

Shroff S.R. Rotary Institute of Chemical Technology

Ref: UPL University /SRICT/BOS/CO/2022-23/02

Date: 30-01-2023

Teaching Scheme for Third Year Bachelor of Computer Engineering

Semester-V (Computer Engineering) Structure

Sr. No	Category of Course	Code No.	Course Title	Hours per week			Total contact hrs/ week	Credits	E	M	I	V	Total
				L	T	P							
1	Humanities & SocialScience	CO2301	Economics & Business Management	3	0	0	3	3	70	30	0	0	100
2	Professional CoreCourse	CO2302	Data Mining	3	0	2	5	4	70	30	20	30	150
3	Professional CoreCourse	CO2303	Design & Analysis of Algorithm	3	0	2	5	4	70	30	20	30	150
4	Professional CoreCourse	CO2304	Web Technologies	3	0	2	5	4	70	30	20	30	150
5	Professional ElectiveCourse		Professional Elective 2	2	0	2	4	3	70	30	20	30	150
6	Open Elective		Open Elective 1	2	0	2	4	3	70	30	20	30	150
7	Mandatory Course	MH2301	CPDP 1	1	1	0	2	2	50	30	20	0	100
8	Inplant Training	MH2303	Industrial Internship	0	0	0	0	1	0	0	50	0	50
Total				17	1	10	28	24	Total				1000

Professional Elective 2			Open Elective 1		
Sr No	Code No.	Course Title	Sr No	Code No.	Course Title
1	CO2305	Information Security	1	CO2307	Computer Graphics
2	CO2306	Advanced Java Programming	2	CO2308	Microprocessor & Interfacing

Shroff S.R. Rotary Institute of Chemical Technology

Semester-VI (Computer Engineering) Structure

Sr. No	Category of Course	Code No.	Course Title	Hours per week			Total contact hrs / week	Credits	E	M	I	V	Total
				L	T	P							
1	Professional Core Course	CO2309	Theory of Computation	3	0	0	3	3	70	30	0	0	100
2	Professional Core Course	CO2310	Artificial Intelligence	3	0	2	5	4	70	30	20	30	150
3	Professional Elective Course		Professional Elective 3	2	0	2	4	3	70	30	20	30	150
4	Professional Elective Course		Professional Elective 4	3	0	2	5	4	70	30	20	30	150
5	Open Elective		Open Elective 2	3	0	2	5	4	70	30	20	30	150
6	Open Elective		Open Elective 3	3	0	2	5	4	70	30	20	30	150
7	Mandatory Course	MH2302	CPDP 2	1	1	0	2	2	50	30	20	0	100
Total				18	1	10	29	24	Total			950	

Professional Elective 3			Professional Elective 4			Open Elective 2			Open Elective 3		
Sr No	Code No.	Course Title	Sr No	Code No.	Course Title	Sr No	Code No.	Course Title	Sr No	Code No.	Course Title
1	CO2311	Advance Technologies	1	CO2313	Mobile Computing	1	CO2315	Big Data Analytics	1	CO2317	Internet of Things
2	CO2312	.Net Programming	2	CO2314	Data Visualization	2	CO2316	Image Processing	2	CO2318	Cyber Security

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A. Course code and definition:

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical
E	Theory External Examination Marks
M	Theory Internal Examination Marks
I	Practical Internal Examination Marks
V	Practical External Examination Marks

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2301
Subject Name: Economics & Business Management

Semester: - V

Type of course: Humanities & Social Science

Prerequisite: Basic knowledge of Social Sciences.

Rationale: Understanding of basic principles of modern economics and its application in various field of engineering.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction Definition of Economics-by different economist (Science of Wealth, Science of Scarcity, Science of Human Behavior & Science of Sustainability). Basics of Economics, Differences between Micro and Macro Economics.	4
2	Basic Terms of Economics Relationship Between Demand And Supply, Price & Supply Curve, Price & Demand Graph, Demand & Supply Curve, Operation Of Invisible Hand By Smith. Definition Of Gdp, Gnp, Ndp, Nnp, Per Capita Income, And Factor Cost & Market Cost.	6
3	National Income Meaning of National Income. Calculate NI. Methods of calculation national income(Income Methods, Production Method, Expenditure Method)	4

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Bachelor of Engineering
Subject Code: CO2301
Subject Name: Economics & Business Management

SECTION-B		
4	Indian Banking System History of Indian Banking System, Types of Bank, Reserve Bank Of India and its monetary policy in economics. Quantitative Approach and Qualitative Approach Used By Rbi To Control Economy In India, Different Rates Of Rbi, Repo Rates, Reverse Repo Rate, Msf Rates, Psl. Moral Suation And Direct Action.	4
5	Introduction to Business Management Definition of Management, Organizational Behavior – Utility function, Rate of commodity substitution, Maximization of utility, Demand functions, Price and Income elasticity’s of demand, Indifference Curve Analysis, Substitution and income effects, Consumer’s surplus. Monopoly and Monopolistic Competition. Duopoly and Oligopoly. Organization Design and Structure - Organization – Meaning, Process, Principles, Or Organization Structure – Determinants and Forms: Line, Functional, Line & Staff, Project, Matrix and Committees; Formal and Informal Organization; Departmentation – Meaning and Bases.	8
6	Planning and Decision Making Planning: Nature, importance, forms, types, making planning effective, Significance & Limitations of Planning; Planning Premises – Meaning & Types, Strategic Planning – Meaning & level, BCG model etc, MBO – Meaning, Process, Importance of decision making – Meaning, Types, Process, Schools of decision making.	4

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	40	35	15	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom’s Taxonomy)

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2301
Subject Name: Economics & Business Management

Text Book:

1. Indian Economy, 12th Edition, by Ramesh Singh 2020-21, Mc Graw Hill.
2. Weihrich and Koontz, et al: Essentials of Management; Tata McGraw Hill

Reference Books:

1. Modern Economics by Ahuja HL, Sultan Chand Publication.
2. Robbins, S. P: Management, Prentice Hall.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Understand the basics of Economics.
CO-2	Analyze the classification of economics based on the terms evolved in economic.
CO-3	Apply the knowledge of taxation based on which one given.
CO-4	Understand the basic of banking system and the main role of RBI.
CO-5	Evaluate the importance of calculating National Income.
CO-6	Remember the meaning of Inflation and Deflation.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2302
Subject Name: Data Mining

Semester: - V

Type of course: Professional Core

Prerequisite: Knowledge of RDBMS and OLTP

Rationale: To understand the need for Data Mining and advantages to the business world. To get a clear idea of various classes of Data Mining techniques, their need, scenarios (situations) and scope of their applicability. To learn the algorithms used for various type of Data Mining problems

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction to data mining (DM) Motivation for Data Mining, Data Mining, Definition and Functionalities, Classification of DM Systems, DM task primitives, Integration of a Data Mining system with a Database or a Data Warehouse, Issues in DM-KDD Process.	6
2	Data Pre-processing Data summarization, data cleaning, data integration and transformation, data reduction, data discretization and concept hierarchy generation, feature	8

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Bachelor of Engineering
Subject Code: CO2302
Subject Name: Data Mining

	extraction , feature transformation, feature selection, introduction to Dimensionality Reduction, CUR decomposition.	
3	Concept Description, Mining Frequent Patterns, Associations and Correlations Concept description, Data Generalization and summarization based characterization, Attribute relevance, class comparisons, Basic concept, efficient and scalable frequent item set mining methods, mining various kind of association rules, from association mining to correlation analysis.	7
SECTION-B		
4	Classification and Prediction Classification vs. prediction, Issues regarding classification and prediction, Statistical Based Algorithms, Distance Based Algorithms, Decision Tree Based Algorithms, Neural Network Based Algorithms, Rule Based Algorithms, Combining Techniques, accuracy and error measure.	6
5	Neural Network Prediction Methods Linear and nonlinear regression, Logistic Regression Introduction of tools such as DB Miner / WEKA / DTREG DM Tools	4
6	Cluster Analysis Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering -K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering, Strengths and Weakness; Outlier Detection, Clustering high dimensional data, clustering Graph and Network data.	8

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	35	25	20	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2302
Subject Name: Data Mining

Text Books:

1. Data Mining Concepts and Techniques by Jiawei Han and Micheline Kamber Kaufmann Publishers, 2011.
2. Data Mining Techniques by Arun K Pujari Orient Longman Publishers.
3. Fundamentals of Data Warehouses by M.Jarke, M Lenzerni.
4. Principles of Data Mining by David Hand, Heikki Mannila, Padhraic Smyth, PHI.

Reference Books:

1. Data Mining Concepts and Techniques by J. Han, M. Kamber, Morgan Kaufmann .
2. Data mining: Concepts, models, methods and algorithms by M. Kantardzic,, John Wiley & Sons Inc.
3. Data Mining: Introductory and Advanced Topics by M. Dunham, Pearson Education.

List of Practicals:

Tools: Data Mining using 'R' Programming / Python

1. Create your own data set (like customer, weather, agriculture etc.), load it and apply any pre-processing technique and clean the data, show results.
 - a. Clean missing values
 - b. Remove Data
2. Pre-process and classify any data set like customer, agriculture, weather etc.
3. Create your own data set and load it and apply any pre-processing technique and perform Data Smoothing using Binning
4. Pre-process and classify any data set like customer, agriculture, weather etc. Implement Decision Tree algorithm by taking appropriate data set and predict the result.
5. Pre-process and classify any data set like customer, agriculture, weather and Calculate entropy and information gain.
6. Implement Association mining algorithm by taking appropriate data set and find support and confidence.

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Bachelor of Engineering
Subject Code: CO2302
Subject Name: Data Mining

7. Implement K-medoids algorithm by taking appropriate data set and predict the result.
8. Implement Naive Bayesian algorithm taking any dataset of your choice and predict the result.
9. Implement CART algorithm by taking appropriate data set and predict the result.
10. Implement K-Nearest Neighbor algorithm by taking appropriate data set and predict the result.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Understand the preprocessing of data and apply mining techniques on it
CO-2	Identify the association rules, classification, and clusters in large data sets.
CO-3	Analyze and solve real world problems in business and scientific information using data mining.
CO-4	Create data analysis tools for scientific applications
CO-5	Apply various supervised machine learning algorithms
CO-6	Formulate various machine learning approach to solve the complex problem.

