NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

Evaluation Scheme & Syllabus

For

Bachelor of Technology

Computer Science & Engineering (Internet of Things)

Third Year

(Effective from the Session: 2025-26)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Bachelor of Technology
Computer Science & Engineering (Internet of Things)

Evaluation Scheme
SEMESTER-V

Sl. No.	Subject Codes	Subject	Types of Subjects	Periods		Evaluation Schemes					End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BCSCC0501	Design Thinking-II	Mandatory	2	1	0	30	20	50		100		150	3
2	BCSE0502	Computer Networks	Mandatory	3	1	0	30	20	50		100		150	4
3		Departmental Elective –I	Departmental Elective	3	0	0	30	20	50		100		150	3
4		Departmental Elective –II	Departmental Elective	3	0	0	30	20	50		100		150	3
5	BCSE0552	Computer Networks Lab	Mandatory	0	0	4				50		50	100	2
6	BCSIOT0551	ARM Architecture for IoT	Mandatory	0	0	6				50		100	150	3
7	BCSE0555	Web Technologies	Mandatory	0	0	6				50		100	150	3
8	BCSE0559	Internship Assessment -II	Mandatory	0	0	2				50			50	1
9	BNC0501/ BNC0502	Constitution of India, Law and Engineering / Essence of Indian Traditional Knowledge	Compulsory Audit	2	0	0	30	20	50		50		100	NA
		MOOCs*	MOOCs											
		TOTAL		**13**	**2**	**18**	**120**	**80**	**200**	**200**	**400**	**250**	**1050**	**22**

*** List of MOOCs Based Recommended Courses for Third year (Semester-V) B. Tech Students**

Sr. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0083	Introduction to Architecting Smart IoT Devices	Infosys Wingspan (Infosys Springboard)	16h 45m	1
2	BMC0095	ReactJS	Infosys Wingspan (Infosys Springboard)	61h 2m	4

PLEASE NOTE: -

- **A 3-4 weeks Internship shall be conducted during summer break after semester-IV and will be assessed during semester-V**
- **Compulsory Audit (CA) Courses (Non-Credit - BNC0501/BNC0502)**
  - All Compulsory Audit Courses (a qualifying exam) do not require any credit.
  - The total and obtained marks are not added in the grand total.

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

DEPARTMENTAL ELECTIVES

Subject Code	Subject Name	Types of subjects	Bucket Name	Branch	Semester
BCSIOT0512	System on Chip Design	Departmental Elective- I	Smart Systems	CSE(IoT)	5
BCSIOT0511	Applied Industrial IoT	Departmental Elective- II		CSE(IoT)	5
BCSE0511	CRM Fundamentals	Departmental Elective- I	CRM-RPA	CSE(IoT)	5
BCSE0513	CRM Administration	Departmental Elective- II		CSE(IoT)	5
BCSDS0511	Data Analytics	Departmental Elective- I	Data Analytics	CSE(IoT)	5
BCSAI0519	Business Intelligence and Data Visualization	Departmental Elective- II		CSE(IoT)	5
BCSE0512	Python Web Development with Django	Departmental Elective- I	Full Stack Development	CSE(IoT)	5
BCSE0514	Design Patterns	Departmental Elective- II		CSE(IoT)	5

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Evaluation Scheme
SEMESTER-VI

Sl. No.	Subject Codes	Subject	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BCSIOT0601	Cloud and Edge Computing	Mandatory	3	1	0	30	20	50		100		150	4
2		Departmental Elective -III	Departmental Elective	3	0	0	30	20	50		100		150	3
3		Departmental Elective -IV	Departmental Elective	3	0	0	30	20	50		100		150	3
4		Open Elective -I	Open Elective	3	0	0	30	20	50		100		150	3
5	BCSIOT0651	Cloud and Edge Computing Lab	Mandatory	0	0	2				25		25	50	1
6	BCSML0653	Machine Learning and its Applications	Mandatory	0	0	6				50		100	150	3
7	BCSIOT0653	IoT Protocols and its Applications	Mandatory	0	0	6				50		100	150	3
8	BCSE0659	Mini Project	Mandatory	0	0	6				50		100	150	3
9	BNC0601/ BNC0602	Constitution of India, Law and Engineering / Essence of Indian Traditional Knowledge	Compulsory Audit	2	0	0	30	20	50		50		100	NA
10		MOOCs*	MOOCs											
		TOTAL		**14**	**1**	**20**	**120**	**80**	**200**	**175**	**400**	**325**	**1100**	**23**

*** List of MOOCs Based Recommended Courses for Third year (Semester-VI) B. Tech Students**

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0081	Internet of Things Foundation Certification	Infosys Wingspan (Infosys Springboard)	1h	0
2	BMC0086	Java Programming Fundamentals	Infosys Wingspan (Infosys Springboard)	36h 10m	3
3	BMC0109	Mobile App Development using Flutter	Infosys Wingspan (Infosys Springboard)	44h 37m	3.5

PLEASE NOTE: -

- **A 3-4 weeks Internship shall be conducted during summer break after semester-VI and will be assessed during Semester-VIII**
- **Compulsory Audit (CA) Courses (Non-Credit - BNC0601/BNC0602)**
  - All Compulsory Audit Courses (a qualifying exam) do not require any credit.
  - The Total and obtained marks are not added in the Grand Total.

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

DEPARTMENTAL ELECTIVES

Subject Code	Subject Name	Types of subjects	Bucket Name	Branch	Semester
BCSIOT0612	Privacy and Security in IoT	Departmental Elective- III	Smart Systems	CSE(IoT)	6
BCSAI0618	Advanced Communication	Departmental Elective- IV		CSE(IoT)	6
BCSE0611	CRM Development	Departmental Elective- III	CRM-RPA	CSE(IoT)	6
BCSE0613	Robotics Process Automation (RPA)	Departmental Elective- IV		CSE(IoT)	6
BCSAI0617	Programming for Data Analytics	Departmental Elective- III	Data Analytics	CSE(IoT)	6
BCSAI0622	Social Media Analytics	Departmental Elective- IV		CSE(IoT)	6
BCSAI0612	Advanced Java Programming	Departmental Elective- III	Full Stack Development	CSE(IoT)	6
BCSE0614	Web Development using MEAN Stack	Departmental Elective- IV		CSE(IoT)	6

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A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

1. For 6 to 12 Hours =0.5 Credit
2. For 13 to18 =1 Credit
3. For 19 to 24 =1.5 Credit
4. For 25 to 30 =2 Credit
5. For 31 to 35 =2.5 Credit
6. For 36 to 41 =3 Credit
7. For 42 to 47 =3.5 Credit
8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only.

The students shall be awarded Honours Degree as per following criterion.

i. If he / she secures 7.50 as above CGPA.
ii. Passed each subject of that degree program in the single attempt without any grace.
iii. Successful completion of MOOCs based 20 credits

B. TECH THIRD YEAR		
Subject Code: BCSCC0501	**L T P** 2-1-0	
Subject Name: DESIGN THINKING –II	**Credits** 3	
Pre- requisites: Student must complete Design Thinking-I course.		
Course Contents/Syllabus		
Unit-1	Introduction: Design thinking & Innovation, Design Thinking Mindset and Principles, recap of 5-Step Process of Design Thinking, Design Approaches, additional in-depth examples of each design approaches. Simon Sinek's – Start with Why, The Golden Circle , Asking the "Why" behind each example (an in-class activity of asking 5-WHYS) , The Higher Purpose, in-class activity for LDO & sharing insights Visualization and its importance in design thinking , reflections on wheel of life (in-class activity for visualization & Wheel of Life), Linking it with Balancing Priorities (in class activity), DBS Singapore and Bank of Americas' Keep the Change Campaign. Litter of Light & Arvind Eye Care Examples, understanding practical application of design thinking tools and concepts, case study on McDonald's Milkshake / Amazon India's Rural Ecommerce & Gillette Working on 1-hour Design problem, Applying RCA and Brainstorm on innovative solutions. Main project allocation and expectations from the project.	8 hours
Unit-2	Refinement and Prototyping: Refine and narrow down to the best idea, 10-100-1000gm, QBL, Design Tools for Convergence – SWOT Analysis for 1000gm discussion. In-class activity for 10-100-1000gm & QBL Prototyping (Convergence): Prototyping mindset, tools for prototyping – Sketching, paper models, pseudo-codes, physical mockups, Interaction flows, storyboards, acting/role-playing etc, importance of garnering user feedback for revisiting Brainstormed ideas. Napkin Pitch, Usability, Minimum Viable Prototype, Connecting Prototype with 3 Laws, A/B Testing, Learning Launch. Decision Making Tools and Approaches – Vroom Yetton Matrix, Shift-Left, Up, Right, Value Proposition, Case study: Careerbuddy, You-Me-Health Story & IBM Learning Launch. In-class activities on prototyping- paper-pen / physical prototype/ digital prototype of project's 1000gm idea.	8 hours
Unit-3	Storytelling, Testing and Assesment: Storytelling: Elements of storytelling, Mapping personas with storytelling, Art of influencing, Elevator Pitch, Successful Campaigns of well-known examples, in-class activity on storytelling. Testing of design with people, conducting usability test, testing as hypothesis, testing as empathy, observation and shadowing methods, Guerrilla Interviews, validation workshops, user feedback, record results, enhance, retest, and refine design, Software validation tools, design parameters, alpha &beta testing, Taguchi, defect classification, random sampling. Final Project Presentation and assessing the impact of using design thinking	8 hours

Unit-4	Innovation, quality and Leadership : Innovation: Need & Importance, Principles of innovations, Asking the Right Questions for innovation, Rationale for innovation, Quality: Principles & Philosophies, Customer perception on quality, Kaizen, 6 Sigma. FinTech case study of Design Thinking application – CANVAS Leadership, types, qualities and traits of leaders and leadership styles, Leaders vs Manager, Personas of Leaders & Managers, Connecting Leaders-Managers with 13 Musical Notes, Trait theory, LSM (Leadership Situational Model), Team Building Models: Tuckman's and Belbin's. Importance of Spatial elements for innovation.	8 hours
Unit-5	Understanding Human Desirability : Comprehensive human goal: the five dimensions of human endeavour (Manaviya - Vyavstha) are: Education- Right living (Sikhsa- Sanskar), Health – Self-regulation (Swasthya - Sanyam), Justice – Preservation (Nyaya- Suraksha), Production – Work (Utpadan – Karya), Exchange – Storage (Vinimya – Kosh), Darshan-Gyan-Charitra (Shifting the Thinking) Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature, Thinking expansion for harmony: Self-exploration (Johari's window), group behaviour, interpersonal behaviour and skills, Myers-Briggs personality types (MBTI), FIRO-B test to repair relationships.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Learn sophisticated design tools to sharpen their problem-solving skills	K2
CO2	Construct innovate ideas using design thinking tools and converge to feasible idea for breakthrough solution	K6
CO3	Implement storytelling for persuasive articulation	K3
CO4	Understanding the nature of leadership empowerment	K2
CO5	Understand the role of a human being in ensuring harmony in society and nature	K2

Text Books:

1. Arun Jain, UnMukt : Science & Art of Design Thinking, 2020, Polaris
2. Gavin Ambrose and Paul Harris, Basics Design 08: Design Thinking, 2010, AVA Publishing SA
3. R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, First Edition, 2009, Excel Books: New Delhi

Reference Books:

1. Jeanne Liedta, Andrew King and Kevin Benett , Solving Problems with Design Thinking – Ten Stories of What Works, 2013, Columbia Business School Publishing.
2. Dr Ritu Soryan, Universal Human Values and Professional Ethics, 2022, Katson Books.
3. Vijay Kumar, 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization, 2013, John Wiley and Sons Inc, New Jersey.
4. Roger L. Martin, Design of Business: Why Design Thinking is the Next Competitive Advantage, 2009, Harvard Business Press, Boston MA.

5. Tim Brown, Change by Design, 2009, Harper Collins.

6. Pavan Soni, Design your Thinking : The Mindsets, Toolsets and Skill Sets for Creative Problem-Solving, 2020, Penguin Books.

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=6_mHCOAAEI8 https://nptel.ac.in/courses/110106124
https://designthinking.ideo.com/

https://blog.experiencepoint.com/how-mcdonalds-evolved-with-design-thinking

https://www.coursera.org/lecture/uva-darden-design-thinking-innovation/the-ibm-story-iq0kE
https://www.coursera.org/lecture/uva-darden-design-thinking-innovation/the-meyouhealth-story-part-i-what-is-W6tTs https://onlinecourses.nptel.ac.in/noc19_mg60/preview

https://www.youtube.com/watch?v=HTSCbxSxsg&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=5

https://www.youtube.com/watch?v=NnlS2BzXvyM

https://www.youtube.com/watch?v=7enWesSofhg

https://youtu.be/rthuFS5LSOo
https://www.youtube.com/watch?v=kho6oANGu_A

https://www.youtube.com/watch?v=9vMpHk44XXo&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=6
Reinforcement Learning Tutorial | Reinforcement Learning Example Using Python | Edureka - YouTube
Association Rule Mining – Solved Numerical Question on Apriori Algorithm(Hindi) - YouTube
Q Learning Explained | Reinforcement Learning Using Python | Q Learning in AI | Edureka - YouTube

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY

GREATER NOIDA-201306

(An Autonomous Institute)

School of Computer Science in Emerging Technologies

B. TECH THIRD YEAR

Course Code: BCSE0502	**L T P** 3-1-0
Course Name: COMPUTER NETWORKS	**Credits** 4

Course objective:

Objective of this course is to develop an understanding of computer networking basics, different components of puter networks, various protocols, modern technologies and their applications.

Pre- requisites: Basic knowledge of Computer system and their interconnection, operating system, Digital logic and design and hands on experience of programming languages.

Course Contents/Syllabus

Unit-1	INTRODUCTION: Goals and applications of networks, Categories of networks, Organization of the Internet, ISP, The OSI reference model, TCP/IP protocol suite, Network devices and components, Mode of communications PHYSICAL LAYER: Network topology design, Types of connections, LAN, MAN and MAN Transmission media, Signal transmission and encoding, Network performance and transmission impairments, Switching techniques and multiplexing, IEEE standards.	10 hours
Unit-2	Data Link Layer: Framing, Error Detection and Correction, Flow control (Elementary Data Link Protocols, Sliding Window protocols). Medium Access Control and Local Area Networks: Channel allocation, Multiple access protocols, LAN standards, Link layer switches & bridges.	10 hours
Unit-3	Network Layer: Point-to-point networks, Logical addressing, Basic internetworking (IP, CIDR, ARP, RARP, DHCP, ICMP). IPv4 and IPv6. Routing, forwarding and delivery, Static and dynamic routing, Routing algorithms and protocols, Congestion control algorithms.	10 hours
Unit-4	Transport Layer: Process-to-process delivery, Transport layer protocols (UDP and TCP). Connection management, Flow control and retransmission. Window management, TCP Congestion control, Quality of service.	8 hours
Unit-5	Application Layer: Domain Name System, World Wide Web and Hyper Text Transfer Protocol, Electronic mail. File Transfer Protocol, Remote login, Network management, Data compression, VPN. Cryptography – basic concepts, Firewalls.	10 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Build an understanding of the fundamental concepts and Layered Architecture of computer networking.	K2, K6
CO2	Understand the basic concepts of link layer properties to detect error and develop the solution for error control and flow control.	K2, K6
CO3	Design, calculate, and apply subnet masks and addresses to fulfil networking requirements and calculate distance among routers in subnet.	K3, K4, K6

CO4	Understand the duties of transport layer, Session layer with connection management of TCP protocol.	K2, K4
CO5	Discuss the different protocols used at application layer.	K2

Text Books:

1.Behrouz Forouzan, “Data Communication and Networking” Fourth Edition-2006, Tata McGraw Hill

2.Andrew Tanenbaum “Computer Networks”, Fifth Edition-2011, Prentice Hall.

