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B.Tech IV-II Semester (CSE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A05801 15A05802 15A05803	**MOOCS-II** a. Data Analytics b. Mobile Computing c. Innovations and IT Management	3	1	-	3
2.	15A05804 15A05805 15A05806	**MOOCS-III** a. Building Large Scale Software Systems b. Enabling Technologies for Data Science & Analytics : IoT c. Cyber Security	3	1	-	3
3.	15A05807	Comprehensive Viva-Voce	-	-	4	2
4.	15A05808	Technical Seminar	-	-	4	2
5.	15A05809	Project Work	-	-	24	12
		Total:	6	2	32	22

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	L	T	P	C
B. Tech IV-II Sem. (CSE)	3	1	0	3

15A05801   DATA ANALYTICS
(MOOCS-II)

Course Objectives:
- To introduce the terminology, technology and its applications
- To introduce the concept of Analytics for Business
- To introduce the tools, technologies & programming languages which is used in day to day analytics cycle

Course Outcomes:
- Ability to work with different data types.
- Ability to solve various problems related to businesses.
- Ability to effectively utilize the time and involve in collaborative tasks.

Unit I
Introduction to Analytics and R programming (NOS 2101)
Introduction to R, RStudio (GUI): R Windows Environment, introduction to various data types, Numeric, Character, date, data frame, array, matrix etc., Reading Datasets, Working with different file types .txt,.csv etc. Outliers, Combining Datasets, R Functions and loops. Summary Statistics - Summarizing data with R, Probability, Expected, Random, Bivariate Random variables, Probability distribution. Central Limit Theorem etc.

Unit II
SQL using R & Correlation and Regression Analysis (NOS 2101)
Introduction to NoSQL, Connecting R to NoSQL databases. Excel and R integration with R connector. Regression Analysis, Assumptions of OLS Regression, Regression Modelling. Correlation, ANOVA, Forecasting, Heteroscedasticity, Autocorrelation, Introduction to Multiple Regression etc.

Unit III
Understand the Verticals - Engineering, Financial and others (NOS 2101)
Understanding systems viz. Engineering Design, Manufacturing, Smart Utilities, Production lines, Automotive, Technology etc. Understanding Business problems related to various businesses

Unit IV
Manage your work to meet requirements (NOS 9001)
Understanding Learning objectives, Introduction to work & meeting requirements, Time Management, Work management & prioritization, Quality & Standards Adherence,

Unit V
Work effectively with Colleagues (NOS 9002)

Introduction to work effectively, Team Work, Professionalism, Effective Communication skills, etc. NOS * National Occupational Standards

Text Books:
1. Student's Handbook for Associate Analytics.
2. Introduction to Scientific Programming and Simulation Using R, Owen Jones, Robert Maillardet and Andrew Robinson, Second Edition, CRC Press, 2014
3. A First Course in Statistical Programming with R, Braun W. J., Murdoch D. J.. — Cambridge University Press, 2007
4. Data Manipulation with R, Jaynal Abedin and Kishor Kumar Das, Second Edition, Packt publishing, BIRMINGHAM – MUMBAI.
5. Beginning R The Statistical Programming language- Mark Gardener, John Wiley & Sons, Inc, 2012

Reference Books:
1. Introduction to Probability and Statistics Using R, ISBN: 978-0-557-24979-4, is a textbook written for an undergraduate course in probability and statistics.
2. An Introduction to R, by Venables and Smith and the R Development Core Team. This may be downloaded for free from the R Project website (http://www.r-project.org/, see Manuals). There are plenty of other free references available from the R Project website.
3. Time Series Analysis and Mining with R**,** Yanchang Zhao
4. Graphics for Statistics and Data Analysis with R – Kevin J. Keen, CRC Press, 2010
5. Data Analysis and Graphics Using R, Third Edition, John Maindonald, W. John Braun, Cambridge University Press, 2010
6. Exploratory Data Analysis with R – Roger D. Peng, Leanpub publications, 2015
7. Introduction to Probability and Statistics Using R, G. jay Kerns, First Edition, 2011
8. The Art of Data Science- A Guide for anyone Who Works with Data – Roger D. Peng and Elizabeth Matsui, Leanpub Publications, 2014
9. Montgomery, Douglas C., and George C. Runger, Applied statistics and probability for engineers. John Wiley & Sons, 2010.The Basic Concepts of Time Series Analysis. http://anson.ucdavis.edu/~azari/sta137/AuNotes.pdf

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B. Tech IV-II Sem. (CSE)

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3	1	0	3

15A05802   MOBILE COMPUTING
(MOOCS-II)

Course Objectives:
- Understand mobile ad hoc networks, design and implementation issues, and available solutions.
- Acquire knowledge of sensor networks and their characteristics.

Course Outcomes:
- Students able to use mobile computing more effectively
- Students gain understanding of the current topics in MANETs and WSNs, both from an industry and research point of views.
- Acquire skills to design and implement a basic mobile ad hoc or wireless sensor network via simulations.

