Writing Clear, Informative Headings, Writing Clear Informative Lists, Writing Clear Informative Paragraphs.		
III	Creating Graphics: The Functions of Graphics, The Characteristics of an Effective Graphic, Understanding the Process of Creating Graphics, Using Color Effectively, Choosing the Appropriate Kind of Graphic, Creating Effective Graphics for Multicultural Readers. Researching Your Subject: Understanding the Differences Between Academic and Workplace Research, Understanding the Research Process, Conducting Secondary Research, Conducting Primary Research, Research and Documentation: Literature Reviews, Interviewing for Information, Documenting Sources, Copyright, Paraphrasing, Questionnaires. Report Components: Abstracts, Introductions, Tables of Contents, Executive Summaries, Feasibility Reports, Investigative Reports, Laboratory Reports, Test Reports, Trip Reports, Trouble Reports	12	CO3
IV	Writing Proposals: Understanding the Process of Writing Proposals, The Logistics of Proposals, The -Deliverables of Proposals, Persuasion and Proposals, Writing a Proposal, The Structure of the Proposal. Writing Informational Reports: Understanding the Process of Writing Informational Reports, Writing Directives, Writing Field Reports, Writing Progress and Status Reports, Writing Incident Reports, Writing Meeting Minutes. Writing Recommendation Reports: Understanding the Role of Recommendation Reports, Using a Problem-Solving Model for Preparing Recommendation Reports, Writing Recommendation Reports. Reviewing, Evaluating, and Testing Documents and Websites: Understanding Reviewing, Evaluating, and Testing, Reviewing Documents and Websites, Conducting Usability Evaluations, Conducting Usability Tests, Using Internet tools to check writing Quality, Duplicate Content Detector, What is Plagiarism?, How to avoid writing plagiarism content? Innovation management: an introduction: The importance of innovation, Models of innovation, Innovation as a management process. Market adoption and technology diffusion: Time lag between innovation and useable product, Innovation and the market ,	12	CO4

	Innovation and market vision ,Analysing internet search data to help adoption and forecasting sales ,Innovative new products and consumption patterns, Crowd sourcing for new product ideas, Frugal innovation and ideas from everywhere, Innovation diffusion theories.		
V	<p>Managing innovation within firms: Organisations and innovation, The dilemma of innovation management, Innovation dilemma in low technology sectors, Dynamic capabilities, Managing uncertainty, Managing innovation projects</p> <p>Operations and process innovation: Operations management, The nature of design and innovation in the context of operations, Process design, Process design and innovation</p> <p>Managing intellectual property: Intellectual property, Trade secrets, An introduction to patents, Trademarks, Brand names, Copyright</p> <p>Management of research and development: What is research and development?, R&D management and the industrial context, R&D investment and company success, Classifying R&D, R&D management and its link with business strategy, Strategic pressures on R&D, Which business to support and how?, Allocation of funds to R&D, Level of R&D expenditure</p> <p>Managing R&D projects: Successful technology management, The changing nature of R&D management, The acquisition of external technology, Effective R&D management, The link with the product innovation process, Evaluating R&D projects.</p>	12	CO5

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Technical Communication	Mike Markel	Bedford/St. Martin's	11	2014
2.	Innovation Management and New Product Development	Paul Trott	Pearson	06	2017
3.	Handbook of Technical Writing	Gerald J. Alred , Charles T. Brusaw , Walter E. Oliu	Bedford/St. Martin's	09	2008
4.	Technical Writing 101: A Real-World Guide to Planning and Writing Technical Content	Alan S. Pringle and Sarah S. O'Keefe	scriptorium	03	2009
5.	Innovation and Entrepreneurship	Peter Drucker	Harper Business	03	2009

Course Outcomes:

After completion of the course, a student should be able to:

CO1: Develop technical documents that meet the requirements with standard guidelines. Understanding the essentials and hands-on learning about effective Website Development.

CO2: Write Better Quality Content Which Ranks faster at Search Engines. Build effective Social Media Pages.

