JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF CSE - ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

III B. Tech – II Semester						
S.No	**Course Code**	**Courses**	**Hours per week**			**Credits**
			L	**T**	**P**	**C**
1	PC	Computer Networks	3	0	0	3
2	PC	Deep Learning	3	0	0	3
3	PC	Design and Analysis of Algorithms	3	0	0	3
4	PE	**Professional Elective-II** 1. Software Project Management 2. Distributed Systems 3. Internet of Things 4. Network Programming	3	0	0	3
5	Open Elective/Job Oriented	**Open Elective-II** Open Electives offered by other departments/ MEAN Stack Development (Job Oriented Course)	3	0	0	3
6	PC	Computer Networks Lab	0	0	3	1.5
7	PC	Algorithms for Efficient Coding Lab	0	0	3	1.5
8	PC	Deep Learning with Tensorflow	0	0	3	1.5
9	SO	**Skill Oriented Course - IV** MEAN Stack Technologies-Module I-HTML 5, JavaScript, Node.js, Express.js and TypeScipt **OR** Big Data : Apache Spark	0	0	4	2
10	MC	Employability skills-II	2	0	0	0
Total credits						**21.5**
Industrial/Research Internship(Mandatory) 2 Months during summer vacation						
11	Minor	Deep Learning$^{\$}$	3	0	2	**4**
Minor courses through SWAYAM			0	0	0	**2**

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COMPUTER NETWORKS					

Course Objectives:
- To provide insight about networks, topologies, and the key concepts.
- To gain comprehensive knowledge about the layered communication architectures (OSI and TCP/IP) and its functionalities.
- To understand the principles, key protocols, design issues, and significance of each layers in ISO and TCP/IP.
- To know the basic concepts of network services and various network applications.

Course Outcomes:
By the end of the course, the student will be able to
- Demonstrate different network models for networking links OSI, TCP/IP, B-ISDN, N-BISDN and get knowledge about various communication techniques, methods and protocol standards.
- Discuss different transmission media and different switching networks.
- Analyze data link layer services, functions and protocols like HDLC and PPP.
- Compare and Classify medium access control protocols like ALOHA, CSMA, CSMA/CD, CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols
- Determine application layer services and client server protocols working with the client server paradigms like WWW, HTTP, FTP, e-mail and SNMP etc.

UNIT I:
Introduction: Network Types, LAN, MAN, WAN, Network Topologies Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, OSI Vs TCP/IP, Lack of OSI models success, Internet History.
Physical Layer –Introduction to Guided Media- Twisted-pair cable, Coaxial cable and Fiber optic cable and unguided media: Wireless-Radio waves, microwaves, infrared.

UNIT II:
Data link layer: Design issues, **Framing**: fixed size framing, variable size framing, flow control, error control, error detection and correction codes, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer, **Elementary Data Link Layer protocols**: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.
Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing, multi link PPP.

UNIT – III:
Media Access Control: Random Access: ALOHA, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, **Controlled Access:** Reservation, Polling, Token Passing, **Channelization:** frequency division multiple Access (FDMA), time division multiple access(TDMA), code division multiple access(CDMA).
Wired LANs: Ethernet, Ethernet Protocol, Standard Ethernet, Fast Ethernet(100 Mbps), Gigabit Ethernet, 10 Gigabit Ethernet.

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UNIT – IV:

The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Approaches to Congestion Control-Traffic Aware Routing- Admission Control-Traffic Throttling-Load Shedding. Traffic Control Algorithm-Leaky bucket & Token bucket.

Internet Working: How networks differ, How networks can be connected, Tunnelling, internetwork routing, Fragmentation, network layer in the internet, IP protocols, IP Version 4 protocol, IPV4 Header Format, IP addresses, Class full Addressing, CIDR, NAT, Subnets, IP Version 6, The main IPV6 header, Transition from IPV4 to IPV6, Comparision of IPV4 & IPV6, Internet control protocols- ICMP, ARP, DHCP

UNIT –V:

The Transport Layer: Transport layer protocols: Introduction, services, port number, User datagram protocol, User datagram, UDP services, UDP applications, Transmission control protocol: TCP services, TCP features, Segment, A TCP connection, windows in TCP, flow control, Error control, Congestion control in TCP.

Application Layer: World Wide Web: HTTP, Electronic mail-Architecture, web based mail, email security, TELENET, local versus remote Logging, Domain Name System: Name Space, DNS in Internet, Resolution, Caching, Resource Records, DNS messages, Registrars, security of DNS Name Servers, SNMP.

Text Books:

1. Computer Networks, Andrew S Tanenbaum, Fifth Edition. Pearson Education/PHI
2. Data Communications and Networks, Behrouz A. Forouzan, Fifth Edition TMH.

References Books:

1. Data Communications and Networks- Achut S Godbole, AtulKahate
2. Computer Networks, Mayank Dave, CENGAGE

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DEEP LEARNING					

Course Objectives: At the end of the course, the students will be expected to:

- Learn deep learning methods for working with sequential data,
- Learn deep recurrent and memory networks,
- Learn deep Turing machines,
- Apply such deep learning mechanisms to various learning problems.
- Know the open issues in deep learning, and have a grasp of the current research directions.

Course Outcomes: After the completion of the course, student will be able to

- Demonstrate the fundamental concepts learning techniques of Artificial Intelligence, Machine Learning and Deep Learning.
- Discuss the Neural Network training, various random models**.**
- Explain the Techniques of Keras, TensorFlow, Theano and CNTK
- Classify the Concepts of CNN and RNN
- Implement Interactive Applications of Deep Learning.

UNIT I:
Fundamentals of Deep Learning: Artificial Intelligence, History of Machine learning: Probabilistic Modeling, Early Neural Networks, Kernel Methods, Decision Trees, Random forests and Gradient Boosting Machines, **Fundamentals of Machine Learning:** Four Branches of Machine Learning, Evaluating Machine learning Models, Overfitting and Underfitting. **[Text Book 2]**

UNIT II: Introducing Deep Learning: Biological and Machine Vision, Human and Machine Language, Artificial Neural Networks, Training Deep Networks, Improving Deep Networks. **[Text Book3]**

UNIT III: Neural Networks: Anatomy of Neural Network, Introduction to Keras: Keras, TensorFlow, Theano and CNTK, Setting up Deep Learning Workstation, Classifying Movie Reviews: Binary Classification, Classifying newswires: Multiclass Classification. **[Text Book 2]**

UNIT IV:
Convolutional Neural Networks: Nerual Network and Representation Learing, Convolutional Layers, Multichannel Convolution Operation, **Recurrent Neural Networks:** Introduction to RNN, RNN Code, PyTorch Tensors: Deep Learning with PyTorch, CNN in PyTorch. **[Text Book 3]**

UNIT V:
Interactive Applications of Deep Learning: Machine Vision, Natural Language processing, Generative Adversial Networks, Deep Reinforcement Learning. **[Text Book 1]**
Deep Learning Research: Autoencoders**,** Deep Generative Models: Boltzmann Machines Restricted Boltzmann Machines, Deep Belief Networks. **[Text Book 1]**

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Text Books:

1. Deep Learning- Ian Goodfellow, Yoshua Bengio and Aaron Courvile, MIT Press, 2016
2. Deep Learning with Python - Francois Chollet, Released December 2017, Publisher(s): Manning Publications, ISBN: 9781617294433
3. Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence - Jon Krohn, Grant Beyleveld, Aglaé Bassens, Released September 2019, Publisher(s): Addison-Wesley Professional, ISBN: 9780135116821
4. Deep Learning from Scratch - Seth Weidman, Released September 2019, Publisher(s): O'Reilly Media, Inc., ISBN: 9781492041412

Reference Books:

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
2. Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,2013.
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.