List of Open Source Software/learning website:

1. Vlabs.iitb.ac.in
2. <https://nptel.ac.in/courses/106105175/>
3. www.coursera.org

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2303
Subject Name: Design & Analysis of Algorithm

Semester: - V

Type of course: Professional Core

Prerequisite: Data Structure & Basic Programming

Rationale: Understanding of basic principles of Engineering is required in various field of engineering.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Basic Concepts of Algorithms Notion of Algorithm, Fundamentals of Algorithmic Solving, Asymptotic Notations and Basic Efficiency Classes, Mathematical analysis of non-recursive algorithms. Mathematical analysis of recursive algorithm: recurrence relations, solution of recurrence relations using substitution method	6
2	Divide and Conquer Strategy Basic algorithm and characteristics, Binary Search: method and analysis of binary search for best, worst and average case for searches, Quick Sort, Merge Sort: method and analysis of algorithms, Finding the largest and smallest number in a list, Matrix Multiplication.	9

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2303

Subject Name: Design & Analysis of Algorithm

3	<p>Greedy Approach The Greedy Method: basic algorithm and characteristics, Fractional Knapsack Problem solving using greedy method, Optimal merge patterns and optimal storage on tapes, Job Sequencing with deadlines, Huffman Coding: greedy method, Minimum cost spanning trees: Prim's and Kruskal's Algorithm, Single source shortest path.</p>	5
SECTION-B		
4	<p>Dynamic Programming Dynamic Programming Method: basic algorithm and characteristics, 0/1 Knapsack Problem solving using DP method, Multistage graphs, Optimal binary search trees, Travelling salesperson problem.</p>	11
5	<p>Backtracking, Branch and Bound Basic algorithm and characteristics, Solving n-queens problem, Sum of subsets problem, Graph coloring, Hamiltonian cycle (TSP). Branch and bound: basic algorithm and characteristics, solving n-queens using branch & bound, FIFO Branch and Bound & Least Cost Branch & Bound, Least Cost Search, 15-puzzle, Solving Travelling salesperson problem using branch & bound.</p>	3
6	<p>Introduction to NP-Completeness The class P and NP, Polynomial reduction, NP- Completeness Problem, NP-Hard Problems. Travelling Salesman problem, Hamiltonian problem, Approximation algorithms.</p>	5

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	30	30	20	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

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Bachelor of Engineering
Subject Code: CO2303
Subject Name: Design & Analysis of Algorithm

Text Book:

1. Fundamentals of algorithms by Horowitz E, Sahini S, Rajasekaran S., University Press 2008.

Reference Books:

1. Algorithm Design, Jon Kelinberg and Eva Tardos, 1st Edition, by Pearson Education 2014.
2. Design & Analysis of Algorithms, by Gajendra Sharma, Khanna Book Publishing 2018.
3. An introduction to analysis of algorithms, R. Sedgewick, 1st edition, by Pearson Education 1996.

List of Practicals:

1. Implementation and Time analysis of Bubble sort.
2. Implementation and Time analysis of Selection sort & Insertion sort.
3. Implementation and Time analysis of Quick sort.
4. Implementation and Time analysis of Merge sort.
5. Implementation and Time analysis of searching algorithm.
6. Implementation of shortest path algorithm.
7. Implementation of Minimum Cost Spanning Tree.
8. Implementation of backtracking.
9. Implementation of greedy algorithm.
10. Implementation of a dynamic programming.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Design algorithms to appreciate the impact of algorithm design in practice.
CO-2	Understand different complexity classes.
CO-3	Apply the best data structure for designing an algorithm to solve a given problem.

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Bachelor of Engineering

Subject Code: CO2303

Subject Name: Design & Analysis of Algorithm

CO-4	Evaluate different algorithms with respect to time and space complexity.
CO-5	Analyze the concept of dynamic programming & apply the concept to demonstrate NP completeness.
CO-6	Demonstrate different computational problems.

List of Open Source Software/learning website:

1. [Vlabs.iitb.ac.in](http://vlabs.iitb.ac.in)
2. <https://nptel.ac.in/courses/106101060>

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2304
Subject Name: Web Technologies

Semester: - V

Type of course: Professional Core

Prerequisite: Basic knowledge of HTML and basic structure of web applications and services.

Rationale: This Subject is useful for Making own Web page and how to host own web site on internet. Along with that Students will also learn about the protocols involved in internet technology.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction to WWW Protocols and programs, secure connections, application and development tools, the web browser, what is server, choices, setting up UNIX and Linux web servers, Logging users, dynamic IP Web Design: Web site design principles, planning the site and navigation,	4
2	Introduction to HTML The development process, Html tags and simple HTML forms, web site structure. Introduction to XHTML XML, Move to XHTML, Meta tags, Character entities, frames and frame	9

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2304
Subject Name: Web Technologies

	sets, inside browser.	
3	Style sheets Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2	7
SECTION-B		
4	JavaScript Client-side scripting, what is JavaScript, how to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition.	5
5	XML Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Well formed, using XML with application. DHTML Combining HTML, CSS and JavaScript, events and buttons, controlling your browser, Ajax Introduction, advantages & disadvantages ,Purpose of it ,ajax based web application, alternatives of ajax	8
6	PHP Starting to script on server side, Arrays, function and forms, advance PHP. Databases Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.	6

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Bachelor of Engineering
Subject Code: CO2304
Subject Name: Web Technologies

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	30	25	30	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. HTML Black Book by Steven Holzner, Dremtech press.
2. Web Technologies: TCP/IP, Web/Java Programming, and Cloud Computing, Third Edition by Achyut Godbole, Atul Kahate, McGraw Hill Education
3. Beginning Web Programming by Jon Duckett.
4. Core Servlets and Java Server pages Vol. 1: Core Technologies by Marty Hall and Larry Brown, Pearson.

Reference Books:

1. Web Applications : Concepts and Real-World Design by Knuckles, Wiley-India
2. Internet and World Wide Web How to program by P.J. Deitel & H.M. Deitel Pearson.
3. Open Source for the Enterprise: Managing Risks, Reaping Rewards by Dan Woods and Gautam Guliani.
4. An Introduction to web Design and Programming by Wang, Thomson

List of Practicals:

1. Write a HTML program for the demonstration of Lists.
 - a. Unordered List
 - b. Ordered List
 - c. Definition List
 - d. Nested List

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Bachelor of Engineering
Subject Code: CO2304
Subject Name: Web Technologies

- Write a HTML program for demonstrating Hyperlinks.
 - Navigation from one page to another.
 - Navigation within the page.
- Write HTML for demonstration of cascading stylesheets.
 - Embedded stylesheets.
 - External stylesheets.
 - Inline styles
- Write a JavaScript program for validating registration form.
- Create HTML Page with JavaScript which takes Integer number as input and tells whether the number is odd or even.
- Write a program to display contents of XML file in a table using Extensible Style Sheets.
- Write a program for implementing XML document for customer details.
- Write a PHP program to check if number is prime or not.
- Write a program using PHP and HTML to create a form and display the details entered by the user.
- Writing program in XML and create a style sheet in CSS & display the document in internet explorer.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Understand the concepts of World Wide Web, and the requirements of effective web design.
CO-2	Create basic websites using HTML and Cascading Style Sheets.
CO-3	Analyze web pages using the CSS features with different layouts as per need of applications.
CO-4	Implement dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
CO-5	Evaluate simple web pages in DHTML and to represent data in XML format
CO-6	Apply modern interactive web applications using PHP, Advanced PHP.



UPL UNIVERSITY
OF
SUSTAINABLE TECHNOLOGY



(Established under Gujarat Private Universities Act, 2009)

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2304
Subject Name: Web Technologies

List of Open-Source Software/learning website:

1. <https://sourceforge.net/>
2. <https://github.com/>
3. www.coursera.org
4. <https://bitbucket.org/>

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2305
Subject Name: Information Security

Semester: - V

Type of course: Professional Elective

Prerequisite: Basic knowledge of Computer Programming, Mathematical concepts: Random numbers, Number theory, finite fields

Rationale: Knowing the concepts, principles and mechanisms for providing security to the information/data is very important for the students of Computer Engineering. The subject covers various important topics concern to information security like symmetric and asymmetric cryptography, digital signatures and overview of the malware technologies.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction and Security Trends Need of Security, Computer Security Concepts, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Symmetric Cipher Model, Substitution Techniques, Transposition Techniques.	4
2	Block Cipher Block Cipher Principles, The Data Encryption Standard (DES), A DES Example, The Strength of DES, Block Cipher Design Principles, Stream	6

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Bachelor of Engineering
Subject Code: CO2305
Subject Name: Information Security

	Ciphers, Advanced Encryption Standard (AES) with Structure, Transformation Functions, Key Expansion, Example, and Implementation	
3	Cipher Mode Multiple encryption and triple DES, Electronic Code Book, Cipher Block Chaining Mode, Cipher Feedback mode, Output Feedback mode, Counter mode, Key Management and Distribution for Symmetric Encryption	3
SECTION-B		
4	Public-Key Cryptosystems Principles of Public-Key Cryptosystems, RSA Algorithm, its computational aspects and security, Diffie-Hellman Key Exchange, Man-in-Middle attack, Key Management and Distribution for Asymmetric Encryption.	4
5	Authentication Authentication Requirements, Application of Cryptographic Hash Function, Requirements and Security of Hash Function, Secure Hash Algorithm (SHA), Message Authentication Codes, Message Authentication Functions, Requirements and Security of MACs, MACs based on Hash Functions.	5
6	Digital Signature Digital Signature, Its Properties, Requirements and Security, Various Digital Signature Schemes (ElGamal and Schnorr), Remote User-Authentication Principles, Remote User-Authentication with Symmetric and Asymmetric Encryption. Web Security Web security Threats and Approaches, SSL Architecture and Protocol, Transport Layer Security, HTTPS and SSH.	4

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	25	25	15	10	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2305
Subject Name: Information Security

Text Book:

1. Cryptography And Network Security Principles And Practice Sixth Edition by William Stallings, Pearson

Reference Books:

1. Cryptography and Network Security by Atul Kahate, Tata Mc Grawhill, India.
2. Information Security Principles and Practice By Mark Stamp, Willy India Edition.
3. Cryptography & Network Security by Forouzan, Mukhopadhyay, McGrawHill
4. Cryptography and Security by C K Shyamala, N Harini, T R Padmanabhan, Wiley-India.

