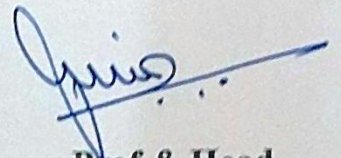


Dr. Ambedkar Institute of technology, Bengaluru-56
Department of Computer Science & Engineering

The enclosed documents are verified & approved.



Prof & Head

Dr. Siddaraju

Department of Computer Science & Engineering

Professor & Head
Department of Computer Science & Engineering
Dr. Ambedkar Institute of Technology
Bangalore-560 056.



Panchajanya Vidya Peetha Welfare Trust (Regd)

Dr. Ambedkar Institute of Technology

An Autonomous Institution, Affiliated to Visvesvaraya Technological University, Belagavi,
Aided by Govt. of Karnataka, Approved by All India Council for Technical Education (AICTE), New Delhi
Accredited by NBA and NAAC with 'A' Grade

BDA Outer Ring Road, Mallathalli, Bengaluru - 560 056

Ref. No. Dr. A.I.T./CSE/354

Date: 7/1/23

This is to certify that the List of courses for the employability, entrepreneurship and skill development have been introduced during the last five years with the approval from BOS Chairman and BOS Members.

Name of the Course	Course Code	Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development	Year of Introduction
Android Programming	CS71	Skill Development	2017
Android Programming Lab	CSL75	Skill Development	2017
Cloud Computing	CS72	Employability	2017
Cloud Computing Lab	CSL76	Employability	2017
Digital Logic and Computer Design	18CS31	Employability	2018
Digital Logic and Computer Design Laboratory	18CSL37	Employability	2018
Microcontroller and Embedded System	18CS43	Employability	2018
Microcontroller and Embedded System Laboratory	18CSL46	Employability	2018
M&E / IPR	18HS51/52	Entrepreneurship	2018
Computer Networks & Internet Protocol	18CS54	Employability	2019
Network Programming Lab using Java & NS	18CSL57	Employability	2019
Internet of Things	18CS61	Employability	2019
Machine Learning	18CS62	Employability	2019



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BDA Outer Ring Road, Mallathalli, Bengaluru - 560 056

Ref. No. Dr. ADT/CSE/34

Date: 7/1/23

Internet of Things	18CS61	Employability	2019
Machine Learning	18CS62	Employability	2019
Principles of Economics	18CS644	Entrepreneurship	2019
Data Science	18CS654	Employability	2019
MAchine Learning Laboratory	18CSL66	Skill Development	2019
Introduction to Big Data Analytics	18CS73	Skill Development	2020
Business Intelligence	18CS731	Employability	2020
Cloud Infrastructure Services	18CS735	Employability	2020
Computer Vision	18CS751	Skill development	2020
Introduction to Robotics	18CS742	Skill development	2020
Soft Computing	18CS743	Skill development	2020

BOS Chairman
Professor & Head
Department of Computer Science & Engineering
Dr. Ambedkar Institute of Technology
Bengaluru-560 056

Principal
Dr. Ambedkar Institute of Technology
Bangalore - 560 056



Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY

**

Department of Computer Science & Engineering

2017 Syllabus

Sub Title : Android programming		
Sub Code:CS71	No. of Credits:3=3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
Exam Duration : 3 hours	CIE +Assignment + SEE = 45 + 5 + 50 =100	Total No. of Contact Hours : 42

Course objectives:

1. To understand the Mobile-Android OS architecture and Features.
2. Understand how Android application works, their life cycle, manifestation, intents and using external resources.
3. Design and use appropriate tools for android development including IDE, device emulator, and profiling tools.
4. To build user interface ,text inputs, lists and study database.
5. To understand windows Moblie Programming for smartphones.

UNIT No	Syllabus Content	No of Hours
1	<p>Introduction To Android: A Little Background; J2ME to Android; What is Android?; An Open-Platform for Mobile Development; Introducing the open handset alliance; Android Architecture (Layers of Android), Android: Android SDK Features; Why Develop for Mobile?; Variants of Android ;Types of Application developed using Android; Native Android Applications and Hybrid Application; Dalvik Virtual Machine;</p> <p>Android Application Manifestation :What is a .dex files; What is an .apk file; Basic Building Blocks of Android (Activities, Intents, Content Providers, Services Broadcast Receivers); Structure of Android Project; What Makes an Android Application?; Introducing the Application Manifest; Possibilities with Android; Drawable Resources; Resolution and Density Independence;</p>	08
2	<p>Android Application Life Cycle: Introducing the Android Application Class; Activity Life Cycle; Creating User Interfaces; The Android Application Life Cycle; Layout Managers (Linear Layout and Relative Layout); Hello World Android Application; View Click Handling; Let's Make a Toast; Fundamental Android UI Design, Introducing Views, Creating and Using Menus; Introducing Intents, Types of Intents; Creating Dialogs; Bundle; Shared Preferences; Types of Preferences; Storing and Retrieving Data from Shared Preferences. Working with Files (Reading and Writing Files). Asynchronous Tasks, Working with Threads;</p>	08
3	<p>Introduction to Android Databases: Introducing Android Databases Introducing SQLite, Working with SQLite Databases, onCreate() and onUpgrade() methods. Cursors and Content Values, Creating a New Content Provider, Using Content Providers, Creating and Using an</p>	08

	Earthquake Content Provider, Accessing Android Content Providers.	
4	Android Services: Services in Android; Types of Services; Local Service; Remote Service; Intent Service. Broadcast Receivers; Types of Broadcasts; Creating a Broadcast Receivers;Introducing Notifications;	07
5	Location Based Services: Using Location-Based Services, Configuring the Emulator to Test Location-Based Services, Updating Locations in Emulator Location Providers, Selecting a Location Provider, Finding Your Location, Using Proximity Alerts, Using the Geocoder, Creating Map-Based Activities, Mapping Earthquakes Example Using Background Threads. Multimedia an Sensors: Playing Audio and Video, Recording Audio, Using the Camera and Taking Pictures, Telephony, Introducing SMS and MMS; Using Sensors and the Sensor Manager Using the Compass, Accelerometer, and Orientation Sensors, Controlling Device Vibration; Communicating to WebServices, Using Alarms; Working with Adapters	11

Note 1: Unit 1 and Unit 5 will have internal choice.

Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.

Assignment - 2 from units 3 and 4.

Assignment - 3 from unit 5.

Course Outcomes:

CO1: Understand the fundamentals of mobile architecture.

CO2: Design and develop android applications with compelling user interface.

CO3: Design applications to save or to store data in SQLite.

CO4: Analyze the problem to build their own mobile apps using Android's APIs.

CO5: Deploy applications with sophisticated and elegant user interface.

Cos	Mapping with Pos
CO1	PO1,PO2,PO6,PO8
CO2	PO1,PO2,PO4,PO5,PO7
CO3	PO1,PO2,PO4,PO5,PO6,PO11,PO12
CO4	PO1,PO2,PO4,PO11,PO12
CO5	PO1,PO2,PO3,PO5,PO6

TEXT BOOK:

1. Professional Android 2 Application Development by Reto Meier, Wiley Publishing, 2010.
2. Pro Android by Sayed Y. Hashimi, Satya Komatineni, Apress, 2009.
3. Professional Android Application Development by Reto Meier, Wiley Publishing, 2009.

REFERENCE BOOKS / WEBLINKS:

1. Beginning Android by Mark Murphy, Apress, 2009.
2. The Android Developer's Cookbook: Building Applications with the Android SDK by James Steele, Nelson To, Addison-Wesley Professional; 2010.
3. The Busy Coders guide to Android development by Mark L Murphy, COMMONSWARE, 2009.

FACULTY INCHARGE:

1. LAVANYA SANTHOSH
2. HARPRITHA K M

Sub Title : ANDROID PROGRAMMING IAB		
Sub Code:CSL75	No. of Credits:1.5=0 : 0 :1.5 (L-T-P)	No. of lecture hours/week : 3
Exam Duration : 3 hours	CIE + SEE = 50 + 50 =100	

<p>Course objectives:</p> <ol style="list-style-type: none"> 1. To Learn and acquire art of Android Programming. 2. To configure initial application, run in emulator. 3. Understand and implement Android's advanced User interface functions, audio video applications 4. Create, modify and query on SQLite database 5. Present different ways of sharing data through the use of services

1.	Write a program to create an Activity to read Employee Details (EmpId, Name, AGe, Address) from the user and to store database and create a menu with menu item (Show Details) on pressing menu details it must go to another activity with employee id search box and search button and display the employee details on the screen
2.	Write a program to create an activity with a text box and three buttons (save, open and create) open must allow to browse the text file from sdcard and must display the contents of the file on text box, save button must save the contents of the text box to file, create button must allow file user to create a new file and save the entered contents of the text box.
3.	Write a program to create an activity with a text boxes (date/time and note contents). Create a content provider to store date and time and note contents to the database. Create another program with the Button (Fetch Today Notes) on Press must access the note provider and display the notes stored for today's date.
4.	Write a program to create an activity with two buttons start and stop. OnPressing start button , the program must start the counter and must keep on counting until stop button is pressed.
5.	Create the program to receive the incoming SMS to the phone and put a notification on the screen, onputting the notification it must display the sender number and message

	content on screen.
6	Create a program to create a service that will put a notification on the screen every 5 sec
7.	Create an .aidl service to add, subtraction and multiplication and create another application with two buttons to read the inputs and three buttons add, subtract and multiply to call add, subtract and multiply operations on .aidl service.
8.	Create an activity like a phone dialler with (1,2,3,4,5,6,7,8,9,0,*,#) buttons and call and save button on pressing the call button it must call the phone number, and on pressing the save button it must save the number to the save number to the phone contact.

Course Outcomes:

CO1: Understand the android OS and fundamental concepts in Android Programming.

CO2: Demonstrate various components, layouts and views in creating Android applications

CO3: Design applications to save or to store data in SQLite

CO4: Demonstrate the sharing data with different applications and sending sms

CO5: Demonstrate how to write applications using services.

Cos	Mapping with POs
CO1	PO1, PO2, PO3, PO11
CO2	PO1, PO2, PO4, PO5, PO9, PO10, PO12
CO3	PO1, PO2, PO4, PO11
CO4	PO1, PO2, PO3, PO4, PO5, PO8, PO9
CO5	PO1, PO2, PO5, PO11, PO12

FACULTY INCHARGE:

1. LAVANYA SANTHOSH

2. HARPRITHA K M

Sub Title : Cloud Computing		
Sub Code: CS72	No. of Credits:3=3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
Exam Duration : 3 hours	CIE +Assignment + SEE = 45 + 5 + 50 =100	Total No. of Contact Hours : 42

Course objectives:

1. To provide comprehensive view to different aspects of cloud computing like; service models, challenges & infrastructure.
2. Explore the various cloud computing applications & paradigms.
3. To introduce to cloud virtualization, with different type of virtualization.
4. To analyze how resource management and scheduling done in cloud computing.
5. To explore data storage systems in cloud computing.