Web Link:

Swayam NPTEL: Deep Learning: https://onlinecourses.nptel.ac.in/noc22_cs22/preview

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DESIGN AND ANALYSIS OF ALGORITHMS					

Course Objectives:

Upon completion of this course, students will be able to do the following:

- Ability to understand, analyze and denote time complexities of algorithms
- To introduce the different algorithmic approaches for problem solving through numerous example problems
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
- To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness

Course Outcomes: After the completion of the course, student will be able to

- Analyze the performance of a given algorithm, denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
- List and describe various algorithmic approaches and Solve problems using divide and conquer &greedy Method
- Synthesize efficient algorithms dynamic programming approaches to solve in common engineering design situations.
- Organize important algorithmic design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches
- Demonstrate NP- Completeness theory ,lower bound theory and String Matching

UNIT I:

Introduction: Algorithm Definition, Algorithm Specification, performance Analysis, Performance measurement, asymptotic notation, Randomized Algorithms.

UNIT II:

Divide and Conquer: General Method, Defective chessboard, Binary Search, finding the maximum and minimum, Merge sort, Quick sort.

The Greedy Method: The general Method, knapsack problem, minimum-cost spanning Trees, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT III:

Dynamic Programming: The general method, multistage graphs, All pairs-shortest paths, optimal Binary search trees, 0/1 knapsack, The traveling salesperson problem.

UNIT IV:

Backtracking: The General Method, The 8-Queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, knapsack problem.

UNIT V:

NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook’s theorem.

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Text Books:

1. Ellis Horowitz, SartajSahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press.
2. Introduction to Algorithms Thomas H. Cormen, PHI Learning
3. Harsh Bhasin, "Algorithms Design & Analysis", Oxford University Press.

Reference Books:

1. Horowitz E. Sahani S: "Fundamentals of Computer Algorithms", 2nd Edition, Galgotia Publications, 2008.
2. S. Sridhar, "Design and Analysis of Algorithms", Oxford University Press.

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		3	0	0	3
SOFTWARE PROJECT MANAGEMENT (Professional Elective-II)					

Course Objectives:
At the end of the course, the student shall be able to:
- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- To compare and differentiate organization structures and project structures
- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

Course outcomes:
Upon the completion of the course students will be able to:-
- Apply the process to be followed in the software development life-cycle models
- Apply the concepts of project management & planning
- Implement the project plans through managing people, communications and change
- Conduct activities necessary to successfully complete and close the Software projects
- Implement communication, modeling, and construction & deployment practices in software development

UNIT I:
Conventional Software Management: The waterfall model, conventional software Management performance.
Evolution of Software Economics: Software Economics, pragmatic software cost estimation.
Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.
The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT II:
Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.
Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT III:
Model based software architectures: A Management perspective and technical perspective.
Work Flows of the process: Software process workflows, Iteration workflows.
Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments.
Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT IV:
Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.
Process Automation: Automation Building blocks, The Project Environment.

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Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

UNIT V:
Agile Methodology, ADAPTing to Scrum, Patterns for Adopting Scrum, Iterating towards Agility.
Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system. DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

Text Books:

1. Software Project Management, Walker Royce, PEA, 2005.
2. Succeeding with Agile: Software Development Using Scrum, Mike Cohn, Addison Wesley.
3. The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.

Reference Books:

1. Software Project Management, Bob Hughes,3/e, Mike Cotterell, TMH
2. Software Project Management, Joel Henry, PEA
3. Software Project Management in practice, Pankaj Jalote, PEA, 2005,
4. Effective Software Project Management, Robert K.Wysocki, Wiley,2006
5. Project Management in IT, Kathy Schwalbe, Cengage

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DISTRIBUTED SYSTEMS (Professional Elective-II)					

Course Objectives:

- To understand the foundations of distributed systems.
- To learn issues related to clock Synchronization and the need for global state in distributedsystems
- To learn distributed mutual exclusion and deadlock detection algorithms
- To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems
- To learn the characteristics of peer-to-peer and distributed shared memory systems

Course Outcomes:

At the end of the course, the students will be able to:

- Elucidate the foundations and issues of distributed systems
- Illustrate the various synchronization issues and global state for distributed systems
- Illustrate the Mutual Exclusion and Deadlock detection algorithms in distributed systems
- Describe the agreement protocols and fault tolerance mechanisms in distributed systems
- Describe the features of peer-to-peer and distributed shared memory systems

UNIT I:

Distributed Systems: Definition, Relation to computer system components, Motivation, Relationto parallel systems, Message-passing systems versus shared memory systems, Primitives for distributed communication, Synchronous versus asynchronous executions, Design issues and challenges.

A model of distributed computations: A distributed program, A model of distributed executions, Models of communication networks, Global state, Cuts, Past and future cones of an event, Modelsof process communications.

Logical Time: A framework for a system of logical clocks, Scalar time, Vector time, Physical clock synchronization: NTP.

UNIT II:

Message Ordering & Snapshots: Message ordering and group communication: Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order (CO), Total order. Global state and snapshot recording algorithms: Introduction, System model and definitions, Snapshot algorithms for FIFO channels.

UNIT III:

Distributed Mutex & Deadlock: Distributed mutual exclusion algorithms: Introduction, Preliminaries, Lamport‘s algorithm, Ricart-Agrawala algorithm, Maekawa‘s algorithm, Suzuki–Kasami‘s broadcast algorithm. Deadlock detection in distributed systems: Introduction, System model, Preliminaries, Models of deadlocks, Knapp‘s classification, Algorithms forthe single resource model, the AND model and the OR model.

UNIT IV:

Recovery & Consensus: Check pointing and rollback recovery: Introduction, Background and

definitions, Issues in failure recovery, Checkpoint-based recovery, Log-based rollback recovery, Coordinated check pointing algorithm, Algorithm for asynchronous check pointing and recovery. Consensus and agreement algorithms: Problem definition, Overview of results, Agreement in a failure, free system, Agreement in synchronous systems with failures.

UNIT V:

Peer-to-peer computing and overlay graphs: Introduction, Data indexing and overlays, Chord – Content addressable networks, Tapestry.
Distributed shared memory: Abstraction and advantages, Memory consistency models, Shared memory Mutual Exclusion.

Text Books:

1. Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore and TimKindberg, Fifth Edition, Pearson Education, 2012.
2. Distributed computing: Principles, algorithms, and systems, Ajay Kshemkalyani and Mukesh Singhal, Cambridge University Press, 2011.

Reference Books:

1. Distributed Operating Systems: Concepts and Design, Pradeep K Sinha, Prentice Hall ofIndia, 2007.
2. Advanced concepts in operating systems. Mukesh Singhal and Niranjan G. Shivaratri,McGraw-Hill, 1994.
3. Distributed Systems: Principles and Paradigms, Tanenbaum A.S., Van Steen M.,PearsonEducation, 2007.

e-Resources:

1) https://nptel.ac.in/courses/106/106/106106168/

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INTERNET OF THINGS (Professional Elective-II)					

Course Objectives:
From the course the student will learn
- the application areas of IOT
- the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- building blocks of Internet of Things and characteristics

Course Outcomes:
By the end of the course, student will be able to
- Review Internet of Things (IoT).
- Demonstrate various business models relevant to IoT.
- Construct designs for web connectivity
- Organize sources of data acquisition related to IoT, integrate to enterprise systems.
- Describe IoT with Cloud technologies.