List of Practicals:

1. To implement Caesar cipher and Monoalphabetic cipher encryption-decryption.
2. To implement Playfair cipher encryption-decryption.
3. To implement Hill cipher encryption-decryption.
4. To implement Rail Fence and Columnar transposition cipher encryption-decryption.
5. To implement Simplified Data Encryption Standard.
6. To implement RSA encryption-decryption algorithm.
7. To implement Diffi-Hellman Key Exchange method.
8. Demonstrate and perform various encryption-decryption techniques with cryptool.
9. Study and use open-source packet analyzer-Wireshark to understand security mechanism of various network protocols.
10. Detail Case study: Real world implementation of Network Security Algorithm/Concept.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2305
Subject Name: Information Security

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Develop concept of security needed in communication of data through computers and networks along with various possible attacks.
CO-2	Explore the basic principles of the symmetric cryptography and techniques with their strengths and weaknesses from perspective of cryptanalysis
CO-3	Implement and analyze various symmetric key cryptography algorithms and their application in different context.
CO-4	Compare public key cryptography with private key cryptography and Implement various asymmetric key cryptography algorithms.
CO-5	Understand authentication requirements and study various authentication mechanisms.
CO-6	Use the techniques and standards of digital signature and understand network security concepts and study different web security mechanisms.

List of Open Source Software/learning website:

- vlabs.iitb.ac.in
- <https://nptel.ac.in/courses/106105031/>
- Cryptool - <https://www.cryptool.org/en/>
- Wireshark - <https://www.wireshark.org/download.html>

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2306

Subject Name: Advanced Java Programming

Semester: - V

Type of course: Professional Elective

Prerequisite: Basic knowledge of core JAVA and Spring

Rationale: Web application based on Java uses Servlet, JSP. Spring framework gives flexibility and makes the web applications loosely coupled.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Collection and Generic Introduction to Generics , Generics Types and Parameterized Types, WildCards, Java Collection Framework, Collections (Basic Operations, Bulk Operations, Iteration) List, Set, Maps	6
2	Introduction Java EE Programming JSP Architecture, JSP building blocks, Scripting Tags, implicit object, Introduction to Bean, standard actions, session tracking types and methods. Custom Tags, Introduction to JSP Standard Tag Library (JSTL) and JSTL Tags.	4
3	Servlets Introduction to Java Servlet, Servlet Interface, GenericServlet, HttpServlet and the Servlet Life Cycle, Servlet Communication, Handling	4

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2306

Subject Name: Advanced Java Programming

	HTTP get and post Requests , Session Tracking	
SECTION-B		
4	Spring and AOP Aspect Oriented Programming with Spring, Types of advices, Defining Point Cut Designator, Annotations.	4
5	JDBC Data Access with Spring Managing JDBC Connection, Configuring Data Source to obtain JDBC Connection, Data Access operations with JdbcTemplate and Spring, RDBMS operation classes , Modelling JDBC Operations as Java Objects	4
6	Introduction to Spring Boot Spring Boot and Database, Spring Boot Web Application Development, Spring Boot RESTful Web Services.	4

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	30	30	10	5	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Book:

1. Java 8 Programming, BlackBook, Edition 2015 by DreamTech Press,.
2. Professional Java Development with the Spring Framework by Rod Johnson et al. John Wiley & Sons 2005.

Reference Books:

1. Java 6 Programming Black Book by Wiley–Dreamtech.
2. Spring in Action, 3rd Edition, by Craig Walls, Manning.
3. Beginning Spring, Mert Caliskan and Kenan Sevindik Published by John Wiley & Sons, Inc.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2306

Subject Name: Advanced Java Programming

List of Practicals:

1. Write a program that prints an array of different type using a single Generic method.
2. Write a program that demonstrates List using ArrayList and LinkedList class.
3. Write a program that demonstrates HashSet and TreeSet implementation.
4. Write a program that demonstrates HashMap implementation.
5. Implement the shopping cart for users for the online shopping. Apply the concept of session.
6. Develop a simple servlet program which maintains a counter for the number of times it has been accessed since its loading; initialize the counter using deployment descriptor.
7. Implement cookies to store firstname and lastname using Java server pages.
8. Create spring JDBC application which performs CRUD operations.
9. Implement Spring Boot JdbcTemplate example with CRUD Rest API.
10. Create a spring boot application with spring AOP.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Understand how to use frameworks for a given problem.
CO-2	Implement webpage with dynamic content using JSP.
CO-3	Develop server side programs using Servlets.
CO-4	Analyze Aspect Oriented Programming(AOP) along with Spring
CO-5	Create , update and retrieve the data from the databases using JDBC-ODBC.
CO-6	Use advanced concepts related to Web Services and spring.

List of Open Source Software/learning website:

1. vlabs.iitb.ac.in
2. <http://www.oracle.com/technetwork/java/index-jsp-135475.html>
3. <http://www.oracle.com/technetwork/java/javaee/jsp/index.html>

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor in Engineering
Subject Code: CO2307
Subject Name: Computer Graphics

Semester: - V

Type of course: Open Elective

Prerequisite: Basic knowledge of C programming, Basic data structure & Concept of mathematics. (Geometry, Matrix and other field).

Rationale: Understanding of basic principles computer graphics followed by computer vision and its application in various field of engineering.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Basics of Computer Graphics Display devices, Primitive operations, Text mode and graphics mode, graphics functions, Shapes, colors, Co-ordinate systems; Applications of computer graphics; Raster scan display, Random scan display	4
2	Generation of various geometrical shapes (Line, circle, and polygon) Basic concepts in line drawing Line drawing algorithms DDA algorithms, Bresenham's algorithm. Circle generating algorithms DDA circle drawing algorithm, Bresenham's circle drawing algorithm, midpoint circle drawing algorithm. Polygons – Types of polygons, Polygon representation, inside –outside	6

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor in Engineering
Subject Code: CO2307
Subject Name: Computer Graphics

	test, Polygon filling, Flood fill, scan-line algorithm.	
3	Transformations 2D transformation Translation, Rotation, scaling, Reflection, shearing, transformation matrices, Homogeneous co-ordinate system. Rotation about an arbitrary point, scaling about fixed point. 3.3 Composite transformations. 3D Transformation Scaling, rotation, translation, rotation about arbitrary axis etc. Yaw, Pitch, Roll about different axes.	3
SECTION-B		
5	Windowing & Clipping Viewing transformation, Normalization transformation Line clipping Cohen-Sutherland Line clipping algorithm, midpoint subdivision algorithm Polygon clipping Sutherland – Hodgeman Polygon clipping algorithm.	5
6	Curves Curve generation: Lagrange Interpolation curves, B-Spline, Bezier curves. Projection Different Parallel projection, Perspective Projection.	4
7	Hidden Surfaces Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods. Color and Shading Models Phong's shading model, Gouraud shading, Shadows and background, Color models, Photo-realistic rendering, Radiosity	4

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	35	20	25	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor in Engineering
Subject Code: CO2307
Subject Name: Computer Graphics

Text Books:

1. Computer Graphics through C by Hearn & Beaker 5th Pearson
2. Computer Graphics Multimedia & Animation, 2nd PHI by Pakhira

Reference Books:

1. Computer Graphics with Virtual Reality System by Maurya, Wiley
2. Computer Graphics by Udit Agarwal Katson books.

List of Practical:

1. Implement DDA algorithm for line drawing.
2. Implement Bresennham's algorithm for line drawing.
3. Implement Mid-point circle drawing algorithm.
4. Implement Bresennham's algorithm of circle drawing.
5. Implement Flood fill algorithm for Polygon filling.
6. Implement scan-line algorithm for polygon filling.
7. Write Program for 2-D transformations -> scaling, Rotation.
8. Write Program for 2 D transformations shearing and Translation program.
9. Implement Cohen- Sutherland algorithm for line clipping.
10. Implement Sutherland-Hodgeman algorithm for polygon clipping.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Understand the basic of computer graphics and to give the idea how a system can design geometrical shapes in taking basic parameters as input from user.
CO-2	Analyze the concepts of transformation of an object in real world those concepts to develop the transformation using any vehicle language.
CO-3	Apply different algorithm used for developing geometrical shapes.
CO-4	Evaluate the basics of windowing and clipping of different geometrical shapes.
CO-5	Create different curves collecting different parameters from users as input.
CO-6	Demonstrate the basics of projection and its application.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2308

Subject Name: Microprocessor and Interfacing

Semester: - V

Type of course: Open Elective

Prerequisite: Fundamentals of Digital Logic Design and Computer Organization

Rationale: The modern digital systems including computer systems are designed with microprocessor as central device connected to memory and I/O devices. The subject introduces the students with basics of microprocessor, microprocessor architecture and programming, interfacing microprocessor with memory and various I/O (Input/Output) devices.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE (V)	PA (I)		
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Block diagram of microprocessor-based system CPU, I/O Devices, Clock, Memory, Concept of Address, Data and Control Bus and Tristate logic, 8086 logical block diagram, Need of Assembly Language and its Comparison with higher level languages, Need of Assembler and Compiler and their comparison.	6
2	Advanced Microprocessors segmentation, Pin functions, Minimum and maximum mode, 80286/80386: Overview and architecture, Programming model, Data types and instruction set, segments and its types, segment descriptor,	3

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2308

Subject Name: Microprocessor and Interfacing

	descriptor table and selector.	
3	8086 System bus structure 8086 signals, System bus timing, System design using 8086, I/O programming, Introduction to Multiprogramming, System Bus Structure, Multiprocessor configurations Closely coupled and loosely Coupled configurations, advanced processors.	4
SECTION-B		
4	I/O Interfacing Memory Interfacing and I/O interfacing, Parallel communication interface, Serial communication interface, D/A and A/D Interface, Timer, Keyboard /display controller, Interrupt controller, DMA controller, Programming and applications Case studies: Traffic Light control, LED display, LCD display, Keyboard display interface and Alarm Controller.	6
5	Peripherals interfacing with 8086 and applications 8086-Interrupt structure, Programmable peripheral Interface 8255, Programmable interval Timer 8254, Elementary features of 8259A and 8257 and interface, Interfacing 8255, 8254 with 8086 and their applications, Memory interfacing with 8086 microprocessors.	4
6	Converter Analog to Digital Converter (ADC) 0809, Digital to Analog Converter (DAC) 0808, Interfacing ADC 0809, DAC 0808 with 8086 and their applications, 8086 based data Acquisition system.	3

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	25	30	20	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2308

Subject Name: Microprocessor and Interfacing

Text Books:

1. Microprocessors and interfacing – Programming & Hardware by Douglas V Hall, TMH
2. The intel Microprocessor – 8086 by Barry B. Brey, Pearson Education
3. Advanced Microprocessor and peripherals by A.K.Ray KM Bhurchandi, McGraw Hill
4. Microprocessors and interfacing by R.S. Gaonkar, TMH

Reference Books:

1. Microcomputer Systems: The 8086/88 Family, 2nd Edition by Liu, Gibson, PHI, 2005
2. The 8086 Microprocessor: Programming & Interfacing the PC by Kenneth Ayala, Cengage Learning, Indian Edition, 2008
3. The 8088 and 8086 Microprocessors, Programming, Interfacing, Software, Hardware and Applications, by Walter A Triebel and Avtar Singh. Pearson.