UNIT No	Syllabus Content	No of Hours
1	Introduction: Network centric computing and network centric content, Peer-to-peer systems, Cloud Computing: an old idea whose time has come, Cloud Computing delivery models & Services, Ethical issues, Cloud vulnerabilities, Challenges. Cloud Infrastructure: Amazon, Google, Azure & online services, open source private clouds. Storage diversity and vendor lock-in, intercloud, Energy use & ecological impact of data centers, service level and compliance level agreement, Responsibility sharing, user experience, Software licensing.	8
2	Cloud Computing: Applications & Paradigms, Challenges, existing and new application opportunities, Architectural styles of cloud applications, Workflows coordination of multiple activities, Coordination based on a state machine model -the Zoo Keeper, The Map Reduce programming model, Apache Hadoop, A case study: the GrepTheWeb application, Clouds for science and engineering, High performance computing on a cloud, cloud for biological research, Social computing, digital content, and cloud computing.	8
3	Cloud Resource Virtualization: Virtualization, Layering and virtualization, Virtual machine monitors, Virtual machines Performance and security isolation, Full virtualization and paravirtualization, Hardware support for virtualization Case study: <i>Xen</i> -a VMM based on paravirtualization, Optimization of network virtualization in <i>Xen</i> 2.0, <i>vBlades</i> -paravirtualization targeting a <i>x86-64</i> Itanium processor, A performance comparison of virtual machines, Virtual machine security, The darker side of virtualization, Software fault isolation.	10
4	Cloud Resource Management and Scheduling: Policies and mechanisms for resource management, Applications of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based web services, Resource bundling, combinatorial auctions for cloud resources, Scheduling algorithms for	10

	computing clouds, fair queuing, Start time fair queuing, Cloud scheduling subject to deadlines.	
5	Storage systems: Storage models, file systems, databases, DFS, General parallel File system, GFS, Apache Hadoop, Locks & Chubby, TPS & NOSQL databases, Bigdata, Mega store.	06

Note 1: Unit3 and Unit 4 will have internal choice. One question each from units 1, 2 and 5.

Note 2: Two assignments are evaluated for 5 marks: Assignment – 1 from units 1 and 2 and Assignment -2 from units 3 and 4.

Course Outcomes:

Upon successful completion of this course, the students will be able to

1. CO1: Obtain knowledge on different aspects of cloud computing like; service models, challenges & infrastructure.
2. CO2: Explore and Analyze different cloud computing applications & paradigms.
3. CO3: Analyze the importance of virtualization and different features of Virtual Machine (VM) in cloud computing
4. CO4: To explore and Analyze different mechanisms and policies used in resources management and scheduling.
5. CO5: To obtain knowledge on storage systems in cloud computing

Cos	Mapping with POs
CO1	PO1,
CO2	PO1, PO2,
CO3	PO1, PO2, PO3
CO4	PO1, PO2, PO3
CO5	PO1, PO2,

TEXT BOOKS:

1. Cloud Computing: Theory and Practice, Dan Marinescu, 1st edition, MK Publishers, 2013.

REFERENCES:

1. Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Kai Hwang, Jack Dongarra, Geoffrey Fox. MK Publishers.
2. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, McGraw Hill, 2010.

Sub Title : Cloud Computing Lab**Sub Code: CSL76****No. of Credits:1.5 =1.5 : 0 : 0 (L-T-P)****No. of lecture hours/week :****Course objectives:**

1. To Install and understand Virtual Box by deploying web application
2. To get Hands on with Different Cloud services: Amazon, Microsoft Azure. Google apps
3. To Create and provision VMs on any Cloud Simulation environments, and execute different polices to understand the VM features

1. Case Study of VirtualBox: Install VirtualBox software and an operating system to it. Deploy a web application to read a text file and display it on the web browser.
2. Case Study of Amazon: Create a web application to enter the students' details like name, USN, semester, section and CGPA to a database and deploy it on Amazon EC2.
3. Case Study of Amazon: Create a web application to implement an online cart for adding items to a shopping cart and deleting it. Deploy it on Amazon EC2.
4. Case Study of Amazon: Create a web application to enter the faculty details like faculty ID, faculty name, and salary to a database and calculate the income tax to be paid by the faculty at the end of financial year and deploy it on Amazon S3.
5. Case Study of Azure: Create a web application to book a flight from a source to destination and store the status of flight, and departure timings on database.
6. Control panel software manager Application of hypervisors.
7. Create a Collaborative learning environment for a particular learning topic using Google Apps. Google Drive, Google Docs and Google Slides must be used for hosting e-books, important articles and presentations respectively.
8. Modeling and simulation Cloud computing environments, including Data Centers, Hosts and Cloudlets and perform VM provisioning using CloudSim: Design a host with two CPU cores, which receives request for hosting two VMs, such that each one requires two cores and plans to host four tasks units. More specifically, tasks t1, t2, t3 and t4 to be hosted in VM1, while t5, t6, t7, and t8 to be hosted in VM2. Implement space-shared allocation policy and time-shared allocation policy. Compare the results.

Course Outcomes:**Upon successful completion of this course, the students will be able to**

To have clear case study on working of different Cloud services

CO1: learn about Amazon EC2. Amazon Cloud computing platform, Amazon Web Services.

CO2: Microsoft Azure cloud computing platform and infrastructure, deploying and managing applications and services

CO3: Google Apps: Google Drive, Google Docs and Google Slides

CO4: To create and run VMs on any Virtualization Hypervisors.

Cos	Mapping with POs
CO1	PO1, PO2, PO3,
CO2	PO1, PO2, PO3
CO3	PO1, PO2, PO3
CO4	PO1, PO2,PO3

Faculty Incharge :

1. Dr.Prakash . S
2. Praveena M.V




Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY

**

Department of Computer Science & Engineering

2018 Syllabus

	SUBJECT TITLE: DIGITAL LOGIC AND COMPUTER DESIGN		
	Sub Code:18CS31	No. of Credits:4=4:0:0 (L-T-P)	No.of.lecture hours/week : 4
	Exam Duration : 3 hours	CIE +Assignment +SEE = 45 + 5 + 50 =100	Total No. of Contact Hours :52

Course Objectives:

- 1 Understand the basic digital principles and working of various logic gates, and different techniques for simplification of Boolean function.
2. Design combinational logic circuits and describe their applications.
3. Analyze working of Flip Flops and sequential circuits.
4. Study the basic organization and architecture of digital computers such as CPU, memory, I/O, and software
5. Discussions of digital logic and microprogramming to understand the design and application of computer systems and can be used as foundation for more advanced computer-related studies

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	Combinational Logic Circuits: Binary Logic, Integrated Circuits, Boolean Functions, Canonical And Standard Forms, The Map Method Two, Three, Four -Variable Maps, Map Manipulation, Essential Prime Implicants, Product-Of-Sums Optimization, Don't-Care Conditions ,minimal sum and minimal product. The Tabulation Method, Determination Of Prime Implicants.	11
2	Data processing circuits: Combinational Logic Design Procedure, Adders, Subtractors, Code Converter, Magnitude Comparator, Multiplexers, De multiplexers, Decoder, Encoders.	10
3	Sequential Logic: Introduction, FLIP-Flops, Triggering Of Flip Flops, Excitation Tables, Design Procedure. Registers, Shift Registers, Ripple Counter, Synchronous Counter.	10

4	Processor Logic Design: Introduction, Processor Organization, Arithmetic Logic Unit, Design Of Logic Circuit, Design Of Arithmetic Circuit, Control logic design: Introduction, Control Organization, Hard Wired Control, Hard Wired control –example.	10
5	Computer Design: Introduction, System of Configuration, Computer Instructions, Timing and Control, Execution of Instructions, Microcomputer System Design: Introduction, Microcomputer Organization, Microprocessor Organization, Instructions and Addressing Modes	11

Text Book:

1. M Morris Mano: Digital Logic and Computer Design, 14th Impression, Pearson, 2012.
ISBN 978-81-7758-409-7.

Reference Books:

1. M. Morris Mano and Charles Kime: Logic & Computer Design, Fundamentals, Pearson, 2014
ISBN 978-93-325-1872-8
2. Andrew S Tenenbaum: Structured Computer Organization, Pearson, 2006,
ISBN 81-7808-692-1

Course Outcomes:

Course Outcomes	Statements	Blooms Level
CO1	Demonstrate the various techniques like K-map, Quine-McCluskey method for minimization of combinational functions.	L3
CO2	Develop and Analyze different combinational and sequential circuits using Logic gates, Multiplexers Decoders, PLA, Flip flops.	L3
CO3	Describe the structure of CPU, memory and I/O unit	L2
CO4	Discuss the design of logic circuits for arithmetic operation in computer system	L2

CO5	Illustrate the use of timing and control signal in the execution of machine instructions of computer system	L3
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Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	3	-	-	-	-	-	-	-	3	3	-
CO2	3	2	3	2	3	-	-	-	-	-	-	-	2	3	-
CO3	2	1	2	2	3	-	-	-	-	-	-	-	1	2	-
CO4	3	2	3	2	3	-	-	-	-	-	-	-	1	2	-
CO5	3	2	2	2	3	-	-	-	-	-	-	-	2	3	-


FACULTY NAME:


SREENIVASA A.H

Associate Professor

ARATHI P

Assistant Professor


Professor & Head
Department of Computer Science & IT
Dr. Ambedkar Institute of Technology
Bangalore-560 056.

	SUBJECT TITLE: DIGITAL LOGIC AND COMPUTER DESIGN LAB		
	SUBJECT CODE: 18CSL37	No. of Credits:0:0:1	No. of Lecture hours per week:3
	Exam Duration :3 hours	Exam Marks:50	

Course Objectives:

This course will help students to achieve the ability to:

1. Implement different logic design circuits using components like logic gates, multiplexer, decoder, flip-flops.
2. Understand the various computer operations using simulation

Detailed Syllabus

Expt No.	Experiment List
PART-A	
1	Given a 4-variable logic expression, simplify it using K-Map and realize using logic gates.
2	Design and implement arithmetic combinational circuit.
3	Design and implement various flip flops.(SR,JK,D,T)
4	Design and implement synchronous counter using flip flops.
5	Design and implement asynchronous counter.
6	Design and implement shift registers.(ring ,switched tail)
PART-B	
1	Design and implementation of combinational circuits.
2	Design and implementation sequential circuits.
3	Design of memory units.(RAM and ROM)
4	Designing a logic circuit to perform various functions.
5	Designing an ALU to perform various operations.
6	Demonstrating the assembly language instruction execution.

