NEW HORIZON
COLLEGE OF ENGINEERING

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by **NAAC** with 'A' Grade, Accredited by **NBA**

The Trust is a Recipient of Prestigious Rajyotsava State Award 2012 Conferred by the Government of Karnataka
Awarded Outstanding Technical Education Institute in Karnataka-2016
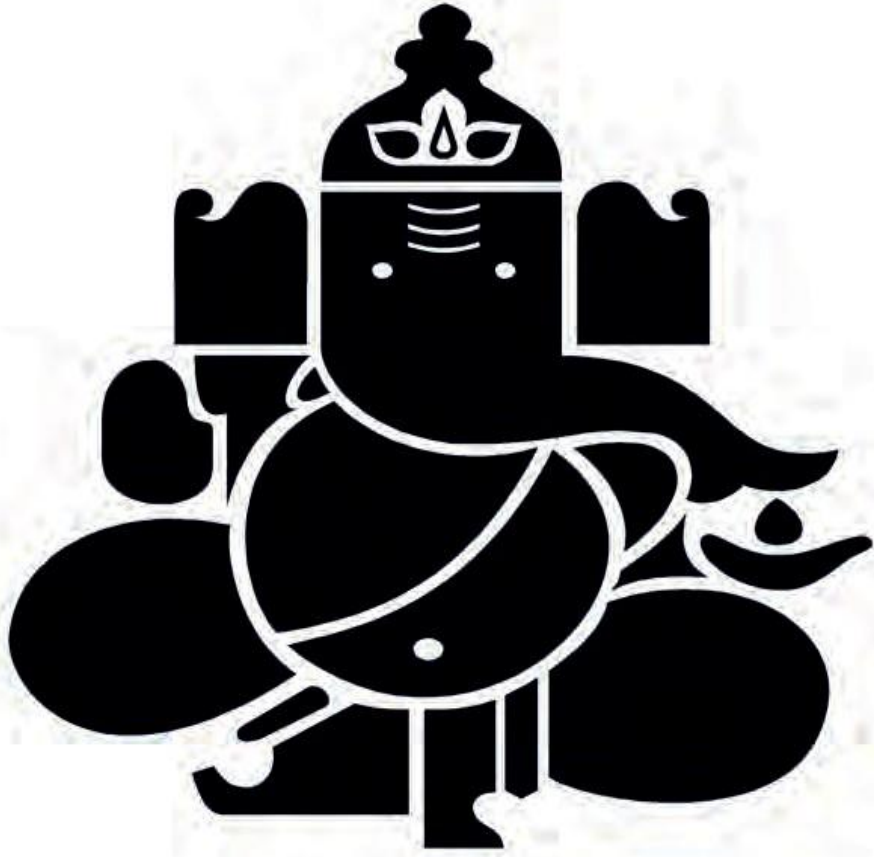Ring Road, Bellandur Post, Near Marathalli, Bangalore -560 103, INDIA

Department of Computer Science and Engineering

Academic Year 2019-20

Seventh and Eight Semesters B.E.

Scheme and Syllabus

2016-2020 Batch

CONTENTS

SCHEME

SYLLABUS

To emerge as a department of eminence in Computer Science and Engineering in serving the Information Technology Industry and the nation by empowering students with a high degree of technical and practical competence.

MISSION

- To strengthen the theoretical and practical aspects of the learning process by strongly encouraging a culture of research, innovation and hands-on learning in Computer Science and Engineering

- To encourage long-term interaction between the department and the IT industry, through the involvement of the IT industry in the design of the curriculum and its hands-on implementation

- To widen the awareness of students in professional, ethical, social and environmental dimensions by encouraging their participation in co-curricular and extracurricular activities

Program Education objectives (PEOs)

PEO1 Proficiency as computer scientists with an ability to solve a wide range of computing- related problems in industry, government, or other work environments.

PEO2 Ability to adapt quickly to new environments and technologies, assimilate new information, and work in multi-disciplinary areas with a strong focus on innovation and entrepreneurship.

PEO3 Possess the ability to think logically and the capacity to understand technical problems with computing systems and design alternative solutions.

PEO4 Possess an ability to collaborate as a team member and team leader to affect technical solutions for computing systems, providing improved function and outcomes.

PEO to Mission Statement Mapping

Mission Statements	PEO1	PEO2	PEO3	PEO4
To educate graduates and research scholars to be successful, ethical, and effective problem-solvers and life-long learners.	3	-	2	-
Produce versatile Computer Science graduates infused not only with technical skills, but also with innovative and entrepreneurial skills.	-	3	-	-
Prepare graduates for successful careers in Software Industry.	3	3	3	3
Provide a great work and learning environment and treat each other with respect and dignity.	-	-	2	3
To prepare graduates well enough to function as professional computer scientists and computer engineers.	-	3	-	-

Correlation: 3- High, 2-Medium, 1-Low

Program Outcomes (PO) with Graduate Attributes

	Graduate Attributes	Program Outcomes (POs)
1	Engineering Knowledge	**PO1:** The basic knowledge of Mathematics, Science and Engineering.
2	Problem analysis	**PO2:** An Ability to analyse, formulate and solve engineering problems.
3	Design and Development of Solutions	**PO3:** An Ability to design system, component or product and develop interfaces among subsystems of computing.
4	Investigation of Problem	**PO4:** An Ability to identify, formulate and analyze complex engineering problem and research literature through core subjects of Computer Science.
5	Modern Tool usage	**PO5:** An Ability to use modern engineering tools and equipment for computing practice.
6	Engineer and society	**PO6:** An Ability to assess societal, health, cultural, safety and legal issues in context of professional practice in Computer Science & Engineering.
7	Environment and sustainability	**PO7:** The broad education to understand the impact of engineering solution in a global, economic, environmental and societal context.
8	Ethics	**PO8:** An understanding of professional and ethical responsibility.
9	Individual & team work	**PO9:** An Ability to work both as individual and team player in achieving a common goal.
10	Communication	**PO10:** To communicate effectively both in written and oral formats with wide range of audiences.
11	Lifelong learning	**PO11:** Knowledge of contemporary issues, Management and Finance.
12	Project management and finance	**PO12:** An Ability to recognize the need and thereby to engage in independent and life-long learning for continued professional and career advancement.

Mapping of POs TO PEOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	3	3	3	-	-	-	-	-	-	-	-	-
PEO2	-	-	-	-	-	-	-	-	-	-	-	-
PEO3	-	-	3	3	-	-	-	-	-	-	3	-
PEO4	-	-	-	-	-	-	-	-	3	-	-	-

Correlation: 3- High, 2-Medium, 1-Low

NEW HORIZON COLLEGE OF ENGINEERING
Department of Computer Science & Engineering
Seventh Semester B.E. Program – Scheme
AY: 2019-2020

S. No	Course Code	Course	Credit Distribution				Overall Credits	Contact hours Weekly (Theory)	Contact hours Weekly (Lab)	Marks		
			L	P	T	S				CIE	SEE	Total
1	CSE71	Web Technologies	3	2	0	0	5	4	4	75	75	150
2	CSE72	Software Testing	3	2	0	0	5	4	4	75	75	150
3	CSE73	Mobile Application Development	3	2	0	0	5	4	4	75	75	150
4	CSE74X	Professional Elective	3	0	0	1	4	4	0	50	50	100
5	CSE75X	Open Elective	3	0	0	1	4	0	3	50	50	100
6	CSE76	Mini Project	0	2	0	0	2	0	2	25	25	50
7	CSE77	Project Phase-1	0	4	0	0	4	-	2	50	50	100
TOTAL							**29**	**16**	**19**	**400**	**400**	**800**

