

AMRITSAR GROUP OF COLLEGES
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SYLLABUS

B. Tech. (CSE): 6th SEM

6 th Semester	AGCS-21601: MACHINE LEARNING				
Internal Marks:	40		L	T	P
External Marks:	60		3	1	0
Total Marks:	100		Credits		4

Course Outcomes: After studying the course, students will be able to:	
CO-1	Learn about applications areas of machine learning.
CO-2	Implement supervised machine learning algorithms.
CO-3	Evaluate the performance of supervised machine learning algorithms.
CO-4	Implement unsupervised machine learning algorithms.
CO-5	Understand the concept of neural networks.
CO-6	Understand new trends in the field of machine learning.

Part	Content	CO
I	Introduction: Introduction to machine learning, artificial intelligence vs machine learning vs deep learning, types of machine learning: supervised, unsupervised, and reinforcement learning, Applications of machine learning. Statistical Learning: Bayesian method, Naive Bayes classifier.	CO-1
II	Supervised Learning: Regression vs classification, linear regression with one variable, multiple linear regression, polynomial regression, logistic regression, nearest neighbours (k-NN), decision trees, random forests, support vector machine.	CO-2
	Techniques for evaluating the performance of supervised learning models: Mean absolute error (MAE), RSquare, mean squared error (MSE), root mean squared error (RMSE), confusion matrix, precision score, accuracy score, F1 score and recall. Optimization algorithm: Working of gradient descent, batch gradient descent vs stochastic gradient descent.	CO-3
III	Unsupervised learning: Need and application of clustering-means clustering, hierarchical clustering, principal component analysis (PCA). Regularization: l1 and l2 regularization and their applications in linear and logistic regression, bias and variance trade-off. Ensemble methods: bagging, boosting, and stacking.	CO-4
IV	Neural networks: Introduction, model representation, activation function, perceptron training, multilayer perceptron's, multiclass representation, backpropagation algorithm.	CO-5
	Trends in machine learning: Multitask learning, online learning and sequence prediction, data streams and active learning, introduction to convolutional neural networks (CNN), recurrent neural networks (RNN) and reinforcement learning.	CO-6

References:
<ul style="list-style-type: none"> Ethem Alpaydin, "Introduction to Machine Learning" 2nd Edition, The MIT Press, 2009. Tom M. Mitchell, "Machine Learning", First Edition by Tata McGraw-Hill Education, 2013. Christopher M. Bishop, "Pattern Recognition and Machine Learning" by Springer, 2007. Mevin P. Murphy, "Machine Learning: A Probabilistic Perspective" by The MIT Press, 2012

6 th Semester		AGCS-21602: CLOUD COMPUTING			
Internal Marks:	40		L	T	P
External Marks:	60		3	0	0
Total Marks:	100		Credits		3

Course Outcomes: After studying the course, students will be able to:

CO-1	Understand the core concepts of the cloud computing paradigm and the driving factors towards Cloud.
CO-2	Understand the Cloud computing Architecture, its Services and Deployment Models.
CO-3	Apply the fundamental concepts in cloud infrastructures to understand the trade-offs in power, efficiency, and cost to build and deploy cloud applications that are resilient, elastic and cost-efficient.
CO-4	Understand the Different types of Virtualizations, Virtual Machine creation and deployment, Hypervisors and Multitenancy.
CO-5	Understand the security issues and their impact on cloud computing.
CO-6	Understand the various real-life implementation of Cloud Computing like GCP, IBM Cloud, Amazon Web Services and Microsoft Azure.