Course Outcomes	Statements	Blooms Level
CO1	Implement different combinational and sequential logic circuits.	L3
CO2	Develop the different sequential circuits	L3
CO3	Demonstrate the various operations of computer using appropriate simulator (Logisim, Marie Sim, CPUOs)	L3
CO4	Illustrate the working of computer components by analyzing their operation using simulator	L3
CO5	Describe the assembly language instruction execution using simulator	L2


Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	3								3	3	-
CO2	3	3	3	3	3								3	3	-
CO3	3	3	3	2	3								2	3	-
CO4	3	3	3	2	3								2	3	-
CO5	3	3	3	2	3								3	3	-

FACULTY NAME:

SRINIVASA A.H
Associate Professor

ARATHI P
Assistant Professor


Professor & Head
Department of Computer Science & IT
Dr. Ambedkar Institute of Tech.
Bangalore-660 056.

	SUBJECT TITLE: MICROCONTROLLER AND EMBEDDED SYSTEM		
	Sub Code:18CS43	No. of Credits:4=4:0:0 (L-T-P)	No.of.lecture hours/week : 4
	Exam Duration : 3 hours	CIE +Assignment +SEE = 45 + 5 + 50 =100	Total No. of Contact Hours :52

Course Objectives:

1. Differentiate between microprocessors and microcontrollers.
2. Explain the architecture of ARM processor with its instruction set.
3. Identify the applicability of the embedded system

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	The History of ARM and Microcontrollers: Introduction to Microcontrollers, the ARM Family History, ARM Architecture and Assembly Language Programming: The General Purpose Registers in the ARM, The ARM Memory Map, Load and Store Instructions in ARM, ARM CPSR (Current Program Status Register), ARM Data Format and Directives, Introduction to ARM Assembly Programming, Assembling an ARM Program, The Program Counter and Program ROM Space in the ARM, Some ARM Addressing Modes, RISC Architecture in ARM, Viewing Registers and Memory with ARM Keil IDE	11
2	Arithmetic and Logic Instructions and Programs: Arithmetic Instructions, Logic Instructions, Rotate and Barrel Shifter, Shift and Rotate Instructions in ARM Cortex, BCD and ASCII Conversion, Branch, Call, and Looping in ARM: Looping and Branch Instructions, Calling Subroutine with BL, ARM Time Delay and Instruction Pipeline, Conditional Execution	11
3	Self-Study: Signed Numbers and IEEE 754 Floating Point: Signed Numbers Concept, Signed Number Instructions and Operations, IEEE 754 Floating-Point Standards, ARM Memory Map, Memory Access, and Stack: ARM Memory Map and Memory Access, Stack and Stack Usage in ARM, ARM Bit-Addressable Memory Region, Advanced Indexed Addressing Mode, ADR, LDR, and PC Relative Addressing, ARM Pipeline and CPU Evolution: ARM Pipeline Evolution, Other CPU Enhancements	10

4	Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems, Embedded firmware design and development: Embedded firmware design approaches, embedded firmware development languages.	10
5	Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: On board and External Communication Interfaces.	10

Text Books:

1. Muhammad Ali Mazidi, Sarmad Naimi, Sepher Naimi, Janice Mazidi, “ARM assembly language Programming and Architecture”, MicroDigitalEd.com, 2nd Edition, 2016. ISBN 978-0997925906
2. Shibu K V, “Introduction to Embedded Systems”, Tata McGraw Hill Education, Private Limited, 2nd Edition, 2009. ISBN 978-0070678798

Reference Books:

1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2. The Insider’s Guide to the ARM7 Based Microcontrollers, Hitex Ltd., 1st edition, 2005
3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015
4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008
5. Raganandan, An Introduction to ARM System Design, Cengage Publication

SELF STUDY REFERENCES/WEBLINKS

1. Muhammad Ali Mazidi, Sarmad Naimi, Sepher Naimi, Janice Mazidi, “ARM assembly language Programming and Architecture”, MicroDigitalEd.com, 2nd Edition, 2016. ISBN 978-0997925906
2. <https://www.youtube.com/watch?v=qBHUGy1xteg>
3. <https://www.youtube.com/watch?v=e3YvT3WkhRs>
4. <https://www.youtube.com/watch?v=q4fwx3h3mdg>

Course Outcomes:

Course Outcomes	Statements	Blooms Level
CO1	Describe the architecture of ARM microcontroller.	L2
CO2	Write the assembly language program using ARM microcontroller instructions	L3
CO3	Illustrate the memory concepts and data representation in ARM microcontroller	L3
CO4	Identify and Analyze the applications of embedded systems	L2
CO5	Select the best components for the design of embedded systems.	L2


CO-PO Mapping


Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	2								3	3	-
CO2	3	3	3	2	3								3	3	-
CO3	2	2	2	3	2								3	3	-
CO4	2	3	2	2	2								2	3	-
CO5	2	3	2	2	2								1	2	-

FACULTY NAME:

Dr. SIDDARAJU
Professor & Head

SRINIVASA A.H
Associate Professor


Professor & Head
Department of Computer Science & Technology
Dr. Ambedkar Institute of Technology
Bangalore-560 056.

	SUBJECT TITLE: MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY		
	SUBJECT CODE: 18CSL46	No. of Credits:0:0:1	No. of Lecture hours per week:2
	Exam Duration :3 hours	Exam Marks:50	

Course Objectives:

This course will help students to achieve the ability to:

1. Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148/Simulator/Emulator
2. Conduct the experiments on an ARM7TDMI/LPC2148 or any other evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/ python compiler.

Detailed Syllabus

Expt No.	Experiment List
PART-A	
1	Write an ALP to evaluate the following expressions i) $C = A + B$ ii) $P = Q + (R * S)$ Assume A, B, C, P, Q, R, S as data memory locations.
2	Write an ALP to perform a simple Boolean operation to calculate the bitwise calculation of the following functions. i) $F1 = A \cdot B + C \cdot D$ ii) $F2 = (A + B) \cdot (C + D)$ Assume A, B, C, D as data memory locations.
3	Assume array of 16 bit number of size N and write the program to find sum of square of numbers and store the result in internal RAM memory
4	Write an ALP to find factorial of a non-negative number.
5	Write an ALP to multiply two signed numbers which are stored in internal RAM and store the result in
6	Write an ALP to add an array of 16 bit numbers of size N and store the result in internal RAM
7	Write an ALP to count the positive and negative numbers in an array of 16 bit numbers of size N
8	Write an ALP to find the largest and smallest number in an array of 32 numbers of size N
9	Write an ALP to arrange a series of 32 bit numbers in ascending/descending order of size N.
10	Write an assembly language program to search an element in an array of 16 bit number of size N using linear search.
PART B	
1	Interface two LEDs to Raspberry Pi and Write a Python code to input a number and switch ON the LEDs depending on the following conditions

	<table border="1"> <tr> <td colspan="2">Number</td> <td>LED1</td> <td>LED2</td> </tr> <tr> <td>Negative</td> <td>Odd</td> <td>OFF</td> <td>OFF</td> </tr> <tr> <td>Negative</td> <td>Even</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td>Positive</td> <td>Odd</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>Positive</td> <td>Even</td> <td>ON</td> <td>ON</td> </tr> </table>	Number		LED1	LED2	Negative	Odd	OFF	OFF	Negative	Even	OFF	ON	Positive	Odd	ON	OFF	Positive	Even	ON	ON
Number		LED1	LED2																		
Negative	Odd	OFF	OFF																		
Negative	Even	OFF	ON																		
Positive	Odd	ON	OFF																		
Positive	Even	ON	ON																		
2	Interface a Stepper motor to Raspberry Pi and Write a Python code to rotate it in clockwise and anti-clockwise direction.																				
3	Interface a PIR Motion Sensor to Raspberry Pi and write a Python code to detect the movement of an object.																				
4	Interface a temperature sensor to Raspberry Pi and write a Python code to Read and calculate the temperature in Celsius.																				
5	Interface a button and a speaker to Raspberry Pi and write a Python code to play .wav sound file on press of the button.																				

Course Outcomes	Statements	Blooms Level
CO1	Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148/Simulator/Emulator	L3
CO2	Describe the ARM7TDMI/LPC2148/Raspberry Pi Evaluation board	L2
CO3	Demonstrate the working of Raspberry Pi device by connecting it with different components.	L3
CO4	Develop the python code for the interfacing components to Raspberry Pi	L3
CO5	Illustrate the working of stepper motor, temperature sensor, and PIR sensor	L3

Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3
CO1	3	2	3	2	3	-	-	-	-	-	-	-	3	3	-
CO2	1	1	2	1	2	-	-	-	-	-	-	-	2	3	-
CO3	2	2	3	2	2	-	-	-	-	-	-	-	1	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-

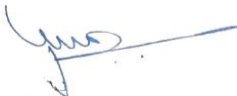
FACULTY NAME:


Dr. SIDDARAJU

SRINIVASA A.H

Professor & Head

Associate Professor


 Professor & Head
 Department of Computer Science &
 Dr. Ambedkar Institute of Techno
 Bangalore-660 056.

	INTELLECTUAL PROPERTY RIGHTS (2021-22)		
	Subject Code: HS04	No. of Credits: 2	No of lecture hours per week: 2 Hrs
	Exam Duration: 2 HOURS	Exam Marks: 50	Total No. of lecture hours: 26hrs

Course Objective:

1. The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.
2. To get registration in our country and foreign countries of their invention, designs and thesis or theory written by the students during their project work and for this they must have knowledge of patents, copy right, trademarks, designs and information Technology Act.
3. Further teacher will have to demonstrate with products and ask the student to identify the different types of IPR's.

units	Syllabus Content	Hours
1	INTRODUCTION TO IPR: Meaning of property, Origin, Nature, Meaning of Intellectual Property Rights, Introduction to TRIPS and WTO. Kinds of Intellectual property rights—Copy Right, Patent, Trade Mark, Trade Secret and trade dress, Design, Layout Design, Geographical Indication, Plant Varieties and Traditional Knowledge.	03
2	PATENT RIGHTS AND COPY RIGHTS— Origin, Meaning of Patent, Types, Inventions which are not patentable, Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties. COPY RIGHT—Origin, Definition &Types of Copy Right, Registration procedure, Assignment & licence, Terms of Copy Right,Piracy, Infringement, Remedies, Copy rights with special reference to software.	10
3	TRADE MARKS— Origin, Meaning & Nature of Trade Marks, Types, Registration of Trade Marks, Domain Names, Infringement & Remedies, Offences relating to Trade Marks, Passing Off, Penalties.	04
4	DESIGN- Meaning, Definition, Object, Registration of Design, Cancellation of Registration, International convention on design, functions of Design. Semiconductor Integrated circuits and layout design Act-2000.	05
5	BASIC TENENTS OF INFORMATION TECHNOLOGY ACT-2000- Cyber crimes, digital signature and E-Commerce.	04

