

ES 3.1: BIG DATA ANALYTICS

Introduction to Big Data: Types of Digital Data: Classification of Digital Data, Introduction to Big Data: Characteristics of data-Evolution of Big data-Challenges of Big data-Other Characteristics of Data Which are not Definitional Traits of Big Data-Why Big Data?-Are we Just an Information Consumer or Do we also produce Information?-Traditional Business Intelligence (BI) versus Big Data – A Typical Data Warehouse Environment – A Typical Hadoop Environment – What is New Today? – What is changing in the Realms of Big Data?

Unit II:

Analytics Basics: Big Data Analytics: Where do we Begin? – What is Big Data Analytics? – What Big Data Analytics Isn't? – Why this Sudden Hype Around Big Data Analytics? – Classification of Analytics – Greatest Challenges that Prevent Business from capitalizing on Big Data – Top Challenges Facing Big Data – why is Big Data Analytics Important? – What kind of Technologies are we looking Toward to Help Meet the Challenges Posed by Big Data? – Data Science – Data Scientist... Your New Best Friend – Terminologies Used in Big Data Environments – Basically Available Soft State Eventual Consistency (BASE) – Few Top Analytics Tools.

Unit III:

Big Data Technologies: The Big Data Technology Landscape: NoSQL (Not Only SQL) – Hadoop, Introduction to Hadoop: Introducing Hadoop – Why Hadoop? – Why not RDBMS? – RDBMS versus Hadoop – Distributed Computing Challenges – History of Hadoop – Hadoop Overview – Use Case of Hadoop – Hadoop Distributors – HDFS(Hadoop Distributed File System) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN(Yet another Resource Negotiator) – Interacting with Hadoop Ecosystem.

Unit IV:

Introduction to MAPREDUCE Programming: Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression, Introduction to Hive: What is Hive? – Hive Architecture – Hive Data Types – Hive File Format – Hive Query Language (HQL) – RCFile Implementation – SerDe – User – Defined Function (UDF).

Unit V:

Analytical Algorithms: Introduction to Machine Learning: Introduction to Machine Learning – Machine Learning Algorithms.


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ES 2.3: INTERNET OF THINGS

Unit I:

Introduction to Internet of Things: Introduction – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT & Deployment Templates. **Domain Specific**

IoTs: Introduction – Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Life style.

Unit II:

IoT and M2M : Introduction : M2M – Difference between IoT and M2M – SDN and NFV for IoT.

IoT System Management with NETCONF-YANG : Need for IoT Systems Management – Simple Network Management Protocol (SNMP) – Network Operator Requirements – NETCONF- YANG – IoT Systems Management with NETCONF_YANG.

Unit III:

IoT Platforms Design Methodology: Introduction – IoT Design Methodology – Case Study on IoT System for Weather Monitoring – Motivation for using Python.

IoT Systems –Logical Design using Python: Introduction – Installing Python – Python Data types & Data Structures – Control Flow – Functions – Modules – Packages – File Handling – Date/Time Operations – Classes – Python packages of Interest for IoT.

Unit IV:

IoT Physical Devices & Endpoints: What is an IoT Device – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT devices.

IoT Physical Servers & Cloud Offerings : Introduction to Cloud Storage Models & Communication APIs – WAMP - AutoBahn for IoT- Xively Cloud for IoT – Python Web application Framework-Django – Designing a REST ful

Web API – Amazon Web Services for IoT – SkynetIoT messaging platform.

Unit V:

Case Studies Illustrating IoT Design: Introduction – Home Automation – Cities – Environment – Agriculture – Productivity applications



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Data Analytics for IoT : Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozier – Apache Spark – Apache Storm – Using Apache Storm for Real-time Data Analysis.

CS 14: DATA COMMUNICATIONS AND COMPUTER NETWORKS

Unit I:

Data Communications, Data Networking and the Internet: Data Communications and Networking for Today's Enterprise – A Communication Model - Data Communications – Networks – The Internet – An Example Configuration

Protocol Architecture, TCP/IP and Internet-Based Applications

The Need for a Protocol Architecture – The TCP/IP Protocol Architecture
– The OSI Model – Standardization within a Protocol Architecture- Traditional Internet-Based Applications – Multimedia

Transmission Media

Guided Transmission Media – Wireless Transmission - Wireless Propagation – Line of Sight Transmission

Unit II:

Digital Data Communication Techniques- Asynchronous and Synchronous Transmission – Types of Errors – Error Detection –Error Correction –Line Configuration

Data Link Control Protocols – Flow Control – Error Control – High Level Data Link Control

Multiplexing – Frequency Division Multiplexing – Synchronous


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Time Division Multiplexing – Statistical Time Division Multiplexing –
Asymmetric Digital Subscriber Line

Unit III:

Wide Area Networks:

Circuit Switching and Packet Switching – Switched Communication Networks

– Circuit Switching Networks - Circuit Switching Concepts – Softswitch Architecture –
Packet Switching Principles – X .25 – Frame Relay **Asynchronous Transfer Mode** –
Protocol Architecture – ATM Logical Connections –ATM Cells – Transmission of ATM
Cells

Routing in Switched Networks – Routing in Packet switching Networks – Examples :
Routing in ARPANET- Least-Cost Algorithms

Unit IV:

Local Area Networks: Background – Topologies of Transmission Media – lan Protocol
Architecture – Bridges – Layer 2 and Layer 3 Switches

Internet and Transport Protocols - Internet Protocols – Basic Protocol Functions –
Principles of Internetworking – Internet Protocol Operation – Internet Protocol – IPv6

Internetwork Operation

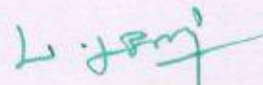
Multicasting – Routing Protocols - Integrated Services Architecture – Differentiated Services
– Service Level Agreements – IP Performance Metrics

Unit V:

Transport Protocols - Connection-Oriented Transport Protocol Mechanisms – TCP –TCP
Congestion Control – UDP

Internet Applications - Electronic Mail and Network Management - Electronic Mail:
SMTP and MIME – Network Management SNMP

Internet Applications – Internet Directory Service and World Wide Web – Internet
Directory Service DNS – Web Access HTTP



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ES 1.2: ADVANCED SOFTWARE ENGINEERING

(5 Hours – 4 Credits)

Unit I :

Software and Software Engineering: The nature of software – Software Engineering – Software Myths. **Process Models:** A generic process model – Process assessment and improvement – Prescriptive process models – The unified process. **Agile Development:** What is Agility? – What is an Agile process? – Extreme programming.

Unit II :

Modeling: Principles that guide each framework activity – **Understanding Requirement:** Requirement engineering – Eliciting requirements – Negotiating requirements – Validating requirements. **Requirement Modeling: Scenarios, Information, and Analysis Classes:** Requirement Analysis – Scenario-based modeling – UML models that supplement the use case – Data modeling concepts – Class-based modeling.

Unit III :

Design Concepts: The design process - Design concepts – **Architectural design:** Software Architecture – Architecture design – **Component level design:** What is component? Designing class based components - **User Interface design:** User Interface analysis & design
– Interface Analysis – Interface Design steps.

Unit IV :

Quality Management: What is quality? Software quality – Achieving software quality
– Software quality assurance; **Elements of software quality assurance – SQA tasks, Goals & metrics - Software reliability.**

Unit V :

Software Testing strategies: A strategic approach to software testing – Testing strategies for conventional software – Test strategies for object-oriented software – Software testing. Software configuration Management-SCM.


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