UNIT I:
The Internet of Things- An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, Examples OF IoTs, Design Principles For Connected Devices, Internet connectivity, **Application Layer Protocols-** HTTP, HTTPS, FTP

UNIT II:
Business Models for Business Processes in the Internet of Things, IoT/M2M systems LAYERS AND designs standardizations, Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability.

UNIT III:
Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT IV:
Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/ Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT V:
Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World.

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Text Books:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

Reference Books:

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things, CunoPfister , Oreilly

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NETWORK PROGRAMMING (Professional Elective-II)					

Course Objectives:
Having successfully completed this course, the student will be able to:

- Demonstrate mastery of main protocols comprising the Internet.
- Develop skills in network programming techniques.
- Implement network services that communicate through the Internet.
- Apply the client-server model in networking applications.
- Practice networking commands available through the operating system

Course Outcomes: At the end of the course, student will be able to

- Identifying different models and sockets
- Demonstrate different TCP Echo server functions and I/O models
- Rationalize IPV4 and IPV6 Socket options
- Identifying daemon processing and Advanced input and output functions
- Analyze Broadcasting and multicasting

UNIT I:
Introduction to Network Programming: Introduction to Network Programming: OSI model, UNIX standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application Elementary Sockets: Sockets introduction, Elementary TCP sockets.

UNIT II:
TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.I/O Multiplexing: I/O Models, the select and poll functions, Batch input and buffering, shutdown function.

UNIT III:
UDP and Socket options: Elementary UDP sockets: Introduction UDP Echo server functions, lost datagram, summary of UDP example, Lack of flow control with UDP. **Socket options:** getsockopt and setsockopt functions. Socket states, Generic socket options IPV4 socket options, IPV6 socket options, ICMPV6 socket options and TCP socket options, SCTP socket options, fcntl function.

UNIT IV:
Advanced Sockets and Daemon Processes: IPV4 and IPV6 interoperability, introduction, IPV4 client: IPV6 server, IPV6 client: IPV4 Server, IPV6 Address-testing macros. Daemon Processes and inetdSuperserver –Introduction, syslogd Daemon, syslog Function, daemon_init Function, inetd Daemon, daemon_inetd. Advanced I/O functions: Socket timeouts, recv and send functions, ready and writev functions, recvmsg and send msg functions, Ancillary data.

UNIT V:
Broadcasting and Multicasting: Broadcasting introduction, broadcast addresses, unicast versus Broadcast, dg_cli function using broadcasting, race conditions, Multicasting addresses, multicasting versus broadcasting on a LAN, multicasting on a WAN, source-specific multicast, multcast socket options. **Raw**

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Sockets: Introduction, Raw Socket Creation, Raw Socket Output, Raw Socket Input, Ping Program, Traceroute Program

Text Books:

1. UNIX Network Programming, by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Pearson Education
2. UNIX Network Programming, 1st Edition, W. Richard Stevens. PHI.

Reference Books:

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education

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MEAN STACK DEVELOPMENT (Job Oriented Course)					

Course Outcomes:
At the end of the Course, Student will be able to:

- Build static web pages using HTML 5 elements.
- Apply JavaScript to embed programming interface for web pages and also to perform Client side validations.
- Build a basic web server using Node.js, work with Node Package Manager (NPM) and recognize the need for Express.js.
- Develop JavaScript applications using typescript and work with document database using MongoDB.
- Utilize Angular JS to design dynamic and responsive web pages.

UNIT-I:
HTML 5: Introduction to Web, Overview of Web Technologies, HTML - Introduction, HTML - Need, Case-insensitivity, Platform-independency, DOCTYPE Declaration, Types of Elements, HTML Elements - Attributes, Metadata Element, Sectioning Elements, Paragraph Element, Division and Span Elements, List Element, Link Element, Character Entities, HTML5 Global Attributes, Creating Table Elements, Table Elements : Colspan/ Rowspan Attributes, border, cellspacing and cellpadding attributes, Creating Form Elements, Input Elements - Attributes, Color and Date Pickers, Select and Datalist Elements, Editing Elements, Media, Iframe, Why HTML Security, HTML Injection, Clickjacking, HTML5 Attributes & Events Vulnerabilities, Local Storage Vulnerabilities, HTML5 - Cross-browser support, Best Practices For HTML Web Pages.

UNIT-II:
JavaScript: Why we need JavaScript, What is JavaScript, Environment Setup, Working with Identifiers, Type of Identifiers, Primitive and Non Primitive Data Types, Operators and Types of Operators, Types of Statements, Non - Conditional Statements, Types of Conditional Statements, If and Switch Statements, Types of Loops, Types of Functions, Declaring and Invoking Function, Arrow Function, Function Parameters, Nested Function, Built-in Functions, Variable Scope in Functions, Working With Classes, Creating and Inheriting Classes, In-built Events and Handlers, Working with Objects, Types of Objects, Creating Objects, Combining and cloning Objects using Spread operator, Destructuring Objects, Browser and Document Object Model, Creating Arrays, Destructuring Arrays, Accessing Arrays, Array Methods, Introduction to Asynchronous Programming, Callbacks, Promises, Async and Await, Executing Network Requests using Fetch API, Creating and consuming Modules.

UNIT-III:
Node.js: Why and What Node.js, How to use Node.js, Create a web server in Node.js, Node Package Manager, Modular programming in Node.js, Restarting Node Application, File Operations.
Express.js: Express Development Environment, Defining a route, Handling Routes, Route and Query Parameters, How Middleware works, Chaining of Middlewares, Types of Middlewares, Connecting to MongoDB with Mongoose, Validation Types and Defaults, Models, CRUD Operations, API Development, Why Session management, Cookies, Sessions, Why and What Security, Helmet Middleware, Using a Template Engine Middleware, Stylus CSS Preprocessor.

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UNIT-IV:

Typescript: Installing TypeScript, Basics of TypeScript, Function, Parameter Types and Return Types, Arrow Function, Function Types, Optional and Default Parameters, Rest Parameter, Creating an Interface, Duck Typing, Function Types, Extending Interfaces, Classes, Constructor, Access Modifiers, Properties and Methods, Creating and using Namespaces, Creating and using Modules, Module Formats and Loaders, Module Vs Namespace, What is Generics, What are Type Parameters, Generic Functions, Generic Constraints.

MongoDB: Introduction Module Overview, Document Database Overview, Understanding JSON, MongoDB Structure and Architecture, MongoDB Remote Management, Installing MongoDB on the local computer (Mac or Windows), Introduction to MongoDB Cloud, Create MongoDB Atlas Cluster, GUI tools Overview, Install and Configure MongoDB Compass, Introduction to the MongoDB Shell, MongoDB Shell JavaScript Engine, MongoDB Shell JavaScript Syntax, Introduction to the MongoDB Data Types, Introduction to the CRUD Operations on documents, Create and Delete Databases and Collections, Introduction to MongoDB Queries.