CO3: Evaluate the essentials parameters of effective Social Media Pages.

CO4: Understand importance of innovation and entrepreneurship.

CO5: Analyze research and development projects.

PSIT303a: Machine Learning

M. Sc (Information Technology)		Semester – III	
Course Name: Machine Learning		Course Code: PSIT303a	
Periods per week (1 Period is 60 minutes)		4	
Credits		4	
		Hours	Marks
Evaluation System	Theory Examination	2½	60
	Internal	--	40

Course Objectives:

- Understanding Human learning aspects.
- Understanding primitives in learning process by computer.
- Understanding nature of problems solved with Machine Learning

Unit	Details	Lectures	Outcome
I	Introduction: Machine learning, Examples of Machine Learning Problems, Structure of Learning, learning versus Designing, Training versus Testing, Characteristics of Machine learning tasks, Predictive and descriptive tasks, Machine learning Models: Geometric Models, Logical Models, Probabilistic Models. Features: Feature types, Feature Construction and Transformation, Feature Selection.	12	CO1
II	Classification and Regression: Classification: Binary Classification- Assessing Classification performance, Class probability Estimation Assessing class probability Estimates, Multiclass Classification. Regression: Assessing performance of Regression- Error measures, Overfitting- Catalysts for Overfitting, Case study of Polynomial Regression. Theory of Generalization: Effective number of hypothesis, Bounding the Growth function, VC Dimensions, Regularization theory.	12	CO2
III	Linear Models: Least Squares method, Multivariate Linear Regression, Regularized Regression, Using Least Square regression for Classification. Perceptron, Support Vector Machines, Soft Margin SVM, Obtaining probabilities from Linear classifiers, Kernel methods for non-Linearity.	12	CO2 CO3
IV	Logic Based and Algebraic Model: Distance Based Models: Neighbours and Examples, Nearest Neighbours Classification, Distance based clustering-K means Algorithm, Hierarchical clustering, Rule Based Models: Rule learning for subgroup discovery, Association rule mining. Tree Based Models: Decision Trees, Ranking and Probability estimation Trees, Regression trees, Clustering Trees.	12	CO2 CO3 CO4

V	Probabilistic Model: Normal Distribution and Its Geometric Interpretations, Naïve Bayes Classifier, Discriminative learning with Maximum likelihood, Probabilistic Models with Hidden variables: Estimation-Maximization Methods, Gaussian Mixtures, and Compression based Models. Trends In Machine Learning : Model and Symbols- Bagging and Boosting, Multitask learning, Online learning and Sequence Prediction, Data Streams and Active Learning, Deep Learning, Reinforcement Learning.	12	CO5
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Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Machine Learning: The Art and Science of Algorithms that Make Sense of Data	Peter Flach	Cambridge University Press		2012
2.	Introduction to Statistical Machine Learning with Applications in R	Hastie, Tibshirani, Friedman	Springer	2nd	2012
3.	Introduction to Machine Learning	Ethem Alpaydin	PHI	2nd	2013

M. Sc (Information Technology)

Semester – III

Course Name: Machine Learning Practical

Course Code: PSIT3P3a

Periods per week (1 Period is 60 minutes)

4

Credits

2

Evaluation System

Practical Examination

Hours

Marks

2

50

Internal

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List of Practical:

10 practicals covering the entire syllabus must be performed. The detailed list of practical will be circulated later in the official workshop.

Course Outcomes:

After completion of the course, a student should be able to:

CO1: Understand the key issues in Machine Learning and its associated applications in intelligent business and scientific computing.

CO2: Acquire the knowledge about classification and regression techniques where a learner will be able to explore his skill to generate data base knowledge using the prescribed techniques.

CO3: Understand and implement the techniques for extracting the knowledge using machine learning methods.

CO4: Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.