3.William Stallings, “Data and Computer Communication”, Eighth Edition-2008, Pearson.

Reference Books:

1.Kurose and Ross, “Computer Networking- A Top-Down Approach”, Eighth Edition-2021, Pearson.

2.Peterson and Davie, “Computer Networks: A Systems Approach”, Fourth Edition-1996, Morgan Kaufmann

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=LX_b2M3IzN8

https://www.youtube.com/watch?v=LnbvhoxHn8M

https://www.youtube.com/watch?v=ddM9AcreVqY

https://www.youtube.com/watch?v=uwoD5YsGACg

B. TECH THIRD YEAR	
Subject Code: BCSE0552	**L T P 0 0 4**
Subject Name: Computer Networks Lab	**Credits 2**

Course Objective: The objective of this course is to provide students with practical exposure to the fundamental concepts of computer networks. Through hands-on experiments, students will learn the construction and testing of physical media, implementation of networking protocols, network configuration, and basic network security techniques. The course aims to develop technical skills in network setup, IP addressing, protocol analysis, and network simulation using industry tools like Cisco Packet Tracer.

Course outcome: After completion of this practical, student will be able to:

CO1	Build an understanding of UTP cable with RJ-45 connector, and build and test simple network using UTP cable.	K2, K4, K6
CO2	Understand and implementation of the bit stuffing protocol.	K2, K3
CO3	Understand and test the various network connection commands of TCP/IP and error control, flow control.	K2, K4
CO4	Understand and implementation of the concept of IP addressing and security technique likes Caesar cipher and RSA.	K2, K3
CO5	Design and understanding the various topology and configuration of switch and router using cisco packet tracer	K2, K6

List of Practical

Lab No.	Program Logic Building	CO Mapping
1.	To make an UTP cable with RJ-45 connector, and build and test simple network using UTP cable (crossover) and a hub based network.	CO1
2.	Implementation of data link layer framing method such as bit stuffing in any language like C++, Java or Python.	CO2
3.	Test the Network connection using ping command and use of ipconfig, netstat and trcert command provided by TCP/IP.	CO3
4.	Develop a client-server chat application using TCP sockets in Python (or C/Java).	CO3
5.	Implementation of CRC algorithm in any language like C++ , Java or Python.	CO3
6.	Implementation of stop and wait protocol in any language like C++ , Java or Python.	CO3
7.	Implementation of hamming code (7, 4) code to limit the noise. We have to code the bit data in to 7bit data by adding 3 parity bits. Implement in in any language like C++ , Java or Python.	CO3
8.	Implement Sliding Window Protocol for Reliable Data Transmission.	CO3
9.	Implementation of Caesar cipher technique & RSA algorithm in any language like C++ , Java or Python.	CO4
10.	Write a program in java to find the IP address of the system.	CO4

11.	Write a program in java to find the IP address of the any site if name is given.	CO4
12.	Develop a program that, given an IP address and the required number of hosts, calculates: • The appropriate subnet mask • The number of subnets • The broadcast address for the subnet	CO4
13.	Introduction to Network Devices (Repeater, Hub, Bridge, Switch, Router, Gateways, NIC etc.).	CO5
14.	Introduction to CISCO Packet Tracer. Design Bus, Star, Mesh, Ring Topology and check the connectivity using ping command.	CO5
15.	Switch Configuration on CISCO packet tracer using CLI.	CO5

B. TECH THIRD YEAR		
Subject Code: BCSIOT0551	**L T P** 0-0-6	
Subject Name: ARM Architecture for IoT	**Credits** 3	
Pre- requisites: Basics of electronic Circuits and Digital electronics, Basics of C language.		
Course Contents/Syllabus		
Unit-1	**Introduction to ARM Architecture and RTOS:** Introduction, ARM Processor Families. Cortex-M0+ Block Diagram, Registers, Processor Memory Map, Instruction Sets: ARM and Thumb Instruction Set, Cortex-M0+ Instruction Set, Program-Generation Flow, Cortex-M0+ Program Image, Program Data, how is Data Stored in RAM, Data Types. Assembly Language vs Embedded C Digital Input and Output, GPIO Controller. Introduction to RTOS: Overview of Mbed OS, Mbed Working and flow diagram in IoT.	14 hours
Unit-2	**Introduction to ARM 7 LPC 2148** Introduction to ARM 7 LPC 2148. General features of LPC2148 microcontroller. Architecture Block Diagram of LPC 2148 Microcontroller: GPIO pins, On Chip Static RAM (SRAM), Flash memory, Vectored Interrupt Controller, ADC, DAC. Serial Communication: UART, I2C, SPI Timers and Counters	12 hours
Unit-3	**Assembly and Embedded C Programming using ARM 7** Introduction to Arm 7 Assembly Instructions: Classification of Instructions, Addressing Modes, Assembly language Programs. Learn the basics of Embedded C programming for device control.	14 hours
Unit-4	**Overview of ARM Development Tools/IDEs** Overview of KEIL 4 IDE, its interface, Embedded c Programming on Keil. Introduction to Proteus, circuit schematics, interface and Programming on Proteus.	8 hours
Unit-5	**Interfacing of sensors and actuators with LPC 2148** Interfacing of Switch, LED and Seven Segment Display to ARM7 LPC2148. Interfacing of IR, Ultrasonic, Soil Moisture and Temperature sensors and DC motor with ARM 7 LPC2148.	24 hours

List of Practical		
Sr. No.	**Program Title**	**CO Mapping**
1	To understand the basics and internal architecture of ARM microcontrollers.	CO1
2	Write and Implement Embedded C Code of LED interfacing on an ARM base Mbed Microcontroller board using the Mbed.	CO1
3	Write and Implement Embedded C Code using Switch and timer on an ARM base Mbed Microcontroller board using Mbed. Perform following: -	CO1
	a. LED1 will blink every second	CO1
	b. LED3 will toggle after 2.5 seconds	CO1
	c. LED2 can be toggled through BUTTON1	CO1
4	Write and Implement Embedded C Code of graphics LCD (C12832) interfacing with ARM based Mbed Microcontroller board using Mbed.	CO1
5	Write and Implement Embedded C Code for interfacing temperature and humidity sensor (SHT31) with ARM based Mbed Microcontroller board using Mbed.	CO1
6	Write and Implement Embedded C Code for interfacing Speaker using ARM based Mbed Microcontroller board using the Mbed Studio tool. Play different frequency tones on speaker.	CO1
7	To understand general features and architecture of ARM 7 Microcontroller.	CO2
8	To understand the GPIO, ADC, and DAC functionalities of the ARM7 LPC2148 microcontroller.	CO2
9	To explore on-Chip Static RAM (SRAM) and Flash memory available on ARM 7 LPC 2148.	CO2
10	To understand the Vectored Interrupt Controller (VIC) in the ARM7 LPC2148 microcontroller.	CO2
11	To explore the serial communication interfaces available in the ARM7 LPC2148.	CO2
12	To explore the timers and counters integrated in the ARM7 LPC2148 microcontroller.	CO2
13	To understand Arm 7 Assembly Instructions in assembly language in ARM 7.	CO3
14	To explore Classification of Instructions in ARM 7.	CO3
15	Understand All Addressing Modes in ARM 7 with Assembly language Programs.	CO3

16	Write and Execute assembly language program to add and subtract two 8, and 32-bit numbers.	CO3
17	Write and Execute assembly language program to add and subtract two 8, and 32-bit numbers using logical shifting only.	CO3
18	Write and Execute assembly language program to perform logical operations (AND, OR, XOR) .	CO3
19	Write and Execute assembly language program for addition of five numbers located at memory started from 0x2000, using all types of register indirect addressing modes.	CO3
20	Write and Execute assembly language program to multiply two numbers.	CO3
21	To explore about KEIL 4 IDE and learn to create projects and their implementations.	CO4
22	To explore about Proteus circuit simulator tool and learn to create projects and their implementations.	CO4
23	Write a program to connect the LED to port 0.4 and blink the LED continuously in KEIL 4 IDE and verify the program in Proteus.	CO4
24	Write a program to interface 4 LED to ARM7 and blink the LED 1 after some time LED 2 then LED 3 and after that LED 4 in KEIL 4 IDE and verify the program in Proteus.	CO4
25	Write a program to interface 4 LED and first LED should be ON, after some time second, then third and at last fourth in KEIL 4 IDE and verify the program in Proteus.	CO4
26	Write a program to interface LCD to ARM7 LPC 2148 and display NIET on first line.	CO5
27	Write a program to interface LCD to ARM7 LPC 2148 and display WELCOME TO IOT.	CO5
28	Write a program to interface LCD to ARM7 LPC 2148 and display WELCOME TO IOT on the first line and WELCOME TO NIET on second line.	CO5
29	Write a program to interface LCD to ARM7 LPC 2148 and display "WELCOME TO INTERNET OF THINGS" on LCD.	CO5
30	Write a Program to transfer the character "A' through UART 0.	CO5
31	Write a aprogram to transfer the string "WELCOME TO ALEXA".	CO5
32	Write a program to receive the character and display the received character on LCD.	CO5
33	Write a program to receive the character, If the character is K, display "WELCOME TO NIET", for any other character display" WELCOME To IoT.	CO5
34	Write a program to receive the character if user entered the character is "1", LED 1 is ON, Display the same info in the serial window. If user enter 2, LED 1 is OFF, If user entered 3, LED 2 should be ON, If user entered 4 , LED should be OFF.	CO5

35	Write a program to interface two switches and LED to ARM 7, When two switches are HIGH, LED should be ON. If any switch is LOW, LED should be OFF.	CO5
36	Write a program to interface IR sensor to 0.4.If any object is bound, LED should be "ON" and display the status in serial window.	CO5
37	Write a program to interface Gas sensor to ARM7 and if any harmful gases are released display the status in the serial window.If gas leakage is there display "1".	CO5
38	Write a program to interface Moisture Sensor Sensor to ARM7. and display the status of soil in serial window and if soil is wet LED should be off and if soil is dry LED should be on.	CO5
39	Write a program to interface 7 Segment display ot ARM 7 LPC 2148	CO5
40	Write a program to interface SPI with ARM7.	CO5
41	Write a program to interface Bluetooth with ARM7.	CO5
42	Write a program to interface RFID with ARM7.	CO5
43	Interfacing DC Motor with ARM 7 LPC 2148.	CO5
44	Development of a mini project.	CO5

Course Outcomes – After completion of this course students will be able to:

CO1	Understand the basics of ARM Processor Families, Cortex M0+ microcontroller with mbed RTOS and embedded c programs.	K2
CO2	Analyze the ARM 7 architecture, memory organization and serial communication.	K4
CO3	Implement assembly and embedded C programs for ARM 7 LPC 2148 microcontroller.	K3
CO4	Design Embedded systems and programs using KEIL 4 IDE and Proteus circuit simulator.	K6
CO5	Design circuit and embedded c programs to interface various sensors and actuators to ARM 7 LPC 2148.	K6

Text Books:

1. The Definitive Guide to the ARM Cortex-M0, Newnes publication
2. ARM system developers guide, Kaufman publishers, 2008.

Reference Books:

1. ARM Cortex-M0 Technical Reference Manual
2. ARM System-on-Chip Architecture, Addison-Wesley Educational Publishers Inc; 2nd edition (17 August 2000)
Links: NPTEL/You Tube/Web Link
https://www.youtube.com/watch?v=JO4AEkOVF2M
https://www.youtube.com/watch?v=JH4j7fCT_o4
https://www.youtube.com/watch?v=4oXc3EpUN4E
https://www.youtube.com/watch?v=Goem6NrCy8A
https://www.youtube.com/watch?v=eu1sQSPEX34

B. TECH THIRD YEAR		
Subject Code: BCSE0555	**L T P** 0-0-6	
Subject Name: Web Technologies	**Credits** 3	
Pre- requisites: Basic Knowledge of any programming language like C/C++/Python/Java. Familiarity with basic concepts of Internet.		
Course Contents/Syllabus		
Unit-1	Introduction to HTML & CSS: **Introduction:** Introduction to Web Technology, History of Web and Internet, Connecting to Internet, Introduction to Internet services and tools, Client-Server Computing, Protocols Governing Web, Basic principles involved in developing a web site, Planning process, Types of Websites, Web Standards and W3C recommendations. **Web Hosting:** Web Hosting Basics, Types of Hosting Packages, Registering domains, Defining Name Servers, Using Control Panel, Creating Emails in Cpanel, Using FTP Client, Maintaining a Website.	10 hours
Unit-2	Responsive Websites with Bootstrap : **HTML:** What is HTML, DOM- Introduction to Document Object Model, Basic structure of an HTML document, Mark up Tags, Heading-Paragraphs , Line Breaks, Understand the structure of HTML tables. Lists, Working with Hyperlinks, Image Handling, Understanding Frames and their needs, HTML forms for User inputs. New form Elements- date, number, range, email, search and data list, Understanding audio, video and article tags. **XML:** Introduction, Tree, Syntax, Elements, Attributes, Namespaces, Display, HTTP request, Parser, DOM, XPath, XSLT, XQuerry, XLink, Validator, DTD, Schema, Server.	14 hours
Unit-3	Introduction to JavaScript and ES6: **Concept of CSS 3:** Creating Style Sheet, CSS Properties , CSS Styling(Background, Text Format, Controlling Fonts) , Working with block elements and objects , Working with Lists and Tables , CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties) CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) , CSS Color, Creating page Layout and Site. **Bootstrap:** Introduction, Bootstrap grid system, Bootstrap Components.	16 hours
Unit-4	Introduction to XML and JSON: **JavaScript Essentials**: Introduction to Java Script , Javascript Types , Var, Let and Const Keywords, Operators in JS , Conditions Statements , Java Script Loops, JS Popup Boxes , JS Events , JS Arrays, Working with Arrays, JS Objects ,JS Functions , Using Java Script in Real time , Validation of Forms, Arrow functions and default arguments, Template Strings, Strings methods, Callback functions, Object de-structuring, Spread and Rest Operator, Typescript fundamentals, Typescript OOPs- Classes, Interfaces, Constructor etc. Decorator and Spread Operator Difference == & ===, Asynchronous Programming in ES6, Promise Constructor, Promise with Chain, Promise Race.	16 hours

Unit-5	Introduction to PHP: Introduction to PHP, Basic Syntax, Variables & Constants, Data Type, Operator & Expressions, Control flow and Decision making statements, Functions, Strings, Arrays. **Working with files and directories:** Understanding file& directory, Opening and closing, a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading. **Session & Cookies:** Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session.	16 hours