Course outcomes:

- **The students once they complete their academic projects, they get awareness of acquiring the patent**
- **They also learn to have copyright for their innovative works.**
- **They also get the knowledge of plagiarism in their innovations which can be questioned legally.**

TEXT BOOKS:

- **1. Intellectual Property Rights and the Law, Gogia Law Agency, by Dr. G.B. Reddy**
- **2. Law relating to Intellectual Property, Universal Law Publishing Co, by Dr. B.L.Wadehra**
- **3. IPR by P. Narayanan**
- **4. Law of Intellectual Property, Asian Law House, Dr.S.R. Myneni.**




Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY


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Department of Computer Science & Engineering

2019 Syllabus

	Course Title: Computer networks and internet protocols		
	Course Code: 18CS54	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42
Course Objectives:	Description		
	<ol style="list-style-type: none"> 1. To understand the fundamental and advanced concepts of communication networks OSI,TCP/IP model , and simulation of computer networks in depth 2. To understand and analyze the data link layer protocols 3. To understand and analyze packet switching networks and congestion control. 4. To understand and analyze the IP protocols. 5. To create the awareness of internet routing protocols, transport layer protocols, and application layer protocols. 		
Unit No	Syllabus Content		No of Hours
1	Introduction to networking: Data Communications, Networks, Layered Tasks, The OSI model, Layers in OSI model, TCP/IP Protocol suite, simulation of computer networks		9
2	(self study) Medium access: Framing, Stop and wait ARQ, Go-back-N ARQ, Random access, Channelization,connecting devices(hubs, repeaters, bridges, switches)		9
3	Packet-Switching Networks: Datagram Networks, Virtual Circuit Networks, Shortest-path routing, congestion and congestion control(open loop, closed loop), techniques to improve QoS (scheduling, traffic shaping, token bucket, leaky bucket)		8
4	IP protocols: IPV4–addressing, header format, subnet addressing, fragmentation and reassembly; IPV6-addressing, header format.		8
5	TCP,UDP and Internet Protocols : User datagram protocol; Transmission control protocol; TCP congestion control; Internet routing protocols (RIP,OSPF) Application layer : DNS, Telnet, Electronic mail ,World wide web		8
Course Outcomes	Description		RBT Levels
CO1	Understand the concepts of communication networks, OSI, and TCP/IP model and Identify the different types of network topologies and protocol models		L2

CO2	Differentiate between different access control methods to the shared transmission media											L3
CO3	Examine routing and congestion control protocols and analyze the concepts of packet switching networks											L4
CO4	Investigate the functionalities and services provided by layer 3 and above and analyze application layer protocols, internet routing protocols, transport layer protocols and different protocols used to implement internetworking											L4
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1								
CO2	3	3	2	1								1
CO3	3	3	2	1								1
CO4	3	3	2	1								1
Strong -3 Medium -2 Weak -1												
TEXT BOOKS:												
1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition Tata McGraw-Hill, ISBN-13, 9780073250328,2014.- units,1,2,3 2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental concepts and Key architectures, 2nd Edition, Tata McGraw-Hill, ISBN-13:978-0-07-0595019, 2014. Shortest-path routing, units 4, 5												
REFERENCE BOOKS:												
1. William Stallings: Data and Computer Communication, 10th Edition, Pearson Education, ISBN-13: 978-0133506488, 2013. 2. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 5th Edition, The Morgan Kaufmann Series, ISBN-9780123850591, 2011. 3. Andrew S. Tanenbaum, <u>David J. Wetherall</u> , Computer Networks, 5th edition, Pearson, ISBN 13: 9780132126953, 2011. 4. Nader F. Mir: Computer and Communication Networks, 2nd Edition, ISBN-13: 978-0133814743, 2014.												
SELF STUDY REFERENCES/WEBLINKS:												
1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition Tata McGraw-Hill, ISBN-13, 9780073250328,2014. 2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental concepts and Key architectures, 2nd Edition, Tata McGraw-Hill, ISBN-13:978-0-07-0595019, 2014.												
COURSE COORDINATOR:	Dr. Mary Cherian											

	Course Title: Network programming lab using JAVA and NS		
	CourseCode: 18CSL57	No. of Credits: 0 : 0 :1 (L-T-P)	No. of lecture hours/week : 2
	Exam Duration : 3 hours	CIE+ SEE = 50+50=100	
Course Objectives:			
		Description	
		<ol style="list-style-type: none"> 1. To understand and apply the basics of Java Programming. 2. To demonstrate some concepts of Networking using Java Programming. 3. To introduce network topologies using NS2 and check the performance of TCP and UDP protocols 4. To understand the creation of an Ethernet LAN by changing error rate and data rate to verify the throughput. 4. To understand and design wireless and wired network using NS2. 	
Unit No			
Syllabus Content			
PART-A			
1.	Write a Java program using synchronized threads to demonstrate producer-consumer concepts.		
2.	<p>Write a Java Swing program that consists of three tabs named Select Semester, Select Course and Select Electives. The “Select Semester” tab must contain four Buttons. The “Select Course” should contain a list of check boxes named with the courses such as Java, Compiler Design, and Machine Learning. “The Select Electives” tab should contain a drop down list of elective names of subjects.</p> <p>Hint: Swing application which uses,</p> <ol style="list-style-type: none"> i) JTabbed Pane ii) Each tab should Jpanel which include any one component given below in each JPanel iii)CheckBox/List/RadioButton 		
3.	Design and implement a simple Client Server Application using RMI.		
4.	Design and implement Client Server communication using TCP socket programming. (Client requests a file, Server responds to client with contents of that file which is then displayed on the screen by Client).		
5.	Implement a JAVA Servlet Program to create a dynamic HTML web page. (user name and password should be accepted using HTML and displayed using a Servlet).		
6.	<p>Using Java JDBC and MySQL, develop a program to accept book information such as accession number, title, authors, edition and publisher from JSP web page from the stored table in the database.</p> <p>Perform the following:</p> <ol style="list-style-type: none"> 1.Search for a book with the title specified by the user 2.Display the search results with proper headings. 		

PART-B

1	Simulate a three nodes point-to-point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.
2	Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
3	Simulate a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP. 3 Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
4	To create scenario and study the performance of Stop and Wait ARQ Protocol through simulation.
5	Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.

Course Outcomes	Description	RBT Levels
CO1	Design solutions using programming constructs in Java to create User interface.	L4
CO2	To Demonstrate the usage of Java networking concepts and creation of dynamic web pages.	L5
CO3	Apply and compare the performance of transport layer protocols.	L4
CO4	Analyze the working of LAN by inducing error model.	L4
CO5	Evaluate the parameters to be configured for wired and wireless communication.	L5

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2							
CO2	3	3	3	1	2							
CO3	3	3	3	1	1							
CO4	3	3	3	1	2							
CO5	3	3	3	1	2							


Strong -3 Medium -2 Weak -1

Instructions to Students:


Part-A: The programs formulated should be executed using Java Programming Language using eclipse IDE.

Part-B: The programs formulated should be executed using NS2 Simulation Software.


COURSE COORDINATOR:	1.Dr.Mary Cherian 2.Dr.Smitha Shekar B 3.Prof Madhu B 4.Prof.Pushpaveni H P 5.Prof.Veena A
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Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-660 056.

	Course Title: Internet of Things		
	Course Code: 18CS61	No. of Credits: 4 : 0 : 0 (L-T-P)	No. of lecture hours/week : 4
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 52
Course Objectives:	Description		
	<ol style="list-style-type: none"> 1. Understand the building blocks of IOT and its characteristics and its application Area. 2. Realize the difference between M2M and IOT 3. Explore the architecture, components and working of IOT with the help of Microcontroller. 4. Comprehend the evolution of IOT in Mobile Devices, Cloud & Sensor Networks. 5. Elaborate the need for Data Analytics mechanism & tools in IoT. 		
Unit No	Syllabus Content		No of Hours
1	Introduction & Concepts: Introduction to Internet of Things, Definitions and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT levels and Development Templates.		11
2	IoT and M2M Communication Introduction, M2M, Difference between IoT and M2M, SDN & NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol, Network Operator Requirements, NETCONF- YANG. IoT Platform Design Methodology: Introduction, IoT Design Methodology, Case Study: Weather Monitoring.		10
3	Domain Specific IOTs Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style. IoT Physical Devices and Endpoints Basic Building blocks - The Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python – Controlling led.		10
4	IoT Physical servers & Cloud Offerings Cloud: introduction to cloud storage models and communication Networks, WAMP – AutoBahn for IoT, Xively cloud for IoT. Python web application frame work - django, Designing a RESTful web API, amazon web services for IoT, SkyNetIoT messaging platforms.		11
5	Self Study: Data Analytics for IoT: Introduction ApacheHadoop, using Hadoop MapReduce for Batch Data Analysis, Apache oozie, Apache Spark, Apache Storm, using Apache Storm for Real-time Data Analysis. Ethics - Characterizing the Internet of Things, Privacy, Control,		10

Environment, Solutions												
Course Outcomes	Description											RBT Levels
CO1	Apply the knowledge of the internet and computer network on to IoT paradigm.											L1, L3
CO2	Adequately learn and demonstrate the IoT communication.											L3
CO3	Apply the knowledge of python in Raspberry PI programming.											L2
CO4	Analyze different configuration setups for connecting different types of sensors and upload the code on the board and communicate to the cloud.											L4
CO5	Apply the knowledge of data analytics and ethics behind a IoT development											L4, L5
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				1							1
CO2	3	2	3	1	2							1
CO3	3	2	2	1	2					1		1
CO4	3	3	1	2	2					1		1
CO5	3	2	1	2	3				1	1		1
Strong -3 Medium -2 Weak -1												
TEXT BOOKS:												
1. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", First Edition, VPT, 2014.												
REFERENCE BOOKS:												
1. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017												
2. Ovidiu Vermesan, PeterFriess, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems". River Publishers Series in Communication.												
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education												
SELF STUDY REFERENCES/WEBLINKS:												
1. Designing the Internet of Things – Adrian McEwen & Hakim Cassimality Wiley India, ISBN: 9788126556861												
COURSE COORDINATOR:												


 Professor & Head
 Department of Computer Science & IT
 Dr. Ambedkar Institute of Tech.
 Bangalore-660 056.



Course Title: Machine Learning

Course Code:18CS62

**No. of Credits: 4 : 0 : 0
(L-T-P)**

**No. of lecture hours/week
: 4**

**Exam Duration : 3
hours**

**CIE+ Assignment + SEE =
45+5+50=100**

**Total No. of Contact
Hours : 52**

**Course
Objectives:**

Description

1. Understand some basic machine learning algorithms and techniques and their applications.
2. Able to analyze the underlying mathematical relationships among Machine Learning algorithms.
3. Able to identify, formulate and solve machine learning problems that arise in practical applications.