Part	Content	CO
I	Introduction: Overview of Existing Hosting Platforms, Cluster Computing, Grid Computing, Utility Computing, Autonomic Computing, Introduction to Cloud Computing, Cloud Computing history and evolution, practical applications of cloud computing for various industries, economics and benefits of cloud computing, Driving factors towards cloud, Selection criteria for cloud deployment.	CO-1
II	Cloud Computing Architecture: Cloud architecture model, Cloud deployment models, public clouds, Hybrid clouds, Community, Virtual private clouds, Cloud based services- IAAS, PAAS, SAAS,	CO-2
	Cloud Computing Concepts: Introduction to virtualization techniques, Characteristics of virtualization, Pros and Cons of virtualization Technology, Hypervisors, Types of hypervisors, Multitenancy, Application programming interfaces (API), Elasticity and scalability.	CO-3
III	CLOUD SERVICE MODELS: Cloud service models, Infrastructure as a service (IaaS) architecture- details and example, Platform as a service (PaaS) architecture- details and example, Software as a service (SaaS) architecture-- details and example, Comparison of cloud service delivery models.	CO-4
IV	Security In Cloud Computing: Cloud security, understanding security risks, Threats and Attacks, Internal security breaches, Data corruption or loss, User account and service hijacking, Steps to reduce cloud security breaches, Detection and forensics, Identity management, Benefits of identity, SLA, Resource Management, Encryption techniques, Encryption & Encrypting data, Symmetric key encryption, Asymmetric key encryption, Digital signature, SSL.	CO-5
	Case Studies: IBM Smart Cloud, Amazon Web Services, Google Cloud platform, Windows Azure platform, a comparison of Cloud Computing Platforms, Common building Blocks.	CO-6

References:

- Raj Kumar Buyya, James Broberg, Andrezei M.Goscinski, Cloud Computing: Principles and paradigms, 2011
- Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, Cloud Computing for dummies, 2009.
- Barrie Sosinsky, Cloud Computing Bible, Wiley, 2011.
- Borko Furht, Armando Escalante (Editors), Handbook of Cloud Computing, Springer, 2010.

6 th Semester		ACGS-21603: BIG DATA ANALYTICS			
Internal Marks:	40		L	T	P
External Marks:	60		3	0	0
Total Marks:	100		Credits		3

Course Outcomes: After studying the course, students will be able to:

CO-1	Understand Ecosystem of Hadoop and Hadoop installation for carrying out Analytics on Big Data
CO-2	Understand HDFS and its usage in storage of Big Data
CO-3	Implement the HDFS commands for managing operations on huge files in a Hadoop cluster
CO-4	Explore tools like Pig and Map reduce for analyzing Big Data
CO-5	Explore various operators in Apache Pig for performing analytics
CO-6	Explore various functions in Apache Pig for performing analytics

Part	Content	CO
I	An Overview of Big Data and Big Data Analytics, Characteristics, and properties of Big Data, 7 Vs of Big Data, various Big Data sources, Application areas of Big Data. Setting up and understanding a Hadoop cluster. Discussing in detail the various configuration files and properties therein: .bashrc, core-site.xml, hdfs-site.xml, hadoop-env.sh, mapred-site.xml. Hadoop WebUI settings. Hadoop Web interface, various steps in setting up the .Trash folder in Hadoop. Configuring the various properties for the .Trash folder. Apache Software Foundation, Introduction to Hadoop and its Ecosystem, Hadoop core components, Hadoop ecosystem projects, Commercial Hadoop landscape, typical Hadoop use cases. Understanding the role of Hadoop in big data processing, Introduction to the various Hadoop Ecosystem components: Hadoop Distributed File System (HDFS), MapReduce, YARN, HBase, Hive, Pig, Sqoop, ZooKeeper, Flume, Oozie, Ambari.	CO-1
II	Introduction to Ubuntu and its various commands like cat, pwd, mkdir, cd, ls etc. Overview of HDFS. Architecture of HDFS, Advantages and disadvantages of HDFS, HDFS Daemons: Namenode, secondary Namenode and datanode, HDFS Blocks, huge block size in HDFS and its importance, HDFS file write and read operations, NameNode as a single point of failure (SPOF), Safemode of Namenode, dfsadmin commands to handle safemode, Hadoop High Availability (HA). Heartbeats, block reports and rereplication in HDFS.	CO-2
	Hadoop fs commands: cat, cp, ls, ls, put, get, rm, df, count, fsck, balancer, mkdir, mv, rm rmr, du, dus copyFromLocal, copyToLocal, moveFromLocal, moveToLocal, chmod, chown, chgrp, setrep, stat, tail, test, text, touchz.	CO-3
III	Introduction to Apache Pig and its need. Mapreduce and its processing paradigm. Differences between Apache Pig and MapReduce. Installation of Apache Pig, Pig Architecture, Pig Use cases, Pig Philosophy. Invoking the grunt shell in various mode: local, mapreduce, tez, tez_local. fs and sh commands in grunt shell. Running piglatin code using: grunt shell, pig-e and pig-f. Basic utility commands: help, history, quit, kill, set, clear. Wordcount example in Apache Pig. Differentiation between run and exec commands along with the pram andparam_file switches. Data types and Operators in Pig, Pig operators for Data analysis: load, store, and dump. Usage of GLOBs in Apache Pig.	CO-4
	<u>Pig Operators</u> filter, distinct, foreach generate, various join operators (inner and outer), group, cogroup, cross, order, limit, union, split, describe, explain, illustrate, rank, sample.	CO-5