UNIT-V:

What is Angular, Features of Angular, Angular Application Setup, Components and Modules, Executing Angular Application, Elements of Template, Change Detection, Structural Directives - ngIf, ngFor, ngSwitch, Custom Structural Directive, Attribute Directives - ngStyle, ngClass, Custom Attribute Directive, Property Binding, Attribute Binding, Style and Event Binding, Built in Pipes, Passing Parameters to Pipes, Nested Components Basics, Passing data from Container Component to Child Component, Passing data from Child Component to ContainerComponent, Shadow DOM, Component Life Cycle, Template Driven Forms, Model Driven Forms or Reactive Forms, Custom Validators in Reactive Forms, Custom Validators in Template Driven forms, Dependency Injection, Services Basics, RxJS Observables, Server Communication using HttpClient, Communicating with different backend services using Angular HttpClient, Routing Basics, Router Links, Route Guards, Asynchronous Routing, Nested Routes.

Text Books:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson.
2. Pro Mean Stack Development, 1st Edition, ELadElrom, Apress O'Reilly.
3. Full Stack JavaScript Development with MEAN, Colin J Ihrig, Adam Bretz, 1st edition, SitePoint, SitePoint Pty. Ltd., O'Reilly Media.
4. MongoDB – The Definitive Guide, 2nd Edition, Kristina Chodorow,O'Reilly.

Reference Books:

1. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book,1st Edition, Dream Tech.
2. An Introduction to Web Design, Programming, 1st Edition, Paul S Wang, Sanda SKatila, Cengage Learning.

Web Links:

1. https://infyspringboard.onwingspan.com/en/app/toc/lex_17739732834840810000_shared/overview (HTML5)

2. https://infyspringboard.onwingspan.com/en/app/toc/lex_18109698366332810000_shared/overview (Javascript)

3. https://infyspringboard.onwingspan.com/en/app/toc/lex_32407835671946760000_shared/overview (Node.js & Express.js)

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4. https://infyspringboard.onwingspan.com/en/app/toc/lex_9436233116512678000_shared/overview (Typescript)

5. https://infyspringboard.onwingspan.com/en/app/toc/lex_20858515543254600000_shared/overview (Angular JS)

6. https://infyspringboard.onwingspan.com/en/app/toc/lex_auth_013177169294712832113_shared/overview (MongoDB)

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III B Tech II Sem		L	T	P	C
		0	0	3	1.5
COMPUTER NETWORKS LAB					

Course Objectives:
Learn basic concepts of computer networking and acquire practical notions of protocols with the emphasis on TCP/IP. A lab provides a practical approach to Ethernet/Internet networking: networks are assembled, and experiments are made to understand the layered architecture and how do some important protocols work

Course Outcomes:
By the end of the course student will be able to

- Know how reliable data communication is achieved through data link layer.
- Suggest appropriate routing algorithm for the network.
- Provide internet connection to the system and its installation.
- Work on various network management tools

List of Experiments:

1. Study of Network devices in detail and connect the computers in Local Area Network.
2. Write a Program to implement the data link layer farming methods such as
   i) Character stuffing ii) bit stuffing.
3. Write a Program to implement data link layer farming method checksum.
4. Write a program for Hamming Code generation for error detection and correction.
5. Write a Program to implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
6. Write a Program to implement Sliding window protocol for Goback N.
7. Write a Program to implement Sliding window protocol for Selective repeat.
8. Write a Program to implement Stop and Wait Protocol.
9. Write a program for congestion control using leaky bucket algorithm
10. Write a Program to implement Dijkstra‘s algorithm to compute the Shortest path through a graph.
11. Write a Program to implement Distance vector routing algorithm by obtaining routing table at each node (Take an example subnet graph with weights indicating delay between nodes).
12. Write a Program to implement Broadcast tree by taking subnet of hosts.
13. Wireshark
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
14. How to run Nmap scan
15. Operating System Detection using Nmap
16. Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv. Simulate to Find the Number of Packets Dropped due to Congestion
    v. Simulate to Compare Data Rate& Throughput.

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III B Tech II Sem		L	T	P	C
		0	0	3	1.5
ALGORITHMS FOR EFFICIENT CODING LAB					

Course Objective:

- To develop efficient coding for the algorithms with various inputs and algorithms

Course Outcomes:

By completing the course the students will be able to:

- Analyze the program execution time

List of Experiments:

1. Develop a program and measure the running time for Binary Search with Divide and Conquer
2. Develop a program and measure the running time for Merge Sort with Divide and Conquer
3. Develop a program and measure the running time for Quick Sort with Divide and Conquer
4. Develop a program and measure the running time for estimating minimum-cost spanning Trees with Greedy Method
5. Develop a program and measure the running time for estimating Single Source Shortest Paths with Greedy Method
6. Develop a program and measure the running time for optimal Binary search trees with Dynamic Programming
7. Develop a program and measure the running time for identifying solution for traveling salesperson problem with Dynamic Programming
8. Develop a program and measure the running time for identifying solution for 8-Queens problem with Backtracking
9. Develop a program and measure the running time for Graph Coloring with Backtracking
10. Develop a program and measure the running time to generate solution of Hamiltonian Cycle problem with Backtracking
11. Develop a program and measure the running time running time to generate solution of Knapsack problem with Backtracking

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III B Tech II Sem		L	T	P	C
		0	0	3	1.5
DEEP LEARNING WITH TENSORFLOW					

Course Outcomes:
On completion of this course, the student will be able to

- Implement deep neural networks to solve real world problems
- Choose appropriate pre-trained model to solve real time problem
- Interpret the results of two different deep learning models

Software Packages required:

- Keras
- Tensorflow
- PyTorch

List of Experiments:

1. Implement multilayer perceptron algorithm for MNIST Hand written Digit Classification.
2. Design a neural network for classifying movie reviews (Binary Classification) using IMDB dataset.
3. Design a neural Network for classifying news wires (Multi class classification) using Reuters dataset.
4. Design a neural network for predicting house prices using Boston Housing Price dataset.
5. Build a Convolution Neural Network for MNIST Hand written Digit Classification.
6. Build a Convolution Neural Network for simple image (dogs and Cats) Classification
7. Use a pre-trained convolution neural network (VGG16) for image classification.
8. Implement one hot encoding of words or characters.
9. Implement word embeddings for IMDB dataset.
10. Implement a Recurrent Neural Network for IMDB movie review classification problem.

Text Books:

1. Reza Zadeh and BharathRamsundar, “Tensorflow for Deep Learning”, O’Reilly publishers, 2018

References:

1. https://github.com/fchollet/deep-learning-with-python-notebooks

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III B Tech II Sem		L	T	P	C
		0	0	4	2
MEAN STACK TECHNOLOGIES-MODULE I- HTML 5, JAVASCRIPT, NODE.JS, EXPRESS.JS, AND TYPESCRIPT (Skill Oriented Course)					

Course Outcomes:
At the end of the Course, Student will be able to:

- Develop professional web pages of an application using HTML elements like lists, navigations, tables, various form elements, embedded media which includes images, audio, video and CSS Styles.
- Utilize JavaScript for developing interactive HTML web pages and validate form data.
- Build a basic web server using Node.js and also working with Node Package Manager (NPM).
- Build a web server using Express.js
- Make use of Typescript to optimize JavaScript code by using the concept of strict type checking.

