GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., Telangana-501301

20CS32001-INTERNET OF THINGS

B.Tech. CSE - III Year, II Sem.

L	T	P/D	C
3	-	-	3

Prerequisite(s):
20CS11L01-PROGRAMMING FOR PROBLEM SOLVING-I
20CS31002-COMPUTER NETWORKS

Course Objectives
Develop ability to

1. Assess the vision and introduction of IoT and understanding how M2M is connected to internet of things
2. Identify the appropriate Hardware and software components of IoT for communication
3. Gain knowledge on Cloud Storage models, web servers and how to integrate device, data and cloud management framework for IoT.
4. Learn the concepts of various data analytics and operational technology security with IoT.
5. Understand advanced and emerging concepts fog computing and Edge computing-IoT

Course Outcomes (COs)
At the end of the course, student would be able to

CO1. Interpret the vision of IoT from a global context, compare and contrast M2M and IoT Technology
CO2. Relate the appropriate Hardware and software components of IoT for providing the communication among the devices
CO3. Implement device, data and cloud management services for IoT applications.
CO4. Explore various data analytical techniques and operational security for IoT applications.
CO5. Comprehend the need of Fog Computing and Edge Computing-IoT

UNIT-I
Introduction to Internet of Things: Definition and Characteristics of IoT, Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT.

UNIT-II
Elements of IoT: Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces.
Software Components: Programming API's (using Python/ Node.js/ Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.

UNIT-III
IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Web server – Web server for IoT, Cloud for IoT

IoT Application Development : Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices

UNIT-IV

Data and Analytics for IoT: Introduction to Big Data Analytical Tools for IoT, Data Analytics for IoT, Edge Streaming Analytics, Network Analytics, Machine Learning for IoT
Securing IoT: Introduction to OT (Operational Technology) security, a brief history and common challenges in OT (Operational Technology) Security,

UNIT-V

Introduction To Fog Computing: Fog Computing-Definition-Characteristics-Application Scenarios -Issues -Fog Computing and Internet of Things-Pros and Cons-Myths of Fog Computing -Need and Reasons for Fog Computing Fog Computing and Edge Computing-IoT

TEXT BOOK(S)

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547

REFERENCES BOOK(S)

1. The Internet of Things: Enabling Technologies, Platforms, and Use Cases, Pethuru Raj and Anupama C. Raman, CRC Press, 2017.
2. Designing the Internet of Things, Adrian McEwen & Hakim Cassimally, Wiley, 2013.
3. Getting Started with the Internet of Things, Cuno Pfister, O"Reilly Media, 2011.

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20MA32001- STATISTICS FOR MACHINE LEARNING

B.Tech. CSE - III Year, II Sem.

L	T	P/D	C
3	-	-	3

Prerequisite(s): None

Course Objectives

Develop ability to

1. Understand different types of random variables and their distributions.
2. Estimate the minimum proportion of observations that fall within a specified values; Solve counting problems using generating functions.
3. Estimate the population parameter from a sample and identify the different types of Testing of hypothesis.
4. Classify the linear and logistic regression.
5. Observe the closest point of the lines from both the classes. Learn the concept of PCA.

Course Outcomes (COs)

At the end of the course, student would be able to

CO1. Distinguish between random variables pertaining to discrete/ continuous distribution systems and apply the discrete distributions like Binomial and Poisson and continuous distribution like Normal and their properties.

CO2. Calculate the minimum proportion of observations that fall within a specified values Analyze probability distribution functions.

CO3. Interpret the result of a test of hypothesis in the context of small and large samples.

CO4. Apply linear and logistic regression to estimate and analyze the association between dependent and independent variable.

CO5. Maximize the margin. Reduces the linear dimensionality and improves the feature extraction.

UNIT-I

Basics of Probability Theory, Baye's Theorem; Random Variables (Discrete and Continuous); Probability Distribution of RV, Expectation, Variance (Binomial, Poisson, Uniform, Normal and Exponential).

Unit-II

Chebyshev's and Markov inequalities, Law of Large Numbers and Central Limit Theorem.
Data simulations in parametric setup: Random number generation (a) Discrete RVs (Binomial, Poisson and Uniform) (b) Continuous RVs (Normal and Exponential). Acceptance/Rejection algorithm.

UNIT-III

Parameter Estimation: Estimation of Model Parameters (Maximum Likelihood Estimation and Method of Moments), Confidence Interval (CI) Estimation, Bayesian Estimation and CI.
Testing of Hypothesis: Z-test, t-test, chi squared-test and F-test (concept of p-value).