CO5: Understand the statistical approach related to machine learning. He will also Apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

PSIT302c: Cloud Application Development

M. Sc (Information Technology)		Semester – III	
Course Name: Cloud Application Development		Course Code: PSIT302c	
Periods per week (1 Period is 60 minutes)		4	
Credits		4	
		Hours	Marks
Evaluation System	Theory Examination	2½	60
	Internal	--	40

Course Objectives:

- To develop and deploy Microservices for cloud
- To understand Kubernetes and deploy applications on Azure Kubernetes Service
- To understand DevOps for Azure
- To follow the DevOps practices for software development
- To build APIs for Azure and AWS

Unit	Details	Lectures	Outcomes
I	<p>Implementing Microservices: Client to microservices communication, Interservice communication, data considerations, security, monitoring, microservices hosting platform options.</p> <p>Azure Service Fabric: Introduction, core concepts, supported programming models, service fabric clusters, develop and deploy applications of service fabric.</p> <p>Monitoring Azure Service Fabric Clusters: Azure application, resource manager template, Adding Application Monitoring to a Stateless Service Using Application Insights, Cluster monitoring, Infrastructure monitoring.</p>	12	CO1
II	<p>Azure Kubernetes Service (AKS): Introduction to kubernetes and AKS, AKS development tools, Deploy applications on AKS.</p> <p>Monitoring AKS: Monitoring, Azure monitor and analytics, monitoring AKS clusters, native kubernetes dashboard, Prometheus and Grafana.</p> <p>Securing Microservices: Authentication in microservices, Implementing security using API gateway pattern, Creating application using Ocrlo and securing APIs with Azure AD.</p> <p>Database Design for Microservices: Data stores, monolithic approach, Microservices approach, harnessing cloud computing, dataase options on MS Azure, overcoming application development challenges.</p> <p>Building Microservices on Azure Stack: Azure stack, Offering IaaS, PaaS on-premises simplified, SaaS on Azure</p>	12	CO2

	stack.		
III	<p>.NET DevOps for Azure: DevOps introduction, Problem and solution.</p> <p>Professional Grade DevOps Environment: The state of DevOps, professional grade DevOps vision, DevOps architecture, tools for professional DevOps environment, DevOps centered application.</p> <p>Tracking work: Process template, Types of work items, Customizing the process, Working with the process.</p> <p>Tracking code: Number of repositories, Git repository, structure, branching pattern, Azure repos configuration, Git and Azure.</p>	12	CO3
IV	<p>Building the code: Structure of build, using builds with .NET core and Azure pipelines,</p> <p>Validating the code: Strategy for defect detection, Implementing defect detection.</p> <p>Release candidate creation: Designing release candidate architecture, Azure artifacts workflow for release candidates,</p> <p>Deploying the release: Designing deployment pipeline, Implementing deployment in Azure pipelines.</p> <p>Operating and monitoring release: Principles, Architectures for observability, Jumpstarting observability.</p>	12	CO4
V	<p>Introduction to APIs: Introduction, API economy, APIs in public sector.</p> <p>API Strategy and Architecture: API Strategy, API value chain, API architecture, API management.</p> <p>API Development: Considerations, Standards, kick-start API development, team orientation.</p> <p>API Gateways: API Gateways in public cloud, Azure API management, AWS API gateway.</p> <p>API Security: Request-based security, Authentication and authorization.</p>	12	CO5

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Building Microservices Applications on Microsoft Azure- Designing, Developing, Deploying, and Monitoring	Harsh Chawla Hemant Kathuria	Apress	--	2019
2.	.NET DevOps for Azure A Developer's Guide to DevOps Architecture the Right Way	Jeffrey Palermo	Apress	--	2019
3.	Practical API Architecture and Development with Azure and AWS - Design and Implementation of APIs for the Cloud	Thurupathan Vijayakumar	Apress	--	2018

M. Sc (Information Technology)		Semester – III	
Course Name: Cloud Application Development Practical		Course Code: PSIT3P2c	
Periods per week (1 Period is 60 minutes)		4	
Credits		2	
		Hours	Marks
Evaluation System	Practical Examination	2	50
	Internal	--	--

List of Practical:

10 practical covering the entire syllabus must be performed. The detailed list of practical will be circulated later in the official workshop.