**Unit
No**

Syllabus Content

**No of
Hours**

1

Introduction:

Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.

Concept Learning:

Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.

Text Book1, Sections: 1.1 – 1.3, 2.1-2.5, 2.7

10 hours

2

Decision Tree Learning:

Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.

Text Book1, Sections: 3.1-3.7

10 hours

3

Artificial Neural Networks:

Fundamental Concepts, Evolution of Neural Network, Basic Model of ANN, important terminologies of ANN, McCulloch-Pitts Neuron, Linear Separability, Hebb Network, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network, Radial Basis function network.

Text book 2, Sections: 2.1 – 2.7,3.1-3.3,3.5,3.6

12 hours

4


Bayesian Learning:

Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS

10 hours

	error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm Text book 1, Sections: 6.1 – 6.6, 6.9, 6.11, 6.12											
5	Self Study Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. Instance Based Learning: Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning, Text book 1, Sections: 5.1-5.6, 8.1-8.5											10 hours
Course Outcomes												
Description											RBT Levels	
At the End of the Course, the students should be able to												
CO1	Acquire knowledge about basic concepts of Machine Learning.											L2
CO2	Identify and apply machine learning techniques suitable for a given problem											L3
CO3	Design and implement machine learning solutions to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.											L4
CO4	Evaluate and interpret the results of the machine learning algorithms.											L5
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			2							
CO2	3	3	2		2							
CO3	3	3	3	3	3							
CO4	3	3		3	3							
Strong -3 Medium -2 Weak -1												
TEXT BOOKS:												
1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education. 2. S N Sivanandam, S N Deepa, Principles of Soft Computing, 3 rd Edition, Wiley Publication, 2019.												

REFERENCE BOOKS:	
<ol style="list-style-type: none"> 1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics. 2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press. 3. Samir Madhavan ,Mastering python for data science, 2015, Packt Publishing, ISBN: 9781784390150 4. Sebastian Raschka, Vahid Mirjalili,Python Machine Learning - Second Edition: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow Kindle Edition. 	
WEBLINKS:	
<ol style="list-style-type: none"> 1. https://towardsdatascience.com/real-world-implementation-of-logistic-regression-5136cefb8125 2. https://towardsdatascience.com/linear-regression-python-implementation-ae0d95348ac4 3. https://towardsdatascience.com/decision-tree-in-machine-learning-e380942a4c96 4. https://towardsdatascience.com/basics-of-bayesian-network-79435e11ae7b 5. https://towardsdatascience.com/introduction-to-artificial-neural-networks-ann-1ae15775ef9 	
COURSE COORDINATOR:	Dr. K R Shylaja Mrs. Asha K N




Professor & Head
 Department of Computer Science & IT
 Dr. Ambedkar Institute of Technology
 Bangalore-660 056.

	Course Title: PRINCIPLES OF ECONOMICS		
	Course Code: 18CS644	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42
Course Objectives:	Description		
	<ol style="list-style-type: none"> 1. Choose the concept of scarcity to explain economic trade-offs, opportunity costs, and rational behavior. 2. Interpret measures of elasticity and investigate the production and costs of the firm. 3. Demonstrate how markets function and what happens in the presence of market failures. 4. Analyze the different types of market structures such as monopoly and a competitive market. 5. Determine how economic growth, unemployment and inflation macroeconomics affects the economy of the nation in the short and long-run. 6. Discover the determinants of foreign trade flows and exchange rates, and their effects on the domestic economy. 		
Unit No	Syllabus Content		No of Hours
1.	Welcome to Economics , What Is Economics, and Why Is It Important? Microeconomics and Macroeconomics, How Economists Use Theories and Models to Understand Economic Issues, How To Organize Economies: An Overview of Economic Systems, Choice in a World of Scarcity , How Individuals Make Choices Based on Their Budget Constraint , The Production Possibilities Frontier and Social Choices, Confronting Objections to the Economic Approach, Demand and Supply , Demand, Supply, and Equilibrium in Markets for Goods and Services, Shifts in Demand and Supply for Goods and Services, Changes in Equilibrium Price and Quantity: The Four-Step Process, Price Ceilings and Price Floors, Demand, Supply, and Efficiency, Labor and Financial Markets , Demand and Supply at Work in Labor Markets, Demand and Supply in Financial Markets, The Market System as an Efficient Mechanism for Information.		09
2.	Elasticity , Price Elasticity of Demand and Price Elasticity of Supply, Polar Cases of Elasticity and Constant Elasticity, Elasticity and Pricing, Elasticity in Areas Other Than Price, Consumer Choices , Consumption Choices, How Changes in Income and Prices Affect Consumption Choices, Behavioral Economics: An Alternative Framework for Consumer Choice, Production, Costs, and Industry Structure , Explicit and Implicit Costs, and Accounting and Economic Profit, Production in the Short Run, Costs in the Short Run, Production in the Long Run, Costs in the Long Run.		08

3.	SELF-STUDY Perfect Competition , Perfect Competition and Why It Matters, How Perfectly Competitive Firms Make Output Decisions, Entry and Exit Decisions in the Long Run, Efficiency in Perfectly Competitive Markets, Monopoly , How Monopolies Form: Barriers to Entry, How a Profit-Maximizing Monopoly Chooses Output and Price, Monopolistic Competition and Oligopoly , Monopolistic Competition, Oligopoly.											08
4.	The Macroeconomic Perspective , Measuring the Size of the Economy: Gross Domestic Product, Adjusting Nominal Values to Real Values, Tracking Real GDP over Time, Comparing GDP among Countries, How Well GDP Measures the Well-Being of Society, Economic Growth , The Relatively Recent Arrival of Economic Growth, Labor Productivity and Economic Growth, Components of Economic Growth, Economic Convergence, Unemployment , How Economists Define and Compute Unemployment Rate, Patterns of Unemployment, What Causes Changes in Unemployment over the Short Run, What Causes Changes in Unemployment over the Long Run.											09
5.	Inflation , Tracking Inflation, How to Measure Changes in the Cost of Living, How the U.S. and Other Countries Experience Inflation, The Confusion Over Inflation, Indexing and Its Limitations, The International Trade and Capital Flows , Measuring Trade Balances, Trade Balances in Historical and International Context, Trade Balances and Flows of Financial Capital, The National Saving and Investment Identity, The Pros and Cons of Trade Deficits and Surpluses, The Difference between Level of Trade and the Trade Balance.											08
Course Outcomes	Description											RBT Levels
CO1	Identify the determinants of supply and demand; demonstrate the impact of shifts in both market supply and demand curves on equilibrium price and output.											L2
CO2	Determine the roles that prices and markets play in organizing and directing economic activity.											L3
CO3	Calculate and graph the short-run and long-run costs of production, supply and demand elasticities.											L3
CO4	Describe governmental efforts to address market failure such as monopoly power, externalities, and public goods.											L2
CO5	Examine and interpret a nation's economic performance indicators such as economic growth, unemployment and inflation from a macroeconomic perspective.											L3
CO6	Articulate the mechanics and institutions of international trade and their impact on the macro economy.											L3
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	1	3	2	2	1	-	-	-	-	-	-	-
CO2	1	3	1	1	1	-	-	-	-	-	-	-
CO3	1	3	1	1	1	-	-	-	-	-	-	-
CO4	1	3	1	1	1	-	-	-	-	-	-	-
CO5	1	3	2	2	1	-	-	-	-	-	-	-
CO6	1	3	2	2	1	-	-	-	-	-	-	-
Strong -3 Medium -2 Weak -1												
TEXT BOOKS:												
1. Steven A. Greenlaw, David Shapiro, “Principles of Economics” , 2 nd Edition, Rice University - OpenStax, 2020. ISBN-13: 978-1947172371 (Available under CC-BY license at https://openstax.org/details/books/principles-economics-2e)												
REFERENCE BOOKS:												
1. N. Gregory Mankiw, “Principles of Economics” , 8 th Edition, Cengage Learning, 2016. ISBN-13: 978-0357038314												
2. Niall Kishtainy, “The Economics Book: Big Ideas Simply Explained” , 1 st Edition, DK Publishers, 2012. ISBN-13: 978-0756698270												
3. Yves Hilpisch, “Python for Finance: Mastering Data-Driven Finance” , 2 nd Edition, O'Reilly Media, 2018 ISBN-13: 978-1492024330												
4. Quentin Batista, Thomas Sargent and Jesse Perla, “QuantEcon DataScience: Introduction to Economic Modeling and Data Science” , Center for Innovative Data in Economics, Vancouver School of Economics, UBC, 2020.												
SELF-STUDY REFERENCES/WEBLINKS:												
1. Perfect Competition https://mru.org/teacher-resources/university-video-mappings/openstax-microeconomics-textbook-video-mapped-syllabus#section8												
2. Monopoly https://mru.org/teacher-resources/university-video-mappings/openstax-microeconomics-textbook-video-mapped-syllabus#section9												
3. Monopolistic Competition and Oligopoly https://www.khanacademy.org/economics-finance-domain/ap-microeconomics/imperfect-competition/monopolistic-competition/v/oligopolies-and-monopolistic-competition												
COURSE COORDINATOR:	Dr.Gowrishankar S.											

