IoT

Unit 1

Chapter- 1 (Introduction)

What is IOT, Components, Applications, Different Definitions & Similar Concept, Sensing, Actuation, Smart Objects, Smart Applications

Chapter- 2 (IOT Application for Industry)

Value Creation & Challenges, IOT Today, as a Network of Networks, IOT's Importance, IOT: Critical for Human Progression, Challenges & Barriers

Unit 2

Chapter- 3 (IOT Communication Models)

Device to Device communications, Device to cloud communications, Device to gateway model, Back-end Data sharing model, Security issues

Chapter-4 (Issues Raised by IOT)

IOT security challenges, a spectrum of security considerations, unique security challenges of IOT devices and privacy, unique privacy aspects of IOT, interoperability

Unit 3

Chapter-5 (Standard Issues)

Interoperability & standards background, key considerations & challenges in IOT interoperability/ standards, Regulatory, Legal & Right issues: Data protection & cross border data flows, IOT data discrimination, IOT devices as aid to law enforcement & public safety, IOT device liability

Chapter-6 (Proliferation & IOT devices)

Used in legal actions, Regulatory, Legal & right issues summary, emerging economy & Development issues: Ensuring IOT opportunities are global, Economic & development opportunities

Chapter- 7 (Case studies)

Case Study on smart home using IOT
Advance Topics: Mobile Cloud Services, IOT & cloud security, Smart Cloud &

IOT

Information Security & Cryptography

UNIT I

Introduction & Number Theory: Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography). Finite fields and Number Theory: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields- Polynomial Arithmetic –Prime numbers- Fermat's and Euler's theorem-Testing for primality -The Chinese remainder theorem- Discrete algorithms.

Block Ciphers: Data Encryption Standard-Block cipher principles-block cipher modes of operation- Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm.

UNIT II

Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management – Diffie Hellman Key exchange

Hash Functions and Digital Signatures: Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – MD5–SHA512–HMAC – CMAC –
Digital signature and authentication protocols – DSS – EI Gamal – Schnorr

UNIT III

Security Practice & System Security: Authentication applications – Kerberos – Authentication services – Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls – Firewall designs –Intruder – Intrusion detection system – Virus and related threats.

E-mail Security: Security Services for E-mail-attacks possible through E-mail – establishing keys privacy- authentication of the source-Message Integrity-Privacy-S/MIME.
IP Security and Web Security: Overview of IP Security – IP Address and IPv6-Authentication Header-Encapsulation Security Payload (ESP)- SSL Architecture and its layers- Transport Layer Security (TLS)- HTTPS- Secure Shell (SSH)

MAD

Unit-1	
Chapter 1.1	Introduction: Cost of Mobile Application Development, Importance of Mobile Strategies, Challenges, Myths, Third-Party Frameworks, Mobile Web Presence, Applications Factors in Developing Mobile Applications: Mobile Software Engineering, Frameworks and Tools, Generic UI Development ,Android User
Chapter 1.2	Introduction to Mobility: Mobility Landscape, Mobile Platforms, Mobile apps development, Overview of Android Platform, Setting up the mobile apps development environment with emulator. Telephony :a. Deciding Scope of an App b. Wireless Connectivity and Mobile Apps c. Android Telephony.
Chapter 1.3	Building block of Mobile apps: App user Interface Designing, Layout, Widgets, User Interface elements, Draw-able, Menu, Activity states and lifecycle, Interaction among activities. App functionality based user interface:Threads, Asynchronous task, Services-states and lifecycle, Notifications, Broadcast receivers, Telephony and SMS API.
Unit-2	
Chapter 2.1	Naïve Data Handling: On Device File I/O, Shared preferences, Mobile Databases such as SQLite and enterprise data access.
Chapter 2.2	Sprucing up Mobile Apps: Graphics and animation-custom views, canvas, animation API multimedia-audio/video playback and record, location aware. Testing Mobile apps: Debugging Apps, White and Black Box Testing and test automation of apps.
Chapter 2.3	Creating Consumable Web Services for Mobile Devices: What is a Web Service, Web Services Languages (Formats), Creating an Example Web Service, Debugging Web Services
Unit-3	
Chapter 3.1	Mobile User Interface Design: Effective Use of Screen Real Estate, Understanding Mobile Information Design, Android app Fragments, Understanding Mobile Application Users, Understanding Mobile Platforms, Using the Tools of Mobile Interface Design.