COURSE CODE	PROFESSIONAL ELECTIVE
CSE741	Fundamentals of Data Science
CSE742	Cryptography & Network Security
CSE743	Artificial Intelligence
CSE744	Real Time Operating System
CSE745	Cyber Security, Forensics and Law
CSE746	Internet of Things

Course Code	Open Electives
NHOP01	Big Data Analytics using HP Vertica- 1
NHOP02	VM Ware virtualization Essentials – 1
NHOP03	Adobe Experience manager – 1
NHOP04	Big Data Analytics using HP Vertica – 2 (Prerequisite: CSE553/ECE563/EEE563/ISE563/NHOP01)
NHOP05	VM Ware virtualization Essentials – 2 (Prerequisite: CSE552/ECE562/EEE562/ISE562/NHOP02)
NHOP06	Adobe Experience manager – 2 (Prerequisite: CSE551/ECE561/EEE561/ISE561/NHOP03)
NHOP07	SAP
NHOP08	Schneider – Industry Automation
NHOP09	Cisco – Routing and Switching – 1
NHOP10	Data Analytics
NHOP11	Machine Learning
NHOP12	Cisco – Routing and Switching – 2 (Prerequisite: NHOP09)
NHOP13	Industrial Internet of Things- Embedded Systems
NHOP14	Blockchain
NHOP15	Product Life Cycle Management

NEW HORIZON COLLEGE OF ENGINEERING
Department of Computer Science & Engineering
Eighth Semester
B.E. Program – Scheme
AY: 2019-2020

S. No	Course Code	Course	Credit Distribution				Overall Credits	Contact hours Weekly (Theory)	Contact hours Weekly (Lab)	Marks		
			L	P	T	S				CIE	SEE	Total
1	CSE81	Object Oriented Analysis and Design	3	0	1	1	5	4	0	50	50	100
2	CSE82	Data Mining and Machine Learning	3	0	0	1	4	4	0	50	50	100
3	CSE83	Internship	0	4	0	0	4	-	-	50	50	100
4	CSE84	Project	0	12	0	0	12	-	-	50	50	100
		TOTAL					25	8	0	200	200	400

SEVENTH SEMESTER
SYLLABUS

WEB TECHNOLOGIES

Course Code	: CSE71	**Credits**	: 05
L: P: T: S	: 3:2:0:0	**CIE Marks**	: 50+25
Exam Hours	: 3+3	**SEE Marks**	: 50+25

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

CO #	COURSE OUTCOMES
CO1	Develop static web pages using XHTML tags.
CO2	Create static web pages using different levels of styles and selector forms in CSS.
CO3	Create dynamic web pages using javascript for the real time applications.
CO4	Create dynamic documents using java script and develop server side programs using servlets for business and personal requirements.
CO5	Develop server side programs using PHP, Mysql and file with the help of advanced tools.
CO6	Design and develop a web based project/program incorporating different web technologies.

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	3	-	-	-	3	-	-	-	3	-
CO2	3	3	3	-	3	-	-	-	3	-	-	-	3	-
CO3	3	-	3	-	3	-	-	-	3	-	-	-	3	-
CO4	3		3	2	3	-	-	-	3	-	-	-	3	-
CO5	3		3	-	3	-	-	-	3	-	-	-	3	-
CO6	3	3	3	2	3	-	-	-	3	1	1	1	3	-

Module	Contents of the Module	COs	Hours
1	**Fundamentals of Web, XHTML:** Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox **Introduction to XHTML**: Basic syntax, Standard structure,Basic text mark-up, Images, Hypertext Links. Lists, Tables, Forms	**CO1**	**9**
	List of Experiments 1. Design the following static webpages 1. LoginPage 2. Class TimeTable		**8**
2	**Cascading Style Sheets:** Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Colour, Alignment of text, The box model,		9
	List of Experiments Design a web page using **CSS** which includes the following: 1)Use different font,style 2)Set a background image for both the page and single elements on the page. 3)Control the repetition of the image with the background-repeat property.		9

3	**Javscript Overview**: Overview of Javascript, Object orientation and Javascript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples. **JavaScript with HTML Documents (I):** The Javascript execution environment, The Document Object Model, Element access in Javascript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements	**CO3**	**9**	

	List of related Experiments
	1. Develop and demonstrate a XHTML file that includes Javascript script for the following problems:
	  1. Input: A number n obtained using prompt Output: The first n Fibonacci numbers
	  2. Input: A number n obtained using prompt
	   Output: A table of numbers from 1 to n and their squares using **alert**
	2.a) Develop and demonstrate, using Javascript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.
			9	

4	**Dynamic Documents with Javascript (II):** Introduction to dynamic documents, positioning elements, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Locating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements. **Introduction to Servlets:** Life cycle of a servlet. The Servlet API,	**CO4**	**9**	
	List of Experiments a) Develop and demonstrate, using Javascript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible b) Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom. 2. Assume four users user1, user2, user3 and user4 having the passwordspwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet to do the following. a. Create a Cookie and add these four user ids and passwords to this Cookie. b. Read the user id and passwords entered in the Login form and authenticate with the values available in the cookies. 3. Program to display a Greeting Message to a user using Servlet		9	

		9
PHP: Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies, Session tracking Using PHP with MySQL : Database access with PHP and MySQL.		
List of Experiments 1 (a) Write a PHP program to accept UNIX command from a HTML form and to display the output of the command executed. (b) Write a PHP program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages. 2. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page. 3. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page. 4. Create a XHTML form with Name, AddressLine1, AddressLine2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name.		9

Text Books:
1. Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson education,2012.

Reference books:
1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 3rd Edition, Pearson education,2004.
2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India,2009

CIE- Continuous Internal Evaluation (50Marks)

Bloom's Category	Tests	Assignments	Quizzes
Marks (out of 50)	25	15	10
Remember	5		
Understand	5		
Apply	5	7.5	
Analyze	5		10
Evaluate			
Create	5	7.5	

CIE-Continuous Internal Evaluation: Lab(25Marks)

Bloom's Category	Tests
Marks (out of 25)	25
Remember	
Understand	
Apply	
Analyze	
Evaluate	
Create	25

SEE- Semester End Examination: Theory (50Marks)

Bloom's Category	Tests
Remember	5
Understand	10
Apply	10
Analyze	10
Evaluate	5
Create	10

SEE- Semester End Examination: Lab (25 Marks)

Bloom's Category	Tests
Remember	
Understand	
Apply	5
Analyze	5
Evaluate	10
Create	5

SOFTWARE TESTING

Course Code	: CSE72	Credits	: 05
L: P: T: S	: 3:2:0:0	CIE Marks	: 50+25
Exam Hours	: 3+3	SEE Marks	: 50+25

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

CO #	COURSE OUTCOME
CO1	Apply the fundamentals of testing in solving real world problems.
CO2	Design and evaluate test cases for various black box testing techniques using open source tools.
CO3	Design and evaluate test cases for various white box testing techniques.
CO4	Analyze and evaluate the test cases with concept of mutation.
CO5	Compare and contrast various software technical reviews and its review culture.
CO6	Create test cases with automation testing tools.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	1	-	-

CO2	3	3	3	-	3	-	-	-	3	-	-	-	3	-
CO3	3	3	3	-	3	-	-	-	3	-	-	-	3	-
CO4	3	3	3	2	3	-	-	-	3	-	-	-	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO6	3	3	3	2	3	-	-	-	3	-	-	-	3	1

Module No	Module Contents	Hours	COs
1	**Fundamentals of testing:** Basic Definitions, Test Cases, Identifying Test Cases, Fault Taxonomies, Levels of Testing, Generalized Pseudocode, The Triangle Problem, The NextDate Function, The Commission Problem, The SATM System, The Currency Converter, Saturn Windshield Wiper Controller, Garage Door Opener	**9**	