UNIT-IV

Linear/Non-linear models: Multiple Linear Regression: Multiple Regression Models, Hypothesis Test for Significance of regressors, Logistic Regression: Models with a Binary Response Variable, Estimating the Parameters in a Logistic Regression Model, Interpretation of the Parameters in a Logistic Regression Model; Classification and Density Estimation.

UNIT-V

Classification (SVM), Clustering (K-means) and Dimension Reduction (PCA).

Kernel Methods: Mercer's Kernels, Kernel Classification, Kernel PCA.

TEXT BOOK(S)

1. Probability and Statistics for Engineers and Scientists by Sheldon Ross, Academic Press, 5th Edition, 2014.
2. Introduction to Statistical Machine Learning, Masashi Sugiyama, Book Aid International, 2016.

REFERENCE BOOK(S)

1. Probability for Statistics and Machine Learning: Fundamentals and Advanced Topics by Anirban Das Gupta, Springer 2011.
2. Statistical Inference by George Casella and Roger L. Berger, Thomson Learning, 2002.
3. An Introduction to Statistical Learning with Applications in R by James, G., Witten, D., Hastie, T., Tibshirani, R. Springer 2013.
4. Introduction to Linear Regression Analysis, Fifth Edition by Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining, Wiley series in Probability and Statistics 2012.

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20CS32008-CRYPTOGRAPHY AND NETWORK SECURITY
(PROFESSIONAL ELECTIVE I)

B.Tech. CSE - III Year, II Sem.

L	T	P/D	C
3	-	-	3

Prerequisite(s):
20CS31002-COMPUTER NETWORKS

Course Objectives
Develop ability to

1. Develop a basic understanding of cryptography, it's evolution, and some key encryption techniques used today.
2. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.
3. Illustrate Symmetric and asymmetric cryptosystem.
4. Develop an understanding of web security services and mechanisms, viruses, threats, IDS and concepts of firewalls.
5. Describe the enhancements made to IPv4 by IPSec.

Course Outcomes (COs)
At the end of the course, student would be able to

CO1. Explain the need for security and understand the fundamentals of cryptography knowledge.
CO2. Distinguish symmetric and asymmetric encryption systems and their vulnerability to various attacks.
CO3. Demonstrate the role of third-party agents in the provision of authentication services and basics of cryptographic Hash functions.
CO4. Analyze web security services and mechanisms and illustrate counter measures including firewalls and intrusion detection systems.
CO5. Comprehend and apply email security and IP security policies.

UNIT – I

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT – II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, and Knapsack Algorithm.

UNIT – III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512). **Message authentication codes:** Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

UNIT – IV

Transport-level Security: Web security considerations, Transport Layer Security, HTTPS, Secure Shell (SSH)

Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

UNIT – V

E-Mail Security: Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, combining security associations, Internet Key Exchange

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOK(S)

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition, 2014.

REFERENCE BOOK(S)

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition, 2011.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition, 2016.
3. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition, 2013.
4. Information Security, Principles, and Practice: Mark Stamp, Wiley India, 2011.
5. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH, 2016.
6. Introduction to Network Security: Neal Krawetz, CENGAGE Learning, 2007.
7. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning, 2010.

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20CS32012-PRINCIPLES OF PROGRAMMING LANGUAGES
(PROFESSIONAL ELECTIVE II)

B.Tech. CSE - III Year, II Sem.

L	T	P/D	C
3	-	-	3

Prerequisite(s):
20CS11001-PROGRAMMING FOR PROBLEM SOLVING – I
20CS21002- OBJECT ORIENTED PROGRAMMING

Course Objectives
Develop ability to

1. To understand and describe syntax and semantics of programming languages and introduce important paradigms of programming languages.
2. Explore and acquire data, data types, and basic statements.
3. To understand call-return architecture and ways of implementing them.
4. To familiarize object-orientation, concurrency, and event handling in programming languages
5. To develop programs in non-procedural programming paradigms.

Course Outcomes (COs)
At the end of the course, student would be able to

CO1. Describe the syntax and semantics of programming languages and understand various Programming Paradigms.
CO2. Explain different constructs in programming languages with merits and demerits.
CO3. Design and implement sub programs in various programming languages and understand Abstract Data Types.
CO4. Acquire knowledge on different programming language features like object-orientation, concurrency, exception handling and event handling
CO5. Distinguish functional, logic and scripting languages.

UNIT-I
Preliminary Concepts: Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments.
Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs.