Course Outcomes:

After completion of the course, a student should be able to:

CO01: Develop the Microservices for cloud and deploy them on Microsoft Azure.

CO02: Build and deploy services to Azure Kubernetes service.

CO03: Understand and build the DevOps way.

CO04: Thoroughly build the applications in the DevOps way.

CO05: Build the APIs for Microsoft Azure and AWS.

PSIT304d: Offensive Security

M. Sc (Information Technology)		Semester – III	
Course Name: Offensive Security		Course Code: PSIT304d	
Periods per week (1 Period is 60 minutes)		4	
Credits		4	
		Hours	Marks
Evaluation System	Theory Examination	2½	60
	Internal	--	40

Course Objectives:

- Understanding of security requirements within an organization
- How to inspect, protect assets from technical and managerial perspectives
- To Learn various offensive strategies to penetrate the organizations security.
- To learn various tools that aid in offensive security testing.

Unit	Details	Lectures	Outcome
I	Fault Tolerance and Resilience in Cloud Computing Environments, Securing Web Applications, Services, and Servers, Wireless Network Security, Wireless Sensor Network Security: The Internet of Things, Security for the Internet of Things, Cellular Network Security	12	CO1
II	Social Engineering Deceptions and Defenses, What Is Vulnerability Assessment, Risk Management, Insider Threat, Disaster Recovery, Security Policies and Plans Development	12	CO2
III	Introduction to Metasploit and Supporting Tools The importance of penetration testing Vulnerability assessment versus penetration testing The need for a penetration testing framework Introduction to Metasploit When to use Metasploit? Making Metasploit effective and powerful using supplementary tools Nessus NMAP w3af Armitage Setting up Your Environment Using the Kali Linux virtual machine - the easiest way Installing Metasploit on Windows Installing Metasploit on Linux Setting up exploitable targets in a virtual	12	CO3

	environment Metasploit Components and Environment Configuration Anatomy and structure of Metasploit Metasploit components Auxiliaries Exploits Encoders Payloads Post, Playing around with msfconsole Variables in Metasploit Updating the Metasploit Framework 55		
IV	Information Gathering with Metasploit Information gathering and enumeration Transmission Control Protocol User Datagram Protocol File Transfer Protocol Server Message Block Hypertext Transfer Protocol Simple Mail Transfer Protocol Secure Shell Domain Name System Remote Desktop Protocol Password sniffing Advanced search with shodan Vulnerability Hunting with Metasploit Managing the database Work spaces Importing scans Backing up the database NMAP NMAP scanning approach Nessus Scanning using Nessus from msfconsole Vulnerability detection with Metasploit auxiliaries Auto exploitation with db_autopwn Post exploitation What is meterpreter? Searching for content Screen capture Keystroke logging Dumping the hashes and cracking with JTR Shell command Privilege escalation Client-side Attacks with Metasploit Need of client-side attacks What are client-side attacks? What is a Shellcode? What is a reverse shell? What is a bind shell? What is an encoder? The msfvenom utility Generating a payload with msfvenom Social Engineering with Metasploit Generating malicious PDF Creating infectious media drives	12	CO4
V	Approaching a Penetration Test Using Metasploit Organizing a penetration test Preinteractions Intelligence gathering/reconnaissance phase Predicting the test grounds Modeling threats Vulnerability analysis Exploitation and post-exploitation Reporting Mounting the environment Setting up Kali Linux in virtual environment	12	CO5