Sr. No.	Program Title	CO Mapping
1	A.Overview and Installation of various code editors.	CO1
2	B. Overview and Installation of various servers	CO1
3	Implementing HTML program that represent in the document as a start tag, which gives the name and attributes	CO2
4	Implementing HTML program that represents a document	CO2
5	Implementing HTML program to display your simple CV	CO2
6	Creating html document that represents document object model	CO2
7	To Create a table to show your class time table.	CO2
8	Apply various colors to suitably distinguish keywords , also apply font styling like italics, underline and two other fonts to words you find appropriate , also use header tags.	CO2
9	Create a webpage with HTML describing your department use paragraph and list tags	CO2
10	Implementing HTML program that for Heading	CO2
11	Implementing program that implement paragraph and line-break	CO2
12	Use tables to provide layout to your HTML page describing your college infrastructure.	CO2
13	Use and tags to provide a layout to the above page instead of a table layout	CO2
14	Create links on the words e.g. —Wi-Fi and —LAN to link them to Wikipedia pages	CO2
15	Insert an image and create a link such that clicking on image takes user to other page	CO2
16	Change the background color of the page; At the bottom create a link to take user to the top of the page.	CO2
17	Creating HTML program to implement three articles with independent, self-contained content.	CO2
18	Creating a XML document that defines the self-descriptive tags	CO2

19	Designing XML document that store various book data such as: book category, title, author, year and price	CO2
20	To Describe the various types of XML key components	CO2
21	Design XML DTD to define the structure and legal element and attribute of XML document	CO2
22	To implement internal and external DTD	CO2
23	Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.	CO2
24	Design a HTML registration form that takes user name, user password and mobile number with submit button control	CO2
25	Design a HTML5 document that implement of date, number, range, email, search and data list.	CO3
26	Implementation in HTML5 that include native audio and video support without the need for Flash.	CO3
27	Create a simple form to submit user input like his name, age, address and favourite subject, movie and singer.	CO3
28	Add few form elements such as radio buttons, check boxes and password field. Add a submit button at last.	CO3
29	Add CSS property assign a style or behavior to an HTML element such as: color, border, margin and font-style.	CO3
30	Add To Style Text Elements with Font, Size, and Color in CSS	CO3
31	Applying a block element in CSS acquires up the full width available for that content.	CO3
32	Demonstrating the CSS Box model with consists of: borders, padding, margins, and the actual content.	CO3
33	Design a web page by applying CSS grouping and dimensions property.	CO3
34	Design a XML Schema that describes the structure of an XML document.	CO3
35	Design a XML document that describe the well-formed XML document	CO3
36	Design a XML document of CD Catalog through each <CD> element, and displays the values of the <ARTIST> and the <TITLE> elements in an HTML table	CO3
37	Create a XSL document for and taken xml document by you.	CO3
38	Create a XSLT document for and taken xml document by you with all steps	CO3
39	Design a web page by applying CSS Display and Positioning property.	CO3

40	Design a web page by applying CSS Display and Positioning property .	CO3
41	Design a web page by applying CSS pseudo classes.	CO3
42	Creating a Java Script code to implement all data types.	CO4
43	Design a basic structure of Bootstrap Grid system.	CO4
44	Design All Bootstrap Components with example.	CO4
45	Implementing a program in Java script to implement augmented function.	CO4
46	Implementing a program to implement calculator application as real time.	CO4
47	Design a HTML form validation using Java Script.	CO4
48	Write a program to implement Arrow function with default argument in ES6	CO4
49	Implementing a program in ES6 to implement Template string concepts	CO4
50	Implementing a program in ES6 to implement all string methods.	CO4
51	Creating a Java Script program to implement Dialog, Confirm and Message Popup Boxes.	CO4
52	Implementing a Java Script program to implement onClick and onSubmit event	CO4
53	Creating a java script code to implement ‘let’ keyword	CO4
54	Creating a java script code to implement ‘const’ keyword	CO4
55	Implementing a program to implement call back functions in ES6.	CO4
56	Implementing a program for de-structuring of an array in ES6	CO4
57	Javascript code to implement object and class concepts in Typescript.	CO4
58	Write a Typescript program that implement interface and constructor	CO4
59	Write a code in typescript that implement decorator and spread operator	CO4
60	Create a constant by using define() function with its proper syntax	CO4
61	Creating PHP script that return any data types whatever you use.	CO4
62	Implementing a code in Java Script to implement Spread and rest operator	CO4
63	Javascript code that should compile by Typescript compiler as’tsc’	CO4
64	Write a code in typescript that implement Asynchronous Programming concepts.	CO4
65	Write a program in Typescript that implement promise constructor	CO4
66	Implementing promise and chain concepts in Typescript	CO4

67	Write a code in typescript that implement Promise.race() static method.	CO4
68	Crating a program that implement control flow and decision making statement.	CO4
69	Creating PHP to implements parameterized function	CO5
70	Creating program in PHP to store multiple string and concatenate these string and print it.	CO5
71	Write a PHP script to create and delete directory structure	CO5
72	Program to upload and download a file in PHP	CO5
73	Implements single dimension array in PHP	CO5
74	Write a PHP code to open and close a file in a proper manner	CO5
75	Write a PHP script to copying, renaming and deleting a file.	CO5
76	PHP program to create and destroy a session.	CO5
77	PHP program to set and delete a cookie.	CO5
78	PHP program to manually register the session variable	CO5
79	PHP program to manually destroy the session variable	CO5
80	PHP program to store the session data on one page and would be available on second page.	CO5

Course Outcomes – After completion of this course students will be able to:

CO1	Identify the basic facts and explaining the basic ideas of Web technology and internet.	K1, K2
CO2	Applying and creating various HTML5 semantic elements and application with working on HTML forms for user input.	K3, K6
CO3	UnderstandingandapplyingtheconceptsofCreatingStyleSheetCSS3 and bootstrap.	K2, K3
CO4	Analysing and implementing concept of JavaScript and its applications.	K4, K6
CO5	Creating and evaluating dynamic web pages using the concept of PHP.	K5, K6

Text Books:

1. C Xavier, “Web Technology and Design”, 1nd Edition 2003, New Age International.
2. Raj Kamal, “Internet and Web Technologies”, 2nd Edition 2017,Mc Graw Hill Education.
3. Oluwafemi Alofe, “Beginning PHP Laravel”,2nd Edition 2020, kindle Publication.

Reference Books:

1. Burdman, Jessica, “Collaborative Web Development” 5th Edition 1999, Addison Wesley Publication.

2. Randy Connolly, “Fundamentals of Web Development”,3rd Edition 2016,

3. Ivan Bayross,” HTML, DHTML, Java Script, Perl & CGI”, 4th Edition 2010 BPB Publication

Links: NPTEL/You Tube/Web Link

Unit 1 https://youtu.be/96xF9phMsWA

https://youtu.be/Zopo5C79m2k

https://youtu.be/ZliIs7jHi1s

https://youtu.be/htbY9-yggB0

Unit 2 https://youtu.be/vHmUVQKXlVo

https://youtu.be/qz0aGYrrlhU

https://youtu.be/BsDoLVMnmZs

https://youtu.be/a8W952NBZUE

Unit 3 https://youtu.be/1Rs2ND1ryYc

https://youtu.be/vpAJ0s5S2t0

https://youtu.be/GBOK1-nvdU4

https://youtu.be/Eu7G0jV0ImY

Unit 4 https://youtu.be/-qfEOE4vtxE
https://youtu.be/PkZNo7MFNFg
https://youtu.be/W6NZfCO5SIk
https://youtu.be/DqaTKBU9TZk

Unit 5 https://youtu.be/_GMEqhUyyFM
https://youtu.be/ImtZ5yENzgE
https://youtu.be/xIApzP4mWyA
https://youtu.be/qKR5V9rdht0

B. TECH THIRD YEAR		
Subject Code: BCSIOT0512		**L T P** 3-0-0
Subject Name: SYSTEM ON CHIP DESIGN		**Credits** 3
Pre- requisites: Basic Knowledge of Microprocessor and Microcontroller		
Course Contents/Syllabus		
Unit-1	**INTRODUCTION TO SYSTEM-ON-CHIP DESIGN** Moore's Law, Scaling, The Design Productivity Gap, Bridging the Design Productivity Gap, SoC, Example Arm-based SoC, Advantages of SoCs, Limitations of SoCs, SoC v Microcontroller v Processor, SoC Design Flow.	8 hours
Unit-2	**ARM CORTEX-M0 PROCESSOR** Arm Cortex-M0 Processor Architecture, Thumb Instruction Set, Thumb-2 Instruction Set, Cortex-M0 Instruction Set, Cortex-M0: Generic Format of Instructions, Register Access: The Move Instruction, Memory Access: The LOAD Instruction, The STORE Instruction, Multiple Data Access, Stack Access: PUSH and POP, Arithmetic ADD, Arithmetic SUB, MUL, Arithmetic CMP, Logic Operation, Arithmetic Shift Operation, Logical Shift Operation, Rotate Operation, Reverse Ordering Operation, Extend Operation, Program Flow Control, Conditional Branch Example, Cortex-M0 Low Power Features, Cortex-M0 Sleep Mode, Sleep-on-Exit Feature, Processor Wakeup Conditions, Wakeup Interrupt Controller.	8 hours
Unit-3	**AMBA 3 AHB-LITE BUS** AMBA 3 AHB-Lite Bus Architecture, Bus Terminology, Bus Operation in General, A Typical Bus Operation Example, Communication Architecture Standards, Arm AMBA System Bus Families, AMBA 3 AHB-Lite Bus, AHB-Lite Bus Block Diagram, AHB-Lite Master and Slave Interface, Address Decoder, Slave Multiplexor, Hardware Implementation, AHB-Lite Operation Principles, AHB-Lite Bus Timing, Basic Read Transfer and Write Transfer. AHB VGA Peripheral Architecture, AHB UART Peripheral, Timer, GPIO and 7-Segment Peripherals, Interrupt Mechanisms.	8 hours
Unit-4	**PROGRAMMING AN SOC USING C LANGUAGE** **C language Terminology,** Define Interrupt Vector in C, Define Stack and Heap, Accessing Peripherals in C, calling a C Function from Assembly, Calling an Assembly Function from C, Embedded Assembly, Arm CMSIS and Software Drivers**,** CMSIS Components, Access NVIC Using CMSIS, Access Special Registers Using CMSIS, Arm Development Studio.	8 hours
Unit-5	**ARM CORTEX-A9 PROCESSOR** ARM Cortex-A9 Processor Architecture, AMBA AXI4 Bus Architecture, Design and Implementation of an AXI4-Lite™ GPIO peripheral and a DDR Memory Controller.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Understand SoC Design flow.	K3
CO2	Recognize Arm Cortex-M0 Processor Architecture.	K2

CO3	Describe AMBA 3 AHB-Lite Bus Architecture, VGA, GPIO and 7-Segment UART Peripheral**.**	K3
CO4	Program SoC Using C Language.	K4
CO5	Understand ARM Cortex-A9 Processor and AXI UART and AXI-Stream Peripheral.	K2

Text Books:

1. ARM System-on-Chip Architecture by Steve B. Furber

2.The Definitive Guide to the ARM Cortex-M0 by Joseph Yiu

Reference Books:

1. ARM Assembly Language: Fundamentals and Techniques by William Hohl

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=KxryzSO1Fjs

https://www.springboard.com/blog/data-wrangling/

https://towardsdatascience.com/exploratory-data-analysis-in-r-for-beginners-fe031add7072

https://learn.datacamp.com/courses/exploratory-data-analysis-in-python

https://onlinecourses.nptel.ac.in/noc20_cs80/preview

B. TECH THIRD YEAR		
Subject Code: BCSIOT0511		**L T P** 3-0-0
Subject Name: APPLIED INDUSTRIAL IoT		**Credits** 3
Pre- requisites: Pre-requisites: Introduction to IOT, sensors and connectivity protocols.		
Course Contents/Syllabus		
Unit-1	**INTRODUCTION OF INDUSTRIAL IOT AND INDUSTRIAL IOT ARCHITECTURE** Introduction of IIOT, Information and Operational Technology, Layers of IIoT Architecture, Functions of IIoT Architecture Layers, Demo of practical use cases, Components of IIoT Architecture, Introduction to On-premise servers and Cloud, Review of Components in various layers of IoT.	8 hours
Unit-2	**THE EDGE COMPUTING AND THE GATEWAY** Edge Computing, Gateway Overview, Types and Features of Gateway, selecting a Gateway, IoT Gateway, Choice of Gateway, Configuring the Gateway IoT Video Analytics and Quality Control at the Edge.	8 hours
Unit-3	**PLATFORM ARCHITECTURE** Types of Server Architecture, Data Architecture, Data Ingestion and Stream Processing, Smart Monitoring of Diesel Generators, Big Data Architecture and Stream Processing, Storage Devices, Storage Technologies, Storage Dimensioning Database, Monitor and Control Schedule, Cost and Resources, Analytics Overview, Types of Analytics, Algorithms and Machine Learning, Visualization.	8 hours
Unit-4	**IIOT SECURITY** IIoT Security Concerns, IIoT Device Security, IIoT Connection Security, IIoT Application Platform and Cloud Security, Threat Modeling, Industrial Example - IoT Connected Workplace Solution.	8 hours
Unit-5	**SOFTWARE DEFINED NETWORKS** Types of Network and Internet Traffic, Demand: Big Data, Cloud Computing and Mobile Traffic Requirements: QoS and QoE, Routing Congestion Control, SDN and NFV, Modern Networking Elements, Network Requirements, The SDN Approach, SDN and NFV Related Standards, SDN Data Plane, Open Flow Logical Network Device, Open Flow Protocol, SDN Control Plane Architecture, REST API, SDN Application Plane Architecture.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Link functionality to the layers appropriately and identify the components required in an IIoT solution.	K3
CO2	Identify the components, features, and size of the gateway required for the application.	K3
CO3	Explain platform architecture and identify the right database, and dimensions.	K3
CO4	Foresee possible security threats and gaps and identify solutions to overcome them.	K3
CO5	Design basic IoT network using Software Defined Networks.	K6

Text Books:
1.Internet of Things: A Hands-on Approach, By Arshdeep Bahga and Vijay Madjsetti.
2.Industry 4.0, The Industrial Internet of Things by Alasdair Gilchrist.
Reference Books:
1. Making Sense of Edge Computing: Cody Bumgardner, Caylin Hickey.
Links: NPTEL/You Tube/Web Link
https://www.youtube.com/watch?v=_7XntF6K_0Y
https://www.youtube.com/watch?v=Xm8frqTZRVI
https://www.youtube.com/watch?v=k02a1TvVQfI
https://www.youtube.com/watch?v=E4h4Z3g-eLM
https://www.youtube.com/watch?v=TQVl5-G3u2U

B.TECH THIRD YEAR		
Subject Code: BCSE0511		**L T P 3-0-0**
Subject Name: CRM Fundamentals		**Credits 3**
Pre- requisites:		
Course Contents/Syllabus		
Unit-1	Introduction: CRM- definition, history, goals. Sources of CRM value. Components of CRM: people, process, technology. Evolution of CRM: marketing and its principles, customer relations to CRM. Dynamics of Customer Supplier Relationships, Nature and context of CRM, Strategy and Organization of CRM: strategy, The relationship-oriented organization: Mission, Culture, Structure, People, Communication & Information Systems.	8 hours
Unit-2	CRM Strategy and Framework: Developing a CRM strategy. Customer oriented (C in CRM), Relationship driven, 360 degree view of customer. CRM system features- functions, application, benefits and solutions. Importance of loyalty- active, passive, split, shifting and switchers, customer profiling, customer segmentation model, Customer Experience, relationship marketing and journey, Case study.	8 hours
Unit-3	Solution Design and Architecture: CRM system solution- specifications. Data Analysis, Solution Requirements. Types of CRM- On-Premise, cloud based. Pros and Cons of each. Integration CRM with other enterprise applications. The Technology of CRM: Data warehouses and customer relationships, creating data mart model, components of operational data warehouse.	8 hours
Unit-4	CRM for Business: CRM in Sales, Service, Marketing, E-commerce. Social Customer Relationship Management. Analytical CRM: Predictive Analytics Vs Operational Analytics. Channel Partner Relationship management, Collaborative CRM (using data pooling), Business Benefits of Cloud Based System, SLAs, Practical Challenges.	8 hours
Unit-5	CRM implementation: Building CRM roadmaps: current processes, customers, strategic goals, technology issues, pilot and proof of concept projects. Preliminary Roadmap and its template, developing roadmap midstream. Design stage, custom development, integration, reporting, data migration, and implementation, testing, launching and application management. Introduction to following CRM tools: ZOHO, Pega, Microsoft Dynamics 365, Sales force.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Understand the basic concepts of Customer relationship management.	K1, K2
CO2	To understand strategy and framework of Customer relationship management.	K2
CO3	Learn basics of Cloud Based Customer relationship management.	K1

CO4	Understand Customer relationship management in context with business use cases.	K3
CO5	Understand implementation basics of CRM.	K3

Text Books:

1.CRM Fundamentals by Scott Kostojohn Mathew Johnson Brian Paulen. Apress, 2011.