IV	<p><u>Functions in Pig</u></p> <p>Eval functions: AVG, BagToString, CONCAT, COUNT, COUNT_STAR, IsEmpty, MAX, MIN, SIZE, SUBTRACT, SUM, TOKENIZE.</p> <p>Load and store functions: Pig Storage, TextLoader, BinStorage.</p> <p>Bag and tuple functions: ToBag, TOP, ToTuple, ToMap.</p> <p>String functions: ENDSWITH, STARTSWITH, SUBSTRING, EqualsIgnoreCase, INDEXOF, LAST_INDEXOF, LCFIRST, UCFIRST, LOWER, UPPER, REPLACE, TRIM, LTRIM, RTRIM.</p> <p>Date time functions: ToDate, CurrentTime, GetDay, GetHour, GetMilliSecond, GetMinute, GetMonth, GetSecond, GetWeek, GetYear, DaysBetween, HoursBetween, MilliSecondsBetween, MinutesBetween, MonthsBetween, SecondsBetween, WeeksBetween, YearsBetween.</p> <p>Math functions: ABS, CBRT, CEIL, FLOOR, EXP, LOG, LOG10, RANDOM, ROUND, SQRT.</p> <p><u>Case Studies (at least 2)</u></p> <p>To perform analytics on real-world datasets like weather dataset, movie review dataset, employee dataset etc. using Apache Pig.</p>	CO-6
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References:

- Big Data, Black Book by DT Editorial Services, Dreamtech Press.
- Hadoop – The Definitive Guide 3rd Edition, Tom White/OReilly- Yahoo press
- Hadoop in Action, Chuck Lam/Manning
- Hadoop – Beginner’s Guide, Garry Turkington/Packt Publishing.

6 th Semester		AGCS-21605: MOBILE APPLICATION DEVELOPMENT			
Internal Marks:	40		L	T	P
External Marks:	60		3	1	0
Total Marks:	100		Credits		4

Course Outcomes: After studying the course, students will be able to:	
CO-1	Understand the Android Architecture, Anatomy, Components and tools required to develop an android application
CO-2	Work with Intents, Intent Filter Collision, Fragments and Notification.
CO-3	Develop and Design various Android applications related to layouts and using interactive user interfaces
CO-4	Design interface using different Menus and List Views
CO-5	Work with different Storage Options available in Android System.
CO-6	Implement the Working of SMS, Gmail, Location based, services including JSON.

Part	Content	CO
I	Introduction: Introduction to Android, Android Versions, Features of Android, Architecture of Android, Android SDK, Installing the Android SDK Tools, build tools, Gradle script, Android Development Tools (ADT), ART, AAPT, DVM, ADB, DDMS, Creating Android Virtual Devices (AVDs), Types of Android Application- Native, Hybrid and web apps, Anatomy of an Android Application, Components of Android application, Journey of Android APK to target machine.	CO-1
II	Activities, Fragments And Intents: Understanding Activities, Activity lifecycle, Introduction to Intent and its types, Creating Activities, Linking Activities Using Intents, Resolving Intent Filter Collision, Returning Results from an Intent, Bundle Intents, Pending intent and Sticky Intent, Fragments, Life Cycle of a Fragment , Static and Dynamic fragment and its implementation, Using Category filter and Action filter, Displaying Notifications.	CO-2
III	Android User Interface: Working with UI components Toast, Edit Text, Text View, buttons Understanding the Components of a Screen, Screen Orientation, Layouts, Date picker, time picker, Action Bar, Progress bar, Rating bar, Seek bar.	CO-3
III	Android User Interface: Using List Views to Display Long Lists, Using Image Views to Display Pictures, Image switcher, Implementation of Menu- Context menu, Option menu, Pop up menu, Implementation of Adapter -list adapter and custom adapter.	CO-4
IV	Databases, Content Providers and Messaging: Saving and Loading User Preferences, Persisting data to Internal and External storage, Creating and Using Databases, Content Providers, Content Resolver, Working of Content Provider in Android.	CO-5
	Services: SMS Messaging, Sending E-mail, Displaying Location on Maps, Introduction to Services and its types, implementation of Services, Consuming JSON Services.	CO-6

References:

- Wei - Meng Lee, “Beginning Android 4 Application Development”, John Wiley & Sons, Inc, 2012.
- Reto Meier, “Professional Android 4 Application Development”, John Wiley & Sons, Inc, 2012.