	List of Programs:
	Write test cases for the following scenarios
	1) Take any ATM system (e.g. SBI Bank ATM system) and study its system specifications and report the various bugs.
	  i) Machine is accepting ATM card.
	  ii) Machine is rejecting expired card.
	  iii) Successful entry of PIN number.
	  iv) Unsuccessful operation due to enter wrong PIN number 3times.
	  v) Successful selection of language.
	  vi) Successful selection of account type.
	  vii) Unsuccessful operation due to invalid account type.
	  viii) Successful selection of amount to be withdrawn.
	  ix) Successful withdrawal.
	  x) Expected message due to amount is greater than day limit.
	  xi) Unsuccessful withdraw operation due to lack of money in ATM.
	  xii) Expected message due to amount to withdraw is greater than possible balance.
	  xiii) Unsuccessful withdraw operation due to click cancel after insert card.
	2) Triangle Problem,
	3) The Currency Converter
		9	**CO1**

2	**Black Box Testing** Types of Black Box Testing Techniques**:** **Boundary Value Testing,** Normal Boundary Value Testing Robust Boundary Value Testing, Worst-Case Boundary Value Testing, Special Value Testing, Examples, Random Testing Guidelines for Boundary Value Testing **Equivalence Class Testing** Equivalence Classes, Traditional Equivalence Class Testing Improved Equivalence Class Testing, Equivalence Class Test Cases for the Triangle Problem, Equivalence Class Test Cases for the NextDate Function, Equivalence Class Test Cases for the Commission Problem, Edge Testing **Decision Table–Based Testing** Decision Tables, Decision Table Techniques Test Cases for the Triangle Problem, Test Cases for the NextDate Function, Test Cases for the Commission Problem	**10**	**CO2**
	List of Programs: Demonstrate Black box testing techniques using open source testing tool	**9**	

3	**Path Testing** Program Graphs, DD-Paths, Test Coverage Metrics, Basis Path Testing **Data Flow Testing** Define/Use Testing, Slice-Based Testing, Program Slicing Tools	8	CO3
	List of Programs: Demonstrate White box testing techniques using open source testing tool	9	
4	**Evaluating Test Cases** Mutation Testing, Fuzzing, Fishing Creel Counts and Fault Insertion **Software Technical Reviews** Economics of Software Reviews, Roles in a Review Types of Reviews, Contents of an Inspection Packet, An Industrial-Strength Inspection Process, Effective Review Culture, Inspection Case Study	9	CO4, CO5
	List of Programs: Test cases to find mutants	9	
5	**Introduction to Test Automation** Use of Automation Testing, Selenium IDE, Selenium RC Architecture, Selenium RC Vs WebDriver, Selenium Webdriver/version 2.0, Configure Selenium WebDriver, **Scripting using WebDriver:** Selenium – Locators, Locators Usage **TestNG:** Need of TestNG, Installing TestNG for Eclipse, Report generation by TestNG, Grouping of Test Case, Set priority for Test case, Annotation of TestNG, Dependency in TestNG, Assert in TestNG	9	CO6
	List of Programs: Test cases and report generation using selenium Web driver and testing	8	

Text Book(s):
1. Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 4th Edition, Auerbach Publications,2013.
2. Selenium Web Driver Practical Guide, SatyaAvasarala,

Reference Book(s):
1. Software testing Principles and Practices – Gopalaswamy Ramesh, Srinivasan Desikan, 2nd Edition, Pearson,2007.
2. Software Testing – Ron Patton, 2nd edition, Pearson Education,2004.
3. Mauro Pezze, Michal Young: Software Testing and Analysis – Process, Principles and Techniques, Wiley India,2009.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes
Marks (Out of 50)	**25**	**15**	**10**
L1: Remember	5	-	-
L2: Understand	5	-	-
L3: Apply	10		10
L4: Analyze	5		
L5: Evaluate	-	-	-
L6: Create	-	15	-

CIE – Continuous Internal Evaluation: Lab (25 Marks)

Blooms Taxonomy	Marks (Out of 25)
L1: Remember	-

Blooms Taxonomy	Marks
L2: Understand	-
L3: Apply	5
L4: Analyze	5
L5: Evaluate	5
L6: Create	10

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	10
L2: Understand	15
L3: Apply	5
L4: Analyze	10
L5: Evaluate	5
L6: Create	5

SEE – Semester End Examination: Lab (25 Marks)

Blooms Taxonomy	Marks (Out of 25)
L1: Remember	-
L2: Understand	-
L3: Apply	5
L4: Analyze	5
L5: Evaluate	5
L6: Create	10

Mobile Application Development

Course Code	: CSE73	**Credits**	: 05
L: P: T: S	: 3:2:0:0	**CIE Marks**	: 50+25
Exam Hours	: 3+3	**SEE Marks**	: 50+25

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

COs	COURSE OUTCOMES
CO1	Apply the basics of android to develop mobile applications
CO2	Analyze the architecture and design applications using android SDK
CO3	Develop applications using data storage, file sharing and inter process communication concepts
CO4	Create applications to interface sensors and bluetooth connectivity
CO5	Design mobile applications using multimedia graphics and animations
CO6	Deploy and monetize mobile applications

Course Outcomes to Program Outcomes Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	3	-	-	-	3	-	-	2	3	-
CO2	3	3	-	-	3	-	-	-	3	-	-	2	3	3
CO3	3	3	3	-	3	-	-	-	3	-	-	-	3	-
CO4	3	3	3	1	3	-	-	-	3	-	-	-	3	3

CO5	3	3	3	1	3	-	-	-	3	-	-	-	3	3
CO6	3	3	-	-	3	-	-	-	3	-	-	-	3	-

Module No	Module Contents	Hours	COs
1	**INTRODUCTION TO ANDROID** Android architecture, Android studio-Project Structure, User Interface, Gradle build system, Debug and profile tools. Android Emulator, AVD in Android studio, Hardware device. Basic Building blocks – Activities, Services, Broadcast Receivers & Content providers, UI Components- Views & notifications, Components for communication -Intents & Intent Filters	10	CO1
	List of Programs: 1) Using Android SDK display **Hello world** in android.	8	
2	**APPLICATION STRUCTURE AND BASIC UI DESIGN** Activity, Lifecycle of activity, View, View groups, Layouts, Basic controls of screen: Managing orientation, Using basic view: Textview, Button, Edit text box, checkbox and radio button, Event handling for views, Recycler view, Adapter and view holder, Alert dialog, Toast, Date picker, Timepicker	9	CO2
	List of Programs: Design and implement a single screen app that displays information about a small **business**. eg. Restaurant, Book shop etc. . Your design must include: • Business name • Photo of business • Contact information Design and develop a Mobile App for smart phones **The Easy Unit Converter** using Android Design and develop a Mobile App for smart phones **Currency Converter**	9	
3	**INTENTS, SERVICE AND NOTIFICATION** Concept of Intents, Implicit and Explicit intent, Service, Overview of services in Android, Implementing a Service, Service lifecycle, Broadcast Receiver, Notification	8	CO3
	List of Programs: Design an app for **Tourist spot**: With three activities, Welcome page, Display attractions of tourist spot and Webpage of the tourist spot Design an android app play **music** in background	9	
4	**DATA STORAGE AND INTERPROCESS COMMUNICATION** Content Provider, Shared Preferences, Preferences activity, Files access, SQLite database, Threads, AsyncTask	9	CO4, CO5
	List of Programs: Design and develop a Mobile App for smart phones **The Expense Manager** using Android. The application should store all the expenses in a file *2)* Design and develop **Health Monitoring App** using Android. The app will store the blood pressure, blood group and glucose level of patient in SQLite database	9	
5	**ADVANCED ANDROID AND ANDROID APP DEPLOYMENT** Sending SMS using App, Building apps with Location Based Services and Google maps, Building app with Camera Preparing for publishing – Signing & Versioning of apps, Using Google Play	9	

	to distribute & Monetize, Best practices for security and privacy		**CO6**
	List of Programs: Develop an android app to display **Map** of your college locality 2) Develop an android app to alert **SMS** to one given phone number	**9**	

Text Book(s):

1. Reto Meier; Professional Android 2 Application Development; Wiley India Pvt.ltd; 1st Edition; 2012; ISBN-13: 9788126525898.
2. Phillips, Stewart, Hardy and Marsicano; Android Programming, 2nd edition - Big Nerd Ranch Guide;2015; ISBN-13 978-0134171494.