List of Practicals:

1. Write 8086 Assembly language program (ALP) to add array of N hexadecimal numbers stored in the memory. Accept input from the user.
2. Write 8086 ALP to perform non-overlapped and overlapped block transfer (with and without string specific instructions). Block containing data can be defined in the data segment.
3. Write 8086 ALP for reverse the string entered by the user.
4. Write a program to find the average of two temperature name HI-TEMP and LO-TEMP and puts the result in the memory location AV-TEMP.
5. Write 8086 ALP to check whether given string is palindrome or not.
6. A Program to find out the number of even and odd numbers from a given series of 16 bit hexadecimal numbers.
7. Write a program to find out the number of positive numbers and negative numbers from a given series of signed numbers.
8. Write 8086 ALP to perform multiplication of two 8-bit hexadecimal numbers. Use successive addition and add and shift method. Accept input from the user.
9. Write and execute an alp to 8086 Microprocessor to add, subtract and multiply two 16 bit unsigned numbers. Store the result in extra segment

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Bachelor of Engineering

Subject Code: CO2308

Subject Name: Microprocessor and Interfacing

10. To write and execute an Assembly language Program (ALP) to 8086 processor to verify the password.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Understand the basic concepts of microcomputer systems.
CO-2	Learn the architecture and software aspects of microprocessor 8086.
CO-3	Write Assembly language program in 8086.
CO-4	Describe the Co-processor configurations.
CO-5	Interface peripherals for 8086.
CO-6	Design elementary aspect of microprocessor-based system.

List of Open-Source Software/learning website:

1. [Vlabs.iitb.ac.in](http://vlabs.iitb.ac.in)
2. <https://nptel.ac.in>

(Established under Gujarat Private Universities Act, 2009)

Bachelor of Engineering

Subject Code: MH2301

Subject Name: Contributor Personality Development Program – 1

Shroff S.R. Rotary Institute of Chemical Technology

Type of course: Work-Personality Development

Prerequisite: To keep open mind and will to learn humanity for oneself and society.

Rationale: The Contributor Program aims to accomplish the following outcomes in the lives of students–

- Improve the employability of students by giving them the right work ethic and thinking that employers are looking for.
- Build their confidence with which they can go into any job and contribute meaningfully.
- Improve their ability to engage better in the workplace and to be able to handle the challenges that come up there.
- Build their career-worthiness and help them develop into future-ready contributors with ability to navigate a career in a volatile, changing world.
- Widen their choices of career and success, so that they are able to open up more opportunities for themselves and take up unconventional career pathways.
- Enable them to recognize how they, as technical professionals, can participate and make a positive contribution to their communities and to their state.

Towards this goal, the Contributor Program has been designed to awaken and strengthen students from within, in terms of building positive self-esteem, increasing their confidence level and I-can attitude, improving their aspirations, giving them new methods of thinking, building their cognitive capacities, exposing them to the skills and practices associated with being contributors in the workplace (not mere employees).

The Program content is also designed to expose students to real-world workplace scenarios and sensitize them to some of the challenges faced in society around them, especially in the local communities around them and in their own state of Gujarat.

The Contributor Program syllabus has been evolved and fine-tuned over several years, (a) to address the changing need and contemporary challenges being faced by industry and what employers of today are looking for in the people they hire and (b) by working extensively with universities and students building an appreciation of their challenges and concerns. At the core, the program is guided by the higher ideas and principles of practical Vedanta in work.

(Established under Gujarat Private Universities Act, 2009)

Bachelor of Engineering

Subject Code: MH2301

Subject Name: Contributor Personality Development Program – 1

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
1	1	0	2	50	30	00	20	100

Note:

- Weekly 2 hours of Classroom facilitated sessions are planned which include Solutioning and Self- discovery sessions.
- In addition, there will be individual/ team projects as part of Practical's. Students can do this on their own, with faculty as guide.

Note:

It is the responsibility of the institute heads that marks for PA of theory & ESE and PA of practical for each Students are entered online into the UPL University Portal at the end of each semester within the dates Specified by UPL University.

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	<p>The Contributor Work Ideal</p> <p>In this topic, students explore what is their “ideal” of work - is the ideal to be a “worker” or to be a “contributor”? For example, an employee who has the ideal of a “worker” goes to work to pass time, earn a living, get benefits; in contrast to an employee with the ideal of a “contributor” who wants to make a difference, get things done well, create value for the company. This enables students to transform their expectation of themselves in work</p>	<p>04 hrs Classroom engagement (including self- discovery/ solutioning sessions)</p>

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Bachelor of Engineering

Subject Code: MH2301

Subject Name: Contributor Personality Development Program – 1

2	<p>Identity & Self-esteem In this topic, students engage with the question “who am I?” or on what basis they define themselves. Is their identity defined by what others think of them (extrinsic self-esteem) or by what they think of themselves (intrinsic self-esteem)? Further, they discover positive identities that lead to intrinsic self-esteem, such as an I-can identity based on one’s capacity and inner strength. This enables them to build confidence and self-esteem.</p>	04 hrs Classroom engagement (including self-discovery/ solutioning sessions)
3	<p>Become a Creator of one’s destiny In a “victim stance”, we see the career environment as full of difficulties and hurdles. We feel powerless or blame our circumstances for not having many opportunities. This makes us fearful of uncertainty and makes us settle for jobs where we remain mediocre. In this topic, students discover the “creator of destiny stance” to challenges and situations. This stance frees them to try out new things, open up new possibilities, take on responsibility, and see the opportunity hidden in their environment.</p>	04 hrs Classroom engagement (including self-discovery/ solutioning sessions)
SECTION-B		
4	<p>Achieving Sustainable Success In this topic, students discover how to achieve sustainable or lasting success, by building one’s “engine of success”, making them success- worthy. Where their focus shifts to building one’s “engine of success” rather than being on chasing the “fruits of success”. This is important, because over a lifetime of work, all people go through ups and downs – where the fruits are not in their control. People who are focused on the fruits of success, fall prey to disappointment, loss in motivation, quitting too early, trying to find shortcuts – when fruits don’t come. Whereas people focused on building their engine of success continue to contribute steadily, irrespective of whether fruits come or not. And with a strong engine of success, fruits come to them in time.</p>	04 hrs Classroom engagement (including self-discovery/ solutioning sessions)

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Bachelor of Engineering

Subject Code: MH2301

Subject Name: Contributor Personality Development Program – 1

5	<p>Career Development Models</p> <p>In this topic, students explore a range of diverse “career development models” and the possibilities for contribution each opens up to them (e.g. start-up career model, change-maker career model, etc.). This opens their mind to different and even unconventional career models possible, beyond the usual (such as “stable large company career model” where one gets an engineering degree, then MBA, then get a job in a large company). This frees them from a herd mentality when making career choices.</p>	<p>04 hrs Classroom engagement (including self- discovery/ solutioning sessions)</p>
6	<p>Expanding contribution in every role</p> <p>In this topic, students explore the many roles they can play in their life & discover the power they have to expand the contribution possible in any role. (E.g. role of student, role of manager, role of a project site engineer). So, the potential of a role is in the individual’s hands. This opens their mind to an alternative way of career growth.</p>	<p>04 hrs Classroom engagement (including self- discovery/ solutioning sessions)</p>

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
-	20	20	20	20	20

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate
C: Create and above Levels (Revised Bloom’s Taxonomy)**

Reference resources:

- A. Basic reference for both students and teachers
 1. Contributor Personality Program textbook cum workbook developed by Illumine

(Established under Gujarat Private Universities Act, 2009)

Bachelor of Engineering

Subject Code: MH2301

Subject Name: Contributor Personality Development Program – 1

2. Web-based ActivGuide™ for self-exploration of rich media resources to vividly understand many of the ideas, watch role models, learn from industry people, get reference readings – that help them enrich the understanding they gained in the class published by Illumine Foundation

B. Advanced reference for teachers

1. On Contributors, Srinivas V.; Illumine Ideas, 2011
2. Enlightened Citizenship and Democracy; Swami Ranganathananda, Bharatiya Vidya Bhavan, 1989
3. Eternal Values for a Changing Society – Vol I-IV, Swami Ranganathananda; Bharatiya Vidya Bhavan
4. Karma Yoga, Swami Vivekananda; Advaita Ashrama
5. Vivekananda: His Call to the Nation, Swami Vivekananda; Advaita Ashrama
6. Six Pillars of Self Esteem, Nathaniel Branden; Bantam, 1995
7. Mindset: The New Psychology of Success, Carol S. Dweck; Random House Publishing Group, 2007
8. Lasting Contribution: How to Think, Plan, and Act to Accomplish Meaningful Work, Tad Waddington; Agate Publishing, 2007
9. Why not?: how to use everyday ingenuity to solve problems big and small, Barry Nalebuff, Ian Ayres; Harvard Business School Press, 2003
10. The value mindset: returning to the first principles of capitalist enterprise (Ch 8 & 9); Erik Stern, Mike Hutchinson; John Wiley and Sons, 2004
11. The Power of Full Engagement: Managing Energy, Not Time, is the Key to High Performance and Personal Renewal, Jim Loehr, Tony Schwartz; Simon and Schuster, 2003
12. Creating Shared Value, Michael E. Porter and Mark R. Kramer; Harvard Business Review; Jan/Feb2011, Vol. 89 Issue 1/2
13. The Speed of Trust: The One Thing That Changes Everything, Stephen M. R. Covey, Rebecca, R. Merrill, Stephen R. Covey; Free Press, 2008
14. The Courage to Meet the Demands of Reality, Henry Cloud; HarperCollins, 2009
15. Responsibility at work: how leading professionals act (or don't act) responsibly, Howard Gardner; John Wiley & Sons, 200

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Bachelor of Engineering

Subject Code: MH2301

Subject Name: Contributor Personality Development Program – 1

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Students will be able to recognize & appreciate two alternative ideals of work – “worker” and “contributor”.
CO-2	Students will be able to recognize & appreciate alternative ways in which they could define themselves & their identity – that will lead to building intrinsic self-esteem and confidence in oneself.
CO-3	Students will be able to recognize & appreciate the way people approach challenges and situations; and how it frees individuals to take on challenges and open up Opportunities.
CO-4	Students will be able to differentiate between two alternative approaches to success - ‘building one’s engine of success’ and ‘chasing the fruits of success’Lead to sustainable or lasting success in the long run.
CO-5	Students will be able to recognize & appreciate different career models and their Value; to help them make more informed career-related choices.
CO-6	Students will be able to recognize & appreciate how one can expand the contribution possible in any role, thereby opening up an alternative way of career Growth to them.