6 th Semester		AGCS-21606: MACHINE LEARNING LAB			
Internal Marks:	30		L	T	P
External Marks:	20		0	0	2
Total Marks:	50		Credits		1

Course Outcomes: After studying the course, students will be able to:

CO-1	Gain knowledge about basic concepts of machine learning.
CO-2	Perform data visualization using machine learning libraries.
CO-3	Explore different data preprocessing and data cleaning methods.
CO-4	Gain practical experience in implementing algorithms using supervised machine learning techniques.
CO-5	Solve the problems using unsupervised machine learning techniques.
CO-6	Design an application using machine learning techniques studied in the subject.

Part	Experiment	CO
A	Import and extract the datasets in different formats from online repositories or websites using python libraries.	CO-1
	For a given set of training data samples stored in a .CSV file, implement and demonstrate the exploratory data analysis and visualization using matplotlib and seaborn libraries.	CO-2
	Data Preprocessing: Handling missing data: Imputation of data with mean, median, mode and specific values, handling of categorical data using different Encoding methods, feature selection and scaling.	CO-3
	Deploy simple linear regression and multiple linear regression with performance evaluation.	
	Simulate decision tree and random forest classification.	CO-4
	Implement k-nearest neighbour algorithm to classify the iris data set.	CO-5
B	Design and implement a project using supervised and un-supervised machine learning algorithms.	CO-6

6 th Semester		AGCS-21607: CLOUD COMPUTING LAB			
Internal Marks:	30		L	T	P
External Marks:	20		0	0	2
Total Marks:	50		Credits		1

Course Outcomes: After studying the course, students will be able to:

CO-1	Configure various virtualization tools such as Virtual Box, VMware workstation.
CO-2	Design and deploy a web application in a PaaS environment.
CO-3	Learn how to simulate a cloud environment to implement new schedulers.
CO-4	Install and use a generic cloud environment that can be used as a private cloud.
CO-5	Implement the security aspects of Cloud.
CO-6	Implement the storage on Amazon Web Services.

Part	Experiment	CO
A	<ul style="list-style-type: none"> ➤ Install VirtualBox/VMware Workstation on different OS. ➤ Install different operating systems in VMware. ➤ Install a C compiler in the virtual machine created using virtual box and execute Simple Programs. 	CO-1
	<ul style="list-style-type: none"> ➤ Install Google App Engine. Create hello world app and other simple web applications using python/java. ➤ Use GAE launcher to launch the web applications 	CO-2
	<ul style="list-style-type: none"> ➤ Simulate a cloud scenario using simulator. 	CO-3
	<ul style="list-style-type: none"> ➤ Implement scheduling algorithms. 	CO-4
	<ul style="list-style-type: none"> ➤ To study cloud security management. ➤ To study and implementation of identity management 	CO-5
B	Case Study - Amazon Web Services/Microsoft Azure/Google cloud services.	CO-6

6 th Semester		AGCS-21608: BIG DATA ANALYTICS LAB			
Internal Marks:	30		L	T	P
External Marks:	20		0	0	2
Total Marks:	50		Credits		1

Course Outcomes: After studying the course, students will be able to:

CO-1	To install the relevant software for setting up a Hadoop cluster
CO-2	To install the relevant software for setting up Apache Pig and to understand its architecture
CO-3	To implement the various commands of Hadoop distributed file systems (HDFS)
CO-4	To explore various operators in Apache Pig for performing analytics
CO-5	To explore various functions in Apache Pig for performing analytics
CO-6	To create a project that demonstrates storage and subsequent analysis of a given dataset using ApachePig