Reference Book(s):

1. Mark Murphy; Beginning Android 3; Apress Springer India Pvt Ltd. ;1st Edition; 2011;ISBN-13: 978-1- 4302-3297-1
2. Eric Hellman; Android Programming – Pushing the limits by Hellman; Wiley; 2013; ISBN 13: 978-1118717370

CIE – Continuous Internal Evaluation : Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	Co-Curricular	Self Study
Marks (Out of 50)	25	15	10	-	-
L1:Remember	2	-	-	-	-
L2:Understand	2	-	-	-	-
L3:Apply	7	4	4	-	-
L4:Analyze	5	4	4	-	-
L5:Evaluate	5	3	2	-	-
L6:Create	4	4	-	-	-

CIE – Continuous Internal Evaluation : Lab (25 Marks)

Blooms Taxonomy	Marks (Out of 25)
L1:Remember	2
L2:Understand	2
L3:Apply	7
L4:Analyze	6
L5:Evaluate	4
L6:Create	4

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1:Remember	4
L2:Understand	4
L3:Apply	14
L4:Analyze	12

L5:Evaluate	8
L6:Create	8

FUNDAMENTALS OF DATA SCIENCE

Course Code : CSE741	**Credits : 04**
L: P: T: S : 3:0:0:1	**CIE Marks : 50**
Exam Hours : 3	**SEE Marks : 50**

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

CO #	COURSE OUTCOMES
CO1	Analyze fundamental concepts of data science.
CO2	Analyze real time data to draw insights for the societal improvement.
CO3	Apply Bayesian model for predicting futuristic data.
CO4	Analyze the data using inferential statistical models to draw insights for the society.
CO5	Evaluate different mathematical models and identify the suitable model for a given application.
CO6	Interpret data using visualization techniques.

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	3	-	-	-	3
CO2	3	3	-	-	-	2	-	-	-	3	-	-	-	3
CO3	3	3	-	-	-	-	-	-	-	3	-	–	–	3
CO4	3	3	-	-	-	2	-	-	-	3	-	-	-	3
CO5	3	3	-	1	-	-	-	–	–	3	-	–	–	3
CO6	3	3	-	-	-	-	-	1	–	3	-	–	–	3

Module No	Module Contents	Hours	COs
1	What is Data Science? Basic Terminology, Why Data Science?, Example – Sigma Technologies, The data science Venn diagram, The math: Example – Spawner-Recruit Models, Computer programming, Data Science terminology, Data science case studies.	**9**	**CO1**
2	Types of data, Structured Vs unstructured data, Quantitative Vs Qualitative data, Four levels of data. Steps of data science, Explore the data with sample data sets.	**9**	**CO2**
3	Introduction to probability: Definition, Bayesian Vs frequentist, compound event, conditional probability, rules of probability, advanced probability, Bayes theorem and its applications, random variables.	**9**	**CO3**
4	Basic statistics: Introduction, how do we obtain and sample data, sampling data, how do we measure statistics, the empirical rule, Advanced statistics: Point estimates, sampling distributions, confidence interval, hypothesis tests.	**9**	**CO4, CO5**

5	Visualization: Communicating data, Identifying effective and ineffective visualizations, when graphs and statistics lie, verbal communications, the why ,how, what strategy of presenting.	**9**	**CO6**

Text Book:
1. "Principles of Data Science", "Sinan Ozdemir", Packt Publishing.

Reference Book(s):
1. Doing Data Science: Straight Talk from the Frontline", "Cathy O'Neil, Rachel Schutt," O'Reilly Media,2013

2. "Data Science from Scratch - First Principles with Python" "Joel Grus" O'Reilly Media, 2015

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Cocurricular- NPTEL
Marks (Out of 50)	25	25
L1: Remember	5	10
L2: Understand	5	1
L3: Apply	10	1
L4: Analyze	5	10
L5: Evaluate	-	1
L6: Create	-	2

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	20
L4: Analyze	10
L5: Evaluate	-
L6: Create	-

CRYPTOGRAPHY AND NETWORK SECURITY

Course Code	**: CSE742**	**Credits**	**: 04**
L: P: T: S	**: 3:0:0:1**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

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

CO1	Understand and learn the security architecture, model and mechanisms to work with classical encryption techniques
CO2	Recognize and apply block cipher design principles and advanced encryptions standards to create secure cryptosystems
CO3	Analyze various public key cryptosystems and their vulnerability to attack, and learn different key exchange mechanisms
CO4	Able to generate digital signatures with Hash and or MAC algorithms for secure Authentication
CO5	Identify some of the factors driving the need for network and system security
CO6	Design security applications in the field of Information technology

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	2	2	2	2	-	1	1	-	-	-	-	-
CO2	3	3	3	3	2	1	1	-	-	-	2	2
CO3	3	3	3	3	2	1	1	-	-	-	-	2
CO4	3	3	3	3	2	1	1	-	-	-	-	2
CO5	2	2	2	3	2	1	1	-	-	-	2	2
CO6	2	2	3	2	3	1	1	-	-	-	2	3

1: Low   2: Medium   3: High

Module No	Module Contents	Hours	COs
1	**Introduction:** Security Trends, The OSI security Architecture, Security-Attacks, Services, Mechanisms, Network Security Model **Classical Encryption Techniques:** Symmetric Cipher Model, Substitution, Transposition Techniques, Steganography	09	CO1
2	**Block Ciphers and Data Encryption Standard:** Block Cipher Principles, DES, Strength of DES, Block Cipher Design Principles, Groups, Rings, Fields, Modular Arithmetic, Euclidean Algorithm, **Advanced Encryption Standard:** Evaluation criteria of AES, The AES Cipher, Multiple Encryption and Triple DES, Block Cipher Modes of Operation, Stream Ciphers and RC4	09	CO2
3	**Public Key Cryptography:** Fermat's and Euler's Theorem, The Chinese Remainder Theorem, Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management- Introduction, Diffie-Hellman Key Exchange, Public Key Cryptosystems-Elliptic Curve Cryptography, Authentication-Requirements, Functions, Message Authentication Codes	09	CO3
4	**Hash and MAC Algorithms:** Hash Functions, Security of Hash Functions and MAC, Secure Hash Algorithm, Whirlpool, HMAC, CMAC **Digital Signatures and Authentication:** Digital Signatures and standards, Authentication Protocols, Authentication Applications-Kerberos, X.509 Service	09	CO4
5	**Network Security Applications:** E-Mail Security-PGP, S/MIME, IP Security-Architecture, Authentication Header, Key Management, Web Security-Considerations, SSL and TL Security, Secure Electronic Transaction **System Security:** Intruders, Malicious Software, Firewalls, Wireless Security, Mobile device security	09	CO5, CO6

Text Book(s):
1. Cryptography and Network Security Principles and Practices, By William Stallings, VI-Edition, Pearson Education