2. Customer Relationship Management- How to develop and execute a CRM strategy By Michael Pearce, Business rt Press, 2021.

Reference Books:

1. The CRM Handbook-A Business Guide to Customer Relationship Management by Jill Dyché; Addison-Wesley (for case studies)

2. Customer Relationship Management Systems handbook by Duane E Sharp. AUERBACH PUBLICATIONS by CRC Press Company

Links: NPTEL/You Tube/Web Link

https://onlinecourses.nptel.ac.in/noc20_mg57/preview

https://archive.nptel.ac.in/courses/110/105/110105145/

B.TECH THIRD YEAR		
Subject Code: BCSE0513		**L T P 3-0-0**
Subject Name: CRM Administration		**Credits 3**
Pre- requisites: Creative thinking and which is being used by the creative talent in your business areas.		
Course Contents/Syllabus		
Unit-1	Introduction: Sales force Platform Basics, User Management, Data Modelling ,Data Management, Identity Basic , Data Security, Lightning Experience Customization, Lightning APP Builder Sales force Mobile App Customization, User Engagement, Formulas and Validation, Data Security, Picklist Administration.	8 hours
Unit-2	Lightning & Salesforce App Experience Customization: Formula and Validation, Accounts and Contacts for Lightning Experience, Lead and Opportunity for Lightning Experience, Product Quotes and Contracts, Campaign Basic.	8 hours
Unit-3	Salesforce Administration: Service Cloud for lightning Experience, Sales force mobile app customization, AppExchange basic Duplicate Management Lightning Experience for Sales force Classic Users, Chatter Administration for Lightning Experience, Reports and Dashboards for lightning experience, Lightning experience customization, Lightning experience rollout , Sales force flow, Lightning experience report dashboard Specialist.	8 hours
Unit-4	Lightning Experience: Prepare Your Sales force Org for Users, Customize an Org to Support a New Business Unit, Protect Your Data in Sales force, Customize a Sales Path for Your Team, Customize a Sales force Object, Import and Export with Data Management Tools.	8 hours
Unit-5	Learn Admin Essentials in Lightning Experience: Create Reports and Dashboards for Sales and Marketing Managers, Improve Data Quality for Your Sales and Support Teams, Create a Process for Managing Support Cases, User Engagement, Business Administration Specialist.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Understand the basic working environment of Sales force	K2
CO2	Understand the concepts of Lightning & Sales force App Experience Customization	K2
CO3	Familiarize with concepts reports chatter administration	K3
CO4	Understand the concepts of Lightning Experience	K2
CO5	Learn Admin Essentials in Lightning Experience	K3

Text Books:

1. Alok Kumar Rai : Customer Relationship Management : Concepts and Cases(Second Edition), PHI Learning, 2018

2. Bhasin- Customer Relationship Management (Wiley Dreamtech) ,2019
Reference Books:
1. Sales force Essentials for Administrators , By ShrivasthavaMohith, Edition Ist ,2018
2. Sales force : A quick Study laminated Reference Guide by Christopher Mathew Spencer eBook by Amazon (Online)
3. Mastering Sales force CRM Administration By Gupta Rakesh Edition IInd 2018
Links: NPTEL/You Tube/Web Link
www. Trailhead.salesforce.com
www.mindmajix.com/salesforce-tutorial
www,youtube.com/watch?v=7K42geizQCI

B. TECH THIRD YEAR		
Subject Code: BCSE0512		**L T P 3-0-0**
Subject Name: Python Web Development with Django		**Credits 3**
Pre- requisites: Students should have good knowledge of Python Programming and Python coding experience.		
Course Contents/Syllabus		
Unit-1	Python libraries for web development: Collections-Container datatypes, Tkinter-GUI applications, Requests-HTTP requests, BeautifulSoup4-web scraping, Scrapy, Zappa, Dash, CherryPy, Turbo Gears, Flask, Web2Py, Bottle, Falcon, Cubic Web, Quixote, Pyramid.	8 hours
Unit-2	Introduction to Django Framework: Understanding Django environment, Features of Django and Django architecture, MVC and MTV, Urls and Views, Mapping the views to URLs, Django Template, Template inheritance Django Models, Creating model for site, Converting the model into a table, Fields in Models, Integrating Bootstrap into Django, Creating tables, Creating grids, Creating carousels.	8 hours
Unit-3	Integrating Accounts & Authentication on Django: Introduction to Django Authentication System, Security Problem & Solution with Django Creating Registration Form using Django, Adding Email Field in Forms, Configuring email settings, Sending emails with Django, Adding Grid Layout On Registration Page, Adding Page Restrictions, Login Functionality Test and Logout.	8 hours
Unit-4	Connecting SQLite with Django: Database Migrations, Fetch Data From Database, Displaying Data On Templates, Adding Condition On Data, Sending data from url to view, Sending data from view to template, Saving objects into database, Sorting objects, Filtering objects, Deleting objects, Difference between session and cookie, Creating sessions and cookies in Django.	8 hours
Unit-5	Connecting SQLite with Django: Creating a functional website in Django, Four Important Pillars to Deploy, registering on Heroku and GitHub, Push project from Local System to GitHub, Working with Django Heroku, Working with Static Root, Handling WSGI with gunicorn, Setting up Database & adding users.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Apply the knowledge of python programing that are vital in understanding Django application and analyze the concepts, principles and methods in current client-side technology to implement Django application over the web.	K3,K6
CO2	Demonstrate web application framework i.e. Django to design and implement typical dynamic web pages and interactive web based applications.	K3, K6
CO3	Implementing and analyzing the concept of Integrating Accounts & Authentication on Django.	K3, K4
CO4	Understand the impact of web designing by database connectivity with SQLite in the current market place where everyone uses to prefer electronic medium for shoping, commerce, and even social life also.	K2, K3

CO5	Analyzing and creating a functional website in Django and deploy Django Web Application on Cloud.	K3, K6

Text Books:

1. Martin C. Brown, "Python: The Complete Reference Paperback", 4th Edition 2018, McGraw Hill Education Publication.
2. Reema Thareja, "Python Programming: Using Problem Solving Approach", 3rd Edition 2017, Oxford University Press Publication.
3. 3. Daniel Rubio, Apress," Beginning Django Web Application Development and Deployment with Python", 2nd Edition 2017, Apress Publication.
4. William Jordon, "Python Django Web Development: The Ultimate Django web framework guide for Beginners", 2nd Edition 2019, Kindle Edition.

Reference Books:

1. Tom Aratyn, "Building Django 2.0 Web Applications: Create enterprise-grade, scalable Python web applications easily with Django 2.0", 2nd Edition 2018, and Packt Publishing.
2. Nigel George, "Build a website with Django", 1st Edition 2019, GNW Independent Publishing Edition.
3. Ray Yao," Django in 8 Hours: For Beginners, Learn Coding Fast! 2nd Edition 2020, independently published Edition.
4. Harry Percival, "Test-Driven Development with Python: Obey the Testing Goat: Using Django, Selenium, and JavaScript", 2nd Edition 2019, Kindle Edition.

Links: NPTEL/You Tube/Web Link

https://youtu.be/eoPsX7MKfe8?list=PLIdgECt554OVFKXRpo_kuI0XpUQKk0ycO
://youtu.be/tA42nHmmEKw?list=PLh2mXjKcTPSACrQxPM2_1Ojus5HX88ht7
://youtu.be/8ndsDXohLMQ?list=PLDsnL5pk7-N_9oy2RN4A65Z-PEnvtc7rf
https://youtu.be/QXeEoD0pB3E?list=PLsyeobzWxl7poL9JTVyndKe62ieoN-MZ3
://youtu.be/9MmC_uGjBsM?list=PL3pGy4HtqwD02GVgM96-V0sq4_DSinqvf

https://youtu.be/F5mRW0jo-U4
://youtu.be/yD0_1DPmfKM?list=PLQVvvaa0QuDe9nqlirjacLkBYdgc2inh3 https://youtu.be/rHux0gMZ3Eg
https://youtu.be/jBzwzrDvZ18 https://youtu.be/RiMRJMbLZmg

https://youtu.be/8DF1zJA7cfc
https://youtu.be/CTrVDi3tt8o https://youtu.be/FzGTpnI5tpo
https://youtu.be/z4lfVsb_7MA https://youtu.be/WuyKxdLcw3w

https://youtu.be/UxTwFMZ4r5k https://youtu.be/2Oe55iXjZQI
://youtu.be/zV8GOI5Zd6E https://youtu.be/uf2tdzh7Bq4
https://youtu.be/RzkVbz7Ie44

https://youtu.be/kBwhtEIXGII https://youtu.be/Q_YOYNiSVDY
://youtu.be/_3AKAdHUY1M
https://youtu.be/6DI_7Zja8Zc https://youtu.be/UkokhawLKDU

B. TECH THIRD YEAR		
Subject Code: BNC0502		**L T P 3-0-0**
Subject Name: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE		
Pre- requisites: Computer Organization and Architecture		
Course Contents/Syllabus		
Unit-1	Society State and Polity In India: State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women.	8 hours
Unit-2	Indian Literature, Culture, Tradition, and Practices: Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali,Prakrit And Sanskrit, Sikh Literature, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature,Malayalam Literature ,Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature	8 hours
Unit-3	Indian Religion, Philosophy, and Practices: Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines , Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.	8 hours
Unit-4	Science, Management and Indian Knowledge System: Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India , Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India ,Writing Technology in India Pyrotechnics in India Trade in Ancient India/,India's Dominance up to Pre-colonial Times..	8 hours
Unit-5	Cultural Heritage and Performing Arts: Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Pottery, Painting, Indian Handicraft, UNESCO'S List of World Heritage sites in India, Seals, coins, Puppetry, Dance, Music, Theatre, drama, Martial Arts Traditions, Fairs and Festivals, UNESCO'S List of Intangible Cultural Heritage, Calenders, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO 1	Understand the basics of past Indian politics and state polity.	K2
CO 2	Understand the Vedas, Upanishads, languages & literature of Indian society.	K2
CO 3	Know the different religions and religious movements in India.	K4
CO 4	Identify and explore the basic knowledge about the ancient history of Indian agriculture, science & technology, and ayurveda.	K4

CO 5	Identify Indian dances, fairs & festivals, and cinema.	K1

Text Books:

1.Behrouz Forouzan, “Data Communication and Networking” Fourth Edition-2006, Tata McGraw Hill

2.Andrew Tanenbaum “Computer Networks”, Fifth Edition-2011, Prentice Hall.

3.William Stallings, “Data and Computer Communication”, Eighth Edition-2008, Pearson.

Reference Books:

1.Kurose and Ross, “Computer Networking- A Top-Down Approach”, Eighth Edition-2021, Pearson.

2.Peterson and Davie, “Computer Networks: A Systems Approach”, Fourth Edition-1996, Morgan Kaufmann

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=LX_b2M3IzN8

https://www.youtube.com/watch?v=LnbvhoxHn8M

https://www.youtube.com/watch?v=ddM9AcreVqY

https://www.youtube.com/watch?v=uwoD5YsGACg

https://www.youtube.com/watch?v=bTwYSA478eA&list=PLJ5C_6qdAvBH01tVf0V4PQsCxGE3hSqEr
https://www.youtube.com/watch?v=tSodBEAJz9Y

B. TECH THIRD YEAR		
Subject Code: BCSE0514	**L T P**	**3-0-0**
Subject Name: Design Pattern	**Credits**	**3**

Pre- requisites: Object Oriented Analysis and Design. Data structures and algorithms. Programming Language (C++ or Java).

Course Contents/Syllabus

Unit-1	Introduction: Describing Design Patterns, Design Patterns in Smalltalk MVC, The Catalog of Design Patterns, Organizing the Catalogue, Design Patterns for Solving the Real life Problems, Selection and Use of Design patterns. Principle of least knowledge.	8 hours
Unit-2	Creational Design Patterns: Creational Patterns: Abstract Factory, Builder, Factory Pattern, Prototype Pattern, Singleton pattern.	8 hours
Unit-3	Structural Design Pattern on Django: Structural Pattern Part-I, Adapter, Bridge, Composite. Structural Pattern Part-II, Decorator Pattern, Façade Pattern, Flyweight Pattern, Proxy Pattern.	8 hours
Unit-4	Behavioural Design Pattern – 1: Behavioural Patterns Part: I, Chain of Responsibility Pattern, Command Pattern, Interpreter Pattern, Iterator Pattern. Behavioural Patterns Part: II, Mediator, Memento, Observer Pattern.	8 hours
Unit-5	Behavioural Design Pattern – II : Behavioural Patterns Part: III, State Patterns, Strategy, Template Patterns, Visitor, Expectation from Design Patterns.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Construct a design consisting of a collection of modules.	K2, K6
CO2	Exploit well-known design patterns (such as Iterator, Observer, Factory and Visitor)	K4, K5
CO3	Distinguish between different categories of design patterns	K4
CO4	Ability to understand and apply common design patterns to incremental/iterative Development	K2, K6
CO5	Ability to identify appropriate patterns for design of given problem and Design the software using Pattern Oriented Architectures	K1, K2, K6

Text Books:

2. Eric Freeman, Elisabeth Freeman, Kathy Sierra, Bert Bates Head First Design Patterns, 2004, O'Reilly

3. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides Design Patterns: Elements of Reusable Object-oriented Software Addison-Wesley, 1995

Reference Books:
1. Design Pattern s By Erich Gamma , Pearson Education
2. Patterns in JAVA Volume -I By Mark Grand, Wiley Dream
Links: NPTEL/You Tube/Web Link
https://youtu.be/C_oPLDaSy-8
https://youtu.be/NU_1StN5Tkk