UNIT-II
Names, Bindings, and Scopes: Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants.
Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence.

Expressions and Statements: Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment.
Control Structures: Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT-III
Subprograms and Blocks: Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines.
Implementing Subprograms: General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping.
Abstract Data Types: The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations.

UNIT –IV
Concurrency: Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Statement Level Concurrency.
Exception Handling and Event Handling: Introduction, Exception, Handling in Ada, C++, Java, and Introduction to Event Handling, Event Handling with Java and c #.

UNIT –V
Functional Programming Language: Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages.
Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming.
Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library. (Text Book 2)

TEXT BOOK(S)

1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education, 2012.
2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech, 2007.

REFERENCE BOOK(S)

1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH, 2007.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003

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20CE32071-GREEN BUILDINGS
(OPEN ELECTIVE II)

L	T	P/D	C
3	-	-	3

B.Tech. CSE - III Year, II Sem.

Prerequisite(s): None.

Course objectives

Develop ability to

1. Impart knowledge on the sustainable construction strategies.
2. Understand green building assessment and LEED certification process.
3. Understand effective energy management systems for a smart building.
4. Learn emerging building materials and their application.
5. Understand green building implementation concepts.

Course Outcomes (COs)

At the end of the course, student would be able to

CO1. Describe the need for green buildings.
CO2. Explain green building process and assessment.
CO3. Explain various approaches like landscaping, stormwater and energy management for green buildings.
CO4. Explain energy policies, water supply and wastewater strategies, and materials in the field of Civil Engineering construction used for green buildings.
CO5. Explain the implementation of green buildings and its future scope.

UNIT – I

Introduction to Green Buildings: Definition of green buildings and sustainable development– typical features of green building– Increased CO_2 trade – Sustainable construction – Major environmental and resource concerns – Green building movement and obstacles – Green building requirements – Perceived use of greenbuilding.

UNIT – II

Green Building Process and Assessment: Conventional versus green building delivery systems – Execution of green building process – Integrated design process – Ecological design – Merits and demerits – Historical perspective – Green building rating systems – GRIHA, IGBC and LEED, Overview of the criteria as per these rating systems. International building assessment standards – Building rating system and its future – Case study of a green building.

UNIT – III

Sustainable landscaping, Energy and Atmosphere: Land and landscape approaches for green buildings – Sustainable landscapes – Enhancing ecosystems – Storm water management – Heat Island mitigation – Building energy issues – Building energy design strategies – Building envelope – Active mechanical systems – Electrical power systems – Innovative energy optimization strategies – Smart buildings and energy management systems – Ozone depleting chemicals in HVAC & R and fire suppression.

UNIT – IV

Building Hydrologic System and Material Loops: Energy policy act of 1992 – High performance building hydrologic strategy - High performance building water supply strategy - High performance building wastewater strategy – Landscaping water efficiency – Green building materials issues and priorities – Difference between green building buildings and green building materials – Waste Management–Handling of construction waste materials, separation of household waste, on-site and off-site organic waste management.

UNIT – V

Green Building Implementation: Site protection planning – Health and safety planning – Construction and demolition – Waste management – Reducing the footprint of construction operations – Essentials of building commissioning – Costs and benefits of building commissioning – Case study for high performance green buildings – The economics of green buildings – Quantifying green building costs – Future directions in green buildings.

TEXT BOOK(S)

1. Sustainable Construction: Green Building Design and Delivery, Charles.J.Kibert, JohnWiley & Sons, New Jersey, 2016
2. Green Building: Guidebook for Sustainable Architecture, M.Bauer, P. Mosle and M.Schwarz, Springer, Verlag Berlin Heidelberg, 2010.

REFERENCE BOOK(S)

1. Marketing Green Building Services: Strategies for success, Jerry Yudelson, Elsever, 2008
2. IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian Green Building Council Publishers.
3. Marketing Green Buildings: Guide for Engineering, Construction and Architecture, JerryYudelson, The Fairmont Press Inc., 2006.
4. GRIHA version 2015, GRIHA rating system, Green Rating for Integrated Habitat Assessment.
5. Green by Design: Creating a Home for Sustainable Living, Angela M. Dean, Gibbs SmithPublication, 2003.
6. Indian Green Building Council Website: https://igbc.in/igbc/
7. http://cpwd.gov.in/Publication/Guideleines_Sustainable_Habitat.pdf
8. For case studies: http://www.nmsarchitects.com/
9. For case studies: http://www.nmsarchitects.com/