Chapter 3.2	Mobile Websites: Choosing a Mobile Web Option, Adaptive Mobile Websites, Dedicated Mobile Websites Mobile Web Apps with HTML5 Android: Android as Competition to itself, connecting to the Google Play, Android Development Practices, Building an App in Android.
Chapter 3.3	Operating Systems iOS: IOS Project, Debugging iOS Apps, Objective-C Basics, Building the Derby App in IOS Windows Phone 7: Windows Phone 7 Project, Building an App in Windows Phone 7, Distribution.

TOC

UNIT –I

Introduction: Basic Terminology: Alphabet, Formal Language and operations on formal languages, Examples of formal languages.

Finite automata: Concept of Basic Machines, Properties and Limitations of Finite State Machines, Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), Equivalence of DFA and NDFA, Non-Deterministic Finite automata with Λ-Transitions.

Regular expression: Regular Languages and Regular Expressions, Kleen's Theorem. Arden's Method.

UNIT –II

Properties of Regular sets: The Pumping Lemma for Regular sets, Application of the Pumping Lemma, Closure Properties of Regular Sets, Myhill- Nerode Theorem and Minimization of Finite Automata, Minimization Algorithm.

Finite Automata with output: Moore and Mealy Machines. Equivalence of Moore and Mealy Machines.

Context Free Grammars: Examples and Definitions, Derivation trees and ambiguity, An Unambiguous CFG for Algebraic Expressions. Regular Grammar, Simplified forms and Normal forms: Removal of useless symbols and unit production, Removal of Λ-moves, Chomsky Normal Form (CNF), Griebach Normal Form (GNF).

UNIT –III

Context sensitive Language: Context sensitive Language and grammar, Relation between lang of classes

Pushdown Automata: Intro and definition of Push-Down Automata, Applications of Push Down Automata.

Turing Machines: Definitions and Examples, Deterministic and Non- Deterministic Turing Machines, Unsolvable Problems: A Non recursive Language and an Unsolvable Problem, PCP Problem and MPCP Problem.

More General Languages and Grammars: Recursively Enumerable and Recursive Languages, Unrestricted grammars, Chomsky hierarchies of grammars.

Discrete Mathematics & Graph Theory

Unit 1	
Ch 1.1	Mathematical Logic: Introduction, Statements and Notation, Connectives, Basic logical operation, truth tables, Tautologies, Contradictions, Algebra of Proposition, logical implications, logical Equivalence, Normal Forms, Functionally complete set of connectives
Ch 1.2	Inference Theory of Statement Calculus, Predicate Calculus. Pigeon hole principle and its application
Unit 2	
Ch 2.1	Basic Structure: Introduction to set theory, Set operations, Algebra of sets, Combination of sets, Finite and Infinite sets, Cardinality of sets, Classes of sets, Powersets, Cartesian product, Principles of inclusion & exclusion.
Ch 2.2	Relations and functions: Binary relations, types of relations, equivalence relations and partitions, partial order relations, functions and its types, composition of function and relations, inverse of relations and functions
Ch 2.3	Algebraic structures: Definition, elementary properties of algebraic structures, semi group, monoid, group, homomorphism, isomorphism and automorphism , subgroups, normal subgroups, cyclic groups.
Unit 3	
Ch 3.1	Graph Theory: Introduction to graphs, directed and undirected graphs, homomorphism and isomorphic graphs, sub graphs multi graphs and weighted graphs, paths and circuits, , Eulerian paths and circuits, Hamiltonian paths and circuits, planer graphs Euler's formula Chromatic numbers (Coloring problems). graph traversal, Basics of Counting, Combinations and Permutations
Ch 3.2	Trees: Trees and Rooted Trees, Spanning Trees, Directed Trees, prefix codes, tree traversal. shortest path in weighted graphs
Ch 3.3	Boolean algebra: Boolean expression, representation & minimization of Boolean function