	<p>The fundamentals of Metasploit</p> <p>Conducting a penetration test with Metasploit</p> <p>Recalling the basics of Metasploit</p> <p>Benefits of penetration testing using Metasploit</p> <p>Open source</p> <p>Support for testing large networks and easy naming conventions</p> <p>Smart payload generation and switching mechanism</p> <p>Cleaner exits</p> <p>The GUI environment</p> <p>Penetration testing an unknown network</p> <p>Assumptions</p> <p>Gathering intelligence</p> <p>Using databases in Metasploit</p> <p>Modeling threats</p> <p>Vulnerability analysis of VSFTPD backdoor</p> <p>The attack procedure</p> <p>The procedure of exploiting the vulnerability</p> <p>Exploitation and post exploitation</p> <p>Vulnerability analysis of PHP-CGI query string parameter vulnerability</p> <p>Exploitation and post exploitation</p> <p>Vulnerability analysis of HFS</p> <p>Exploitation and post exploitation</p> <p>Maintaining access</p> <p>Clearing tracks</p> <p>Revising the approach</p> <p>Reinventing Metasploit</p> <p>Ruby – the heart of Metasploit</p> <p>Creating your first Ruby program</p> <p>Interacting with the Ruby shell</p> <p>Defining methods in the shell</p> <p>Variables and data types in Ruby</p> <p>Working with strings</p> <p>Concatenating strings</p> <p>The substring function</p> <p>The split function</p> <p>Numbers and conversions in Ruby</p> <p>Conversions in Ruby</p> <p>Ranges in Ruby</p> <p>Arrays in Ruby</p> <p>Methods in Ruby</p> <p>Decision-making operators</p> <p>Loops in Ruby</p> <p>Regular expressions</p> <p>Wrapping up with Ruby basics</p> <p>Developing custom modules</p> <p>Building a module in a nutshell</p> <p>The architecture of the Metasploit framework</p> <p>Understanding the file structure</p> <p>The libraries layout</p> <p>Understanding the existing modules</p> <p>The format of a Metasploit module</p> <p>Disassembling existing HTTP server scanner module</p> <p>Libraries and the function</p> <p>Writing out a custom FTP scanner module</p> <p>Libraries and the function</p> <p>Using msftidy</p> <p>Writing out a custom SSH authentication brute forcer</p> <p>Rephrasing the equation</p> <p>Writing a drive disabler post exploitation module</p> <p>Writing a credential harvester post exploitation module</p> <p>Breakthrough meterpreter scripting</p>		
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	<p>Essentials of meterpreter scripting</p> <p>Pivoting the target network Setting up persistent access</p> <p>API calls and mixins</p> <p>Fabricating custom meterpreter scripts</p> <p>Working with RailGun</p> <p>Interactive Ruby shell basics</p> <p>Understanding RailGun and its scripting</p> <p>Manipulating Windows API calls</p> <p>Fabricating sophisticated RailGun scripts</p> <p>The Exploit Formulation Process</p> <p>The absolute basics of exploitation</p> <p>The basics The architecture System organization basics</p> <p>Registers</p> <p>Exploiting stack-based buffer overflows with Metasploit</p> <p>Crashing the vulnerable application</p> <p>Building the exploit base Calculating the offset Using the pattern_create tool</p> <p>Using the pattern_offset tool Finding the JMP ESP address Using Immunity Debugger to find executable modules</p> <p>Using msfbinscan Stuffing the space</p> <p>Relevance of NOPs Determining bad characters</p> <p>Determining space limitations</p> <p>Writing the Metasploit exploit module</p> <p>Exploiting SEH-based buffer overflows with Metasploit</p> <p>Building the exploit base Calculating the offset Using pattern_create tool Using pattern_offset tool <i>Table of Contents</i></p> <p>Finding the POP/POP/RET address</p> <p>The Mona script Using msfbinscan</p> <p>Writing the Metasploit SEH exploit module Using NASM shell for writing assembly instructions</p> <p>Bypassing DEP in Metasploit modules Using msfrop to find ROP gadgets Using Mona to create ROP chains</p> <p>Writing the Metasploit exploit module for DEP bypass</p>		
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Books and References:					
Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Computer and Information Security Handbook	John R. Vacca	Morgan Kaufmann Publisher	3 rd	2017
2.	Metasploit Revealed: Secrets of the Expert Pentester	Sagar Rahalkar	Packt Publishing		2017