List of Exercises

1.a	**Course Name:** HTML5 - The Language
	Module Name: Case-insensitivity, Platform-independency, DOCTYPE Declaration, Types of Elements, HTML Elements - Attributes, Metadata Element
	Include the Metadata element in Homepage.html for providing description as "IEKart's is an online shopping website that sells goods in retail. This company deals with various categories like Electronics, Clothing, Accessories etc.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_28320667711144660000_shared?collectionId=lex_177397328348408100 00_shared&collectionType=Course
1.b	**Course Name:** HTML5 - The Language
	Module Name: Sectioning Elements
	Enhance the Homepage.html of IEKart's Shopping Application by adding appropriate sectioning elements.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_6372291347110857000_shared?collectionId=lex_1773973283484081000 0_shared&collectionType=Course
1.c	**Course Name:** HTML5 - The Language
	Module Name: Paragraph Element, Division and Span Elements, List Element
	Make use of appropriate grouping elements such as list items to "About Us" page of IEKart's Shopping Application
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_32785192040894940000_shared?collectionId=lex_177397328348408100 00_shared&collectionType=Course
1.d	**Course Name:** HTML5 - The Language
	Module Name: Link Element
	Link "Login", "SignUp" and "Track order" to "Login.html", "SignUp.html" and "Track.html" page respectively. Bookmark each category to its details of IEKart's Shopping application.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_15515105953273338000_shared?collectionId=lex_177397328348408100 00_shared&collectionType=Course

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1.e	**Course Name:** HTML5 - The Language
	Module Name: Character Entities
	Add the © symbol in the Home page footer of IEKart's Shopping application.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_547667376938096260_shared?collectionId=lex_17739732834840810000_shared&collectionType=Course
1.f	**Course Name:** HTML5 - The Language
	Module Name: HTML5 Global Attributes
	Add the global attributes such as contenteditable, spellcheck, id etc. to enhance the Signup Page functionality of IEKart's Shopping application.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_28723566050321920000_shared?collectionId=lex_177397328348408100000_shared&collectionType=Course
2.a	**Course Name:** HTML5 - The Language
	Module Name: Creating Table Elements, Table Elements : Colspan/Rowspan Attributes, border, cellspacing, cellpadding attributes
	Enhance the details page of IEKart's Shopping application by adding a table element to display the available mobile/any inventories.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_013168035284033536113_shared?collectionId=lex_17739732834840810000_shared&collectionType=Course
2.b	**Course Name:** HTML5 - The Language
	Module Name: Creating Form Elements, Color and Date Pickers, Select and Datalist Elements
	Using the form elements create Signup page for IEKart's Shopping application.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_13975270903118459000_shared?collectionId=lex_177397328348408100000_shared&collectionType=Course
2.c	**Course Name:** HTML5 - The Language
	Module Name: Input Elements - Attributes
	Enhance Signup page functionality of IEKart's Shopping application by adding attributes to input elements.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_14048414537062347000_shared?collectionId=lex_177397328348408100000_shared&collectionType=Course
2.d	**Course Name:** HTML5 - The Language
	Module Name: Media, Iframe
	Add media content in a frame using audio, video, iframe elements to the Home page of IEKart's Shopping application.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_30738402225794945000_shared?collectionId=lex_177397328348408100000_shared&collectionType=Course
3.a	**Course Name:** Javascript
	Module Name: Type of Identifiers
	Write a JavaScript program to find the area of a circle using radius (var and let - reassign and observe the difference with var and let) and PI (const)
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_013053264414818304732_shared?collectionId=lex_18109698366332810000_shared&collectionType=Course

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3.b	**Course Name:** Javascript
	Module Name: Primitive and Non Primitive Data Types
	Write JavaScript code to display the movie details such as movie name, starring, language, and ratings. Initialize the variables with values of appropriate types. Use template literals wherever necessary.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_21528322245232402000_shared?collectionId=lex_181096983663328100 00_shared&collectionType=Course
3.c	**Course Name:** Javascript
	Module Name: Operators and Types of Operators
	Write JavaScript code to book movie tickets online and calculate the total price, considering the number of tickets and price per ticket as Rs. 150. Also, apply a festive season discount of 10% and calculate the discounted amount.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_13808338384481720000_shared?collectionId=lex_181096983663328100 00_shared&collectionType=Course
3.d	**Course Name:** Javascript
	Module Name: Types of Statements, Non - Conditional Statements, Types of Conditional Statements, if Statements, switch Statements
	Write a JavaScript code to book movie tickets online and calculate the total price based on the 3 conditions: (a) If seats to be booked are not more than 2, the cost per ticket remains Rs. 150. (b) If seats are 6 or more, booking is not allowed. (c) If se
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_16257498471333610000_shared?collectionId=lex_181096983663328100 00_shared&collectionType=Course
3.e	**Course Name:** Javascript
	Module Name: Types of Loops
	Write a JavaScript code to book movie tickets online and calculate the total price based on the 3 conditions: (a) If seats to be booked are not more than 2, the cost per ticket remains Rs. 150. (b) If seats are 6 or more, booking is not allowed. (c) If
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_6238536888292970000_shared?collectionId=lex_181096983663328100 0_shared&collectionType=Course
4.a	**Course Name:** Javascript
	Module Name: Types of Functions, Declaring and Invoking Function, Arrow Function, Function Parameters, Nested Function, Built-in Functions, Variable Scope in Functions
	Write a JavaScript code to book movie tickets online and calculate the total price based on the 3 conditions: (a) If seats to be booked are not more than 2, the cost per ticket remains Rs. 150. (b) If seats are 6 or more, booking is not allowed. (c) If
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_15455199570613326000_shared?collectionId=lex_181096983663328100 00_shared&collectionType=Course
4.b	**Course Name:** Javascript
	Module Name: Working With Classes, Creating and Inheriting Classes
	Create an Employee class extending from a base class Person. Hints: (i) Create a class Person with name and age as attributes. (ii) Add a constructor to initialize the values (iii) Create a class Employee extending Person with additional attributes role
	https://infyspringboard.onwingspan.com/web/en/viewer/web-

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	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_012599811117760512458_shared?collectionId=lex_181096983663332810000_shared&collectionType=Course
4.c	**Course Name:** Javascript
	Module Name: In-built Events and Handlers
	Write a JavaScript code to book movie tickets online and calculate the total price based on the 3 conditions: (a) If seats to be booked are not more than 2, the cost per ticket remains Rs. 150. (b) If seats are 6 or more, booking is not allowed. (c) If se
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_4192188372573027000_shared?collectionId=lex_1810969836633281000 0_shared&collectionType=Course
4.d	**Course Name:** Javascript
	Module Name: Working with Objects, Types of Objects, Creating Objects, Combining and cloning Objects using Spread operator, Destructuring Objects, Browser Object Model, Document Object Model
	If a user clicks on the given link, they should see an empty cone, a different heading, and a different message and a different background color. If user clicks again, they should see a re-filled cone, a different heading, a different message, and a diffe
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_13197025862804100000_shared?collectionId=lex_181096983663328100 00_shared&collectionType=Course
5.a	**Course Name:** Javascript
	Module Name: Creating Arrays, Destructuring Arrays, Accessing Arrays, Array Methods
	Create an array of objects having movie details. The object should include the movie name, starring, language, and ratings. Render the details of movies on the page using the array.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_013053270191734784711_shared?collectionId=lex_181096983663 32810000_shared&collectionType=Course
5.b	**Course Name:** Javascript
	Module Name: Introduction to Asynchronous Programming, Callbacks, Promises, Async and Await, Executing Network Requests using Fetch API
	Simulate a periodic stock price change and display on the console. Hints: (i) Create a method which returns a random number - use Math.random, floor and other methods to return a rounded value. (ii) Invoke the method for every three seconds and stop when
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_012599811633905664460_shared?collectionId=lex_181096983663 32810000_shared&collectionType=Course
5.c	**Course Name:** Javascript
	Module Name: Creating Modules, Consuming Modules
	Validate the user by creating a login module. Hints: (i) Create a file login.js with a User class. (ii) Create a validate method with username and password as arguments. (iii) If the username and password are equal it will return "Login Successful" else w
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_013052857053585408667_shared?collectionId=lex_181096983663 32810000_shared&collectionType=Course
6.a	**Course Name:** Node.js
	Module Name: How to use Node.js