Reference Book(s):
1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford
2. Cryptography and Network Security Principles and Practices, By William Stallings, IV-Edition, Prentice Hall Publications
3. Cryptography and Information Security, V k Pachghare, PHE ,2013.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Cocurricular-NPTEL
Marks (Out of 50)	25	25
L1: Remember	05	-

Blooms Taxonomy		
L2: Understand	05	-
L3: Apply	05	5
L4: Analyze	05	10
L5: Evaluate	-	10
L6: Create	05	-

SEE- Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	10
L4: Analyze	10
L5: Evaluate	-
L6: Create	10

ARTIFICIAL INTELLIGENCE

Course Code	: CSE743	Credits	: 04
L: P: T: S	: 3:0:0:1	CIE Marks	: 50
Exam Hours	: 3	SEE Marks	: 50

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

CO #	COURSE OUTCOMES
CO1	Apply the basic concepts of Artificial Intelligence and the searching techniques for the societal application.
CO2	Analyze different logics to represent knowledge, reasoning patterns in propositional logic and derive the proof from the facts using inference.
CO3	Derive statistical reasoning for incomplete and uncertain Information using bayes theorem.
CO4	Analyze different AI techniques for planning and learning.
CO5	Demonstrate the fundamentals of conceptual dependency, game playing and design scripts.
CO6	Evaluate different phases of natural language processing and connectionist models.

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	3	-	3	-	-
CO2	3	3	3	-	-	-	-	-	-	3	-	-	3	-
CO3	3	3	3	-	-	-	-	-	-	3	-	3	3	-
CO4	3	3	3	-	-	-	-	-	-	3	-	-	-	-
CO5	3	3	3	2	-	-	-	-	-	3	-	-	3	-
CO6	3	3	3	2	-	-	-	-	-	3	-	3	3	1

Module No	Module Contents	Hours	Cos
1	**Introduction and Search techniques :** What is artificial intelligence?, Foundations of AI, Problem solving, Problem Definition and characteristics, Spaces and search, Heuristic search technique –Generate and test, Hill climbing, Best fit search	9	CO1

2	**Knowledge Representation** Knowledge-based agents, The wumpus world as an example world, Logic, propositional logic, Reasoning patterns in propositional logic, Agents based on propositional logic. Syntax and semantics of first-order logic, Using first-order logic, Knowledge engineering in first-order logic.	9	CO2
3	**Reasoning with Uncertainty & Probabilistic Reasoning** Symbolic Reasoning under Uncertainty-Nonmonotonic reasoning implementation of BFS and DFS, Statistical reasoning-Bayes theorem and Bayesian networks, Weak Slot and Filter Structures-semantic nets and frames.	9	CO3
4	**Learning:** Strong slot-and-filler structures-conceptual dependency, scripts, CYC, planning- Components and types, Game Playing, Learning: Forms of Learning, Inductive learning, Learning decision trees, Ensemble learning	9	CO4, CO5
5	**Advanced topics in AI:** Natural Language Processing, Expert Systems, Connectionist models.	9	CO6

Text Books:
1. E. Rich , K. Knight & S. B. Nair - Artificial Intelligence, 3/e, McGraw Hill.
2. Stuart Rusell, Peter Norving , Artificial Intelligence: A Modern Approach, Pearson Education, 3rd Edition.
3. Akira Hanako, Modern Approach to Artificial Intelligence, Volume 1, Clanrye International, 2015

Reference Books:
1. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems –Prentice Hal of India.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem Solving", Fourth Edition, Pearson Education, 2002.
3. Artificial Intelligence and Expert Systems Development by D W Rolston-McGraw hill.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Cocurricular-NPTEL
Marks (Out of 50)	25	25
L1: Remember	5	-
L2: Understand	10	-
L3: Apply	5	5
L4: Analyze	5	10
L5: Evaluate	-	10
L6: Create	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	10
L2: Understand	20
L3: Apply	10
L4: Analyze	10
L5: Evaluate	-
L6: Create	-

REAL TIME OPERATING SYSTEM

Course Code : CSE744		**Credits**	: 04
L: P: T: S : 3:0:0:1		**CIE Marks**	: 50
Exam Hours : 3		**SEE Marks**	: 50

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

CO #	COURSE OUTCOMES
CO1	Relate to Theoretical background and practical knowledge of real-time operating systems.
CO2	Identify multitasking techniques in real-time systems.
CO3	Apply real time scheduling techniques for the given specifications.
CO4	Analyze real time memory management, I/O management and IPC.
CO5	Develop programs for multithreaded applications using suitable Techniques.
CO6	Estimate the impact of real time operating systems on application area.

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	1	-
CO2	2	3	3	2	-	-	-	-	-	-	-	-	1	-
CO3	2	3	3	2	-	-	-	-	-	-	-	-	1	-
CO4	2	3	3	2	-	-	-	-	-	-	-	-	1	-
CO5	2	3	3	2	-	-	-	-	-	-	-	-	1	-
CO6	2	3	3	-	-	-	-	-	-	-	-	-	1	-

Module	Contents of Module	Hours	COs
1	Introduction to Real Time Operating Systems: Multirate Systems, Processes and Threads, Context Switching, Multi tasking, Cooperative Multi-tasking, Pre-emptive Operating Systems structure, Operating system function, Timing requirements on processes, Features of RTOS.	9	CO1, CO2
2	Real Time Task Scheduling: Process state and scheduling, Clock driven and Event driven scheduling, Rate-Monotonic Scheduling, Earliest-Deadline First Scheduling, Fault-Tolerant scheduling.	9	CO3
3	Real-time Memory Management and I/O: Worst case execution time, Intermediate I/O, Shared Memory, ECC Memory, Flash file systems. Multi-resource Services, Blocking, Deadlock and live lock, Critical sections to protect shared resources, Missed deadline, QoS.	9	CO4
4	Inter-process Communication: Process and thread creations, Shared Memory Communication, Semaphores, Message-Based Communication, Shared buffer applications involving inter task / thread communication using multiple threads.	9	CO4, CO5
5	Real-time Kernel: POSIX, Case studies: VxWorks for different application market, Building RTOS image for Target Hardware, Benchmarking RTOS.	9	CO6

Text Books:
1. Real-Time Embedded Systems and Components, Sam Siewert, 2016, Cengage Learning India Edition.
2. Real time operating system –Book 1-The Theory-Jim Cooling,2017, Lindentree Associates

Reference Books:
1. Real Times Systems Theory and Practice, Rajib Mall, 2008, Pearson Education India.
2. Computers as Components Principles of Embedded Computing System Design,3RD Edition, 2013, Wayne Wolf, Morgan Kaufman
3. Real Time System, James W S Liu, 2008, Pearson education.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Cocurricular-NPTEL
Marks (Out of 50)	**25**	25
L1: Remember	5	-
L2: Understand	10	-
L3: Apply	5	5
L4: Analyze	5	10
L5: Evaluate	-	10
L6: Create	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of50)
L1: Remember	10
L2: Understand	20
L3: Apply	10
L4: Analyze	10
L5: Evaluate	
L6: Create	

CYBER CRIME, FORENSICS AND LAW

Course Code	: CSE745	Credits	: 04
L: P: T: S	: 3:0:0:1	CIE Marks: 50	
Exam Hours	: 3	SEE Marks: 50	

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

CO #	COURSE OUTCOMES
CO1	Analyze the various types of cybercrimes and cybercriminals.
CO2	Interpret the importance of tools and methods used in cybersecurity.
CO3	Apply cyber laws to investigate cybercrimes.
CO4	Develop solutions to societal problems using forensics techniques.
CO5	Analyze various cyber forensic investigation tools and methods.
CO6	Evaluate the methods for data recovery and evidence collection.