Part	Experiment	CO
A	Installation of Apache Hadoop and working of various configuration files like .bashrc, core-site.xml, hdfs-site.xml, hadoop-env.sh and mapred-site.xml.	CO-1
	Installation of Apache Pig. Understanding Apache Pig architecture and its processing paradigm	CO-2
	Running HDFS commands like cat, cp, ls, lsr, put, get, rm, df, count, fsck, balancer, mkdir, mv, rm, rmr, du, dus, copyFromLocal, copyToLocal, moveFromLocal, moveToLocal, chmod, chown, chgrp, setrep, stat, tail, test, text, touchz.	CO-3
	To implement the working of Apache Pig operators: filter, distinct, foreach generate, various join operators (inner and outer), group, cogroup, cross, order, limit, union, split, describe, explain, illustrate, rank, sample.	CO-4
	To implement the working of Apache Pig functions: Eval functions: AVG, BagToString, CONCAT, COUNT, COUNT_STAR, IsEmpty, MAX, MIN, SIZE, SUBTRACT, SUM, TOKENIZE. Load and store functions: PigStorage, TextLoader, BinStorage. Bag and tuple functions: ToBag, TOP, ToTuple, ToMap. String functions: ENDSWITH, STARTSWITH, SUBSTRING, EqualsIgnoreCase, INDEXOF, LAST_INDEXOF, LCFIRST, UCFIRST, LOWER, UPPER, REPLACE, TRIM, LTRIM, RTRIM. Date time functions: ToDate, CurrentTime, GetDay, GetHour, GetMilliSecond, GetMinute, GetMonth, GetSecond, GetWeek, GetYear, DaysBetween, HoursBetween, MilliSecondsBetween, MinutesBetween, MonthsBetween, SecondsBetween, WeeksBetween, YearsBetween. Math functions: ABS, CBRT, CEIL, FLOOR, EXP, LOG, LOG10, RANDOM, ROUND, SQRT.	CO-5
B	To create a project that demonstrates storage and subsequent analysis of huge datasets using Apache Pig operators, functions and HDFS.	CO-6

6 th Semester	AGCS-21609: MOBILE APPLICATION DEVELOPMENT LAB				
Internal Marks:	30		L	T	P
External Marks:	20		0	0	2
Total Marks:	50		Credits		1

Course Outcomes: After studying the course, students will be able to:

CO-1	Install the Android Studio and Understand the design of Android Program.
CO-2	Implement Intents, Intent Filter Collision, Fragments and Notification.
CO-3	Develop and design layout of various Android applications.
CO-4	Design user interface using different Menus and List Views
CO-5	Implement SMS, Gmail, Location based services including JSON.
CO-6	Design and develop an application using SQLite and other Storage Options available in Android System

Part	Experiment	CO
A	Installing Android Studio on ubuntu & Windows Creating New Project on Android Studio Open, Re-open and Close existing project on Android studio Creating Android Virtual Devices Creating Hello World application	CO-1
	Linking Activities using Intent Passing Data and result Back using an Intent ObjectImplicit intents Familiarization Intent Filter Collision and its Resolution Implementation of Fragments and Notifications	CO-2
	Understanding different layouts in android Implementation of different views buttons, toast, image, image switcher Implementation of Picker Views	CO-3
	Create a simple list view Implementation of Menus and Action Bar Create a list view with image and text Integrate a website inside the application using WebView	CO-4
	Implementation of SMS Implementation of Gmail Implementation of Location Marker Implementation of JSON and Service	CO-5
B	Developing a Small Application Using SQLite and UI Design elements available in Android.	CO-6

6 th Semester		AGCS-21604A: INFORMATION SECURITY(PEC-2)			
Internal Marks:	40		L	T	P
External Marks:	60		3	0	0
Total Marks:	100		Credits		3

Course Outcomes: After studying the course, students will be able to:

CO-1	Elucidate the CIA triad of Confidentiality, Integrity and Availability and various encryption techniques.
CO-2	Implement symmetric and asymmetric encryption systems, public key cryptography and RSA.
CO-3	Implement the various authentication protocols used for the protection of information.
CO-4	Understand the concept of network security and security architecture.
CO-5	Illustrate the concept of web security and SET.
CO-6	Implement system security concepts.