	Course Title: DATA SCIENCE		
	Course Code: 18CSE024	No. of Credits: 3: 0: 0 (L-T-P)	No. of lecture hours/week: 3
	Exam Duration: 3 hours	CIE + Assignment + SEE = 45 + 5 + 50 = 100	Total No. of Contact Hours: 42
Course Objectives:	Description		
	<ol style="list-style-type: none"> Determine the appropriate natural language processing, machine learning and deep learning models to solve the business-related challenges. Indicate proficiency with statistical analysis of data to derive insight from results and interpret the data findings visually. Demonstrate skills in data management by obtaining, cleaning and transforming the data. Discuss how social networks appraise the ways in which the social clustering shape individuals and groups in contemporary society. 		
Unit No	Syllabus Content		No of Hours
1.	Visualizing Data , matplotlib, Bar Charts, Line Charts, Scatterplots, Linear Algebra , Vectors, Matrices, Statistics , Describing a Single Set of Data, Correlation, Simpson's Paradox, Some Other Correlational Caveats, Correlation and Causation, Probability , Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem.		08
2.	Hypothesis and Inference , Statistical Hypothesis Testing, Example: Flipping a Coin, p-Values, Confidence Intervals, p-Hacking, Example: Running an A/B Test, Bayesian Inference, Gradient Descent , The Idea Behind Gradient Descent Estimating the Gradient, Using the Gradient, Choosing the Right Step Size, Using Gradient Descent to Fit Models, Minibatch and Stochastic Gradient Descent, Getting Data , stdin and stdout, Reading Files, Scraping the Web, Using APIs, Example: Using the Twitter APIs, Working with Data , Exploring Your Data, Using NamedTuples, Dataclasses, Cleaning and Munging, Manipulating Data, Rescaling, An Aside: tqdm, Dimensionality Reduction.		08
3.	Machine Learning , Modeling, What Is Machine Learning?, Overfitting and Underfitting, Correctness, The Bias-Variance Tradeoff, Feature Extraction and Selection, k-Nearest Neighbors , The Model, Example: The Iris Dataset, The Curse of Dimensionality, Naive Bayes , A Really Dumb Spam Filter, A More Sophisticated Spam Filter, Implementation, Testing Our Model, Using Our Model, Simple Linear Regression , The Model, Using Gradient Descent, Maximum Likelihood Estimation, Multiple Regression , The Model, Further Assumptions of the Least Squares Model, Fitting the Model, Interpreting the Model, Goodness of Fit, Digression: The Bootstrap, Standard Errors of Regression Coefficients, Regularization, Logistic Regression , The Problem, The		09

	Logistic Function, Applying the Model, Goodness of Fit, Support Vector Machines.											
4.	Decision Trees , What Is a Decision Tree?, Entropy, The Entropy of a Partition, Creating a Decision Tree, Putting It All Together, Random Forests, Neural Networks , Perceptrons, Feed-Forward Neural Networks, Backpropagation, Example: Fizz Buzz, Deep Learning , The Tensor, The Layer Abstraction, The Linear Layer, Neural Networks as a Sequence of Layers, Loss and Optimization, Example: XOR Revisited, Other Activation Functions, Example: FizzBuzz Revisited, Softmaxes and Cross-Entropy, Dropout, Example: MNIST, Saving and Loading Models, Clustering , The Idea, The Model, Example: Meetups, Choosing k, Example: Clustering Colors, Bottom-Up Hierarchical Clustering.											09
5.	SELF-STUDY Natural Language Processing , Word Clouds, n-Gram Language Models, Grammars, An Aside: Gibbs Sampling, Topic Modeling, Word Vectors, Recurrent Neural Networks, Example: Using a Character-Level RNN, Network Analysis , Betweenness Centrality, Eigenvector Centrality, Directed Graphs and PageRank, Recommender Systems , Manual Curation, Recommending What's Popular, User-Based Collaborative Filtering, Item-Based Collaborative Filtering, Matrix Factorization.											08
Course Outcomes	Description											RBT Levels
CO1	Interpret the concepts and methods of mathematical disciplines relevant to data analytics and statistical modeling.											L3
CO2	Examine, visualize, curate, and prepare data and recognize how the quality of the data and the means of data collection may affect interpretation.											L3
CO3	Determine the machine learning, deep learning and natural language processing skills to design and implement efficient, data-driven solutions for real world problems.											L3
CO4	Illustrate how network analysis and recommender systems can contribute to increasing knowledge about diverse aspects of societal clustering.											L3
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	3	-	-	-	-	-	-	-
CO2	2	2	2	2	3	-	-	-	-	-	-	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-
CO4	3	2	2	2	3	-	-	-	-	-	-	-
Strong -3	Medium -2		Weak -1									

TEXT BOOKS:

1. Joel Grus, **“Data Science from Scratch”**, 2nd Edition, O’Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2019. ISBN-13: 978-9352138326.


REFERENCE BOOKS:

1. Emily Robinson and Jacqueline Nolis, **“Build a Career in Data Science”**, 1st Edition, Manning Publications, 2020. ISBN: 978-1617296246.
2. Aurélien Géron, **“Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems”**, 2nd Edition, O’Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2019. ISBN-13: 978-1492032649.
3. François Chollet, **“Deep Learning with Python”**, 1st Edition, Manning Publications, 2017. ISBN-13: 978-1617294433
4. Jeremy Howard and Sylvain Gugger, **“Deep Learning for Coders with fastai and PyTorch”**, 1st Edition, O’Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2020. ISBN-13: 978-1492045526.
5. Sebastian Raschka and Vahid Mirjalili, **“Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow 2”**, 3rd Edition, Packt Publishing Limited, 2019. ISBN-13: 978-1789955750

SELF-STUDY REFERENCES/WEBLINKS:

1. **Natural Language Processing**
<https://www.youtube.com/watch?v=xvqsFTUsOmc>
2. **Network Analysis**
<https://www.youtube.com/watch?v=K5xiFDClgjo>
3. **Recommender Systems**
<https://www.youtube.com/watch?v=39vJRxIPSxw>


**COURSE
COORDINATOR:****Dr.Gowrishankar S.**

	Course Title: Machine Learning Laboratory		
	Course Code: 18CSL66	No. of Credits: 0: 0 : 1 (L-T-P)	No. of lecture hours/week : 2
	Exam Duration : 3 hours	CIE + SEE = 50 + 50 =100	
	Description		
Course Objectives:	<p>This course will enable students to</p> <ol style="list-style-type: none"> 1. Implement the machine learning algorithms using the Data Set. 2. Learn to use Various python tools for Machine Learning 3. Analyze and interpret the outcomes of the machine learning algorithms. 		
Lab Experiments:			
1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.			
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.			
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.			
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.			
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.			
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.			
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.			
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.			
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.			
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.			
NOTE:			
1. The programs should be implemented in Python.			
2. For Problems 1 to 6 and 10, programs are to be developed without using the built-in APIs of Python.			
3. Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or (https://www.kaggle.com/datasets) or constructed by the students.			

Conduction of Practical Examination:

1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Marks distribution: Procedure + Conduction + Viva: **10 + 30 +10 (50)**
4. **Change of experiment is allowed only once and marks allotted to the procedure part to be made zero.**

Course Outcomes	Description	RBT Levels										
The students should be able to:												
CO1	Understand and interpret the implementation procedures and python Libraries for the machine learning algorithms.	L2										
CO2	Analyse the correctness of the data sets to apply appropriate Machine Learning algorithms.	L3										
CO3	Design and implement Machine Learning algorithms to solve real world problems.	L4										
CO4	Evaluate and interpret the results of the machine learning algorithms.	L5										
CO-PO Mapping												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2		3							
CO2	3	3	3	3	3							
CO3	3	3	3	3	3	2						2
CO4	3	3		3	3							
Strong -3 Medium -2 Weak -1												
COURSE COORDINATORS:				Dr. Shylaja K R Mrs. Asha K N								


Professor & Head
Department of Computer Science & IT
Dr. Ambedkar Institute of Technology
Bangalore-660 056.




Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY

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Department of Computer Science & Engineering

2020 Syllabus

	Course Title: Introduction To Big Data Analytics		
	Course Code: 18CS73	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 03
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42
Course Objectives:	Description		
	<p>This course will enable students to:</p> <ul style="list-style-type: none"> • Understand fundamentals process of adopting Big Data analytics • Learn the Hadoop framework and NOSQL concepts • Learn to use Spark APIs, write SQL queries, Streaming concepts • Design distributed Machine Learning models with Spark's MLlib • Get exposed to case studies of complex real world problems 		
Unit No	Syllabus Content	No of Hours	
1	Introduction to Big Data Analytics: Big data and its characteristics, Market and Business Drivers for Big Data Analytics, Business Problems Suited to Big Data Analytics, Developing a Strategy for Integrating Big Data Analytics into the Enterprise, Introduction to High-Performance Appliances for Big Data Management, NoSQL Data Management for Big Data	8	
2	<p>Introduction to Hadoop: Introduction, Hadoop and its Ecosystem, Hadoop Distributed File System, MapReduce Framework and Programming Model, Hadoop Yarn, Hadoop Ecosystem Tools</p> <p>Introduction to Apache Spark: The genesis of Spark, Hadoop at Yahoo and Spark early years, What is Apache Spark, Unified Analytics, Apache Spark's Distributed Execution, Spark Application and Spark session, Spark Jobs, Spark stages , Spark tasks, Transformation, Actions and Lazy Evaluation, Narrow and wide transformation, The Spark UI, Your first Standalone application.</p>	9	
3	Adding structure to Apache Spark: Apache Spark's structured APIs : The Dataframe API, The dataset API, Spark SQL and the underlying engine, Using Spark SQL in Spark Applications, SQL Tables and Views, Data sources for Data frames and SQL Tables, Common Data frames and Spark SQL operations, Structured Streaming, Programming model of Structured streaming, The fundamentals of Structured Streaming query, Streaming data sources and sinks : Apache Kafka.	9	
4	<p>Reliable Storage solutions with Apache Spark: Importance of Optimal storage solutions, Databases, Data lakes, Data houses, Apache Hudi, Apache Iceberg, Delta lake</p> <p>Machine Learning with MLlib:Supervised and Unpersived Machine</p>	8	

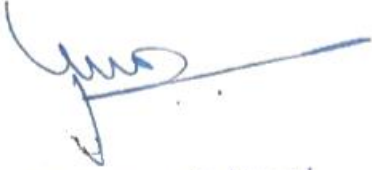
	Learning, Designing machine Learning pipelines, Hyperparameter Tuning, Model Management using MLflow											
5	Advanced analytics with Spark, Case studies: Exploring key machine learning algorithms on Spark for Recommender engines, Anomaly detection in network, Latent Semantic analysis in Natural language processing, Geospatial and temporal data Analysis, Image data analysis											8
Course Outcomes	Description											RBT Levels
CO1	Explore the fundamentals and process of adopting Big Data analytics											L1, L2
CO2	Explore Hadoop framework and NOSQL Data Management for Big Data											L1, L2, L3
CO3	Use Spark to process structured data to perform data engineering tasks											L1,L2, L3, L4
CO4	Build distributed Machine Learning models with Spark's MLlib											L1, L2, L3
CO5	Create complex analytics on large datasets using Machine learning tools by building and evaluating models											L1,L2, L3, L4
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	2								2
CO2	1	2	2									
CO3	3	2	2		2							
CO4	3	3	2	2								
CO5	3	2	2	2	2							1
Strong -3 Medium -2 Weak -1												
TEXT BOOKS:												
<ol style="list-style-type: none"> David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013. Holden Karau, Andy Konwinski, Patrick WendellMatei Zaharia, "Learning Spark: Lightning-Fast Big Data Analysis", O'Reilly, 2015, Edition 1. Sandy Ryza, Uri Laserson, Sean Owen, and Josh Wills,"Advanced Analytics with Spark by Sandy Ryza, Uri Laserson, Sean Owen, and Josh Wills (O'Reilly). Copyright 2015 . 												
REFERENCE BOOKS:												


1. Raj Kamal and Preeti Saxena, "**Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning**", McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966
2. Douglas Eadline, "**Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem**", 1st Edition, Pearson Education, 2016. ISBN-13: 978-9332570351
3. Raj Kamal and Preeti Saxena, "**Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning**", McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966