Prepared By: Ms. Aakancha Sanjeev Kumar

Moderated By: Dr Purvi Naik

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2309
Subject Name: Theory of Computation

Semester: - VI

Type of course: Professional Core

Prerequisite: Calculus, Data Structures and Algorithms, Set Theory

Rationale: Theory of computation teaches how efficiently problems can be solved on a model of computation. The main thrust is to identify the limitations of the computers through formalizing computation (by introducing several models including Turing Machines) and applying mathematical techniques to the formal models obtained. It is also necessary to learn the ways in which computer can be made to think. Finite state machines can help in natural language processing which is an emerging area.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Review of Mathematical Theory Sets, Functions, Logical statements, Proofs, Relations, Languages, Principal of Mathematical Induction, Strong Principle, Recursive Definitions, Structural Induction.	5
2	Regular Languages and Finite Automata Regular Expressions, Regular Languages, Application of Finite Automata, Automata with output - Moore machine & Mealy machine, Finite Automata, Memory requirement in a recognizer, Definitions, union-	8

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2309
Subject Name: Theory of Computation

	intersection and complement of regular languages, Non Deterministic Finite Automata, Conversion from NFA to FA, \wedge - Non Deterministic Finite Automata, Conversion of NFA- \wedge to NFA, Kleene's Theorem, Minimization of Finite automata, Regular And Non Regular Languages – pumping lemma.	
3	Context Free Grammar (CFG) Definitions and Examples, Unions Concatenations And Kleene's of Context free language, Regular Grammar for Regular Language, Derivations and Ambiguity, Unambiguous CFG and Algebraic Expressions, Bacos Naur Form (BNF), Normal Form – CNF.	6
SECTION-B		
4	Pushdown Automata, CFL And NCFL Definition, deterministic PDA, Equivalence of CFG and PDA, Pumping lemma for CFL, Intersections and Complements of CFL, Non-CFL	8
5	Turing Machine (TM) TM Definition, Model Of Computation And Church Turning Thesis, computing functions with TM, Combining TM, Variations Of TM, Non Deterministic TM, Universal TM, Recursively and Enumerable Languages, Context sensitive languages and Chomsky hierarchy	8
6	Undecidability A Language That Can't Be Accepted, and a Problem That Can't Be Decided, Non Recursive Enumerable (RE) Language – Undecidable Problem with RE – Undecidable Problems about TM – Undecidable Problems Involving Context-Free Languages, Post's Correspondence Problem, The Class P and NP.	4

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	40	25	20	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2309
Subject Name: Theory of Computation

Text Book:

1. Theory of Computation by A.A PUNTAMBEKAR, Book Paperback(Technical).

Reference Books:

1. Introduction to Languages and the Theory of Computation, 4th by John Martin, Tata Mc Graw Hill.
2. An introduction to automata theory and formal languages By Adesh K. Pandey, Publisher: S.K. Kataria & Sons
3. Introduction to computer theory By Deniel I. Cohen , Joh Wiley & Sons, Inc
4. Computation: Finite and Infinite By Marvin L. Minsky Prentice-Hall
5. Compiler Design By Alfred V Aho, Addison Wesley
6. Introduction to the Theory of Computation By Michael Sipser
7. Automata Theory, Languages, and Computation By John Hopcroft, Rajeev Motowani, and Jeffrey Ullman

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Use the concepts and techniques of discrete mathematics for theoretical computer science.
CO-2	Identify different formal languages and their relationship.
CO-3	Classify and construct grammars for different languages and vice-versa.
CO-4	Build finite automata; push down automata and Turing machine.
CO-5	Analyze various concepts of undecidability and Computable Function and Discuss analytically and intuitively for problem-solving situation.
CO-6	Evaluate Computable Functions.

List of Open Source Software/learning website:

1. http://en.wikipedia.org/wiki/Theory_of_computation
2. <http://meru.cecs.missouri.edu/courses/cecs341/tc.html>

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor Of Engineering
Subject Code: CO2310
Subject Name: Artificial Intelligence

Semester: - VI

Type of course: Professional Core

Prerequisite: Basic knowledge of computer programming, Algebra, Linear Algebra, Trigonometry, Statistics.

Rationale: Students will learn the basic concepts and techniques of Artificial Intelligence. They should be able to develop AI algorithms for solving practical problems.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction Artificial Intelligence and its Applications Introduction to Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Natural Language Possessing. Artificial Intelligence Techniques, Level of models, criteria of success, advantages, and limitations of AI	7
2	Problem Solving Techniques State space search, control strategies, heuristic search, problem and characteristics, production system characteristics., Generate and test, Hill climbing, best first search, A* search, Constraint satisfaction problem, Mean-end analysis, Min-Max Search, Alpha-Beta Pruning, Additional	7

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Bachelor Of Engineering
Subject Code: CO2310
Subject Name: Artificial Intelligence

	refinements, Iterative Deepening	
3	Knowledge representation and Inference Propositional logic, Using Predicate Logic: Representing facts, Inference methods – Resolution, Forward Reasoning, Backward Reasoning	6
SECTION-B		
4	Knowledge Representation Schemes and Reasoning Mapping between facts and representations, Approaches to knowledge representation, procedural vs declarative knowledge, forward vs. Backward reasoning, Matching, conflict resolution, non-monotonic reasoning, Default reasoning, statistical reasoning, fuzzy logic Weak and Strong filler structures	7
5	Planning The Planning problem, planning with state space search, planning graphs, planning with propositional logic, Hierarchical planning, conditional planning, Continuous and Multi Agent planning Basics of Machine Learning Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Preprocessing, Unsupervised vs Supervised Learning, Application of Unsupervised Learning	6
6	Expert system Introduction Architecture and types of Expert Systems, Expert system shell. Neural Networks: Introduction to neural network, Activation functions, Architectures, Perceptron, Multilayer Perceptron with Backpropagation	6

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	30	30	20	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor Of Engineering
Subject Code: CO2310
Subject Name: Artificial Intelligence

Text Book:

1. A Classical Approach to Artificial Intelligence by M.C. Trivedi, Khanna Book Publishing, 2019.
2. Artificial Intelligence: A modern approach by Stuart Russel, Pearson Education, 2010.

Reference Book:

1. Artificial Intelligence, 3rd Edition, by Elaine Rich, Kevin Knight and Shivashankar B Nair, McGraw Hill
2. Artificial Intelligence and Machine learning by Vinod Chandra S.S. and AnandHarindran S. PHI

List of Practicals:

1. Write a program to conduct uninformed search strategies.
2. Write a program to conduct informed search strategies.
3. Write a program to conduct min - max algorithm.
4. Write a program of depth first search.
5. Write a program to construct a Best first search (for 8 puzzle problem or Water Jug problem or any AI search problem).
6. Write a program to implement DFS (for 8 puzzle problem or Water Jug problem or any AI search problem)
7. Write a program to Implement A* Algorithm.
8. Write a program to solve traveling salesman problems.
9. Write a program to implement Tic-Tac-Toe game problem.
10. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets

Course Outcomes:

Student will be able to:

Sr. No.	CO statement
CO-1	Understand the basic concepts and techniques of Artificial Intelligence.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor Of Engineering
Subject Code: CO2310
Subject Name: Artificial Intelligence

CO-2	Apply AI algorithms for solving practical problems
CO-3	Describe human intelligence and AI
CO-4	Study and use various types of logic and knowledge representation schemes
CO-5	Evaluate and compare algorithms based on different metrics and parameters.
CO-6	Construct methods of game playing, types of expert system.

List of Open-Source Software/learning website:

1. <https://www.edx.org/course/artificial-intelligence-ai>
2. <https://www.udemy.com/course/artificial-intelligence-az>

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2311
Subject Name: Advance Technologies

Semester: - VI

Type of course: Professional Elective

Prerequisite: Knowledge of web technology.

Rationale: The aim of this course is to teach the students the concepts, technologies and techniques for creating large-scale distributed software system using service-oriented computing and cloud applications.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction to Web Technology Hypertext Markup Language and its components, HTML tags and attributes, Text formatting tags, List tags, Image tags, HTML tables, HTML Forms, Document Object Model (DOM), Cascading Style Sheets – Inline Style, Embedded Style, External Style Sheet, Imported Style Sheet, Ruleset, @ rule, Contextual Selector, Attribute Selector, CSS Properties, JavaScript - Data types, Operators, Variables, length, substring, Conditional Statements - if, Loops - for, & Functions, HTML DOM and JavaScript - Finding HTML Elements, Changing HTML elements, DOM events.	5

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2311

Subject Name: Advance Technologies

2	Events Handlers & Forms in Java Script Define Events, Events in JavaScripts, Event Handlers, this keyword, Event handlers in JavaScripts, Emulating Events in java scripting, onLoad and onUnload Event Handlers, Web-Hopping with window.open(), Resetting Event Handlers.	4
3	Messaging & Timing Events in Java Script Alert Box: syntax & its example, Confirm Box: syntax & its example, Prompt Box: syntax & its example, Line Breaks: syntax & its example, JavaScript Timing Events, setInterval() Method, window.clearInterval() method, setTimeout() Method, window.clearTimeout() method.	4
SECTION-B		
4	XML and Ajax XML – Declaration, Root Element, Child Elements, Element Attributes, Entity References, Comments, Ajax – XML HTTP Request Object, Sending Ajax requests, Handling Ajax Responses, Adding Ajax Functionality in JavaScript, Adding Ajax Functionality to a Web Page	4
5	Introduction to Node JS Introduction to Node JS, What is Node JS, Node.js Process Model, Advantages of Node JS , Traditional Web Server Model, Functions, Buffer, Module, Working in REPL, Node JS Console, What is NPM, Installing Packages Locally.	4
6	Introduction to jQuery Why jQuery, features of jQuery library, Adding jQuery to web pages: Downloading jQuery & jQuery CDN, jQuery Syntax & jQuery Selectors, jQuery Event Methods & their syntaxes, jQuery Effects: Hide and Show, Fading, Sliding, Animation, stop(), jQuery HTML: get & set content: text(), html(), and val(), jQuery - AJAX: Introduction, load(), get() and post() Methods.	5

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2311

Subject Name: Advance Technologies

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	35	25	30	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Book:

1. Web Programming, building internet applications, Chris Bates 2nd edition, by WILEY Dreamtech.
2. HTML5 in Action by Rob Crowther, Joe Lennon, Ash Blue & Greg Wanish
Publisher: Manning Publications.