Part	Content	CO
I	Symmetric Ciphers - Overview: Services, Mechanisms and Attacks, the OSI Security Architecture, A Model of Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography. Block Cipher and the Data Encryption Standard: Simplified DES, Block Cipher Principles, the DES, the Strength of DES, Differential and Linear Cryptanalysis. Symmetric Ciphers: Triple DES, Blowfish. Confidentiality using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation.	CO-1
II	Public Key Encryption, Number Theory, Prime Numbers Formats and Eulers Theorems, Testing for Primality. Public Key Cryptography and RSA: Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management.	CO2
III	Authentication Protocols - Message Authentication: Authentication Requirements, Authentication Functions, Message Authentication Codes, MD5 Message Digest Algorithms, Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standards.	CO-3
IV	Network Security - Authentication Applications: Kerberos, X.509 Directory Authentication Service. IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload.	CO4
	Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.	CO-5
	System Security- Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, Firewalls and its Design Principles.	CO-6

References:

- William Stallings, Network Security Essentials, Applications and Standards Pearson Education.
- William Stallings, Cryptography and Network Security Principles and practice. 2nd Edition, Pearson Education.
- Bishop, Matt, Introduction to Computer Security. Addison-Wesley, Pearson Education, Inc.
- Michael. E. Whitman and Herbert J. Mattord Principles of Information Security, Cengage Learning.

6 th Semester		AGCS-21604B: CYBER SECURITY(PEC-2)			
Internal Marks:	40		L	T	P
External Marks:	60		3	-	-
Total Marks:	100		Credits		3

Course Outcomes: After studying the course, students will be able to:	
CO-1	Analyze the cyber security needs of an organization.
CO-2	Explore various types of attacks.
CO-3	Understand various cyber security regulation and roles of Cyber Laws.
CO-4	Examine software vulnerabilities and security solutions to reduce the risk of exploitation.
CO-5	Identify the tools for mitigating cyber-attacks.
CO-6	Apply intrusion prevention techniques.

Part	Content	CO
I	Introduction to Cyber Security: Defining cyberspace and overview of computer and web- technology, architecture of cyberspace, layers of security, communication and web technology,internet, World Wide Web, advent of internet, internet infrastructure for data transfer and governance, CIA trade, regulation of cyberspace, concept of cyber security, issues and challenges of cyber security.	CO-1
II	Cybercrimes: Cybercrimes targeting computer systems and mobiles- data diddling attacks, spyware, logic bombs, DoS, DDoS, advanced persistent threat, virus, trojans, ransomware, data breach. Online scams and frauds-email scams, phishing, vishing, smishing, online job fraud, debit/ credit card fraud, online payment fraud, cyberbullying, website defacement, cyber- squatting, pharming, cyber espionage, crypto jacking, darknet- illegal trades, drug trafficking,human trafficking. Social media scams & frauds-impersonation, identity theft, job scams, misinformation, fake news cyber. Crime against persons- cyber grooming, cyber stalking, social engineering attacks, cyber police stations, crime reporting procedure, Case Studies- Pune Citibank MphasiS Call Center Fraud, Parliament Attack Case.	CO-2
	Cyber Laws: Cybercrime and legal landscape around the world, IT act, 2000 and its amendments. limitations of IT act, 2000. cybercrime and punishments, cyber laws and legal and ethical aspects related to new technologies- AI/ML, IOT, Blockchain, Darknet and social media, cyber laws of other countries, case studies.	CO-3
III	Cyber Security Management, Compliance and Governance: cyber security plan-cybersecurity policy, business continuity, risk assessment, types of security controls and their goals, cyber security audit and compliance, national cyber security policy and strategy.	CO-4
IV	Cyber Security Tools and Techniques: Digital devices security, tools and technologies for cyber security, end point device and mobile phone security, password policy, security patch management, data backup, downloading and management of third-party software, device security policy, cyber security best practices, significance of ant-virus, Wi-Fi security, configuration of basic security policy and permissions.	CO-5
	Intrusion Detection: Host based intrusion detection, network -based intrusion detection,distributed or hybrid intrusion detection, intrusion detection exchange format, Honeypots. Firewalls and Intrusion Prevention Systems: need for firewalls, firewall characteristics andaccess policy, types of firewalls, firewall basing, firewall location and configurations, intrusion prevention systems, example unified threat management products.	CO-6

References:

- William Stallings, Lawrie Brown, “Computer Security Principles and Practice”, 3rd Edition, Pearson
- Nina Godbole, Sunit Belapure, Cyber Security- Understanding cyber-crimes, computer forensics and legal perspectives, Wiley Publications, 2016.
- Andrew Vladimirov Michajlowski, Konstantin, Andrew A. Vladimirov, Konstantin V. Gavrilenko, Assessing Information Security: Strategies, Tactics, Logic and Framework, IT Governance Ltd, O’Reilly, 2010

6 th Semester		AGCS-21604C: BLOCKCHAIN TECHNOLOGY			
Internal Marks:	40		L	T	P
External Marks:	60		3	-	-
Total Marks:	100		Credits		3

Course Outcomes: After studying the course, students will be able to:	
CO-1	Understand emerging abstract models for Block chain Technology.
CO-2	Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain.
CO-3	Understand Bitcoin Consensus and Issues in permissioned blockchain.
CO-4	Understand Distributed Consensus and its method.
CO-5	Apply hyperledger Fabric and Ethereum platform to implement the Block chain Application.
CO-6	Learn the application of Blockchain technology in various fields.

Part	Content	CO
I	INTRODUCTION TO BLOCKCHAIN: Blockchain-Public Ledgers, Blockchain as Public Ledgers-Bitcoin, Blockchain 2.0, Smart Contracts, Block in a Blockchain, Transactions-Distributed Consensus, The Chain and the Longest Chain-Cryptocurrency to Blockchain 2.0-Permissioned Model of Blockchain, Cryptographic-Hash Function, Properties of a hash function-Hash pointer and Merkle tree	CO-1
II	BITCOIN AND CRYPTOCURRENCY: A basic crypto currency, Creation of coins, Payments and double spending, FORTH-the precursor for Bitcoin scripting, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in open environment, Consensus in a Bitcoin network	CO-2
	BITCOIN CONSENSUS: Bitcoin Consensus, Proof of Work (PoW)-Hash cash PoW, Bitcoin PoW, Attacks on PoW, monopoly problem-Proof of Stake-Proof of Burn-Proof of Elapsed Time-Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Blockchains, Execute Contracts-Consensus models for permissioned blockchain-Distributed consensus in closed environment Paxos	CO-3
III	DISTRIBUTED CONSENSUS: -Raft Consensus-Byzantine general problem, Byzantine fault tolerant system-Agreement Protocol, Lamport-Shostak-Pease BFT Algorithm-BFT over Asynchronous systems, Practical Byzantine Fault Tolerance	CO-4
IV	HYPER LEDGER FABRIC & ETHERUM: Architecture of Hyperledger fabric v1.1-Introduction to Hyperledger fabric v1.1, chain code- Ethereum: Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity, Smart contracts, Truffle Design and issue Crypto currency, Mining, DApps, DAO.	CO-5
	BLOCKCHAIN APPLICATIONS: Internet of Things-Medical Record Management System-Block chain in Government and Block chain Security-Block chain Use Cases -Finance	CO-6

References:

- Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Bashir, Imran, 2017.
- Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
- Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015.

6 th Semester		AGCS-21604D: ETHICAL HACKING			
Internal Marks:	40		L	T	P
External Marks:	60		3	-	-
Total Marks:	100		Credits		3

Course Outcomes: After studying the course, students will be able to:	
CO-1	Understand the basics of computer-based vulnerabilities.
CO-2	Explore different foot printing, reconnaissance and scanning methods.
CO-3	Expose the enumeration and vulnerability analysis methods.
CO-4	Learn hacking options available in Web and wireless applications.
CO-5	Explore the options for network protection.
CO-6	Study various tools and website to perform ethical hacking to expose the vulnerabilities.