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	Verify how to execute different functions successfully in the Node.js platform.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_19002830632103186000_shared?collectionId=lex_3240783567194676000_shared&collectionType=Course
6.b	**Course Name:** Node.js
	Module Name: Create a web server in Node.js
	Write a program to show the workflow of JavaScript code executable by creating web server in Node.js.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_28177338996267815000_shared?collectionId=lex_3240783567194676000_shared&collectionType=Course
6.c	**Course Name:** Node.js
	Module Name: Modular programming in Node.js
	Write a Node.js module to show the workflow of Modularization of Node application.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_28865394191004004000_shared?collectionId=lex_3240783567194676000_shared&collectionType=Course
6.d	**Course Name:** Node.js
	Module Name: Restarting Node Application
	Write a program to show the workflow of restarting a Node application.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_91740738560001590000_shared?collectionId=lex_3240783567194676000_shared&collectionType=Course
6.e	**Course Name:** Node.js
	Module Name: File Operations
	Create a text file src.txt and add the following data to it. Mongo, Express, Angular, Node.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_33376440180246100000_shared?collectionId=lex_3240783567194676000_shared&collectionType=Course
7.a	**Course Name:** Express.js
	Module Name: Defining a route, Handling Routes, Route Parameters, Query Parameters
	Implement routing for the AdventureTrails application by embedding the necessary code in the routes/route.js file.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_29394215542149950000_shared?collectionId=lex_3240783567194676000_shared&collectionType=Course
7.b	**Course Name:** Express.js
	Module Name: How Middleware works, Chaining of Middlewares, Types of Middlewares
	In myNotes application: (i) we want to handle POST submissions. (ii) display customized error messages. (iii) perform logging.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_13930661312009580000_shared?collectionId=lex_3240783567194676000_shared&collectionType=Course
7.c	**Course Name:** Express.js
	Module Name: Connecting to MongoDB with Mongoose, Validation Types and Defaults

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	Write a Mongoose schema to connect with MongoDB.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_01303558877548544069 1_shared?collectionId=lex_324078356719467600 00_shared&collectionType=Course
7.d	**Course Name:** Express.js
	Module Name: Models
	Write a program to wrap the Schema into a Model object.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_01303559389686988866 2_shared?collectionId=lex_324078356719467600 00_shared&collectionType=Course
8.a	**Course Name:** Express.js
	Module Name: CRUD Operations
	Write a program to perform various CRUD (Create-Read-Update-Delete) operations using Mongoose library functions.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_01303568427012915269 6_shared?collectionId=lex_324078356719467600 00_shared&collectionType=Course
8.b	**Course Name:** Express.js
	Module Name: API Development
	In the myNotes application, include APIs based on the requirements provided. (i) API should fetch the details of the notes based on a notesID which is provided in the URL. Test URL - http://localhost:3000/notes/7555 (ii) API should update the details bas
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_01303575452509757447 55_shared?collectionId=lex_324078356719467600 00_shared&collectionType=Course
8.c	**Course Name:** Express.js
	Module Name: Why Session management, Cookies
	Write a program to explain session management using cookies.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_24299316914857090000_shared?collectionId=lex_324078356719467600 00_shared&collectionType=Course
8.d	**Course Name:** Express.js
	Module Name: Sessions
	Write a program to explain session management using sessions.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_905413034723449100_shared?collectionId=lex_32407835671946760000 _shared&collectionType=Course
8.e	**Course Name:** Express.js
	Module Name: Why and What Security, Helmet Middleware
	Implement security features in myNotes application
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_31677453061177940000_shared?collectionId=lex_324078356719467600 00_shared&collectionType=Course
9.a	**Course Name:** Typescript
	Module Name: Basics of TypeScript
	On the page, display the price of the mobile-based in three different colors. Instead of using the number in our code, represent them by string values like GoldPlatinum, PinkGold, SilverTitanium.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-

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	module/lex_28910354929502245000_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
9.b	**Course Name:** Typescript
	Module Name: Function
	Define an arrow function inside the event handler to filter the product array with the selected product object using the productId received by the function. Pass the selected product object to the next screen.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_10783156469383723000_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
9.c	**Course Name:** Typescript
	Module Name: Parameter Types and Return Types
	Consider that developer needs to declare a function - getMobileByVendor which accepts string as input parameter and returns the list of mobiles.
	https://infyspringboard.onwingspan.com/web/en/viewer/hands-on/lex_auth_012712912427057152901_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
9.d	**Course Name:** Typescript
	Module Name: Arrow Function
	Consider that developer needs to declare a manufacturer's array holding 4 objects with id and price as a parameter and needs to implement an arrow function - myfunction to populate the id parameter of manufacturers array whose price is greater than or equ
	https://infyspringboard.onwingspan.com/web/en/viewer/hands-on/lex_auth_012712910875500544904_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
9.e	**Course Name:** Typescript
	Module Name: Optional and Default Parameters
	Declare a function - getMobileByManufacturer with two parameters namely manufacturer and id, where manufacturer value should passed as Samsung and id parameter should be optional while invoking the function, if id is passed as 101 then this function shoul
	https://infyspringboard.onwingspan.com/web/en/viewer/hands-on/lex_auth_012712914940641280906_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
10.a	**Course Name:** Typescript
	Module Name: Rest Parameter
	Implement business logic for adding multiple Product values into a cart variable which is type of string array.
	https://infyspringboard.onwingspan.com/web/en/viewer/hands-on/lex_auth_012712921860915200909_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
10.b	**Course Name:** Typescript
	Module Name: Creating an Interface
	Declare an interface named - Product with two properties like productId and productName with a number and string datatype and need to implement logic to populate the Product details.
	https://infyspringboard.onwingspan.com/web/en/viewer/hands-on/lex_auth_012712925244276736910_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course

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10.c	**Course Name:** Typescript
	Module Name: Duck Typing
	Declare an interface named - Product with two properties like productId and productName with the number and string datatype and need to implement logic to populate the Product details.
	https://infyspringboard.onwingspan.com/web/en/viewer/hands-on/lex_auth_01271292599545856091 2_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
10.d	**Course Name:** Typescript
	Module Name: Function Types
	Declare an interface with function type and access its value.
	https://infyspringboard.onwingspan.com/web/en/viewer/hands-on/lex_auth_01271294894534656091 8_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
11.a	**Course Name:** Typescript
	Module Name: Extending Interfaces
	Declare a productList interface which extends properties from two other declared interfaces like Category,Product as well as implementation to create a variable of this interface type.
	https://infyspringboard.onwingspan.com/web/en/viewer/hands-on/lex_auth_01271295165213900892 0_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
11.b	**Course Name:** Typescript
	Module Name: Classes
	Consider the Mobile Cart application, Create objects of the Product class and place them into the productlist array.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_3705824317381604400_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
11.c	**Course Name:** Typescript
	Module Name: Constructor
	Declare a class named - Product with the below-mentioned declarations: (i) productId as number property (ii) Constructor to initialize this value (iii) getProductId method to return the message "Product id is <<id value>>".
	https://infyspringboard.onwingspan.com/web/en/viewer/hands-on/lex_auth_01271295461678284892 7_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
11.d	**Course Name:** Typescript
	Module Name: Access Modifiers
	Create a Product class with 4 properties namely productId, productName, productPrice, productCategory with private, public, static, and protected access modifiers and accessing them through Gadget class and its methods.
	https://infyspringboard.onwingspan.com/web/en/viewer/hands-on/lex_auth_01271295351717068893 1_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
12.a	**Course Name:** Typescript
	Module Name: Properties and Methods
	Create a Product class with 4 properties namely productId and methods to setProductId() and getProductId().