B. TECH THIRD YEAR		
Subject Code: BCSDS0511	**L T P 3-0-0**	
Subject Name: DATA ANALYTICS	**Credits 3**	
Pre- requisites: Basic Knowledge of Statistics and Probability.		
Course Contents/Syllabus		
Unit-1	**Introduction To Data Science** Introduction to Data Science, Big Data, the 5 V's, Evolution of Data Science, Datafication, Skillsets needed, Data Science Lifecycle, types of Data Analysis, Data Science Tools and technologies, Need for Data Science, Analysis Vs Analytics Vs Reporting, Big Data Ecosystem, Future of Data Science, Applications of Data Science in various fields, Use cases of Data science- Facebook, Netflix, Amazon, Uber, AirBnB.	8 hours
Unit-2	**Data Handling** Types of Data: structured, semi-structured, unstructured data, Numeric, Categorical, Graphical, High Dimensional Data, Transactional Data, Spatial Data, Social Network Data, standard datasets, Data Classification, Sources of Data, Data manipulation in various formats, for example, CSV file, pdf file, XML file, HTML file, text file, JSON, image files etc. import and export data in R/Python.	8 hours
Unit-3	**Data Pre-processing** Form of Data Pre-processing, data Attribute and its types, understanding and extracting useful variables, KDD process, Data Cleaning: Missing Values, Noisy Data, Discretization and Concept hierarchy generation (Binning, Clustering, Histogram), Inconsistent Data, Data Integration and Transformation. Data Reduction: Data Cube Aggregation, Data Compression, Numerosity Reduction.	8 hours
Unit-4	**Exploratory Data Analysis** Handling Missing data, Removing Redundant variables, variable Selection, identifying outliers, Removing Outliers, Time series Analysis, Data transformation and dimensionality reduction techniques such as Principal Component Analysis (PCA), Factor Analysis (FA) and Linear Discriminant Analysis (LDA), Univariate and Multivariate Exploratory Data Analysis. Data Munging, Data Wrangling- APIs and other tools for scrapping data from the web/ internet using R/Python.	8 hours
Unit-5	**Data Visualization** Introductions and overview, Debug and troubleshoot installation and configuration of the Tableau. Creating Your First visualization: Getting started with Tableau Software, Using Data file formats, connecting your Data to Tableau, creating basic charts (line, bar charts, Tree maps), Using the Show me panel. Tableau Calculations: Overview of SUM, AVR, and Aggregate features Creating custom calculations and fields, Applying new data calculations to your visualization. Manipulating Data in Tableau: Cleaning-up the data with the Data Interpreter, structuring your data, Sorting, and filtering Tableau data, Pivoting Tableau data. Advanced Visualization Tools: Using Filters, Using the Detail panel Using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colours, Creating Dashboards & Stories, Distributing & Publishing Your Visualization	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Understand the fundamental concepts of data analytics in the areas that plays major role within the realm of data science.	K1
CO2	Explain and exemplify the most common forms of data and its representations.	K2
CO3	Understand and apply data pre-processing techniques.	K3
CO4	Analyse data using exploratory data analysis.	K4
CO5	Illustrate various visualization methods for different types of data sets and application scenarios.	K3

Text Books:

1) Glenn J. Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, John Wiley Publishers, 2007.

2) Data Analysis and Data Mining, 2nd Edition, John Wiley & Sons Publication, 2014.

Reference Books:

1) Open Data for Sustainable Community: Glocalized Sustainable Development Goals, Neha Sharma, Santanu Ghosh, Monodeep Saha, Springer, 2021.

2) The Data Science Handbook, Field Cady, John Wiley & Sons, Inc, 2017

3) Data Mining Concepts and Techniques, Third Edition, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann, 2012.

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/playlist?list=PL15FRvx6P0OWTlNBS_93NHG2hIn9cynVT

https://www.youtube.com/playlist?list=PLLy_2iUCG87DxxkLX4Pc3wCvsF1yAvz0T

https://www.youtube.com/watch?v=lhO3fBiMDag

B. TECH THIRD YEAR		
Subject Code: BCSAI0519		**L T P 3-0-0**
Subject Name: BUSINESS INTELLIGENCE AND DATA VISUALIZATION		**Credits** 3
Pre- requisites: Basic Knowledge of Business intelligence.		
Course Contents/Syllabus		
Unit-1	**INTRODUCTION TO BUSINESS INTELLIGENCE** Business Intelligence (BI), Scope of BI solutions and their fitting into existing infrastructure, BI Components and architecture, BI Components, Future of Business Intelligence, Functional areas of BI tools, End user assumptions, setting up data for BI, Data warehouse, OLAP and advanced analytics, Supporting the requirements of senior executives including performance management, Glossary of terms and their definitions specific to the field of BI and BI systems.	8 hours
Unit-2	**ELEMENTS OF BUSINESS INTELLIGENCE SOLUTIONS** Business Query and Reporting, Reporting, Dashboards and Scorecards Development, Development, Scorecards, Metadata models, Automated Tasks and Events, Mobile Business Intelligence, Software development kit (SDK). Stages of Business Intelligence Projects, Project Tasks, Risk Management and Mitigation, Cost justifying BI solutions and measuring success, BI Design and Development, Building Reports, Building a Report, Drill-up, Drill-down Capabilities.	8 hours
Unit-3	**TABLEAU** **Introductions and overview:** What Tableau can and cannot do well, Debug and troubleshoot installation and configuration of the software. **Creating Your First visualization:** Getting started with Tableau Software, Using Data file formats, connecting your Data to Tableau, creating basic charts (line, bar charts, Tree maps), Using the Show me panel **Tableau Calculations:** Overview of SUM, AVR, and Aggregate features Creating custom calculations and fields, Applying new data calculations to your visualization. **Formatting Visualizations:** Formatting Tools and Menus, formatting specific parts of the view, Editing and Formatting Axes.	8 hours
Unit-4	**DATA VISUALIZATION** **Manipulating Data in Tableau:** Cleaning-up the data with the Data Interpreter, structuring your data, Sorting, and filtering Tableau data, Pivoting Tableau data. **Advanced Visualization Tools:** Using Filters, Using the Detail panel Using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colours. **Creating Dashboards & Stories:** Using Storytelling, creating your first dashboard and Story, Design for different displays, Adding interactivity to your Dashboard **Distributing & Publishing Your Visualization:** Tableau file types, Publishing to Tableau Online, sharing your visualization, Printing, and exporting. **Given a case study**: Perform Interactive Data Visualization with Tableau	8 hours
Unit-5	**INTRODUCTION TO POWER BI** Describe the Power BI ecosystem, Define Power BI and its relationship with Excel, Discuss the Power BI suite of products, Describe how the Power BI products integrate, Explain the typical analytics process flow, Differentiate between the various data sources, Connect Power BI to a	8 hours

	data source, Clean and transform data to ensure data quality, Load the data to the Power BI Data Model.	

Course Outcomes – After completion of this course students will be able to:

CO1	Apply quantitative modelling and data analysis techniques to the solution of real-world business problems	K2
CO2	Understand the importance of data visualization and the design and use of many visual components	K2
CO3	Understand as products integrate defining various analytical process flow.	K2
CO4	Learn the basics of troubleshooting and creating charts using various formatting tools.	K4
CO5	Learn basics of structuring data and creating dashboard stories adding interactivity dashboard stories.	K6

Text Books:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2013.
2. Learning Tableau 10 - Second Edition: Business Intelligence and data visualization that brings your business into focus" by Joshua N. Milligan

Reference Books:

1. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
2. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager"s Guide", Second Edition, 2012.

Links: NPTEL/You Tube/Web Link

Introduction to Business Intelligence - YouTube

Business Intelligence Tutorial - YouTube

What Is Power BI? | Introduction To Microsoft Power BI | Power BI Training | Edureka - YouTube

B. TECH THIRD YEAR		
Subject Code: BNC0501		**L T P 3-0-0**
Subject Name: Constitution Of India, Law And Engineering		
Pre- requisites: To acquaint the students with legacies of constitutional development in India and help them to understand the most diversified legal document of India and philosophy behind it.		
Course Contents/Syllabus		
Unit-1	Introduction and basic information about Indian Constitutions: Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947,Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.	8 hours
Unit-2	Union Executive and State Executive:Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of Vice-President, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, Lok Ayukta, The Lokpal and Lok ayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.	8 hours
Unit-3	Introduction and Basic Information about Legal System: The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.	8 hours
Unit-4	Intellectual Property Laws and Regularization to Information: Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information, Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature	8 hours

	Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.	
Unit-5	Business Organizations and E-Governance: Sole Traders, Partnerships: Companies: The ompany's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO1	Identify and explore the basic features and modalities about Indian constitution.	K1
CO2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level.	K2
CO3	Differentiate different aspects of Indian Legal System and its related bodies.	K4
CO4	Discover and apply different laws and regulations related to engineering practices.	K4
CO5	Correlate role of engineers with different organizations and governance models	K4

Text Books:

1. M Laxmikanth: Indian Polity for civil services and other State Examination,6th Edition, Mc Graw Hill
2. Brij Kishore Sharma: Introduction to the Indian Constitution, 8th Edition, PHI Learning Pvt. Ltd.
3. Granville Austin: The Indian Constitution: Cornerstone of a Nation (Classic Reissue), Oxford University Press.

Reference Books:

1. Madhav Khosla: The Indian Constitution, Oxford University Press.
2. PM Bakshi: The Constitution of India, Latest Edition, Universal Law Publishing.
3. V.K. Ahuja: Law Relating to Intellectual Property Rights (2007)

B.TECH THIRD YEAR		
Subject Code: BCSIOT0601	**L T P** 3-1-0	
Subject Name: CLOUD AND EDGE COMPUTING	3	
Pre- requisites: Basics of OS		
Course Contents/Syllabus		
Unit-1	**Introduction** Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning, EC2 Instances and its types. Overview of different cloud service providers	8 hours
Unit-2	**Cloud Enabling Technologies** Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.	8 hours
Unit-3	**Networ Cloud Architecture, Services and Storage** Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds – laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3, RDS, EBS.	8 hours
Unit-4	**Edge Computing** Introduction of edge computing, Difference between client server model and edge computing, components of edge computing, Edge Testbed: edge environment, launching an edge testbed, launching an edge application, Building an edge application; Agent based systems, Secret agent communications.	8 hours
Unit-5	**OTA & IoT Agent** OTA introduction, Terminology, Design Considerations, OTA example, Porting the OTA Library. IoT agent: overview, Agent Console, Comparison between Edge and Fog computing. **Streaming complex event processing:** Streaming data, complex event processing, and complex event processing in edge computing.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO 1	Understand Cloud Computing and different deployment models.	K1
CO2	Describe importance of virtualization along with their technologies.	K2
CO3	Apply different cloud computing services.	K3
CO4	Build an Edge application.	K6
CO5	Manage IoT for Edge computing.	K4

Text Books:

1. Rajkumar Buyya, Satish Narayana Srirama “Fog and Edge Computing: Principles and Paradigms” Wiley Publication E1 January 2019
2. Raj kumarBuyya, Christian Vecchiola, S. Thamaraiselvi, “Mastering Cloud Computing”, Tata Mcgraw Hill, 2013.
Reference Books:
1. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.
2. Anwesha Mukherjee (Editor), Debashis De (Editor), Soumya K. Ghosh (Editor), Rajkumar Buyya Mobile Edge Computing Springer; 1st ed. 2021 edition (November 19, 2021)
Links: NPTEL/You Tube/Web Link
https://www.youtube.com/watch?v=ZHCtVZ6cjdg&list=PLmmuEIIZy1cbwIMvGF1EsV4ZtAe8vA_7I
https://www.youtube.com/watch?v=ZHCtVZ6cjdg&list=PLmmuEIIZy1cbwIMvGF1EsV4ZtAe8vA_7I
https://www.youtube.com/watch?v=ZHCtVZ6cjdg&list=PLmmuEIIZy1cbwIMvGF1EsV4ZtAe8vA_7I
https://www.youtube.com/watch?v=ZHCtVZ6cjdg&list=PLmmuEIIZy1cbwIMvGF1EsV4ZtAe8vA_7I
https://www.youtube.com/watch?v=ZHCtVZ6cjdg&list=PLmmuEIIZy1cbwIMvGF1EsV4ZtAe8vA_7I

B.TECH FOURTH YEAR	
Subject Code: BCSIOT0651	**L T P** **0 0 2**
Subject Name: CLOUD AND EDGE COMPUTING LAB	**Credits** **1**
Pre- requisites: Basic knowledge of Python and R Programming.	

Course outcome: After completion of this practical, student will be able to:

CO 1	Implement cloud services like EC2 VPC S3 using AWS	K6
CO 2	Build edge computing deploys, connect, manage and secure RTOS.	K6

List of Practical

Lab No.	Program Logic Building	CO Mapping
1	How to create free AWS account?	CO1
2	AWS Pricing Calculator and TCO Calculator.	CO1
3	Launch an EC2 and configure Security Groups to access control.	CO1
4	Build your VPC and deploy an EC2 instance with a Web Server.	CO1
5	Getting Started with S3 in Cloud.	CO1
6	Hosting a static website on S3 in Cloud.	CO1
7	Deploy and connect RTOS using AWS IoT for edge.	CO2
8	Manage and secure RTOS using AWS IoT for edge.	CO2
9	Development of mini project.	CO2

B. TECH THIRD YEAR		
Subject Code: BCSIOT0653	**L T P** 0-0-6	
Subject Name: IoT Protocols and its Applications	3	
Pre- requisites: Introduction to IoT		
Course Contents/Syllabus		
Unit-1	**Introduction to Raspberry Pi and ARM-Based Microcontrollers** Introduction to Raspberry Pi and its various versions, Study the Architecture and Pin diagram of Raspberry Pi, Study the various types of Raspberry Pi, Introduction to Raspberry Pi operating system, Study of GPIO and different ARM processor families, Differences between Raspberry Pi and Arduino.	20 hours
Unit-2	**IoT Protocols and Communication Architectures** Introduction to IoT protocols, IoT layered Architecture, Comparison with OSI Model layers, MQTT, CoAP, XMPP protocols their characteristics and Architecture, DDS, AMQP protocols their characteristics and Architecture.	14 hours
Unit-3	**Networking Protocols for IoT** IPV4, IPV6, IPsec protocols, EIGRP, ICMP, IGMP protocols, OSPF, RPL protocols, TCP, UDP protocols.	6 hours
Unit-4	**Wireless Communication Standards in IoT** Features and applications of IEEE802.15.4, RFID, Features and applications of LORA, ZigBee, Features and applications of 6LoWPAN, NFC, Bluetooth.	8 hours
Unit-5	**Serial Communication, Cloud Integration & Smart City Use Cases** Introduction to Serial communication (with UART), Introduction to UART Protocol, Characteristics and Architecture of UART Protocol, Working of UART Protocol, Advantages, Disadvantages and Applications of UART Protocol, Interfacing IoT Protocols with Cloud, Thing speak and MQTT cloud, Implementation of COAP protocol, Case study on smart city (Singapore, Dubai).	20 hours

Experiment No.	Unit	Title of Program	CO Mapping
1	1	Demonstrate the installation process of the Raspbian operating system on a PC or laptop.	CO 1
2	1	Interfacing Raspberry Pi with I/O Peripherals like Push Buttons.	CO 1
3	1	Interfacing Raspberry Pi with I/O Peripherals like Potentiometer	CO 1
4	1	Interfacing Raspberry Pi with I/O Peripherals like LCD	CO 1
5	1	Interfacing Raspberry Pi with Ultrasonic Sensor	CO 1