Part	Content	CO
I	Introduction: Ethical Hacking Overview, Role of Security and Penetration Testers, Penetration Testing Methodologies, Laws of the Land, Overview of TCP/IP, The Application Layer, The Transport Layer, The Internet Layer, IP Addressing, Network and Computer Attacks, Malware, Protecting Against Malware Attacks, Intruder Attacks, Addressing Physical Security	CO-1
II	Foot printing, Reconnaissance and Scanning Networks: Foot printing Concepts, Foot printing through Search Engines, Web Services, Social Networking Sites, Website, Email, Competitive Intelligence, Foot printing through Social Engineering, Foot printing Tools, Network Scanning Concepts, Port-Scanning Tools, Scanning Techniques, Scanning Beyond IDS and Firewall.	CO-2
	Enumeration and Vulnerability Analysis: Enumeration Concepts, NetBIOS Enumeration, SNMP, LDAP, NTP, SMTP and DNS Enumeration, Vulnerability Assessment Concepts, Desktop and Server OS Vulnerabilities, Windows OS Vulnerabilities, Tools for Identifying Vulnerabilities in Windows, Linux OS Vulnerabilities, Vulnerabilities of Embedded Oss	CO-3
III	System Hacking: Hacking Web Servers, Web Application Components, Vulnerabilities, Toolsfor Web Attackers and Security Testers Hacking Wireless Networks, Components of a Wireless Network, Wardriving, Wireless Hacking, Tools of the Trade.	CO-4
IV	Network Protection Systems: Access Control Lists, Cisco Adaptive Security Appliance Firewall, Configuration and Risk Analysis Tools for Firewalls and Routers, Intrusion Detectionand Prevention Systems, Network Based and Host-Based IDSs and IPSs, Web Filtering, Security Incident Response Teams, Honeypots.	CO-5
	Real World Scenario: Study of various tools and website to perform ethical hacking to exposethe vulnerabilities in real world environment.	CO-6

References:

- Authors: Dafydd Stuttard and Marcus Pinto "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws", Wiley.
- Jon Erickson "Hacking: The Art of Exploitation", No Starch Press
- Allen Harper, Daniel Regalado, Ryan Linn, Stephen Sims, Branko Spasojevic, and Linda Martinez "Gray Hat Hacking: The Ethical Hacker's Handbook", McGraw-Hill Education

6 th Semester		AGFE-21603: FUNCTIONAL ENGLISH-III			
Internal Marks:	50		L	T	P
External Marks:	0		0	1	0
Total Marks:	50		Credits		1

Course Outcomes: After studying the course, students will be able to:	
CO-1	Self-Introduction and Body Language to prepare students to face one to one interaction.
CO-2	Spoken Activity such as Group Discussion to hone spoken skills and interpersonal communication of students.
CO-3	Vocabulary based session to improve language proficiency of students.
CO-4	Resume writing and cover letter writing to make students proficient in English correspondence.
CO-5	Book reading to improve reading skills of students.
CO-6	Corporate Profile Report to make students aware of companies of their stream and their selection criteria.

Part	Content	CO
I	Mock interview to provide one (students) with an opportunity to practice one's interviewing skills in an environment similar to an actual interview.	CO-1
II	This section includes Group discussion is a task, which is generally aimed at understanding and evaluating candidate's behavior in a group.	CO-2
	This section includes word power, analogies, sentence correction and verbal reasoning.	CO-3
III	Resume writing and cover letter writing to make students proficient in English correspondence.	CO-4
IV	Rich Dad Poor Dad shall be prescribed for honing reading skills and comprehension in depth.	CO-5
	Corporate Profile Report to make students aware of companies of their stream and their selection criteria.	CO-6

References:
<ul style="list-style-type: none"> • www.Indiabix.com • English Grammar by Wren and Martin • www.freshersworld.com • www.alison.com

6 th Semester		AGAP-21603: ENGINEERING APTITUDE-III			
Internal Marks:	50		L	T	P
External Marks:	0		0	1	0
Total Marks:	50		Credits		1

Course Outcomes: After studying the course, students will be able to:

CO-1	Enhance the logical thinking of students
CO-2	How likely events could happen and so the risks could be determined and resolved professionally
CO-3	Understand the time taken by an individual or a group of individuals to complete a piece of work
CO-4	Understand different relations among the members of a family
CO-5	Determine if a system of linear equations has no solution, one solution, or infinitely many solutions
CO-6	Use Quadratic equations in real life

Part	Content	CO
I	Problem on Ages: Shortcut method to simplify questions based on Age	CO-1
	Venn Diagrams: Applications of Sets	CO-2
II	Area , volume and surface area : Cuboid, Cube, Parallelepiped, Cylinder, Sphere	CO-3
III	Calendar and Time : To find odd days in an ordinary year, Leap year, Days of week related to odd days	CO-4
	Clocks : Hands of Clock, Angle Traced by Hands	CO-5
IV	Chain Rule : Direct Proportion , Indirect Proportion	CO-6

References:

- Quantitative Maths: Arihant Publishers.
- Objective Mathematics : R S Aggarwal.
- Quantitative Maths: TMH Publication