SELF STUDY REFERENCES/WEBLINKS:

**COURSE
COORDINATOR:**


Vinutha H



Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: BUSINESS INTELLIGENCE		
	Course Code: 18CS741	No. of Credits: 3: 0: 0 (L-T-P)	No. of Lecture Hours/Week: 3
	Exam Duration: 3 Hours	CIE + Assignment + SEE = 45 + 5 + 50 = 100	Total No. of Contact Hours: 42
Course Objectives:	Description		
	<ol style="list-style-type: none"> 1. Describe the concepts and components of Business Intelligence. 2. Understand the technological architecture that underpins the Business Intelligence systems. 3. Determine how dimensional modeling fits in an enterprise. 4. Examine the data integration techniques to discover previously hidden insights that can profoundly impact the success of any business. 5. Develop Business Intelligence systems using data analytics tools to aid the decision making process. 		
Unit No	Syllabus Content		No of Hours
1.	The Business Demand for Data, Information, and Analytics , Just One Word: Data. Welcome to the Data Deluge, Taming the Analytics Deluge, Too Much Data, Too Little Information, Data Capture versus Information Analysis, The Five Cs of Data, Common Terminology from our Perspective, Justifying BI: Building the Business and Technical Case , Why Justification is Needed, Building the Business Case, Building the Technical Case, Assessing Readiness, Creating a BI Road Map, Developing Scope, Preliminary Plan, and Budget, Obtaining Approval, Common Justification Pitfalls, Defining Requirements - Business, Data and Quality, The Purpose of Defining Requirements, Goals Deliverables, Roles, Defining Requirements Workflow, Interviewing, Documenting Requirements.		08
2.	Architecture Framework , The Need for Architectural Blueprints, Architectural Framework, Information Architecture, Data Architecture, Technical Architecture, Product Architecture, Metadata, Security and Privacy, Avoiding Accidents with Architectural Planning, Do Not Obsess over the Architecture, Information Architecture , The Purpose of an Information Architecture, Data Integration Framework, DIF Information Architecture, Operational BI versus Analytical BI, Master Data Management, Data Architecture , The Purpose of a Data Architecture, History, Data Architectural Choices, Data Integration Workflow, Data Workflow - Rise of EDW Again, Operational Data Store.		09
3.	SELF-STUDY Foundational Data Modeling , The Purpose of Data Modeling, Definitions - The Difference Between a Data Model and Data Modeling, Three Levels of Data Models, Data Modeling Workflow, Where Data Models Are Used, Entity-Relationship (ER) Modeling Overview, Normalization, Limits and Purpose of Normalization, Dimensional Modeling , Introduction to Dimensional Modeling,		09

	High-Level View of a Dimensional Model, Facts Dimensions, Schemas, Entity Relationship versus Dimensional Modeling, Purpose of Dimensional Modeling Fact Tables, Achieving Consistency, Advanced Dimensions and Facts, Dimensional Modeling Recap, Business Intelligence Dimensional Modeling , Introduction, Hierarchies, Outrigger Tables, Slowly Changing Dimensions, Causal Dimension, Multivalued Dimensions, Junk Dimensions, Value Band Reporting, Heterogeneous Products, Alternate Dimensions, Too Few or Too Many Dimensions.											
4.	Data Integration Design and Development , Getting Started with Data Integration, Data Integration Architecture, Data Integration Requirements, Data Integration Design, Data Integration Standards, Loading Historical Data, Data Integration Prototyping, Data Integration Testing, Data Integration Processes , Introduction: Manual Coding versus Tool-Based Data Integration, Data Integration Services.											08
5.	Business Intelligence Applications , BI Content Specifications, Revise BI Applications List, BI Personas, BI Design Layout - Best Practices, Data Design for Self-Service BI, Matching Types of Analysis to Visualizations, BI Design and Development , BI Design, BI Development, BI Application Testing, Advanced Analytics , Advanced Analytics Overview and Background, Predictive Analytics and Data Mining, Analytical Sandboxes and Hubs, Big Data Analytics, Data Visualization.											08
Course Outcomes	Description											RBT Levels
CO1	Establish Business Intelligence in the enterprise by defining the requirements for businesses that demand information.											L3
CO2	Employ a well architected foundation that provides information that helps in aligning the company's data with its business strategies.											L3
CO3	Articulate how the data and dimensional models are considered the cornerstone to building Business Intelligence applications.											L3
CO4	Illustrate the Data Integration workflow of source data as it is transformed to become actionable information.											L3
CO5	Develop Business Intelligence applications with user interfaces and standards that resonate with the intended audience and employ analytics for forecasting.											L3
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	2	2	-	-	-	-	-	-	-
CO2	2	3	3	3	3	-	-	-	-	-	-	-
CO3	1	2	2	2	3	-	-	-	-	-	-	-

CO4	2	2	2	2	3	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-
Strong -3 Medium -2 Weak -1												
TEXT BOOKS:												
1. Rick Sherman, “ Business Intelligence Guidebook: From Data Integration to Analytics ”, 1 st Edition, Morgan Kaufmann Publishers/Elsevier Publishers Pvt Ltd., 2014. ISBN-13: 978-0124114616.												
REFERENCE BOOKS:												
1. R N Prasad and Seema Acharya, “ Fundamentals of Business Analytics ”, 2 nd Edition, Wiley Publications, 2016. ISBN-13: 978-8126563791.												
2. U Dinesh Kumar, “ Business Analytics: The Science of Data - Driven Decision Making ”, 1 st Edition, Wiley Publications, 2017. ISBN-13: 978-8126568772.												
3. Foster Provost and Tom Fawcett, “ Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking ”, 1 st Edition, O'Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2013. ISBN-13: 978-9351102670.												
4. Ramesh Sharda, Dursun Delen and Efraim Turban, “ Business Intelligence, Analytics, and Data Science: A Managerial Perspective ”, 1 st Edition, Pearson Education, 2019, ISBN-13: 978-9353067021.												
5. Carolo Vercellis, “ Business Intelligence: Data Mining and Optimization for Decision Making ”, 1 st Edition, Wiley Publications, 2013. ISBN-13: 978-8126541881.												
SELF-STUDY REFERENCES/WEBLINKS:												
1. Foundational Data Modeling https://www.youtube.com/watch?v=CyP8UfeXVWg												
2. Dimensional Modeling https://www.youtube.com/watch?v=lWPiSZf7-uQ												
3. Business Intelligence Dimensional Modeling https://www.youtube.com/watch?v=rcpM0MZx-9c												
COURSE COORDINATOR:	Dr.Gowrishankar S.											


 Professor & Head
 Department of Computer Science & IT
 Dr. Ambedkar Institute of Tech.
 Bangalore-660 056.

	Course Title: CLOUD INFRASTRUCUTRE SERVICES		
	Course Code: 18CS735	No. of Credits: 3: 0: 0 (L-T-P) L-Lecture, T-Tutorials, P-Practicals	No. of Lecture Hours/Week: 3
	Exam Duration: 3 Hours	CIE + Assignment + SEE = 45 + 5 + 50 = 100	Total No. of Contact Hours: 42 its 42 hours for 3 credit course

Course Objectives:	Description
	<ol style="list-style-type: none"> To provide students with the fundamentals and essentials of Cloud Computing, Operating Systems administration, and Network Administration To provide students a sound foundation of the Cloud Computing, Operating Systems administration, and Network Administration so that they can start using and adopting Cloud Computing services and tools in their real-life scenarios. To enable students exploring some important cloud computing, Operating Systems administration and Network Administration driven commercial systems and applications. To expose the students to frontier areas of Cloud Computing and Operating Systems administration and Network Administration, while providing sufficient foundations to enable further study and research.

Unit No	Syllabus Content	No of Hours
1.	Windows Administration: Introduction to Operating System, File System, Deploy Windows Server 2012, ADDS, DNS, DHCP, WDS, Backup and Restore Linux Administration: Basics of RHEL & Installation, System and Device Management, Process Management, System Services, Bash Editing, File System User & Group Management, Back up & Restore, Troubleshooting	10
2.	VMware Administration: Basics, Installation and Configuration of VMware ESXi 6.0, vSphere tool, vSphere Networking, Storage, VM Management, HA, Access Control and Resource Monitoring	10
3.	Citrix Administration: Architecture, Deploy the site, Apps and Desktops Images, Deliver app and desktop resources, Citrix Profile Management, Supporting Citrix Virtual Apps and Desktops	12
4.	SQL Server Database Administration(DBA): SQL Fundamentals, Server Security, Server and Database Roles, SQL Encryption and Auditing, Backup and Recovery, Automating SQL Server Management, SQL Server Agent, Importing and Exporting Data	10

	Oracle Server Database Administration(DBA): Introduction to Oracle Database, Core DBA Tasks and Tools, Installing the oracle database software, Managing Oracle Instance, Oracle Flush, Configuring the oracle network environment, Administering User Security, Oracle 12 C New Features.	
5.	Network Administration: Living in a network centric world, communicating over the network, Communication model, Application layer, OSI Transport Layer, OSI network layer, IPV4OSI Data link layer, OSI Physical Layer, DHCP, DNS, Mail Services, Directory Service, Switching, Router, Security, IPV6	10

Note: One of the modules must be Self-study


Course Outcomes	Description												RBT Levels
CO1	Understand the common terms and definitions of Operating System, Cloud Computing and Virtualization.												L1
CO2	Learning the business benefits and considerations of VMware virtualization.												L2
CO3	Analyzing the implications of virtualization on Data Center Challenges.												L3
CO4	Enable to configure the VMware vSphere storage and network virtualization.												L4
CO5	Enable to configure the VMware vSphere network virtualization												L5
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	3	2	1	1	-	1	1	-	-	2	-	-	
CO2	2	2	2	1	3	-	-	-	1	1	-	2	
CO3	2	2	2	3	3	1	1	-	3	2	1	2	
CO4	2	2	2	3	3	2	1	-	1	2	1	2	
CO5	2	2	2	3	3	2	1	-	1	2	1	2	

Strong -3 Medium -2 Weak -1


TEXT BOOKS:


1. Mastering VMware vSphere 6, Publisher: Sybex; 1 edition (24 March 2015), Nick Marshall, Scott Lowe (Foreword by) with Grant Orchard, Josh Atwell.
2. Citrix VDI Handbook and Best Practices XenApp and XenDesktop 7.15 Long Term Service Release
3. Mastering Windows Server 2012 R2 by Mark and Kevin Greene
4. Linux Administration: The Linux Operating System and Command Line Guide for Linux Administrators
5. Microsoft SQL Server 2016 - A Beginners Guide by Dusan Petkovic
6. Oracle® Database SQL Reference 10g Release 2 (10.2)
7. Computer Networks by James F Kurose