6	1	Interfacing Raspberry Pi with Colour Sensor.	CO1
7	1	Interfacing Raspberry Pi with Audio Sensor.	CO1
8	1	Interfacing Raspberry PI with Actuators like DC Motor	CO1
9	2	To control an LED connected to a Raspberry Pi via MQTT messages.	CO2
10	2	Interface Raspberry Pi with a DHT11 sensor and send temperature/humidity data using MQTT.	CO2
11	2	Implement a smart lighting solution with Raspberry Pi using an LDR sensor for light detection and MQTT for real-time data transmission to ThingSpeak.	CO2
12	2	To publish real-time temperature and humidity data from a DHT11 sensor connected to a Raspberry Pi to an MQTT broker and subscribe the data using another client.	
13	2	Control a Relay connected to Raspberry Pi by subscribing to MQTT messages for remote actuator operation.	CO2
14	2	Design a system using Raspberry Pi to read data from a Gas Sensor and reliably publish it to an AMQP queue using RabbitMQ for robust message delivery.	CO2
15	2	Implement a setup using a Raspberry Pi to control a Servo Motor by subscribing to AMQP messages through RabbitMQ for reliable actuator control.	CO2
16	2	Design a system using Raspberry Pi to read data from a Rain Sensor and reliably publish it to an AMQP queue using RabbitMQ for robust message delivery.	CO2
17	2	To interface a soil moisture sensor with Raspberry Pi and develop a CoAP server that allows remote access to real-time soil moisture data for smart irrigation applications.	CO2
18	3	Working with IPV4 using Raspberry Pi.	CO3
19	3	To configure static IPv4 addresses on two Raspberry Pi boards and establish communication between them using basic networking tools.	CO3
20	3	To configure IPv6 addresses on two Raspberry Pi boards and establish communication between them over a local network.	CO3
21	4	To implement the RFID-based authentication using a Raspberry Pi.	CO4
22	4	To Transfer Data Between Arduino and NodeMCU Using Zigbee Modules.	CO4

23	4	To implement the communication between Android and Raspberry Pi using Bluetooth.	CO4
24	5	Simple Serial communication from Arduino to Raspberry Pi	CO5
25	5	Bidirectional Serial communication from Raspberry Pi and Arduino	CO5
26	5	Raspberry Pi Serial Communication with Android Application Example.	CO5
27	5	IoT Controlled LED with Blynk App using Raspberry Pi	CO5
28	5	To send sensor data to the Thingspeak cloud with a Raspberry Pi	CO5
29	5	Smart Lighting System using ThingSpeak IoT Cloud and Raspberry Pi	CO5
30	5	Development of a Mini Project (List of suggested Projects)	CO5

Course Outcomes – After completion of this course students will be able to:		
CO 1	Understand the architecture, hardware, and functionality of Raspberry Pi and compare it with Arduino.	K2
CO2	Analyze various IoT communication protocols such as MQTT, CoAP, XMPP, DDS, and AMQP.	K4
CO3	Explain the use of different IP-based protocols like IPV4, IPV6, RPL, and TCP/UDP in IoT networks.	K2
CO4	Examine the use of wireless communication technologies such as IEEE802.15.4, LoRa, Zigbee, and Bluetooth in IoT applications.	K4
CO5	Demonstrate the implementation of UART protocol and cloud integration (ThingSpeak, MQTT), and analyze real-time smart city IoT case studies.	K5
Text Books:		
1.“Enabling things to talk”, Springer-Verlag Berlin An, 2016.		
2.“IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, CISCO Press, 2017		
3.The internet of things: Key applications and protocols. John Wiley & Sons, 2011.		
Reference Books:		
1.Internet of Things: A Hands-On Approach, Universities Press		
2.Raspberry Pi IoT Projects: Prototyping Experiments for Makers, McGraw-Hill Education		
Links: NPTEL/You Tube/Web Link		
https://www.youtube.com/watch?v=e7mPuhSz8o8		

https://www.youtube.com/watch?v=J0EfiB2uSxY
https://www.youtube.com/watch?v=CfDEHd8nn2k
https://www.youtube.com/watch?v=jv_5pijEyoo
https://www.youtube.com/watch?v=gl7Jfhy3J0U

B. TECH THIRD YEAR		
Subject Code: BCSML0653		**L T P** 0-0-6
Subject Name: Machine Learning and its Applications		3
Pre- requisites: Python libraries (Numpy, Pandas, Matplotlib, Seaborn)		
Course Contents/Syllabus		
Unit-1	**Introduction to Machine Learning and Feature Engineering** **Introduction to Machine Learning:** Motivation, Definition, Applications of Machine Learning **Types of Machine Learning:** Supervised, Unsupervised and Reinforcement Learning **Datasets and Features:** Features and their types, handing missing data, Dealing with categorical features, Feature Scaling, Feature selection, outlier detection and removal **Dimensionality reduction:** Curse of Dimensionality, Principal Component Analysis (PCA) Algorithm.	6 hours
Unit-2	**Regression and Regularization** **Introduction to Regression:** Regression Problem**,** Linear regression model (Simple, Multiple and Polynomial) **Errors Measures:** Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Mean Absolute Error (MAE) **Cost function:** Formula, intuition and visualization **Gradient Descent:** Algorithm, intuition, learning rate and Gradient Descent for linear regression. **Evaluating the Accuracy of Linear Regression Model:** R^2 and Adjusted R^2 **Regularization:** Bias and Variance, Overfitting and Underfitting, L1 and L2 Regularization, Regularized cost function, Regularized Linear Regression	8 hours
Unit-3	**Classification Algorithms** **Classification:** Classification problem, Binary and Multiclass Classification, Decision Boundary Logistic regression model for binary classification, Cost function of logistic regression model, Regularized logistic regression, One Vs. All strategy for multiclass classification using logistic regression. **Measuring Performance of Classification Model:** Accuracy, Precision, Recall, F1-Score, ROC-AUC curve, Confusion matrix	12 hours

	Decision Trees: Decision Tree Classification Algorithm, Attribute Selection Measures, Variants of Decision Trees (ID3, C4.5, CART) **Large Margin Classifier:** Support Vector Machines **Instance Based Learning:** K Nearest Neighbor Algorithm	
Unit-4	**Probabilistic Models and Ensembles** **Probabilistic Methods for Classification:** Bayesian Learning, Naive Bayes Classifier, Bayesian belief networks **Tree Ensembles:** Using multiple decision trees, Bagging Vs. Boosting, Sampling with replacement, Random Forest Algorithm, Adda boost, Gradient Boosting, Xgboost Algorithm.	6 hours
Unit-5	**Clustering Algorithms and Anomaly Detection** **Unsupervised Learning &Clustering:** The problem of clustering, Distance measures **Partition Based Methods:** K-Means Clustering (Intuition, Algorithm, Optimization objective, Initializing K-Means, Choosing number of clusters) K-Medoids and K-Mode clustering algorithms. **Hierarchical Clustering** (Single Linkage, Complete Linkage, AGNES (Agglomerative Nesting), DIANA (Divisive Analysis). **Density-based Clustering:** DBSCAN Algorithm **Anomaly Detection:** Finding unusual events, Gaussian Distribution and Gaussian Mixture Model, Anomaly Detection Algorithm**,** Developing and evaluating anomaly detection system.	10 hours

Lab No.	Unit		CO Mapping
1	1	1. Introduction to Anaconda and Jupyter Notebooks, Sklearn library, Datasets available in Sklearn library, Kaggle Datasets to develop basic understanding of features and applications of Machine Learning. 2. Perform the following on an IoT based dataset: a) Basic data exploration, Check for missing values, Remove rows with missing values, Fill missing numerical values with mean or median, Fill in categorical values with mode or a specific value, Handling duplicate rows, Removing outliers. b) Dealing with categorical Variables: one-hot encoding, label encoding, ordinal encoding, and target encoding c) Feature Scaling: MinMaxScaler, StandardScaler, MaxAbsScaler, RobustScaler, Normalizer d) Correlation Analysis 3. Implement Principal Component Analysis (PCA) algorithm for dimensionality reduction.	CO1

2	2	1. Implement a class having functions for Mean Absolute Error, Root Mean Square Error, Log loss, R-square and Adjusted R Square 2. Fit a linear regression model to predict housing prices based on the size of the house. 3. Implement linear regression model to predict PM2.5 concentrations based on various air quality features using Air Quality Index (AQI) dataset. 4. Forecasting Stock Closing Prices with Polynomial Regression and Bias-Variance Trade-off Analysis. 5. Implement Gradient Descent algorithm and analyse the effect of learning rate and derivatives. 6. Demonstrate effect of underfitting and overfitting and hyper parameters in already implemented regression algorithms along with Hyper-parameter tuning. 7. Implementation of regularized linear regression: Lasso and Ridge regression	CO2
3	3	1. Implement logistic regression for binary classification on IoT-23: A l dataset with malicious and benign IoT network traffic 2. Implement logistic regression model for Handwritten digit classification. 3. Sentiment Analysis of Product Reviews Using One-Hot Encoding and Logistic Regression 4. Implement K-Nearest Neighbor regression from scratch for classification. 5. Credit Card Fraud Detection Using KNN and ROC-AUC Evaluation 6. Use the ID3 algorithm to build a decision tree to predict whether a customer will purchase a product based on their browsing behaviour on an e-commerce website. 7. Use a support vector machine (SVM) to classify images into different categories using the CIFAR-10 dataset.	CO3
4	4	1. Implement Email Spam Classifier using Naïve Bayes Algorithm. 2. Implementation of Naïve Bayes Classifier for Titanic Dataset. 3. Implement Random Forest algorithm and Xgboost algorithm for Telco Customer Churn Prediction and compare the performance of both the algorithms. 4. Implement Random Forest algorithm and Xgboost algorithm for Credit Card Fraud Detection and compare the performance of both the algorithms.	CO4
5	5	1. Customer Segmentation for a Retail Store Using K-Means Clustering. 2. Grouping News Articles by Topics Using K-Medoids Clustering.	CO5

		3. Document Clustering Using Hierarchical Clustering and Dendrograms. 4. Fraud Pattern Detection in Transactions Using DBSCAN Clustering. 5. Clustering City Temperature Patterns Using Gaussian Mixture Models. 6. Implementation of anomaly detection system.	

Course Outcomes – After completion of this course students will be able to:		
CO 1	Apply the fundamental concepts of Machine Learning including data preprocessing and dimensionality reduction in the context of IoT based datasets.	K3
CO2	Analyze linear regression models, utilizing Gradient Descent for optimization and regularization for enhanced robustness.	K4
CO3	Implement diverse classification algorithms for binary and multiclass problems.	K4
CO4	Evaluate probabilistic methods and advanced ensemble techniques to build robust classification models.	K5
CO5	Analyze the characteristics and applications of various unsupervised learning algorithms, including clustering and anomaly detection.	K4

Text Books:

1.Marco Gori , Machine Learning: A Constraint-Based Approach, Morgan Kaufmann. 2017

2.Ethem Alpaydin, Machine Learning: The New AI, MIT Press-2016

Reference Books:

1.Ryszard, S., Michalski, J. G. Carbonell and Tom M. Mitchell, Machine Learning: An Artificial Intelligence Approach, Volume 1, Elsevier. 2014

2.Stephen Marsland, Taylor & Francis 2009. Machine Learning: An Algorithmic Perspective.

B. TECH THIRD YEAR		
Subject Code: BCSIOT0612	**L T P**	3-0-0
Subject Name: PRIVACY AND SECURITY IN IoT	**Credits**	3
Pre- requisites: Basic C programming		

Course Contents/Syllabus

Unit-1	**INTRODUCTION: SECURING THE INTERNET OF THINGS** Security Requirements in IoT Architecture - Security in Enabling Technologies - Security Concerns in IoT Applications. Security Architecture in the Internet of Things - Security Requirements in IoT - Insufficient Authentication/Authorization - Insecure Access Control - Threats to Access Control, Privacy, and Availability - Attacks Specific to IoT. Vulnerabilities – Secrecy and Secret-Key Capacity - Authentication/Authorization for Smart Devices - Transport Encryption – Attack & Fault trees.	8 hours
Unit-2	**CRYPTOGRAPHIC FUNDAMENTALS FOR IOT** Cryptographic primitives and its role in IoT – Encryption and Decryption – Hashes – Digital Signatures – Random number generation – Cipher suites – key management fundamentals – cryptographic controls built into IoT messaging and communication protocols – IoT Node Authentication.	8 hours
Unit-3	**IDENTITY & ACCESS MANAGEMENT SOLUTIONS FOR IOT** Identity lifecycle – authentication credentials – IoT IAM infrastructure – Authorization with Publish / Subscribe schemes – access control.	8 hours
Unit-4	**PRIVACY PRESERVATION AND TRUST MODELS FOR IOT** Concerns in data dissemination – Lightweight and robust schemes for Privacy protection – Trust and Trust models for IoT – self-organizing Things - Preventing unauthorized access.	8 hours
Unit-5	**CLOUD SECURITY FOR IOT** Cloud services and IoT – offerings related to IoT from cloud service providers – Cloud IoT security controls – An enterprise IoT cloud security architecture – New directions in cloud enabled IoT computing.	8 hours

Course Outcomes – After completion of this course students will be able to:

CO 1	Understand the security requirements in IoT.	K2
CO2	Understand the cryptographic fundamentals for IoT.	K4
CO3	Understand the authentication credentials and access control.	K2, K3
CO4	Understand the various types of trust models.	K2
CO5	Implement cloud security for IoT.	K3

Text Books:
1.Practical Internet of Things Security (Kindle Edition) by Brian Russell, Drew Van Duren.
2.Securing the Internet of Things Elsevier.
Reference Books:
1.Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations.
Links: NPTEL/You Tube/Web Link
https://www.youtube.com/watch?v=bcVztl4lJN8&t=453s https://www.youtube.com/watch?v=Fki7MCRWgdo
https://www.youtube.com/watch?v=_bVoW7FoZWc
https://www.youtube.com/watch?v=7v2x0omNMe8

B. TECH THIRD YEAR		
Subject Code BCSAI0618	**L T P** 3-0-0	
Subject Name: ADVANCED COMMUNICATION	**Credits** 3	
Pre- requisites: Time- frequency Transformation, Analog and Digital Signals and Systems		
Course Contents/Syllabus		
Unit-1	**ANALOG COMMUNICATION** Frequency domain representation of signal: Fourier transform and its properties, Overview of Communication system, Communication channels Need for modulation, Baseband and Pass band signals, Amplitude Modulation: Double side band with Carrier (DSB-C), Types of angle modulation, Frequency Modulation its frequency spectrum, transmission BW, methods of generation (Direct & Indirect).	8 hours
Unit-2	**DIGITAL COMMUNICATION** Properties of Line codes- Unipolar / Polar RZ & NRZ – Bipolar NRZ, Geometric Representation of signals - Generation, detection, PSD & BER of Coherent BPSK, BFSK & QPSK - QAM – Carrier. Synchronization. Introduction to mobile device communication.	8 hours
Unit-3	**OFDM** 4G Communication Systems, Introduction, principle of OFDM, implementation of transceivers, frequency-selective channels, channel estimation, peak to average power ratio, inter carrier interference, Bit Error Rate, adaptive modulation and capacity, multiple access, multi carrier code division multiple access, single carrier modulation with frequency-domain equalization.	8 hours
Unit-4	**ADVANCE MIMO SYSTEMS** 5G Communication: Multi antenna system: smart antennas, multiple input multiple output systems, multi user MIMO. Massive MIMO.	8 hours
Unit-5	**COGNITIVE RADIO** Problem description before CR, cognitive radio transceiver architecture, principle of interweaving, spectrum sensing, spectrum management, spectrum sharing, overlay, underlay.	8 hours

Course outcome: After completion of this course students will be able to		
CO1	Understand wireless Analog communication system and use of modulation.	K2
CO 2	Understand Digital communication and signal coding.	K2
CO 3	Describe 4th generation Communication using OFDM technology.	K1
CO 4	Describe 5th generation technology using MU-MIMO and Massive MIMO.	K1
CO 5	Understand Wireless communication using Cognitive radio.	K2

Text Books:

1. B P Lathi; Zhi Ding, Modern Digital and Analog Communication Systems, Oxford University Press
2. Peyman Setoodeh, Simon Haskin, Fundamentals of Cognitive Radio, July 2017
3. Haykin: Mordern Wireless Communication, Pearson Education
4. Thomas L. Marzetta, Erik G. Larsson, Hong Yang, Hien Quoc Ngo, Fundamentals of Massive MIMO, Cambridge University Press

Reference Books:

1. Raj Kamal: Mobile Computing, Oxford University Press.
2. Lee: Cellular and Mobile Telecommunication- Analog & digital systems, TMH.
3. Rappaport: Wireless Communications- principles and practice, Pears3. Lee: Mobile communications design fundamentals, Wiley India
4. Price: Wireless Communication and Networks, TMH.