Reference Book:

1. An Introduction to WEB Design and Programming by Wang-Thomson
2. Internet and World Wide Web – How to program by Dietel and Nieto PHI/
Pearson Education Asia.

List of Practicals:

1. Develop static pages (using Only HTML) of an online bookstore. The pages should resemble: www.amazon.com. The website should consist of the following pages.
 - a) Home page
 - b) Registration and user Login
 - c) User Profile Page
 - d) Books catalog
 - e) Shopping Cart
 - f) Payment By credit card
 - g) Order Conformation
2. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2311

Subject Name: Advance Technologies

3. Design the following static web pages required for an online bookstore web site.
 - i. Registration Page
 - ii. Cart Page
4. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.
5. Create and save an XML document on the server, which contains 10 users information. Write program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
6. Write an XML file which will display the Book information which includes the following: Title of the book, Author Name, ISBN number, Publisher name, Edition and Price. Validate the above document using DTD and XML Schema.
7. Write an XML file which will display the Book information which includes the following: Title of the book, Author Name, ISBN number, Publisher name, Edition and Price. Validate the above document using DTD and XML Schema.
8. Write a program to get the selected value and currently selected text of a dropdown box using jQuery.
9. Design an online registration form for any application and validate it using jQuery.
10. Develop a web application which involves database operations using NodeJS.

Course Outcomes:

Student will be able to:

Sr. No.	CO statement
CO-1	Create the fundamental ideas and standards underlying Web Service Technology.
CO-2	Understand the major frameworks allowing to develop web services and clouding applications and assess their suitability for specific usage scenarios.
CO-3	Apply solution to complex problems using appropriate method, technologies, frameworks, web services and content management
CO-4	Evaluate technology-enabled assessment and evaluation strategies.
CO-5	Analyze web-based application using suitable client side and server-side web technologies.
CO-6	Remember , describe, and apply emerging technologies in teaching and learning environments

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2312
Subject Name: .Net Programming

Semester: - VI

Type of course: Professional Elective

Prerequisite: Knowledge of Computer

Rationale: The .NET platform has evolved quickly to become a robust technology platform for enterprise application development and systems integration. It is a very popular platform these days being used to develop web sites/ web-based applications.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
2	0	2	3	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction to .Net Architecture Introduction to .NET Framework Architecture, Program Execution in .NET, CLR structure, Assemblies, creating strong named assemblies, putting DLL in GAC, Garbage Collection, DLL Hell, Side by Side Execution, Debugging.	5
2	Object Oriented Programming in C# Creating Class, declaring variables and methods, Access modifiers, Constructors, Abstract Class, Partial Class, Inheritance, Method overloading, method overriding, Anonymous method, Properties, Indexers, Exception Handling	4

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2312
Subject Name: .Net Programming

3	Building GUI with C# and Database Connectivity using ADO.NET GUI: Working with C# windows applications, working with common form controls, Visual Inheritance, Creating MDI Form, Event handling. ADO.NET: Overview of ADO.NET framework, working with SQL server database, Managed Provider, Dataset, working with data source, Connected and disconnected architecture, Binding data with Datagrid, Binding data with Crystal Report.	4
SECTION-B		
4	Web and ASP.NET Controls Web Server, HTTP/HTTPS Protocol, ASP.NET Benefits, ASP.NET Page Layout, Life Cycle, HTML Server Controls, Web Server Controls, Validation Controls, Introduction to AJAX	4
5	Master Page, Theme and State Management, Web Service Master page and theme, Different methods to preserve state in ASP.NET, Creating and consuming web service. Getting Started with ASP.NET MVC What is MVC Architecture? What is ASP.NET MVC? Learning Model, View, Controller. Advantages of MVC. Application configuration files	5
6	Basics of Cloud Computing The cloud, cloud computing, and the cloud Optimized stack, Microsoft Azure C# library to create a storage container, ASP.NET web application that uses the storage container.	4

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	25	25	20	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2312
Subject Name: .Net Programming

Text Book:

1. Recipes: A Practical Solution Asp.Net Mvc 5 by Nimit Joshi.

Reference Books:

1. A learner's guide to Real world programming with C# and .NET core 4th edition, by Andrnew Stellman and Jennifer Greene-
2. Pro C# 9 with .NET 5: Foundational Principles and Practices in Programming 10th ed. Edition by Andrew Troelsen (Author), Phillip Japikse .

List of Practicals:

1. Implement Overloading and Overriding, constructor and Destructor in C#.
2. Write a program for Arithmetic Calculator using Windows Application.
3. Implement Windows Form based application using controls like menus, dialog and tool tip, dropdown, radio and selection button etc.
4. Implement concepts of Inheritance, visual inheritance and Interface in widows form application.
5. Use Dataset, Data Reader, XML Reader & Data Sources (SQL, Object & XML) with Any Windows or Web Application.
6. Use Data Controls like Data List, Grid View, Detail View, Repeater and List Bound Control.
7. Implement web application using ASP.NET with web controls with validation controls.
8. Create a Web application that illustrates the use of themes and master pages with Site-Map.
9. Implement the concept of state management in a web application.
10. Implement code in ASP.NET that creates and consumes Web service by any web application.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2312
Subject Name: .Net Programming

Course Outcomes:

Student will be able to:

Sr. No.	CO statement
CO-1	Understand C# and the .NET framework namespace contents.
CO-2	Implement the console and GUI applications using C# .Net.
CO-3	Synthesize various navigation techniques for integrating web pages within the site
CO-4	Demonstrate the design of dynamic web page using ASP.NET controls which interact with databases.
CO-5	Construct and implement cookies and sessions as state management techniques and create a basic cloud-based application.
CO-6	Examine basics of cloud computing.

List of Open-Source Software/learning website:

1. Vlabs.iitb.ac.in
2. <https://nptel.ac.in>
3. www.coursera.org

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2313
Subject Name: Mobile Computing

Semester: - VI

Type of course: Professional Elective

Prerequisite: Knowledge of basic concepts of computer networks

Rationale: The Mobile Computing is a new Eco-system of actual items that deals with study the basics of wireless, cellular technology and the working of Mobile IP, ad hoc network, features of mobile operating systems. This course will enable Graduate students to understand the basics building blocks of J2ME, SDK, android that helps the mobile application development. Students will learn about the use of M-Commerce application.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Basics of Communication Technologies Mobile handsets, Wireless Communications and Server Applications, Cell phone System, Types of Telecommunication Networks, Components of wireless communication system, Architecture of mobile telecommunication system, wireless networking standards, Wireless LANs, Wireless LAN Architecture, Applications of WLANs, Advantages of WLANs over wired LANs, Bluetooth Technology, Protocol stack of Bluetooth.	6
2	Introduction to Mobile Computing and Wireless Networking Define Mobile Computing, Mobile Computing vs. Wireless Networking,	8

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2313

Subject Name: Mobile Computing

	Mobile Computing Application, Characteristics of Mobile Computing, Structure of Mobile Computing Application, Cellular Mobile Communication, Generation of Cellular Communication Technologies, Global System for Mobile communications(GSM),GSM Services, System Architecture of GSM,GSM security, General Packet Radio Service(GPRS),GPRS Services, GPRS Architecture Universal Mobile Telecommunication System (UMTS),UMTS Network Architecture, SDR, Mobile phone and human body.	
3	Mobile IP and Mobile Ad Hoc Networks (MANET) Mobile IP, Packet Delivery, Desirable features of Mobile IP, Key mechanism used in Mobile IP, Route Optimization, Dynamic Host Configuration Protocol(DHCP),significance of DHCP.A Few Basics concepts, Ad Hoc Network setup without the infrastructure Support Routing in a MANET a Complex Task, Characteristics of Mobile Ad Hoc Networks(MANETs)-MANET Operational Constraints, Applications of MANETs, MANET Design issues, Routing ,Vehicular Ad Hoc Networks(VANETs), MANET vs VANET, Security issues in a MANET.	6
SECTION-B		
4	Operating Systems for Mobile Computing A Few Basic Concepts, Special Constraints and Requirements of Mobile OS,A Survey of Commercial Mobile Operating Systems, Windows Mobile, Palm OS, Symbian OS, iOS, Android, Blackberry OS,A Comparative study of Mobile OS,OS for sensor Network.	6
5	Mobile Application Development and Protocols Mobile Devices as Web Clients, HDML (Handheld Markup Language) WAP, J2ME - J2ME Configuration, Android Application Development - Software Development Kit (SDK), Features of SDK, Android Application Components, and Android Software stack Structure, Advantages of Android.	7
6	Mobile Commerce Application of M-Commerce, Business to Consumer (B2C) Applications, Business to Business (B2B) Applications, Structure of M-Commerce, Pros and Cons of M-Commerce, Mobile Payment System, Mobile Payment Schemes, Desirable properties of a Mobile Payment system, Mobile Payment solutions, Process of Mobile Payment, Security Issues	6

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering

Subject Code: CO2313

Subject Name: Mobile Computing

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	30	20	30	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Book:

1. Fundamentals of Mobile Computing, Second Edition, by Prasant Kumar Pattanaik, Rajib Mall, , PHI, ISBN: 978-81-203-5181-3.