UNIT-I:
Wireless LANS and PANS: Introduction, Fundamentals of WLANS, IEEE 802.11 Standards, HIPERLAN Standard, Bluetooth, Home RF.
Wireless Internet:
Wireless Internet, Mobile IP, TCP in Wireless Domain, WAP, Optimizing Web over Wireless.

UNIT-II:
AD HOC Wireless Networks: Introduction, Issues in Ad Hoc Wireless Networks, AD Hoc Wireless Internet.
MAC Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT -III:
Routing Protocols: Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand
Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols.

Transport Layer and Security Protocols: Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks, Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

UNIT –IV:
Quality of Service: Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QoS Frameworks for Ad Hoc Wireless Networks.
Energy Management: Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Ad Hoc Wireless Networks, Battery Management Schemes, Transmission Power Management Schemes, System Power Management Schemes.

UNIT –V:
Wireless Sensor Networks: Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other Issues.

TEXT BOOKS:
1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, PHI, 2004.
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control - Jagannathan Sarangapani, CRC Press

REFERENCE BOOKS:
1. Ad hoc Mobile Wireless Networks – Subir Kumar sarkar, T G Basvaraju, C Puttamadappa, Auerbach Publications,2012.
2. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.
3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh , Pearson Education.

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B. Tech IV-II Sem. (CSE)   **3   1   0   3**

15A05803   INNOVATIONS AND IT MANAGEMENT
(MOOCS-II)

Course Objectives:
- Understand the rule of information technology in businesses, in state or central government departments and in remote parts of India.
- Understand the future of information systems and the manner in which they are shaping the world around us.
- Understand the Ethical and Social issues concerning information systems.

Course Outcomes:
- Ability to do Business over the Internet.
- Ability to solve Business problems by applying analytics.
- Ability to use ICT to participate in Democratic process.

Unit-1:
Organisations and Information Systems: Modern organization, Information systems in organisations, The role of Internet, , Managing in the Internet Era, Managing Information Systems in Organisations, Challenges for the Manager. **Concepts of MIS:** Data and information, Information as a Resource, Information in Organisational Functions, Types of Information Technology, Types of Information Systems, Decision Making with MIS, Communication in Organisations. **Information systems and Management Strategy:** The Competitive environment of Business, Using IT for Competing, Information goods, Information systems and competitive Strategy.

Unit- 2:E-Commerce technology, HTML and E-mail, Business over the Internet, E-Business, E-Governance. **Managing Information Systems:** Challenges of managing the IT Function, Vendor Management, The role of CIO, Ethical Issues, and Social Issues.

Unit- 3: Infrastructure of IT: What is IT Infrastructure, IT infrastructure Decisions, Infrastructure components, networks, solutions, cloud computing, Virtualization, Enterprise systems, IT Outsourcing, Networks in organisation and what has to be managed. **Information systems security and control:** Threats to the organization, Technologies for handling security, managing security.

Unit- 4: Analysis of Business Process, Business Process Integration, Motivation for Enterprise systems (ES), Supply chain management systems, Customer Relationship

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Management systems, Challenges for ES implementations, International Information systems, Decision support systems (DSS), Components of DSS, Analytical and Business Intelligence, Knowledge Management.

Unit-5: ICT Development, Types of ICT interventions, Examples, E-Governance concepts, E-Government, E-Participation, Social Dynamics of the internet, Services of the Internet, Technology of the Internet, Social Issues, Social networks in the Enterprise, concept of open source software, open source licences, open source in business and Government, open Data Standards and the open community.

Text book:
1. "MIS: Managing information Systems and in Business, Government and Society" Rahul De, Wiley publications.

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B. Tech IV-II Sem. (CSE)	**3**	**1**	**0**	**3**

15A05804   BUILDING LARGE SCALE SOFTWARE SYSTEMS
(MOOCS-III)

Course Objectives:
- To introduce the architecture of large c programs.
- To introduce the concept Case study for design of large C programs using Linux kernel.
- To introduce the tools, technologies & programming languages.

Course Outcomes:
- Student able to understand coupling and cohesion
- Student able to design large c and c++ programs using Linux kernel
- Student able to understand how to design Linux kernel
- Ability to solve various problems related to Object Oriented Software using patterns

Unit I: Architecture of Large C Programs : Coupling and Cohesion concepts , types of cohesion functional, sequential, procedural, temporal, logical and coincidental; types of coupling – data,stamp, control, common, content coupling.

Unit II: Designing Large C programs having good cohesion and coupling; C modules-notion of separate compilation; Case study for design of large C programs using linux kernel.

Unit III: Tools for building large programs – version control using git and building large programs using make – bug tracking systems – bugzilla.

Unit IV: Building Large C++ programs – Architecture of Large C ++ programs – Coupling and Cohesion of C++ programs, Metrics for measuring the quality of C++ programs, Chidamber and Krammer. Metric suite- MOOD metrics – improving the design of C++ programs; Case study of redesigning Linux kernel into Minimalistic Object Oriented Linux (MOOL).