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	3	-	1	2	-	2	-	-	-	-	-	-	-	-

CO5	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO6	3	3	-	2	-	2	-	-	-	-	-	-	-	-

Module No	Module Contents	Hours	Cos
1	**Introduction to Cybercrime-** Cybercrime: Definition and origins of the word, Cybercrime and Information Security, Who are Cybercriminals ?, Classification of Cybercrimes, Categories of Cybercrime, How criminals plan the Attacks, Social engineering, Cyberstalking, Cybercafe and Cybercrimes	9	CO1
2	**Tools and Methods used in Cybercrime-**Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL injection, Buffer Overflow, Attacks on wireless Networks, Methods of phishing, Phishing techniques, Spear Phishing, Types of Phishing Scams, Phishing Toolkits and Spy Phishing, Phishing countermeasures	9	CO2
3	**Cybercrimes and Cybersecurity: The Legal Perspectives –**Cybercrime and the Legal Landscape around the world, Why do we need Cyberlaws: The Indian Context, The Indain IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of not addressing the weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and punishment, Cyberlaw, technology and students: Indian Scenario.	9	CO3
4	**Understanding Computer Forensics-**Digital forensics science, The need for Computer Forensics, Cyberforensics and Digital Evidence, Forensics Analysis of E-mail, Digital Forensics Life cycle, Chain of custody concept, Network Forensics, Approaching a Computer Forensics Investigation,Computer Forensics and steganography, Relevance of the OSI 7 layer model to Computer Forensics, Forensics and social networking sites, Challenges in computer forensics, special tools and techniques, Antiforensics	9	CO5
5	**Forensics of Hand-held devices-**Understanding Cell phone working characteristics, Hand-held devices and digital forensics, Toolkits for Hand-Held device forensics, forensics of iPods and Digital Music devices, An illustration on real life use of forensics, Techno-Legal Challenges with Evidence from Hand-held devices, Organizational Guidelines on Cell phone forensics	9	CO3, CO6

Text Book(s):
1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and LegalPerspectives, by Nina Godbole and Sunit Belapure, Wiley.

Reference Book(s):
1. Guide to Computer Forensics and Investigations (4th edition). By B. Nelson, A. Phillips, F. Enfinger, C. Steuart. ISBN 0-619-21706-5,Thomson, 2009
2. Cyber Crime and Cyber Terrorism Investigator's Handbook By Babak Akhgar, AndrewStaniforth, Francesca Bosco. ISBN: 978-0-12-800743-3, Elsevier, 2014
3. Websites and indiancyber law by Sai sushanth, Kindle edition, 2015

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Cocurricular - NPTEL
Marks (Out of 50)	25	25
L1: Remember	5	1
L2: Understand	10	1
L3: Apply	5	2
L4: Analyze	5	1
L5: Evaluate	-	10
L6: Create	-	10

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	10
L4: Analyze	10
L5: Evaluate	10
L6: Create	-

INTERNET OF THINGS

Course Code	: CSE746	Credits	: 04
L: P: T: S	: 3:0:0:1	CIE Marks	: 50
Exam Hours	: 04 Hours	SEE Marks	: 50

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

CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.
CO2	Compare and contrast the deployment of smart objects and the technologies to connect them to network.
CO3	Appraise the role of IoT protocols for efficient network communication.
CO4	Elaborate the need for Data Analytics and Security in IoT.
CO5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	-	-	1	-	1	-	1	-	1	-	1
CO2	1	1	1	-	-	1	-	1	-	-	-	1	-	1
CO3	1	1	2	1	-	1	-	-	-	-	-	1	-	1
CO4	2	1	2	2	-	1	-	-	-	-	-	1	-	1
CO5	1	1	2	-	2	2	2	-	1	1	2	1	-	1

Module No	Module Contents	Hours	COs
1	What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack	9	CO1
2	Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies	9	CO2
3	IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods	9	CO3
4	Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment	9	CO4
5	IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples	9	CO5

Text Book(s):
1. 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 (Cisco Press Indian Reprint). (ISBN: 978- 9386873743)
2. Srinivasa K G, "Internet of Things",CENGAGE Leaning India, 2017

Reference Book(s):
1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",
1st Edition, VPT, 2014. (ISBN: 978-8173719547)
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Cocurricular-NPTEL
Marks (Out of 50)	**25**	25
L1: Remember		-
L2: Understand		-
L3: Apply	10	5
L4: Analyze	5	10
L5: Evaluate	5	10
L6: Create	5	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	5
L2: Understand	5
L3: Apply	15
L4: Analyze	15
L5: Evaluate	5
L6: Create	5

MINI PROJECT

Course Code: CSE76   **Credits   : 2**
L: P: T: S   : 0:2:0:0   **CIE Marks   : 25**
Exam Hours: 3   **SEE Marks   : 25**

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

CO #	COURSE OUTCOMES
CO1	Identify societal problems and classify under different domains of computer science and engineering.
CO2	Demonstrate the ability to locate and use technical information from multiple sources.
CO3	Analyze existing literature and formulate the problem statement.
CO4	Formulate an algorithm to solve the problem.
CO5	Develop models for the proposed system.
CO6	Demonstrate their communication skill effectively with technical presentation.

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	3	-	-	3	3	1	-	-	3
CO2	3	3	-	-	-	3	-	-	3	3	-	-	-	3
CO3	3	3	-	-	-	3	-	1	3	3	-	-	-	3
CO4	3	3	2	-	2	-	-	-	3	3	-	1	2	3
CO5	3	3	2	-	2	-	-	-	3	3	-	-	2	3
CO6	-	-	-	-	-	-	-	-	3	3	-	-	-	3

The student shall be capable of identifying a problem related to the field of Computer Science and Engineering and carry out a mini project on the problem defined. Each student is expected to do the

mini project individually. The code developed towards the project will be reviewed by a panel of experts during the course of the semester. Plagiarized projects will automatically get an **"F" GRADE** and the student will be liable for further disciplinary action. At the completion of a project the student will submit a project report, which will be evaluated by duly appointed examiner(s).

Evaluation Stages:

Activity	Evaluation Attribute
Synopsis Submission	Problem Statement
Review-I	Algorithm of the project and outline design of project
Review-II	Partial code development and or partial execution
Review-III	Final Implementation PPT(10-12 slides) + Results verification + Report Submission in defined format

Sample Mini Projects (Mobile based Applications):
1) Pizza Delivery
2) GPS based Search
3) Hospital Management
4) Billing Management system
5) Interdisciplinary application

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Taxonomy Marks (Out of 25)	Mini Project
Remember	
Understand	5
Apply	5
Analyze	5
Evaluate	5
Create	5

SEE – Semester End Examination (25 marks)

Bloom's Taxonomy	Mini Project
Remember	-
Understand	5
Apply	5
Analyze	5
Evaluate	5
Create	5

Course Code: CSE77	**Credits**	**: 4**
L: P: T: S : 0:4:0:0	**CIE Marks**	**: 50**
Exam Hours : 3	**SEE Marks**	**: 50**

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

CO #	COURSE OUTCOMES
CO1	Identify societal problems and classify under different domains of computer science and engineering.
CO2	Demonstrate the ability to locate and use technical information from multiple sources.
CO3	Analyze existing literature and formulate the problem statement.
CO4	Formulate an algorithm to solve the problem.
CO5	Develop models for the proposed system.
CO6	Demonstrate their communication skill effectively with technical presentation.