Links:

Unit-I	https://www.youtube.com/watch?v=s_vmLqT_6NQ&list=PLPeKeikHHWGfaHVBYrqxRk2Wl8uYSjRWM
Unit-II	https://www.youtube.com/watch?v=qQcpnmJNluU&list=PLF84ABD7D4EBA31C4
Unit-III	https://www.youtube.com/watch?v=-ymnQ5rpcYA&list=PLbMVogVj5nJSi8FUsvglRxLtN1TN9y4nx
Unit-IV	https://www.youtube.com/watch?v=pWs_PXDD_VA&list=PL2rY_MetoyGnxjllP1eC6Lc0GXeS5Kfly
Unit-V	https://www.youtube.com/watch?v=SljXFf0vgvw&list=PL48UwQJyfW3SmrjLgl5LrVciqfWz9XazY

B. TECH THIRD YEAR		
Subject Code: BCSE0611	**L T P** 3-0-0	
Subject Name: CRM DEVELOPMENT	**Credits** 3	
Pre- requisites: Creative thinking and which is being used by the creative talent in your business areas		
Course Contents/Syllabus		
Unit-1	**Salesforce Fundamentals :**Building blocks of Salesforce, Data model & Security model, Business process automation options, Master Sales Cloud and Service Cloud , Salesforce platform, Salesforce terminology, force platform,Multi-tenancy and cloud, Salesforce metadata and APIs, Salesforce architecture.	8 hours
Unit-2	**Salesforce Data Modeling :**Salesforce Data model, IDIC model QIC model, CRM value chain model ,Payne & Frow's five forces and CRM objects , Relationship types, Formula fields and roll-up summary fields ,Importing and exporting data	8 hours
Unit-3	**Logic and Process Automation:**Formulas and Validations, Formula Operators and Functions, Screen Flow Distribution, Salesforce Flow, Apex Basics , Apex Triggers, Database & .NET Basics, Search Solution Basics, Triggers and Order of Execution, Platform Events Basics, Process Automation Specialist, Apex Specialist, Apex integration Services, Apex Metadata API.	8 hours
Unit-4	**User Interface :**General development, Apex code development Visualforce development , Sales dashboard , Visualforce performance ,Technique for optimizing performance Lightning Web Components Basics Lightning App Builders Development.	8 hours
Unit-5	**Testing, Debugging, and Deployment :**Apex Testing, Apex code Test Method, Custom controller and Controller Extension, Test Data Developer Console Basics, Asynchronous Apex, Debugging Tool and Techniques, Debug logs, Application lifecycle and development model, Change Set Development model.	8 hours

Course Outcomes – After completion of this course students will be able to:		
CO 1	Implement the working concept of variables	K1, K2
CO2	Apply the concepts of Data Management	K1, K2
CO3	Understand the concepts of APEX	K3
CO4	Understand the concepts of APEX Code development	K1, K2
CO5	Implement concepts of APEX Integration	K1, K3

Text Books:

1.Alok Kumar Rai : Customer Relationship Management : Concepts and Cases(Second Edition), PHI Learning, 2018

2.Bhasin- Customer Relationship Management (Wiley Dreamtech),2019
3.Salesforce for beginners by Shaarif Sahaalane book by Amazon(Online Edition)
Reference Books:
1.Salesforce : A quick Study laminated Reference Guide by Christopher Mathew Spencer eBook by Amazon(Online)
2.Salesforce Platform Developer By Vandevelde Jain Edition Ist 2018
3.Learning Salesforce Development By Paul Battisson E-book (Online)
Links: NPTEL/You Tube/Web Link
www. Trailhead.salesforce.com
www.mindmajix.com/salesforce-tutorial
www,youtube.com/watch?v=7K42geizQCI

B. TECH THIRD YEAR		
Subject Code: BCSE0613	**L T P** 3-0-0	
Subject Name: ROBOTICS PROCESS AUTOMATION (RPA)	**Credits** 3	
Pre- requisites: Computer Organization and Architecture		
Course Contents/Syllabus		
Unit-1	**PROGRAMMING BASICS &RECAP**: Programming Concepts Basics - Understanding the application - Basic Web Concepts - Protocols - Email Clients -. Data Structures - Data Tables - Algorithms - Software Processes - Software Design - Scripting - .Net Framework - .Net Fundamentals - XML - Control structures and functions - XML - HTML - CSS - Variables & Arguments.	8 hours
Unit-2	**RPA Concepts:** RPA Basics - History of Automation - What is RPA - RPA vs Automation - Processes & Flowcharts - Programming Constructs in RPA - What Processes can be Automated - Types of Bots - Workloads which can be automated - RPA Advanced Concepts - Standardization of processes - RPA Development methodologies - Difference from SDLC - Robotic control flow architecture - RPA business case - RPA Team - Process Design Document/Solution Design Document - Industries best suited for RPA - Risks & Challenges with RPA - RPA and emerging ecosystem	8 hours
Unit-3	**RPA TOOL INTRODUCTION &BASICS:** Introduction to RPA Tool - The User Interface - Variables - Managing Variables - Naming Best Practices - The Variables Panel - Generic Value Variables - Text Variables - True or False Variables - Number Variables - Array Variables - Date and Time Variables - Data Table Variables - Managing Arguments - Naming Best Practices - The Arguments Panel - Using Arguments - About Imported Namespaces - Importing New Namespaces Control Flow - Control Flow Introduction - If Else Statements - Loops Advanced Control Flow - Sequences - Flowcharts - About Control Flow - Control Flow Activities - The Assign Activity - The Delay Activity - The Do While Activity - The If Activity - The Switch Activity - The While Activity The For Each Activity - The Break Activity - Data Manipulation - Data Manipulation Introduction - Scalar variables, collections and Tables - Text Manipulation - Data Manipulation - Gathering and Assembling Data	8 hours
Unit-4	**ADVANCED AUTOMATION CONCEPTS AND TECHNIQUES** : Recording and Advanced UI Interaction- Recording Introduction-Basic and Desktop Recording-Web Recording - Input/output Methods - Screen Scraping- Data Scraping - Scraping advanced techniques - Selectors - Selectors - Defining and Assessing Selectors - Customization - Debugging - Dynamic Selectors - Partial Selectors - RPA Challenge - Image, Text & Advanced Citrix Automation - Introduction to Image & Text Automation - Image based automation - Keyboard based automation - Information Retrieval - Advanced Citrix Automation challenges - Best Practices - Using tab for Images	8 hours

	- Starting Apps - Excel Data Tables & PDF - Data Tables in RPA - Excel and Data Table basics - Data Manipulation in excel - Extracting Data from PDF - Extracting a single piece of data - Anchors - Using anchors in PDF	
Unit-5	**EMAIL AUTOMATION & EXCEPTIONAL:** Email Automation - Email Automation - Incoming Email automation - Sending Email, automation - Debugging and Exception Handling - Debugging Tools - Strategies for solving issues - Catching errors	8 hours

Course Outcomes – After completion of this course students will be able to:

CO 1	Understand RPA principles, its features and applications	K3
CO2	Demonstrate proficiency in handling several types of variables inside a workflow and data manipulation techniques	K3
CO3	Gain insights into Desktop, Web, Citrix, Email Automation and exception handling.	K2
CO4	Analyze and design a real-world automation project and debug the workflows.	K2
CO5	Student will be able to understand architecture of computing technology.	K2

Text Books:

1. Tripathi, Alok Mani. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool–UiPath. Packt Publishing Ltd, 2018.
2. Primer, A. "Introduction to Robotic Process Automation." Institute for Robotic Process Automation (2015).
3. Murdoch, Richard. Robotic Process Automation: Guide to Building Software Robots, Automate Repetitive Tasks & Become an RPA Consultant. Richard Murdoch & RPA Ultra, 2018.
4. Taulli, Tom. "The robotic process automation handbook." The Robotic Process Automation Handbook. https://doi. org/10.1007/978-1-4842-5729-6 (2020).

Reference Books:

1. Gaonkar, Sushant. "Future of work: Leveraging the power of technologies to create a near-human like digital worker." Gavesana Journal of Management 13.1 (2020): 15-23.
2. Vellaichamy, Mr NMS S., Mr R. Dinesh, and Mrs JR Rajalakshmi. "Reskillng Indian Workforce: The Need of the Hour LavanyanjaliMukkerlaDr.Braou."

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=3SMZHd_ngIw

https://www.youtube.com/watch?v=3zXb8H3odek

https://www.youtube.com/watch?v=3zXb8H3odek

https://www.youtube.com/watch?v=3zXb8H3odek

B. TECH THIRD YEAR		
Subject Code: BCSAI0617	**L T P**	3-0-0
Subject Name: PROGRAMMING FOR DATA ANALYTICS	**Credits**	3
Pre- requisites: Basic Knowledge of Python and R.		

Course Contents/Syllabus

Unit-1	**BASIC DATA ANALYSIS USING PYTHON/R** Pandas data structures – Series and Data Frame, Data wrangling using pandas, Statistics with Pandas, Mathematical Computing Using NumPy, Data visualization with Python Descriptive and Inferential Statistics, Introduction to Model Building, Probability and Hypothesis Testing, Sensitivity Analysis, Regular expression: RE packages.	8 hours
Unit-2	**R GRAPHICAL USER INTERFACES** Built-in functions, Data Objects-Data Types & Data Structure, Structure of Data Items, Manipulating and Processing Data in R using Dplyr package & Stringr package, Building R Packages, Running and Manipulating Packages, data import and export, attribute and data types, descriptive statistics, exploratory data analysis, Flex dashboard and R-shiny.	8 hours
Unit-3	**DATA ENGINEERING FOUNDATION** Connecting to a database (sqlite) using Python, Sending DML and DDL queries and processing the result from a Python Program, Handling error, NOSQL query using MongoDB, MongoDB Compass.	8 hours
Unit-4	**INTRODUCTION TO TENSOR FLOW AND AI** Introduction, Using TensorFlow for AI Systems, Up and Running with TensorFlow, Understanding TensorFlow Basics, Convolutional Neural Networks, Working with Text and Sequences, and TensorBoard Visualization, Word Vectors, Advanced RNN, and Embedding Visualization. TensorFlow Abstractions and Simplifications, Queues, Threads, and Reading Data, Distributed TensorFlow, Exporting and Serving Models with TensorFlow.	8 hours
Unit-5	**DEEP LEARNING WITH KERAS** Introducing Advanced Deep Learning with Keras, Deep Neural Networks, Autoencoders, Generative Adversarial Networks (GANs), Improved GANs, Disentangled Representation GANs, Cross-Domain GANs, Variational Autoencoders (VAEs), Deep Reinforcement Learning, Policy Gradient Methods.	8 hours

Course outcome: After completion of this course students will be able to:

CO1	Install, Code and Use Python & R Programming Language in R Studio IDE to perform basic tasks on Vectors, Matrices and Data frames.	K1
CO2	Implement the concept of the R packages.	K3
CO3	Understand the basic concept of the MongoDB.	K2
CO4	Understand and apply the concept of the RNN and tensorflow.	K4
CO5	Understand and evaluate the concept of the keras in deep learning.	K4

Textbooks:

1.Glenn J. Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, John Wiley Publishers, 2007.

2. Learning TensorFlow by Tom Hope, Yehezkel S. Resheff, Itay Lieder O'Reilly Media, Inc.

3. Advanced Deep Learning with TensorFlow 2 and Keras: Apply DL, GANs, VAEs, deep RL, unsupervised learning, object detection and segmentation, and more, 2nd Edition.

4. Glenn J. Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, John Wiley Publishers, 2007.	
Reference Books:	
1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, 1 st Edition, Wrox, 2013.	
2. Chris Eaton, Dirk Deroos et. al., “Understanding Big data”, Indian Edition, McGraw Hill, 2015.	
3. Tom White, “HADOOP: The definitive Guide”, 3 rd Edition, O Reilly, 2012	
Links:	
Unit 1	https://www.ibm.com/cloud/blog/python-vs-r
Unit 2	https://www.youtube.com/watch?v=C5R5SdYzQBI
Unit 3	https://hevodata.com/learn/data-engineering-and-data-engineers/
Unit 4	https://www.youtube.com/watch?v=IjEZmH7byZQ
Unit 5	https://www.youtube.com/watch?v=pWp3PhYI-OU

B. TECH THIRD YEAR		
Subject Code: BCSAI0622		**L T P 3-0-0**
Subject Name: SOCIAL MEDIA ANALYTICS		**Credits** 3
Pre- requisites: Python/R.		
Course Contents/Syllabus		
Unit-1	**SENTIMENT MINING** Overview: Text and Sentiment Mining, Semantic Analysis Applications, Sentiment Analysis Process, Speech Analytics, Text Representation-tokenization, stemming, stop words, TF-IDF, Feature Vector Representation, Named Entity Recognition (NER), N-gram modelling, Text Clustering, Text Classification, Topic Modelling-LDA, HDP. Sentiment Classification, feature based opinion mining, comparative sentence, and relational mining, Opinion Summarization, Opinion spam detection.	8 hours
Unit-2	**WEB-MINING** Web Mining Overview, Web Structure Mining, Search Engine, Web Analytics, Machine Learning for extracting knowledge from the web, Inverted indices and Boolean queries. PLSI, Query optimization, SEO, page ranking, social graphs (Interaction, Latent and Following Graphs), Ethics of Scraping, Static data extraction and Web Scraping using Python.	8 hours
Unit-3	**MINING SOCIAL MEDIA** Introduction to Social Media Mining, Challenges in Social Media Mining, Process of Social media mining, Essentials of social graphs and its types, Social Networks Measures, Network Models, Information Diffusion in social media, Behavioral Analytics, Influence and Homophily, Recommendation in social media.	8 hours
Unit-4	**TEXT SUMMARIZATION** Introduction to Text Summarization, Text extraction, classification and clustering, Anomaly and Trend Detection, Text Processing, N-gram Frequency Count and Phrase Mining, Page Rank and Text Rank Algorithm, LDA Topic Modelling, Machine-Learned Classification and Semantic Topic Tagging, Python libraries for Text Summarization. (NumPy, Pandas, Ntlk, Matplotlib).	8 hours
Unit-5	**RECENT TRENDS** Trend Analysis, Types of trend analysis, Recent Trends in Text, Data Localization Role of Web Mining in E-Commerce, Social Media Analytics, Social media analytics tools. Case Studies: Facebook Insights Using Python, Sentiment and Text Mining of Twitter data and Google analytics.	8 hours