Unit V: Pattern Oriented Software Architecture: Building object oriented programs using design patterns identification of design patterns in source code- refactoring existing programs into design pattern based programs- case studies of building software with design patterns.

Text Books:
1. D. Janakiram, "Building Large Scale Software Systems", McGraw Hill Education, 2013.
2. John Lakos , "Large-Scale C++ Software Design", Addison Wesley, 1996.

References:
1. Scott W. Ambler, Barbara Hanscome, "Process Patterns: Building Large-Scale Systems Using Object Technology", 1st Edition, Camebridge University Press, 1998.
2. Peter van der Linden, "Expert C Programming: Deep C Secrets 1st Edition", Prentice Hall.
3 . Andrei Alexandrescu, "Modern C++ Design: Generic Programming and Design Patterns Applied", 1st Edition, Addison Wesley, 2011.

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B. Tech IV-II Sem. (CSE)	**3**	**1**	**0**	**3**

15A05805   ENABLING TECHNOLOGIES FOR DATA SCIENCE & ANALYTICS: IoT

Course objectives:
- Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IoT Devices.

Course Outcomes:
- Able to understand the application areas of IoT
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- Able to understand building blocks of Internet of Things and characteristics.

UNIT I: Introduction to Internet of Things
Introduction, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies.
Domain Specific IoTs
Introduction, Home Automation, cities, Environment, Retail, Agriculture, Industry, Health & Lifestyle.

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 System Management with NETCONF-YANG.

UNIT III: Developing Internet of Things
Introduction, IoT Design Methodology, Case Study on IoT System for Weather Monitoring.
Case Studies Illustrating IoT Design:
Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications.

UNIT IV
Advanced Topics:
Introduction, Apache Hadoop, Using Hadoop Map Reduce for Batch Data Analysis.

IEEE 802.15.4:
The IEEE 802 committee family of protocols, The physical layer, The Media Access control layer, Uses of 802.15.4, The Future of 802.15.4: 802.15.4e and 802.15.4g.

UNIT V:
ZigBee:
Development of the standard, ZigBee Architecture, Association, The ZigBee network layer, The ZigBee APS Layer, The ZigBee Devices Object (ZDO) and the ZigBee Device Profile (ZDP), Zigbee Security, The ZigBee Cluster Library (ZCL), ZigBee Applications profiles, The ZigBee Gateway Specifications for network devices.

TEXT BOOKS:
1. Internet of Things a Hands-on Approach by Arshdeep Bahga and Vijay Madisetti. University Press.
2. The Internet of Things key applications and protocols by Oliver Hersent, David Boswarthick and Omar elloumi, Wiley Student Edition.

REFFERENCE BOOOKS:
1. Internet of Things: Architecture, Design Principles and Applications by Raj Kamal MCGraw Hill Edition.

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15A05806   CYBER SECURITY
(MOOCS-III)

Course Objectives:
- Appraise the current structure of cyber security roles across the DoD enterprise, including the roles and responsibilities of the relevant organizations.
- Evaluate the trends and patterns that will determine the future state of cyber security

Course Out comes:
- Analyze threats and risks within context of the cyber security architecture
- Appraise cyber security incidents to apply appropriate response
- Evaluate decision making outcomes of cyber security scenarios

Unit-I

Cyber crime: Mobile and Wireless devices-Trend mobility-authentication service security-Attacks on mobile phones-mobile phone security Implications for organizations-Organizational measurement for Handling mobile-Security policies and measures in mobile computing era. Cases.

Unit-II

Tools and methods used in cyber crime-Proxy servers and Anonymizers-PhishingPassword cracking-Key loggers and Spy wares-Virus and worms-Trojan Horse and Backdoors-Steganography-SQL Injection-Buffer overflow-Attacks on wireless network. Cases.

Unit-III

Understanding computer forensic-Historical background of cyber forensicForensic analysis of e-mail-Digital forensic life cycle-Network forensic-Setting up a computer forensic Laboratory-Relevance of the OSI 7 Layer model to computer Forensic-Computer forensic from compliance perspectives. Cases.

Unit-IV

Forensic of Hand –Held Devices-Understanding cell phone working characteristics-Hand-Held devices and digital forensic- Toolkits for Hand-Held device-Forensic of i-pod and digital music devices-Techno legal Challenges with evidence from hand-held Devices. Cases.

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Unit-V

Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing Security and privacy Implications-Protecting people privacy in the organizations Forensic best practices for organizations. Cases.

Text book:

1. Nina Godbole & Sunit Belapure "Cyber Security", Wiley India, 2012.

REFERENCES:

1. Harish Chander, "cyber laws & IT protection", PHI learning pvt.ltd, 2012.
2. Dhiren R Patel, "Information security theory & practice",PHI learning pvt ltd,2010.
3. MS.M.K.Geetha & Ms.Swapne Raman"Cyber Crimes and Fraud Management, "MACMILLAN,2012. Pankaj Agarwal : Information Security& Cyber Laws (Acme Learning), Excel, 2013.
4. Vivek Sood, Cyber Law Simplified, TMH, 2012.