Reference Book:

1. Mobile Computing, Second Edition, by ASOKE TALUKDER HASAN AHMED ROOPA R YAVAGAL, Mc GrawHill.

List of Practicals :

1. Develop an android app which displays "Hello, welcome to Android Lab" message.
2. Develop an android app which displays a form to get following information from user.
3. Using Android, Create a login Activity. It asks "username" and "password" from user. If username and password are valid, it displays Welcome message using new activity.
4. Develop calculator Android Application.
5. Study of perform infrared communication.
6. Study of Bluetooth file transfer in android.
7. Study of to identify the Bluetooth devices in the wireless range.
8. Create an application that shows different country name on listview and on selecting it will show flag of that country.
9. Create an application using firebase.
10. Case Study in different real time mobile computing services.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2313
Subject Name: Mobile Computing

Course Outcomes:

Student will be able to:

Sr. No.	CO statement
CO-1	Analyze and explain wireless and Mobile Communication system and Bluetooth technology.
CO-2	Create and Differentiate Mobile Computing vs Wireless Networking, GSM, GPRS, UMTS and SDR.
CO-3	Understand the working of Mobile IP and Mobile Ad Hoc Networks, Vehicular Ad Hoc Network.
CO-4	Apply the constraints and survey of commercial mobile Operating Systems.
CO-5	Evaluate and explain Mobile Application Development.
CO-6	Remember different Mobile Commerce applications.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2314
Subject Name: Data Visualization

Semester: - VI

Type of course: Professional Elective

Prerequisite: Basic knowledge of Computer Programming, Charts, JavaScript, HTML.

Rationale: Understanding of basic principles of Engineering is required in various field of engineering.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction to Data Visualization Acquiring and Visualizing Data, Simultaneous acquisition and visualization, Applications of Data Visualization, Keys factors of Data Visualization (Control of Presentation, Faster and Better JavaScript processing, Rise of HTML5, Lowering the implementation Bar)	7
2	Exploring the Visual Data Spectrum charting Primitives (Data Points, Line Charts, Bar Charts, Pie Charts, Area Charts), Exploring advanced Visualizations (Candlestick Charts, Bubble Charts, Surface Charts, Map Charts, Infographics).	6
3	Basics of Data Visualization – Tables Reading Data from Standard text files (.txt, .csv, XML), Displaying JSON content Outputting Basic Table Data (Building a table, Using	6

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2314
Subject Name: Data Visualization

	Semantic Table, Configuring the columns), Assuring Maximum readability (Styling your table, Increasing readability, Adding dynamic Highlighting), Including computations, Using data tables library, relating data table to a chart.	
SECTION-B		
4	Visualizing Data Programmatically Creating HTML5 CANVAS Charts (HTML5 Canvas basics, Linear interpolations, A Simple Column Chart, Animations), Starting with Google charts (Google Charts API Basics, A Basic bar chart, A basic Pie chart, Working with Chart Animations).	6
5	Introduction to D3.js Getting setup with D3, Making selections, changing selection's attribute, Loading and filtering External data: Building a graphic that uses all of the population distribution data, Data formats you can use with D3.	8
6	Advanced Data Visualization Making charts interactive and Animated: Data joins, updates and exits, interactive buttons, Updating charts, Adding transactions.	6

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	35	30	15	05	05

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Book:

1. Data Analysis and Visualization Computer Engineering, by Avinash Jha, Book Paperback Technical.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2314
Subject Name: Data Visualization

Reference Books:

1. JavaScript and jQuery for Data Analysis and Visualization by Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery, WROX
2. Visual story telling with D3 by Ritchie S. King, Pearson.
3. Visualizing data: Exploring and explaining data with the processing environment by Ben Fry, O'Reilly, 2008.
4. Designing Data Visualizations: Representing Informational Relationships by A Julie Steele and Noah Iliinsky, O'Reilly
5. Andy Kirk, Data Visualization: A Successful Design Process, PAKT

List of Practicals:

1. Setup Environment for All the Tools.
2. Develop the following Program Using HTML5 CANVAS and SVG TAG.
 - A. Develop the Different basic Graphical Shapes using HTML5 CANVAS
 - B. Develop the Different Advanced Graphical Shapes using HTML5 CANVAS
3. Develop the following Program Using SVG TAG.
 - A. Develop the Different basic Graphical Shapes using HTML5 SVG
 - B. Develop the Different Advanced Graphical Shapes using HTML5 SVG
4. Develop Following Program Using HTML5 and JavaScript.
 - A. Develop the simple bar chart using HTML5 CANVAS
 - B. Read the data .txt file and draw Data Table
 - C. Read the data .txt file and draw Simple Bar Chart
5. Develop Following Program Using HTML5 and JavaScript for XML File.
 - A. Read the data .csv file and draw Data Table
 - B. Read the data .csv file and draw Column Bar Chart
 - C. Read the data XML file and draw Data Table
6. Develop Following Program Using HTML5 and JavaScript for JSON data.
 - A. Read the data XML file and draw Simple Chart
 - B. Read JSON Data and draw Data Table
 - C. Read JSON Data and draw Simple Chart
7. Develop Following Program Using HTML5 and D3.js and Canvas.js
 - A. Showing the data as a column chart (simple)
 - B. Showing the data as a stacked column chart

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2314
Subject Name: Data Visualization

- C. Showing the Data as a column chart for four age group
- 8. Develop Different Charts by Using HTML5 and D3.js and Canvas.js
 - A. Showing the data as a Line Chart (single, fewer and multiple lines)
 - B. Showing the data as a Pie Chart (single and multiple pie)
 - C. Showing the data as a Bar Chart (Simple and multiple)
- 9. Using Google API read JSON file and create Google Map.
- 10. Build interconnected Dashboards using.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Explore various data visualization techniques in order to provide new insight.
CO-2	Understand appropriate data visualization techniques to provide trends/insights for the given dataset.
CO-3	Analyze visualization tools / techniques for various data analysis tasks
CO-4	Evaluate the application context for given data set, Design the information Dashboard for access information based on user criteria.
CO-5	Demonstrate the basic of data visual.
CO-6	Apply the basic concept of D3.JS to build the data programmatically.

List of Open Source Software/learning website:

1. HTML5 (Canvas and SVG tags)
2. D3.js (<https://d3js.org/>)
3. Canvas.js Google API

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2315
Subject Name: Big Data Analytics

Semester: - VI

Type of course: Open Elective

Prerequisite: Some prior knowledge about SQL, Data Mining, and DBMS would be beneficial.

Rationale: Provide an overview of exciting and growing field of big data analytics. Enchase the programming skills using big data technologies such as map reduce, NoSQL, Hive, Pig, Kafka, and Spark.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction to Big Data and Hadoop Introduction to Big Data, Big Data characteristics, Types of Big Data, Traditional vs. Big Data, Big Data Applications. Hadoop architecture: HDFS, YARN 2, YARN Daemons. Hadoop Ecosystem.	5
2	HDFS and Map Reduce: HDFS HDFS architecture, Features of HDFS, Rack Awareness, HDFS Federation, Map Reduce the Map Task, The Reduce Task, Grouping by Key, Partitioner and Combiners, Detail of Map Reduce Execution. Algorithm Using Map Reduce Matrix and Vector Multiplication by Map Reduce, Computing Selection and Projection by Map Reduce, and Computing Grouping and Aggregation	9

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2315
Subject Name: Big Data Analytics

	by Map Reduce.	
3	<p>NoSQL Introduction to NoSQL, No SQL Business drivers, NoSQL Data architecture patterns: key value stores, Column family Stores, Graph Stores, Document Stores. NoSQL to manage big data Analyzing big data with shared nothing architecture, choosing distribution master slave vs. peer to peer overview, HBASE data model, and Read Write architecture.</p>	6
SECTION-B		
4	<p>Hadoop Ecosystem HIVE and PIG, HIVE: background, architecture, warehouse directory and meta-store, HIVE query language, loading data into table, HIVE built-in functions, joins in HIVE, Partitioning. HiveQL and PIG querying data, sorting and aggregation, background, architecture, PIG Latin Basics, PIG execution, modes, PIG processing – loading and transforming data, PIG built-in functions, filtering, grouping, sorting data Installation of PIG and PIG Latin commands.</p>	9
5	<p>Apache Kafka Kafka Fundamentals, Kafka architecture, Apache Spark Spark Basics, Working with RDDs in Spark, Spark Framework, aggregating Data with Pair RDDs, Writing and Deploying Spark Applications, Spark SQL and Data Frames.</p>	5
6	<p>Cluster Mining Frequent item sets Market Based Model, Apriori Algorithm, Handling Large Data Sets in Main Memory, Limited Pass Algorithm, and Counting Frequent item sets in a Stream, Clustering Techniques: Hierarchical, K-Means, Frequent Pattern based Clustering Methods.</p>	5

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2315
Subject Name: Big Data Analytics

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	30	20	30	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. HADOOP: The definitive Guide, Third Edition by Tom White, O'Reilly 2012, ISBN: 978-1-449-31152-0
2. Hadoop in Action, First Edition, by Chuck Lam, Dreamtech Press 2016, ISBN: 13 9788177228137.

Reference Books:

1. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics by Bill Franks, Wiley, 2012.
2. Beginner's Guide for Data Analysis using R Programming by Jeeva Jose, Khanna Book Publishing House, 2019.

List of Practicals:

1. Set up the Configuration of Hadoop System Using Cloudera.
2. Execute following Hadoop commands with detail explanation. (cp, rmr, dus, stat, put, get, mkdir),
3. Write a program in Map Reduce for Intersection and WordCount operation.
4. Write a program in MapReduce for Grouping and Aggregation and Union operation.
5. Query the sample Database using MongoDB querying commands (CRUD Operations).
 - a) Create collection

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2315
Subject Name: Big Data Analytics

- b) Insert document
- c) Delete Document
- d) Update Document.
- 6. Execute HiveQL: Select Where, Select Order By, Group By, Joins with explanation.
- 7. Execute the HIVE Built-In Operators. (Arithmetic, Relational, Logical).
- 8. Execute RDD Transformation operation in Apache Spark. Minimum 5 operations.
- 9. To install and run PIG and then write PIG Latin Script to sort, group, join, project and filter your data.
- 10. Execute Word Count and Char count operation in Apache Spark. Execute map, groupby, orderby operations on same dataset.

Course Outcomes:

Student will be able to:

Sr. No.	CO statement
CO-1	Understand the key issues in big data management and its associated application for business decision.
CO-2	Create problem solving and critical thinking skills in fundamental enabling techniques like Map Reduce.
CO-3	Evaluate problem solving and critical thinking skills in fundamental enabling techniques like NoSQL, Hadoop Ecosystem.
CO-4	Remember Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics
CO-5	Analyze RDD and Data Frame to create Application in Spark.
CO-6	Apply appropriate techniques and tools to solve big data problems

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2316
Subject Name: Image Processing

Semester: - VI

Type of course: Open Elective

Prerequisite: Knowledge of Fourier transform, Probability theory & Good programming skills.