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	3	-	-	3	3	1	-	-	3
CO2	3	3	-	-	-	3	-	-	3	3	-	-	-	3
CO3	3	3	-	-	-	3	-	1	3	3	-	-	-	3
CO4	3	3	2	-	2	-	-	-	3	3	-	1	2	3
CO5	3	3	2	-	2	-	-	-	3	3	-	-	2	3
CO6	-	-	-	-	-	-	-	-	3	3	-	-	-	3

This course will be conducted largely as group of 1-3 students members under the direct supervision of a member of academic staff. Students will be required to

1) Identify the Problem and choose the specific project topic which will reflect the commoninterests and expertise of the student and supervisor.
2) Perform a literature search to review current knowledge and developments in the chosentechnical area.
3) Conduct a Feasibility study of the Project.
4) Submit the main Project Proposal.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Project
Marks (Out of 50)	-
Remember	-
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	10

SEE – Semester End Examination (50 marks)

Bloom's Taxonomy	Project
Marks (Out of 50)	-
Remember	-
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	10

EIGHTH SEMESTER SYLLABUS

CSE81 - OBJECT ORIENTED ANALYSIS AND DESIGN

Course Code	**: CSE81**	**Credits**	**: 05**
L:P:T:S	**: 3:0:1:1**	**CIE Marks**	**: 50**
Exam Hours	**: 3 Hrs**	**SEE Marks**	**: 50**

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

CO #	COURSE OUTCOMES
CO1	Analyze the importance of Object Oriented Development and UML models in software development life cycle.
CO2	Analyze the business requirements; transform them into design specific layout using use case and interaction models.
CO3	Apply the unified modeling language notations to develop the system designs.
CO4	Design interaction diagrams for modeling the dynamic aspects of a software system.
CO5	Develop the models for implementation, testing and deployment.
CO6	Explain the current trends in system development.

Mapping of Course Outcomes to Program Outcomes and Program Specific Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	3	-	-	-	-	-	3	-	1	-	3
CO3	3	3	3	3	3	-	-	-	-	3	-	-	-	3
CO4	3	3	3	3	3	-	-	-	-	3	-	-	2	3
CO5	3	3	3	3	3	-	-	-	-	3	-	-	2	-
CO6	3	-	-	-	-	-	-	-	-	3	-	-	2	-

Module No	Module Contents	Hours	COs
1	**Object oriented Development and Modeling** **Object-oriented Development and the Unified Process** Overview, The System Development Life Cycle, Methodologies, Models, Tools and Techniques, The Unified Process as a System Development Methodology, The UP Disciplines, Overview of Object-oriented concepts, tools to support Systems Development, Case studies. **Modeling and the Requirements Discipline** Overview, The Requirements discipline in more detail, System requirements, Models and Modeling, Techniques for Information Gathering, Validating the requirements, Case studies.	9	CO1

2	**Use Cases, Domain Classes and Use Case Modeling Use Cases and Domain Classes** Overview, Events and Use Cases, Problem Domain Classes, The Class Diagram, Locations and the CRUID Matrix, Use Cases, Domain Model and Iteration Planning, Case Studies. **Use Case Modeling and Detailed Requirements** Overview, Detailed Object-oriented Requirements Definitions, System Processes- A Use Case/ Scenario View, Identifying Inputs and Outputs- The System Sequence Diagram, Identifying object Behavior- The State chart Diagram, Integrating Object-Oriented Models, Case Studies.	9	CO2
3	**Design Activities and Environments** Overview, Moving from Business Modeling to Requirements to design, Understanding the Elements of Design, Design Discipline Activities, Project Management- Coordinating the Project, Deployment Environment, Software Architecture, Network Design, Case studies.	9	CO3
4	**Use Case Realization** Overview, Object- Oriented Design –The Bridge between Requirements and Implementation, Design Classes and Design Class Diagrams, Interaction Diagrams – Realizing Use Cases and Defining Methods, Designing with Communication Diagrams, Updating the Design Class Diagram, Package Diagrams – Structuring the Major Components, Implementation Issues for Three-Layer Design, Case Studies.	8	CO4
5	**Implementation, Testing and Deployment Disciplines Making the System Operational** Overview, Implementation, Testing, Configuration and Change Management, Deployment, Planning and Managing Implementation, Testing, and Deployment, Case Studies. **Current Trends in System Development** Overview, Software Principles and Practices, Adaptive Approaches to Development, Model-Driven Architecture – Generalizing Solutions, Frameworks and Components, Case Studies. **Legacy System** Reverse Engineering, Building the interaction model, Building the class model, Building the state model, Wrapping, Maintenance.	10	CO5, CO6

Text Book(s):
1. John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Object-Oriented Analysis and Design with the Unified Process, Cengage Learning.
2. Michael Blaha, James Rumbaugh, Object Oriented Modeling and design with UML, 2nd edition, Pearson education, 2005.

Reference Book(s):
1. Practical Object oriented Design with UML- Mark Priestley, 2nd edition, Tata McGraw- Hill,2003
2. The Unified Modeling Language User Guide- Grady Booch, James Rumbaugh and Ivar Jacobson, 2nd edition, Pearson, 2005.
3. Object-Oriented Systems Analysis and Design Using UML- Simon Bennett, Steve McRobb and Ray farmer, 2nd Edition, Tata McGraw-Hill, 2002.

SELF STUDY

The student shall identify an emerging topic related to Object Oriented Analysis and Design to carry out a self-study on the problem defined. Topic should be socially relevant and research oriented ones. On the completion student will submit a report, which will be evaluated.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	Self Study
Marks (Out of 50)	25	10	05	10
L1: Remember	2	-	-	-
L2: Understand	2	5	-	-
L3: Apply	10	5	-	10
L4: Analyze	7	-	-	-
L5: Evaluate	2	-	-	-
L6: Create	2	-	5	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	-
L2: Understand	10
L3: Apply	10
L4: Analyze	10
L5: Evaluate	10
L6: Create	10

DATA MINING AND MACHINE LEARNING

Code : CSE82		Credits	: 04
L:P:T:S : 3:0:0:1		CIE Marks	: 50
Exam Hours: 3 Hrs		SEE Marks	: 50

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

CO #	COURSE OUTCOMES
CO1	Identify various data mining principles and techniques with different applications.
CO2	Apply pre-processing and association rule mining techniques for large data.
CO3	Create clusters using different clustering techniques for performing real-time analysis on common societal data.
CO4	Classify large dataset into different groups by applying various classification techniques.
CO5	Categorize different learning techniques and propose solutions to various real time and social impact problems.
CO6	Make use of neural network and genetic algorithms to investigate and solve problems from different engineering sectors.

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	1	-	3
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	3
CO3	3	3	3	-	-	2	-	-	-	-	-	-	-	3
CO4	3	3	3	-	-	-	-	-	-	-	-	-	-	3
CO5	3	3	3	-	-	2	-	-	-	-	-	-	-	3
CO6	3	3	3	1	-	-	-	-	-	-	-	-	-	3

Module No	Module Contents	Hours	Cos
1	**Introduction:** What is Data, Data-Types, What is data mining, Why Data Mining, What kinds of data can be mined, What kinds of patterns can be mined, Which Technologies Are used, Which kinds of Applications are targeted, Major issues in data mining.	8	CO1
2	**Data Pre-processing:** An overview, Data cleaning, Data integration, Data reduction, Data transformation and data discretization. **Mining Frequent Patterns, Associations and Correlations:** Basic Concepts, Confidence and support, Apriori algorithm, FP Growth Algorithm.	10	CO2
3	**Classification:** Basic Concepts, Decision tree induction, Bayes Classification, Rule-Based classification. **Cluster Analysis:** Requirements for cluster analysis, overview of basic clustering methods, K-means, k-medoids Algorithms.	10	CO3,CO4
4	**Introduction to Machine Learning:** What is Machine Learning, difference between supervised and unsupervised learning techniques? **Concept Learning And Decision Learning**: Learning Problems, Designing Learning systems, Perspectives and Issues. **Concept Learning:** Find-S-finding a maximally specific hypothesis-Version Spaces and Candidate Elimination Algorithm. **Decision Learning:** ID3, CART, C4.5 Algorithms.	9	CO5
5	**Artificial Neural networks:** Neural Network representation, Perceptrons, Multi Layer networks and the Back propagation Algorithm and problems. **Genetic algorithms:** Motivation, Representing hypotheses, Genetic operators, Fitness function and selection, An illustrative example.	8	CO6

Text Book(s):

1. Data Mining Concepts &Techniques –by Jaiwei Han ,Micheline Kamber,Jian Pei 3rd Edition,MK publisher.
2. Machine Learning-by Tom M.Mitchell ,Mc Graw Hill Education ,2013.