REFERENCE BOOKS:	
1. VMware Virtualization Handbook: vSphere 6.0 : Jitendranath Mungara, Vikas BO, Swathi B	
2. Introduction to Storage Area Networks: An IBM Redbooks publication	
SELF-STUDY REFERENCES/WEBLINKS:	
1. VMware Self Study at NDG Group : https://www.netdevgroup.com/online/content/vmita	
COURSE COORDINATOR:	

	Course Title: Computer Vision		
	Course Code: 18CS751	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42
Course Objectives:	Description		
	<ol style="list-style-type: none"> 1. To understand the basics of computer vision and image processing. 2. To understand the different kinds of detectors and matching applications. 3. To understand the need of motion and its techniques. 4. To understand the importance of detection and recognition. 5. To understand the basics of motion estimation and image stitching. 		
Unit No	Syllabus Content		No of Hours
1	Introduction: What is computer vision? , A brief history, overview. Image formation: Geometric primitives and transformations, Photometric image formation, The digital camera. Image processing: Steps in image processing, filtering, Fourier transformation, neighborhood operation.		8
2	Feature detection and matching:- Points and patches , Feature detectors , Feature descriptors ,Feature matching , Feature tracking ,Application: Performance-driven animation ,Edges- Edge detection, Edge linking ,Application: Edge editing and enhancement, Lines- Successive approximation , Hough transforms , Vanishing points		9
3	Structure from motion: Triangulation, Two-frame structure from motion, Projective (uncalibrated) reconstruction ,Self-calibration Application: View morphing, Factorization ,Perspective and projective factorization , Application: Sparse 3D model extraction ,Bundle adjustment ,Exploiting sparsity ,Application: Match move, and augmented reality ,Uncertainty and ambiguities ,Application: Reconstruction from Internet photos ,Constrained structure and motion ,Line-based techniques Plane-based techniques.		9
4	Recognition: object detection, face detection, face recognition, instance recognition, category recognition, context and scene understanding, recognition databases and test sets.		9
5	Self study: Dense motion estimation: translational alignment, parametric motion, Spline based motion, optical flow, layered motion, Image Stitching: motion models, global alignment, compositing and blending.		7
Course Outcomes	Description		RBT Levels
CO1	Acquire fundamental concepts and applications of computer vision and image processing.		L1, L3
CO2	Interpret and Apply the various detectors and matching applications.		L2, L3
CO3	Explain the importance motion and usage of its techniques.		L1, L2

CO4	Apply the analysis on scene and recognizing all of its constituent objects.										L3	
CO5	Develop motion estimation algorithms that can be used for wide variety of applications.										L4,L5	
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3			2	3			1			3
CO2	3	3	2	2	2	3			1			3
CO3	3	3	2	2	2	3			2			3
CO4	3	3	2	2	2	3			1			3
CO5	2	2	2	2	2	3			2			3
Strong -3 Medium -2 Weak -1												
TEXT BOOKS:												
1. Computer vision: algorithms and applications by Richard Szelski 2010 Springer.												
REFERENCE BOOKS:												
1. Forsyth A. David and Ponce Jean, Computer Vision, A Modern Approach. 2nd ed., 2011. 2. Trucco and Verri, Introductory Techniques for 3D Computer Vision, 1998.												
SELF STUDY REFERENCES/WEBLINKS:												
1. http://szeliski.org/Book/ . 2. http://www.amazon.com/Computer-Vision-Models-Learning-Inference/product-reviews/1107011795/ref=dp_top_cm_cr_acr_txt?showViewpoints=1												


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	Course Title: Introduction to Robotics		
	Course Code: 18CS752	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 03
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42
Course Objectives:	Description		
	<ol style="list-style-type: none"> 1. To understand how to build basic robots 2. To understand how to use robot architectures to build robots in realtime 3. To distinguish differences between various architectures and apply in realtime 4. To program the AI robots for various behaviours of different complexity 		
Unit No	Syllabus Content		No of Hours
1	From Teleoperation To Autonomy: Overview, How Can a Machine Be Intelligent? What Can Robots Be Used For? Social implications of robotics, A Brief History of Robotics, Industrial manipulators , Space robotics and the AI approach, Teleoperation , telepresence, Semi-autonomous control, The Seven Areas of AI		8
2	The Hierarchical Paradigm: Overview, Attributes of the Hierarchical Paradigm, Strips, More realistic Strips example, Strips summary, Closed World Assumption and the Frame Problem, Representative Architectures, Nested Hierarchical Controller, NIST RCS, Evaluation of hierarchical architectures, Advantages and Disadvantages.		8
3	Biological Foundations of the Reactive Paradigm: Overview, Why explore the biological sciences? Agency and computational theory, What Are Animal Behaviors? Reflexive behaviours, Coordination and Control of Behaviors, Innate releasing mechanisms, Concurrent behaviours, Perception in Behaviors, Action-perception cycle, Two functions of perception, Gibson: Ecological approach, Neisser: Two perceptual systems, Schema Theory, Behaviors and schema theory, Principles and Issues in Transferring Insights to Robots		8
4	The Reactive Paradigm : Overview 105 4.2 Attributes of Reactive Paradigm, Characteristics and connotations of reactive behaviours, Advantages of programming by behaviour, Representative architectures, Subsumption Architecture, Example, Subsumption summary, Potential Fields Methodologies, Visualizing potential fields, Magnitude profiles, Potential fields and perception, Programming a single potential field, Combination of fields and behaviours, Example using one behavior per sensor, Pfields compared with subsumption, Advantages and disadvantages , Evaluation of		9

	Reactive Architectures												
5	Designing a Reactive Implementation: Overview, Behaviors as Objects in OOP, Example: A primitive move-to-goal behaviour, Example: An abstract follow-corridor behaviour, Where do releasers go in OOP? Steps in Designing a Reactive Behavioral System , Case Study: Unmanned Ground Robotics Competition, Assemblages of Behaviors, Finite state automata, A Pick Up the Trash FSA, Implementation examples , Abstract behaviors , Scripts											9	
Course Outcomes	Description											RBT Levels	
CO1	Understand basic operations of robots and their sub-components involved in designing.											R1, R2, R3	
CO2	To interpret the biological behaviours of human or animal and mapping them to different robot behaviours											R4 and R5	
CO3	To Analyze and design the robot behaviours using different robot architectures that work in real-time environments.											R4	
CO4	To use appropriate programming approaches to design and build the robot behaviours											R5	
CO-PO Mapping	PO 1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO12	
CO1	3	3											
CO2	3	3	2										
CO3	3	3		2	2							2	
CO4	3	3	3	3	3	2	2					2	
Strong -3 Medium -2 Weak -1													
TEXT BOOKS:													
1. Robin R Murphy, 2000, Introduction to AI Robotics, 2 nd Edition, MIT Press, Cambridge, MA, USA, ISBN:978-0-262-13383-8													
REFERENCE BOOKS:													
1. Kathy Ceceri, Making Simple Robots: Exploring Cutting-Edge Robotics with Everyday Stuff, Make Community, LLC; 1st edition (March 2, 2015), ISBN-10 : 9781457183638; ISBN-13 : 978-1457183638													


EXTERNAL REFERENCES/WEBLINKS:

**COURSE
COORDINATOR:**

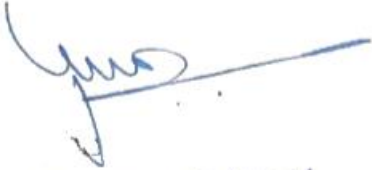
Dr. K R Shylaja



**Professor & Head
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Bangalore-560 056.**

	Course Title: Soft Computing		
	Course Code: 18CS753	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 03
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42
Course Objectives:	Description		
	<ol style="list-style-type: none"> 1. To learn the key aspects of Soft computing 2. To know about the components and building block hypothesis of Genetic algorithm. 3. To gain insight onto Neuro Fuzzy modeling and control. 4. To gain knowledge in machine learning through Support vector machines 		
Unit No	Syllabus Content		No of Hours
1	Introduction to Soft computing: Neural networks, Fuzzy logic, Genetic algorithms, Hybrid systems and its applications. Fundamental concept of ANN, Evolution, basic Model of ANN, Terminologies used in ANN, MP model, linear separability, Hebb Network.		11
2	Supervised Learning: Perceptual Network, Adaptive linear neuron, Multiple adaptive linear neurons, Back propagation Network, Associative Memory Network: introduction, training algorithms for pattern association, associative memory network,		10
3	Classical sets and Fuzzy Sets – classical and Fuzzy Relations – Features of membership functions, Fuzzification and methods of membership value assignment. Defuzzification lambda cuts for fuzzy relations and fuzzy sets.		10
4	Fuzzy Decision Making: introduction, individual decision making, multiperson Decision making, multiobjective decision making, multiattribute decision making, fuzzy Bayesian decision making, Fuzzy logic control systems: introduction, control system design, architecture and operation of FLC systems, FLC system Models, Applications of FLC systems		11
5	Self Study Component Genetic algorithms: Introduction - Basic operations - Traditional optimization and search techniques. Genetic algorithms and search space, Operators of genetic algorithms – Genetic programming		10
Course Outcomes	Description		RBT Levels

CO1	Understand the basics of soft computing, ANN and Terminologies to relate and understand the real time problems										R2 R3	
CO2	Solve the real-time problems using ANN representations										R3 R4	
CO3	Analyze and adopt fuzzy logic in designing and implementing soft computing applications.										R3 R4	
CO4	Analyze and apply genetic algorithms to solve the optimization problems										R3 R4	
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3									
CO2	3	3	2									
CO3	3	3	3									2
CO4	3	3	3	2	2							2
Strong -3 Medium -2 Weak -1												
TEXT BOOKS:												
1. Principles of Soft computing, S N Sivanandam, and S N Deepa, Wiley India, 3 rd edition ISBN 13: 978812658744-5, 2019												
REFERENCE BOOKS:												
1. Neuro-fuzzy and soft computing, J.S.R. Jang, C.T. Sun, E. Mizutani, Phi (EEE edition), 2012, ISBN 0-13-261066-3												
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Third Edition												
WEBLINKS:												
1. Introduction to Soft Computing by Prof. Debasis Samanta NPTEL course												
2. L. A. Zadeh, "Fuzzy Algorithms", Information and Control, vol. 12, pp. 94-102, 1968. CrossRef Google Scholar												
3. L. A. Zadeh, "A Rationale for Fuzzy Control", J.Dynamic Systems Measurement and Control, vol. 94, pp. 3-4, 1972. CrossRef Google Scholar												
4. L. A. Zadeh, "Outline of a New Approach to the Analysis of Complex Systems and Decision Processes", IEEE Trans. Systems Man and Cybernetics, vol. SMC-3, pp. 28-44, 1973												
COURSE COORDINATOR:						Dr. K R Shylaja						


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