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	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_9356738095572543000_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course
12.b	**Course Name:** Typescript
	Module Name: Creating and using Namespaces
	Create a namespace called ProductUtility and place the Product class definition in it. Import the Product class inside productlist file and use it.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_20787271128051925000_shared?collectionId=lex_943623311651267800 0_shared&collectionType=Course
12.c	**Course Name:** Typescript
	Module Name: Creating and using Modules
	Consider the Mobile Cart application which is designed as part of the functions in a module to calculate the total price of the product using the quantity and price values and assign it to a totalPrice variable.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_24788158187785620000_shared?collectionId=lex_943623311651267800 0_shared&collectionType=Course
12.d	**Course Name:** Typescript
	Module Name: What is Generics, What are Type Parameters, Generic Functions, Generic Constraints
	Create a generic array and function to sort numbers as well as string values.
	https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_446287045482942800_shared?collectionId=lex_9436233116512678000_shared&collectionType=Course

Software configuration and installation

1. HTML & Javascript
   - Simple editors such as Notepad or go for IDEs like Visual Studio Code(recommended), Eclipse etc. which makes coding easier.
   - And, to execute application, you can use any commonly used browser such as Google Chrome(recommended), Mozilla Firefox etc
   - Setup details: Environmental Setup for HTML5 - Viewer Page | Infosys Springboard (onwingspan.com)
   - Environment Setup: Internal - Viewer Page | Infosys Springboard (onwingspan.com)
2. Node JS
   Download **Node.js** from the official site
   Setup details : How to use Node.js - Viewer Page | Infosys Springboard (onwingspan.com)
3. Typescript
   Installing TypeScript - Internal - Viewer Page | Infosys Springboard (onwingspan.com)

Text Books:

1. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson.
2. Pro Mean Stack Development, 1st Edition, ELadElrom, Apress O'Reilly.
3. Full Stack JavaScript Development with MEAN, Colin J Ihrig, Adam Bretz, 1st edition, SitePoint, SitePoint Pty. Ltd., O'Reilly Media.

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Reference Books:

1. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, 1st Edition, Dream Tech.
2. An Introduction to Web Design, Programming, 1st Edition, Paul S Wang, Sanda S Katila, Cengage Learning.

Web Links:

1. https://infyspringboard.onwingspan.com/en/app/toc/lex_17739732834840810000_shared/overview (HTML5)
2. https://infyspringboard.onwingspan.com/en/app/toc/lex_18109698366332810000_shared/overview (Javascript)
3. https://infyspringboard.onwingspan.com/en/app/toc/lex_32407835671946760000_shared/overview (Node.js & Express.js)
4. https://infyspringboard.onwingspan.com/en/app/toc/lex_9436233116512678000_shared/overview (Typescript)

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III B Tech II Sem		L	T	P	C
		0	0	4	2
BIG DATA : APACHE SPARK (Skill Oriented Course)					

Course Objectives:
The main objective of the course is to process Big Data with advance architecture like spark and streaming data in Spark

Course Outcomes:
By the end of the course , the student will be able to
- Develop MapReduce Programs to analyze large dataset Using Hadoop and Spark
- Write Hive queries to analyze large dataset Outline the Spark Ecosystem and its components
- Perform the filter, count, distinct, map, flatMap RDD Operations in Spark.
- Build Queries using Spark SQL
- Apply Spark joins on Sample Data Sets
- Make use of sqoop to import and export data from hadoop to database and vice-versa

List of Experiments:

1.

EXPERIMENT-1:
To Study of Big Data Analytics and Hadoop Architecture
(i) know the concept of big data architecture
(ii) know the concept of Hadoop architecture
https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01256841991858585686_shared/overview

2. Loading DataSet in to HDFS for Spark Analysis

EXPERIMENT-2:
Installation of Hadoop and cluster management
(i) Installing Hadoop single node cluster in ubuntu environment
(ii) Knowing the differencing between single node clusters and multi-node clusters
(iii) Accessing WEB-UI and the port number
(iv) Installing and accessing the environments such as hive and sqoop
(We can restrict to standalone or if the facilities available can try for pseudo-distribution mode {or} fully distribution mode)
https://infyspringboard.onwingspan.com/web/en/viewer/video/lex_auth_013295035317460992435 39_shared?collectionId=lex_auth_013295035804901376435 44_shared&collectionType=Collection

EXPERIMENT-3:
File management tasks & Basic linux commands
(i) Creating a directory in HDFS
(ii) Moving forth and back to directories

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(iii) Listing directory contents
(iv) Uploading and downloading a file in HDFS
(v) Checking the contents of the file
(vi) Copying and moving files
(vii) Copying and moving files between local to HDFS environment
(viii) Removing files and paths
(ix) Displaying few lines of a file
(x) Display the aggregate length of a file
(xi) Checking the permissions of a file
(xii) Zipping and unzipping the files with & without permission pasting it to a location
(xiii) Copy, Paste commands
https://infyspringboard.onwingspan.com/web/en/viewer/video/lex_auth_01257430580733542457_shared?collectionId=lex_auth_01256841991858585686_shared&collectionType=Course

EXPERIMENT-4:
Map-reducing
(i) Definition of Map-reduce
(ii) Its stages and terminologies
(iii) Word-count program to understand map-reduce
(Mapper phase, Reducer phase, Driver code)
https://infyspringboard.onwingspan.com/web/en/viewer/video/lex_auth_01257421539761356848_shared?collectionId=lex_auth_01256841991858585686_shared&collectionType=Course

EXPERIMENT-5:
Implementing Matrix-Multiplication with Hadoop Map-reduce

EXPERIMENT-6:
Compute Average Salary and Total Salary by Gender for an Enterprise.