Reference Book(s):

1. Discovering Knowledge in Data: An introduction to Data Mining, Daniel T.Larose, John Wiley, 2nd Edition, 2014
2. Introduction to Machine Learning-Ethem Alpaydin,3rd Edition,PHI publications.
3. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	Self Study
Marks (Out of 50)	25	10	05	10
L1: Remember	5	-	-	
L2: Understand	5	-	-	5
L3: Apply	5	5	2.5	5
L4: Analyze	5	5	2.5	
L5: Evaluate	5	-	-	
L6: Create	-	-	-	

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	10
L4: Analyze	10
L5: Evaluate	10
L6: Create	-

INTERNSHIP

Course Code	: CSE83	**Credits**	: 16
L: P: T: S	: 0:16:0:0	**CIE Marks**	: 50
Exam Hours	: 3	**SEE Marks**	: 50

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

CO #	COURSE OUTCOMES
CO1	Make use of theoretical background and knowledge of current trend in technologies
CO2	Identify techniques to work and gain knowledge
CO3	Develop the skills in designing and learn to do coding for application.
CO4	Analyze real time working and developing code for the projects
CO5	Demonstrate working of code using suitable platform.
CO6	Demonstrate their communication skill effectively with technical presentation.

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	-	1
CO2	3	3	-	2	-	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	2	3	-	-	2	3	-
CO4	3	3	2	2	-	-	-	2	3	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	3	2	-	-	3	-
CO6	-	-	-	-	-	-	-	-	3	2	-	-	3	-

This course will be conducted individual student under the direct supervision of a member of academic staff. The specific project topic undertaken will reflect the common interests and expertise of the student and supervisor. Students will be required to

1) Undertake the detailed technical work in the chosen area.
2) Design the Architecture of the System
3) Produce progress reports or maintain a professional journal to establish work completed, and to schedule additional work within the time frame specified for the project.
4) Prepare an interim report describing the work undertaken and results obtained so far
5) Demonstrate the Complete working of the Project with results of all modules.
6) Present the work in a forum involving poster presentations and demonstrations of operational hardware and software.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Project
Marks (Out of 50)	
Remember	
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	10

SEE – Semester End Examination (50 marks)

Bloom's Taxonomy	Project
Marks (Out of 50)	
Remember	
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	10

PROJECT PHASE-2

Course Code: CSE84   **Credits: 12**
L: P: T: S : 0:12:0:0   **CIE Marks :50**
Exam Hours : 03   **SEE Marks: 50**

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

CO #	COURSE OUTCOMES
CO1	Review the literature and develop solutions for framed problem statement.
CO2	Apply different software development process models in design and development of the project.
CO3	Use latest technologies and tools in implementing software package system for identified problems.
CO4	Test and evaluate the performance and functionality of the modules planned.
CO5	Demonstrate working model of the developed solution.
CO6	Demonstrate their communication skill effectively with technical presentation.

Course Outcomes to Program Outcomes Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	-	1	1	3	3	3	2	3	3	3
CO2	3	3	3	3	3	-	-	3	3	3	-	3	3	3
CO3	3	-	3	3	3	-	-	3	3	3	2	3	3	3
CO4	3	3	3	3	3	-	-	-	3	3	-	3	3	3
CO5	3	-	-	-	-	-	-	-	3	3	-	-	-	3
CO6	-	-	-	-	-	-	-	-	3	3	-	-	-	3

This course will be conducted largely as group of 1-3 student members under the direct supervision of a member of academic staff. The specific project topic undertaken will reflect the common interests and expertise of the student and supervisor. Students will be required to

1. Undertake the detailed technical work in the chosen area.
2. Design the Architecture of the System
3. Produce progress reports or maintain a professional journal to establish work completed, and to schedule additional work within the time frame specified for the project.
4. Prepare an interim report describing the work undertaken and results obtained so far
5. Demonstrate the Complete working of the Project with results of all modules.
6. Present the work in a forum involving poster presentations and demonstrations of operational hardware and software.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy Marks (Out of 50)	Project
Remember	-
Understand	05
Apply	10
Analyze	10
Evaluate	10
Create	15

SEE – Semester End Examination (50 marks)

Bloom's Taxonomy Marks (Out of 50)	Project
Remember	-
Understand	05
Apply	10
Analyze	10
Evaluate	10

APPENDIX A

Outcome Based Education

Outcome-based education (OBE) is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience each student should have achieved the goal. There is no specified style of teaching or assessment in OBE; instead classes, opportunities, and assessments should all help students achieve the specified outcomes.

There are three educational Outcomes as defined by the National Board of Accreditation:

Program Educational Objectives: The Educational objectives of an engineering degree program are the statements that describe the expected achievements of graduate in their career and also in particular what the graduates are expected to perform and achieve during the first few years after graduation. [nbaindia.org]

Program Outcomes: What the student would demonstrate upon graduation. Graduate attributes are separately listed in Appendix C

Course Outcome: The specific outcome/s of each course/subject that is a part of the program curriculum. Each subject/course is expected to have a set of Course Outcomes

Mapping of Outcomes

COURSE OUTCOME

↓

PROGRAM OUTCOME

↓

PROGRAM EDUCATIONAL OBJECTIVES

↓

DEPARTMENTAL MISSION

↓

DEPARTMENTAL VISION
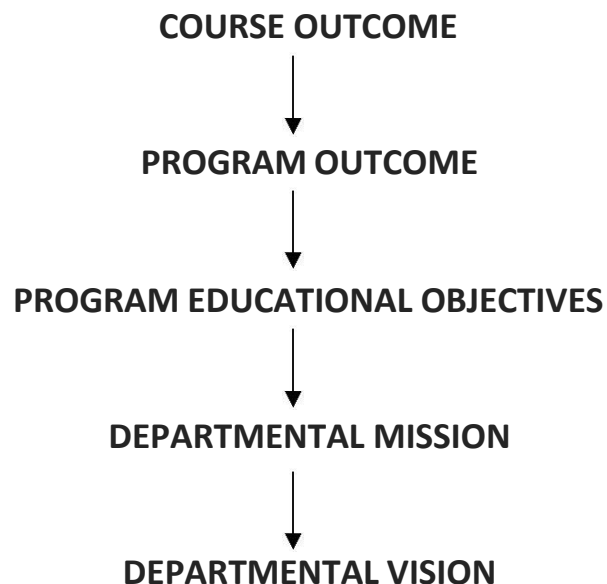
APPENDIX B

The Graduate Attributes of NBA

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: The problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions that require consideration of appropriate constraints/requirements not explicitly given in the problem statement (like: cost, power requirement, durability, product life, etc.) which need to be defined (modeled) within appropriate mathematical framework that often require use of modern computational concepts and tools.

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

BLOOM'S TAXONOMY

Bloom's taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. Educators have typically used Bloom's taxonomy to inform or guide the development of assessments (tests and other evaluations of student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies. **[eduglosarry.org]**

Bloom's Taxonomy

create — Produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate

evaluate — Justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh

analyze — Draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

apply — Use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

understand — Explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

remember — Recall facts and basic concepts
define, duplicate, list, memorize, repeat, state

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