Course outcome: After completion of this course students will be able to

CO 1	Apply state of the art mining tools and libraries on realistic data sets as a basis for business decisions and applications.	K3
CO 2	Apply a wide range of classification, clustering, estimation and prediction algorithms on web data.	K3
CO 3	Implement social network analysis to identify important social actors, subgroups and network properties in social media sites.	K3
CO 4	Interpret the terminologies, metaphors and perspectives of text summarization.	K3
CO 5	Design new solutions to opinion extraction, sentiment classification and data summarization problems.	K6

Textbooks	
1. BingLiu,“WebDataMining-ExploringHyperlinks,Contents,andUsageData”,Springer,Second Edition, 2011.	
2. RezaZafarani, Mohammad AliAbbasiandHuanLiu,“SocialMediaMining-AnIntroduction”, Cambridge University Press, 2014.	
3. Bing Liu, “Sentiment Analysis and Opinion Mining”, Morgan & Claypool Publishers, 2012.	
Reference Books	
1. NitinIndurkhya, FredJDamerau,“HandbookofNaturalLanguageProcess”,2ndEdition,CRC Press, 2010.	
2. Matthew A. Russell, “Mining the social web”, 2nd edition- O'Reilly Media, 2013.	
3. M Berry, “Text Mining: Applications and Theory”, John Wiley & Sons Inc; 1st edition (12 March 2010)	
NPTEL/ YouTube/ Faculty Video Link:	
Unit 1	https://www.youtube.com/watch?v=Uqs0GewlMkQ https://www.youtube.com/watch?v=tUNwSH7671Y&t=2s https://www.youtube.com/watch?v=zz1CFBS4NaY
Unit 2	https://slideplayer.com/slide/14222744/
Unit 3	https://www.youtube.com/watch?v=KjWu1-dZn00
Unit 4	https://www.youtube.com/watch?v=ntOaoW0T604
Unit 5	https://www.youtube.com/watch?v=otoXeVPhT7Q&list=PL34t5iLfZddt0tt5GdDy3ny6X5RQvwrp6&index=2

B. TECH THIRD YEAR		
Subject Code: BCSAI0612	**L T P**	**3-0-0**
Subject Name: Advanced Java Programming	**Credits**	**3**
Pre- requisites: Basics of C, C++, and basic concept of Core JAVA.		
Course Contents/Syllabus		
Unit-1	**Introduction** **JDBC**: Introduction, JDBC Driver, DB Connectivity, Driver Manager, Connection, Statement, Result Set, Prepared Statement, Transaction Management, Stored Procedures. **Servlet:** Servlet Overview, Servlet API, Servlet Interface, Generic Servlet, HTTP Servlet, Servlet Life Cycle, Redirect requests to other resources, Session Tracking, Event and Listener.	8 hours
Unit-2	**JSP**: Introduction, Overview, JSP Scriptlet Tag, JSP expression Tag, JSP declaration Tag, Life Cycle of JSP, JSP API, Implicit Objects: JSP request, JSP response, JSP config, JSP session, JSP Application, JSP Page Context; JSP Page, JSP Exception.	8 hours
Unit-3	**Spring 5.0**: Spring Core Introduction and Overview, Managing Beans, The Spring Container, The Factory Pattern, Dependency Injection (DI), Spring Managed Bean Lifecycle, Constructor Injection, Metadata/Configuration: Life Cycle Annotations, Java Configuration, XML Free configuration.	8 hours
Unit-4	**Spring MVC:** Introduction/Developing Web Application with Spring MVC, Advanced Techniques, Spring Controllers **Spring Boot:** Spring Boot Starters, CLI, Application Class, Logging, Auto Configuration Classes, Spring Boot dependencies, Spring data JPA introduction and Overview.	8 hours
Unit-5	**JPA**: Introduction & overview of data persistence, Overview of ORM tools, Understanding JPA, Entities: Requirement for Entity Class, Persistent Fields and Properties, Primary keys in Entries, Entity Management, Querying Entities, Entities Relationships.	8 hours

Course outcome: After completion of this course students will be able to		
CO 1	Understand the concept of implementing the connection between Java and Database using JDBC.	K2, K4
CO 2	Understand, Analyse, and Build dynamic web pages for server-side programming	K2, K3
CO 3	Analyze and design the Spring Core Modules and DI to configure and wire beans (application objects) together	K4,K5
CO 4	Design Model View Controller architecture and ready components that can be used to develop flexible and loosely coupled web applications.	K2, K3, K6
CO 5	Deploy JPA to Map, store, retrieve, and update data from java objects to relational databases and vice versa.	K5

Text books:

1. Bhave, “Programming with Java”, Pearson Education, 2009
2. Herbert Schieldt, “The Complete Refernce: Java”, TMH, 1991
3. Hans Bergsten, “Java Server Pages”, SPD O’Really, 1985
4. Katy Sierra and Bert Bates, “Head First: Java”, O’Really, 2008
5. Katy Sierra and Bert Bates, “Head First: Servlets & JSP”, O’Really , 2008

Reference Books:	
1.	NaughtonSchildt, “The Complete Refernce: JAVA2”, TMH ,1991
2.	Balagurusamy E, “Programming in JAVA”, TMH, 2010
3.	Introduction to Web Development with HTML, CSS, JavaScript (Cousera Course)

NPTEL/ YouTube/ Faculty Video Link:	
Unit1	https://youtu.be/96xF9phMsWA https://youtu.be/Zopo5C79m2k https://youtu.be/ZliIs7jHi1s https://youtu.be/htbY9-yggB0
Unit2	https://youtu.be/vHmUVQKXlVo https://youtu.be/qz0aGYrrlhU https://youtu.be/BsDoLVMnmZs https://youtu.be/a8W952NBZUE
Unit 3	https://youtu.be/1Rs2ND1ryYc https://youtu.be/vpAJ0s5S2t0 https://youtu.be/GBOK1-nvdU4 https://youtu.be/Eu7G0jV0ImY
Unit 4	https://youtu.be/-qfEOE4vtxE https://youtu.be/PkZNo7MFNFg https://youtu.be/W6NZfCO5SIk https://youtu.be/DqaTKBU9TZk
Unit 5	https://youtu.be/_GMEqhUyyFM https://youtu.be/ImtZ5yENzgE https://youtu.be/xIApzP4mWyA https://youtu.be/qKR5V9rdht0

B. TECH THIRD YEAR		
Subject Code: BCSE0614	**L T P**	**3-0-0**
Subject Name: WEB DEVELOPMENT USING MEAN STACK	**Credits**	**3**
Pre- requisites: Basic knowledge of HTML, CSS and ES6 required.		
Course Contents/Syllabus		
Unit-1	**Introduction to Nodejs :**Installing Nodejs, Node in-built packages (buffer, fs, http, os, path, util, url) Node.js modules, File System Module, Json data, Http Server and Client, Error handling with appropriate HTTP, Callback function, asynchronous programing REST API's(GET, POST PUT, DELETE UPDATE), GraphQL, Promises, Promise Chaining, Introduction to template engine (EJS).	8 hours
Unit-2	**Express Framework:** Configuring Express, Postman configuration, Environment Variables, Routing, Defining pug templates, HTTP method of Express, URL binding, middleware function, Serving static files, Express sessions, REST full API's, FORM data in Express, document modeling with Mongoose.	8 hours
Unit-3	**Basics of Angular js :** Typescript, Setup and installation, Power of Types, Functions, Function as types Optional and default parameters, Arrow functions, Function overloading, Access modifiers, Getters and setters, Read-only & static, Abstract classes, Interfaces, Extending and Implementing Interface, Import and Export modules.	8 hours
Unit-4	**Building Single Page App with Angular js:** MVC Architecture, One-way and Two-way data binding, AngularJS Expressions, AngularJS Controllers, AngularJS Modules, adding controller to a module, Component, Dependency Injection, Filters, Tables, AngularJS Forms and Forms validation, Select using ng-option, AngularJS AJAX.	8 hours
Unit-5	**Connecting Angular js with MongoDB :** Environment Setup of Mongodb, data modeling, The current SQL/NoSQL landscape, Create collection in Mongodb, CRUD Operations in MongoDB. Mongo's feature set, Introduction to Mongoose, understanding mongoose schemas and datatypes, Connecting Angular with mongoDB using API.	8 hours

Course Outcomes – After completion of this course students will be able to:		
CO 1	Explain, analyze and apply the role of server-side scripting language like Nodejs in the workings of the web and web applications.	K2, K3
CO2	Demonstrate web application framework i.e., Express is to design and implement typical dynamic web pages and interactive web based applications.	K3, K6
CO3	Apply the knowledge of Typescript that are vital in understanding angular is, and analyze the concepts, principles and methods in current client-side technology to implement angular application over the web.	K3, K6

CO4	Analyze, build and develop single page application using client-side programming i.e. angular js and also develop a static web application.	K3, K4
CO5	Understand the impact of web designing by database connectivity with Mongodb in the current market place where everyone use to prefer electronic medium for shoping, commerce, and even social life also.	K2, K3

Text Books:

1. Amos Q. Haviv (Author), Adrian Mejia (Author), Robert Onodi (Author), "Web Application Development with MEAN",3rdIllustrated Edition 2017,Packt Publications.
2. Simon Holmes (Author), Clive Herber (Author), "Getting MEAN with Mongo, Express, Angular, and Node", 2nd Edition 2016, Addison Wesley Publication.
3. Dhruti Shah, "Comprehensive guide to learn Node.js", 1st Edition, 2018 BPB Publications.
4. Christoffer Noring, Pablo Deeleman, "Learning Angular", 3rd Edition,2017 Packt publications.

Reference Books:

1. Anthony Accomazzo, Ari Lerner, and Nate Murray, "Fullstack Angular: The Complete Guide to AngularJS and Friends",4th edition, 2020 International Publishing.
2. David Cho, "Full-Stack Angular, Type Script, and Node: Build cloud-ready web applications using Angular 10 with Hooks and GraphQL",2nd edition, 2017 Packt Publishing Limited.
3. Richard Haltman & Shubham Vernekar, "Complete node.js: The fast guide: Learn complete backend development with node.js"5th edition, 2017 SMV publication.
4. Glenn Geenen,Sandro Pasquali , Kevin Faaborg, "Mastering Node.js: Build robust and scalable real-time server-side web applications efficiently" 2nd edition Packt Publishing Limited.
5. Greg Lim,"Beginning Node.js, Express & MongoDB Development, kindle edition, international publishing.
6. Daniel Perkins, "AngularJS Master Angular.js with simple steps, guide and instructions" 3rd edition, 2015 SMV publication.
7. Peter Membrey, David Hows, Eelco Plugge, "MongoDB Basics", 2nd edition, 2018 International Publication.

Links: NPTEL/You Tube/Web Link

https://youtu.be/BLl32FvcdVM

https://youtu.be/fCACk9ziarQ

https://youtu.be/YSyFSnisip0

https://youtu.be/mGVFltBxLKU

https://youtu.be/bWaucYA1YRI

https://youtu.be/7H_QH9nipNs
https://youtu.be/AX1AP83CuK4

https://youtu.be/SccSCuHhOw0 https://youtu.be/lY6icfhap2o https://youtu.be/z7ikpQCWbtQ
https://youtu.be/0LhBvp8qpro https://youtu.be/k5E2AVpwsko https://youtu.be/SQJkj0WYWOE?list=PLvQjNLQMdagP3OzoBMfBT48uJ-SPfSsWj https://youtu.be/0eWrpsCLMJQ?list=PLC3y8-rFHvwhBRAgFinJR8KHIrCdTkZcZ https://youtu.be/ZSB4JcLLrIo
https://youtu.be/0LhBvp8qpro https://youtu.be/k5E2AVpwsko https://youtu.be/SQJkj0WYWOE?list=PLvQjNLQMdagP3OzoBMfBT48uJ-SPfSsWj https://youtu.be/0eWrpsCLMJQ?list=PLC3y8-rFHvwhBRAgFinJR8KHIrCdTkZcZ https://youtu.be/ZSB4JcLLrIo
https://youtu.be/Kvb0cHWFkdc https://youtu.be/pQcV5CMara8 https://youtu.be/c3Hz1qUUIyQ https://youtu.be/Mfp94RjugWQ https://youtu.be/SyEQLbbSTWg

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY GREATER NOIDA-201306

(An Autonomous Institute)

School of Computer Science in Emerging Technologies

B. TECH. THIRD YEAR

Course code	BNC0602	L T P	Credits
Course Title	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	2 0 0	0

Course objective: To enable the students to understand the importance of our surroundings and encourage them to contribute towards sustainable development.

Pre-requisites: Philosophical Systems, Spiritual Practices, Cultural Heritage, Ayurveda and Traditional Medicine, Architecture

Course Contents / Syllabus

UNIT-I	Society State and Polity in India	8 Hours

State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women.

UNIT-II	Indian Literature, Culture, Tradition, and Practice	8 Hours

Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist and Jain Literature in Pali, Prakrit and Sanskrit, **Sikh Literature**, Kautilya's Artha Shastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature, Malayalam Literature, Sangama Literature Northern Indian Languages & Literature, Persian And Urdu Hindi Literature

UNIT-III	Indian Religion, Philosophy, and Practices	8 Hours

Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines, Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.

UNIT-IV	Science, Management and Indian Knowledge System	8 Hours

Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India, Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India Writing Technology in India Pyrotechnics in India Trade in Ancient India/, India's Dominance up to Pre-colonial Times.

UNIT-V	Cultural Heritage and Performing Arts	8 Hours

Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Pottery, Painting, Indian Handicraft, UNESCO'S List of World Heritage sites in India, Seals, coins, Puppetry, Dance, Music, Theatre, drama, Martial Arts Traditions, Fairs and Festivals, UNESCO'S List of Intangible Cultural Heritage, Calendars, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema

COURSE OUTCOMES: After completion of this course students will be able to

CO 1	Understand the basics of past Indian politics and state polity.	K2
CO 2	Understand the Vedas, Upanishads, languages & literature of Indian society.	K2
CO 3	Know the different religions and religious movements in India.	K.4
CO 4	Identify and explore the basic knowledge about the ancient history of Indian agriculture, science & technology, and ayurveda.	K.4
CO 5	Identify Indian dances, fairs & festivals, and cinema.	K.1

Textbooks:

1- Indian Art and Culture: for civil services and other competitive Examinations, Nitin Singhania

Reference Books:

1- The Wonder that was India (34th impression), A. L. Basham

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=cjh7vCAvKhc

https://www.youtube.com/watch?v=fCiOPDZW-30

https://www.youtube.com/watch?v=JnFeKp0T3AQ

https://www.youtube.com/watch?v=_d8N2hKMpw8

https://www.youtube.com/watch?v=8D6UyaVj1tY