EXPERIMENT-7:
(i) Creating hive tables(External and internal)
(ii) Loading data to external hive tables from sql tables(or)Structured c.s.v using scoop
(iii) Performing operations like filterations and updations
(iv) Performing Join(inner, outer etc)
(v) Writing User defined function on hive tables
https://infyspringboard.onwingspan.com/web/en/viewer/webmodule/lex_auth_01257841711418572848_shared?collectionId=lex_auth_01258388119638835242_shared&collectionType=Course

EXPERIMENT-8:
Create a sql table of employees
Employee table with id,designation
Salary table (salary ,dept id)
Create external table in hive with similar schema of above tables,Move data to hive using scoop and load the

contents into tables,filter a new table and write a UDF to encrypt the table with AES-algorithm, Decrypt it with key to show contents
https://infyspringboard.onwingspan.com/web/en/viewer/web-module/lex_auth_012606909641981952143_shared?collectionId=lex_auth_012605268423008256169 2_shared&collectionType=Course

EXPERIMENT-9:
(i) Pyspark Definition(Apache Pyspark) and difference between Pyspark, Scala, pandas
(ii) Pyspark files and class methods
(i) get(file name)
(ii) get root directory()

EXPERIMENT-10 :
Pyspark -RDD'S
(i) what is RDD's?
(ii) ways to Create RDD
(i) parallelized collections
(ii) external dataset
(iii) existing RDD's
(iv) Spark RDD's operations
(Count, foreach(), Collect, join,Cache()
https://infyspringboard.onwingspan.com/web/en/app/toc/lex_3509975869549336000_shared/overviw

EXPERIMENT-11 :
Perform pyspark transformations
(i) map and flatMap
(ii) to remove the words, which are not necessary to analyze this text.
(iii) groupBy
(iv) What if we want to calculate how many times each word is coming in corpus ?
(v) .How do I perform a task (say count the words 'spark' and 'apache' in rdd3) separatly on each partition and get the output of the task performed in these partition ?
(vi) unions of RDD
(vii) join two pairs of RDD Based upon their key
https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013301505844518912251 82_shared/overview

EXPERIMENT-12:
Pyspark sparkconf-Attributes and applications
(i) What is Pyspark spark conf ()
(ii) Using spark conf create a spark session to write a dataframe to read details in a c.s.v and later move that c.s.v to another location

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Hardware and software configuration:

Hardware Configuration for each Node (Suggested)

Operating System:
NAME="Red Hat Enterprise Linux Server", VERSION="7.9 (Maipo)"
CPU Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
CPU(s): 32
RAM: 64G

Software Required

Java: openjdk version "1.8.0_202" (installed in all nodes)
For Hive metastore – we have installed MySQL
MySQL: Ver 8.0.19 for Linux on x86_64 (MySQL Community Server - GPL)

Resource Links for installation

- Hadoop Installation steps: Apache Hadoop 3.3.2 – Hadoop: Setting up a Single Node Cluster. & Apache Hadoop 3.3.2 – Hadoop Cluster Setup
- Links to download different versions of Hadoop : Index of /hadoop/ common (apache.org) &Index of /dist/hadoop/core (apache.org)

Text Books:

1. Spark in Action, Marko Bonaci and Petar Zecevic, Manning.
2. PySpark SQL Recipes: With HiveQL, Dataframe and Graphframes, Raju Kumar Mishra and Sundar Rajan Raman, Apress Media.

Web Links:	
1.	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013301505844518912251822_shared/overview
2.	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01258388119638835242_shared/overview
3.	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012605268423008256169 2_shared/overview

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III B Tech II Sem		L	T	P	C
		2	0	0	0
EMPLOYABILITY SKILLS-II					

Course Objectives:
The main objective of this course is to assist students in developing employability skills and personal qualities related to gaining and sustaining employment.

Course Outcomes: After completion of this course
- Solve various Basic Mathematics problems by following different methods
- Follow strategies in minimizing time consumption in problem solving Apply shortcut methods to solve problems
- Confidently solve any mathematical problems and utilize these mathematical skills both in their professional as well as personal life.
- Analyze, summarize and present information in quantitative forms including table, graphs and formulas

UNIT I:
Numerical ability l: Number system, HCF & LCM, Average, Simplification, Problems on numbers
Numerical ability II: Ratio & Proportion, Partnership, Percentages, Profit & Loss

UNIT II:
Arithmetical ability l: Problems on ages, Time & Work, Pipes & Cistern, Chain Rule.
Arithmetical ability ll: Time & Distance, Problems on boats &Steams, Problems on Trains

UNIT III:
Arithmetical ability lll: Allegation, Simple interest and compound interest, Races & Games of skills, Calendar and Clock,
Logical ability: Permutations and Combination and Probability.

UNIT IV:
Mensuration: Geometry, Areas, Volumes

UNIT V:
Data interpretation: Tabulation, Bar graphs, Pie charts, line graphs

Text Books And Reference Books:
1. R. S. Aggarwal “Quantitative Aptitude”, Revised ed., S Chand publication, 2017 ISBN:8121924987

E- resources:
1. https://blog.feedspot.com/aptitude_youtube_channels/
2. https://www.tutorialspoint.com/quantitative_aptitude/
3. https://www.careerbless.com/aptitude/qa/home.php

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III B Tech II Sem	Minor	L	T	P	C
		3	0	2	4
DEEP LEARNING					

Course Outcomes: After the completion of the course, student will be able to

- Implement deep neural networks to solve real world problems
- Choose appropriate pre-trained model to solve real time problem
- Interpret the results of two different deep learning models

UNIT I:
Fundamentals of Deep Learning: Artificial Intelligence, History of Machine learning: Probabilistic Modeling, Early Neural Networks, Kernel Methods, Decision Trees, Random forests and Gradient Boosting Machines, **Fundamentals of Machine Learning:** Four Branches of Machine Learning, Evaluating Machine learning Models, Overfitting and Underfitting. **[Text Book 2]**

UNIT II: Introducing Deep Learning: Biological and Machine Vision, Human and Machine Language, Artificial Neural Networks, Training Deep Networks, Improving Deep Networks. **[Text Book3]**

UNIT III: Neural Networks: Anatomy of Neural Network, Introduction to Keras: Keras, TensorFlow, Theano and CNTK, Setting up Deep Learning Workstation, Classifying Movie Reviews: Binary Classification, Classifying newswires: Multiclass Classification. **[Text Book 2]**

UNIT IV:
Convolutional Neural Networks: Nerual Network and Representation Learing, Convolutional Layers, Multichannel Convolution Operation,

UNIT V:
Recurrent Neural Networks: Introduction to RNN, RNN Code, PyTorch Tensors: Deep Learning with PyTorch, CNN in PyTorch. **[Text Book 3]**

Software Packages required:

- Keras
- Tensorflow
- PyTorch

List of Experiments:

1. Implement multilayer perceptron algorithm for MNIST Hand written Digit Classification.
2. Design a neural network for classifying movie reviews (Binary Classification) using IMDB dataset.
3. Design a neural Network for classifying news wires (Multi class classification) using Reuters dataset.
4. Design a neural network for predicting house prices using Boston Housing Price dataset.
5. Build a Convolution Neural Network for MNIST Hand written Digit Classification.
6. Build a Convolution Neural Network for simple image (dogs and Cats) Classification

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Text Books:

1. Deep Learning- Ian Goodfellow, Yoshua Bengio and Aaron Courvile, MIT Press, 2016
2. Deep Learning with Python - Francois Chollet, Released December 2017, Publisher(s): Manning Publications, ISBN: 9781617294433
3. Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence - Jon Krohn, Grant Beyleveld, Aglaé Bassens, Released September 2019, Publisher(s): Addison-Wesley Professional, ISBN: 9780135116821
4. Deep Learning from Scratch - Seth Weidman, Released September 2019, Publisher(s): O'Reilly Media, Inc., ISBN: 9781492041412
5. Reza Zadeh and BharathRamsundar, "Tensorflow for Deep Learning", O'Reilly publishers, 2018

Reference Books:

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
2. Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,2013.
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.
4. https://github.com/fchollet/deep-learning-with-python-notebooks

Web Link:

Swayam NPTEL: Deep Learning: https://onlinecourses.nptel.ac.in/noc22_cs22/preview