Rationale: This is fundamental course of computer vision. This course will strengthen fundamental knowledge about digital image processing techniques. Digital image processing is used in almost all engineering fields and wide range of applications in industrial automation, medical, agriculture, security, entertainment, education and many more.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Digital Image Fundamentals Light and Electromagnetic spectrum, Components of Image processing system, Image formation and digitization concepts, Neighbours of pixel adjacency connectivity, regions and boundaries, Distance measures, Applications.	8
2	Image Enhancements In spatial domain: Basic gray level transformations, Histogram	10

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Bachelor of Engineering
Subject Code: CO2316
Subject Name: Image Processing

	processing, Using arithmetic/Logic operations, smoothing spatial filters, Sharpening spatial filters. In Frequency domain: Introduction to the Fourier transform and frequency domain concepts, smoothing frequency-domain filters, Sharpening frequency domain filters.	
3	Image Restoration Various noise models, image restoration using spatial domain filtering, image restoration using frequency domain filtering, Estimating the degradation function, Inverse filtering.	5
SECTION-B		
4	Colour Image Processing Colour fundamentals, Colour models, Colour transformation, Smoothing and Sharpening, Colour segmentation.	6
5	Wavelet and Multi-resolution Processing Image pyramids, Multi-resolution expansion, wavelet transform.	4
6	Image Compression and Segmentation Introduction, Image compression model, Error-free compression, Lossy compression. Detection of discontinuities, Edge linking and boundary detection, thresholding.	6

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	30	30	20	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Book:

1. Image Processing by Anamitra Nimbalkar.

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Bachelor of Engineering
Subject Code: CO2316
Subject Name: Image Processing

Reference Books:

1. Digital Image Processing, Second Edition by Rafael C. Gonzalez and Richard E. Woods, Pearson Education
2. Digital Image Processing by Bhabatosh Chanda and Dwijesh Majumder, PHI
3. Fundamentals of Digital Image Processing by Anil K Jain, PHI

List of Practicals:

1. Write program to read and display digital image using SCILAB
 - a. Become familiar with SCILAB Basic commands 5 Colour Image Processing: Colour Fundamentals, Colour Models, Pseudo-colour image processing.
2. To write and execute image processing programs using point processing method
 - a. Obtain Negative image
 - b. Obtain Flip image
3. To write and execute programs for image arithmetic operations
 - a. Addition of two images
 - b. Subtract one image from other image
4. To write and execute program for geometric transformation of image
 - a. Translation
 - b. Scaling
 - c. Rotation
 - d. Shrinking
 - e. Zooming
5. To understand various image noise models and to write programs for image restoration
 - a. Remove Salt and Pepper Noise
 - b. Minimize Gaussian noise
6. Write and execute programs to remove noise using spatial filters
 - a. Understand 1-D and 2-D convolution process
7. Write and execute programs to remove noise using spatial filters
 - a. Use 3x3 Mask for low pass filter and high pass filter
8. Write and execute program for image morphological operations erosion and dilation.

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Bachelor of Engineering
Subject Code: CO2316
Subject Name: Image Processing

9. Write and execute programs for image frequency domain filtering
 - a. Apply FFT on given image
 - b. Perform low pass and high pass filtering in frequency domain
 - c. Apply IFFT to reconstruct image
10. To write and execute program for wavelet transform on given image and perform inverse wavelet transform to reconstruct image.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Understand the basic image enhancement techniques in spatial & frequency domains
CO-2	Analyze the various kind of noise present in the image and how to restore the noisy image.
CO-3	Create the basic multi-resolution techniques and segmentation methods.
CO-4	Apply these concepts for image handling in various fields.
CO-5	Propose morphological operations on given image.
CO-6	Identify the methods of image compressing and segmenting.

List of Open Source Software/learning website:

1. MATLAB with image processing toolbox.
2. Scilab (SIP) ACTIVE LEARNING ASSIGNMENTS:
3. <http://fossee.in/>
4. www.scilab.in

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor in Engineering
Subject Code: CO2317
Subject Name: Internet Of Things

Semester: - VI

Type of course: Open Elective

Prerequisite: Knowledge of Computer

Rationale:

Understanding core technology, applications, sensors used and IOT architecture along with the industry perspective. Principles and operations of different types of sensors commonly used on mobile platform will be taught in a manner that by the end of the course the students will be able to design and implement real time solutions using IOT.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction to IoT Introduction of IoT, Difference between Embedded device and IoT device, Properties of IoT device, IoT Ecosystem, IoT Decision Framework, IoT Solution Architecture Models, Major IoT Boards in Market	6
2	Setting Up Raspberry/Arduino to Create Solutions Explore Raspberry Pi, setting up Raspberry Pi, showing working of Raspberry Pi using SSH Client and Team Viewer, Understand Sensing	7

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor in Engineering
Subject Code: CO2317
Subject Name: Internet Of Things

	actions, Understand Actuators and MEMS	
3	Communication Protocols used in IoT Types of wireless communication, Major wireless short range communication devices, properties, comparison of these devices (Bluetooth, WIFI, ZigBee, 6LoWPAN), Major wireless Long-range communication devices, properties, comparison of these devices (Cellular IoT, LPWAN)	7
4	IoT Applications Industrial Internet 4.0, Applications such as Smart home, wearables, smart city, smart grid, connected car, connected health (digital health, telehealth, telemedicine), smart retail	7
5	Sensors Applications of various sensors: Google Maps, Waze, WhatsApp, Ola Positioning sensors: encoders and accelerometers, Image sensors: cameras	6
6	Global Positioning Sensors GPS, GLONASS, IRNSS, Galileo and indoor localization systems, Motion & Orientation Sensors: Accelerometer, Magnetometer, Proximity Sensor, Gyroscope Calibration, noise modeling and characterization and noise filtering and sensor data processing. Privacy & Security	6

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	30	30	20	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor in Engineering
Subject Code: CO2317
Subject Name: Internet Of Things

Text Books:

1. Internet of Things (A Hands-on Approach), 1st Edition, by Vijay Madiseti and Arshdeep Bahga, VPT, 2014
2. Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, 1st Edition, by Francis da Costa Apress Publications, 2014
3. Getting Started with the Internet of Things by Cuno Pfister, O'Reilly Media, 2011

Reference Book:

1. The Internet of Things – Key applications and Protocols by Olivier Hersent, David Boswarthick, Omar Elloumi and Wiley, 2012 (for Unit2).
2. From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence”, Jan Höller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle and Elsevier, 2014.
3. Architecting the Internet of Things, Dieter Uckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer, 2011.

List of Practicals:

1. Familiarization with Arduino/ Raspberry Pi and perform necessary software installation.
2. To interface LED/ Buzzer with Arduino/ Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/ Digital sensor (IR/LDR) with Arduino/ Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/ Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface motor using Arduino/ Raspberry Pi and write a program to turn ON motor when push button is pressed.
6. To interface OLED with Arduino/ Raspberry Pi and write a program to print temperature and humidity readings on it.
7. To interface Bluetooth with Arduino/ Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
8. To interface Bluetooth with Arduino/ Raspberry Pi and write a program to turn LED ON/OFF when 1/0 is received from smartphone using Bluetooth.

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Subject Code: CO2317
Subject Name: Internet Of Things

9. Write a program on Arduino/ Raspberry Pi and write a program to upload temperature and humidity data to thingspeak cloud.
10. Write a program on Arduino/ Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Understand core technology, applications, sensors used and IOT architecture along with the industry perspective.
CO-2	Learn Arduino/ Raspberry's working and implementation.
CO-3	Practice various communication protocols used in IoT.
CO-4	Examine various IOT technologies in real-life applications.
CO-5	Analyze various sensors.
CO-6	Create global positioning sensors in different systems.

List of Open-Source Software/learning website:

1. [Vlabs.iitb.ac.in](http://vlabs.iitb.ac.in)
2. <https://nptel.ac.in>
3. www.coursera.org

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2318
Subject Name: Cyber Security

Semester: - VI

Type of course: Open Elective

Prerequisite: Basic knowledge of Computer

Rationale: This course provides the basis for understanding the fundamental issues surrounding the protection of information assets. The course's goal is to give students an overview of the topic of cyber security and assurance. Cyber Security is an area of study that investigates the possibilities of safe internet activity and how to safeguard oneself and, eventually, society against such attacks.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	Introduction Introduction to Cyber Security, Importance and challenges in Cyber Security, Cyberspace, and Cyber threats, Cyber warfare, CIA Triad, Cyber Terrorism, Cyber Security of Critical Infrastructure, Cyber security -Organizational Implications.	6
2	Hackers And Cyber Crimes Types of Hackers, Hackers and Crackers, Cyber-Attacks and Vulnerabilities, Malware threats, Sniffing, Gaining Access, Escalating	7

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2318
Subject Name: Cyber Security

	Privileges, Executing Applications, Hiding Files, Covering Tracks, Worms, Trojans, Viruses – Backdoors.	
3	Fundamentals of Ethical Hacking and Social Engineering Ethical Hacking Concepts and Scopes - phases of ethical hacking, Enterprise Information Security Architecture, Vulnerability Assessment and Penetration Testing, Types of Social Engineering, Scanning and enumeration, Insider Attack, Preventing Insider Threats, Social Engineering Targets and Defense Strategies. Virtual LAN	7
SECTION-B		
4	Network Defense and Countermeasures Automated Security Assessment Tools (OpenVAS, Nessus), IDS, Honeypots and Firewalls, Cryptographic Attacks and Defenses. Password Cracking and Brute-Force Tools – John the Ripper, Pwdump, Firewalls and Packet Filters, VPN.	7
5	Web Application Vulnerabilities Owasp Top 10 web application security, Application Inspection tools – Zed Attack Proxy, Sqlmap, DVWA.	7
6	Introduction about Cyber Laws Classification of cybercrimes and its examples, The legal perspectives, Cybercrime and the Indian ITA 2000, Global Perspective on Cybercrimes.	5

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	25	30	10	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

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Bachelor of Engineering
Subject Code: CO2318
Subject Name: Cyber Security

Text Books:

1. The Ethical Hacker's Handbook, Fourth Edition by Gray Hat Hacking
2. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.

Reference Books:

1. Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspective", by Nina Godbole, Sunit Belapure, Wiley Publication.
2. Computer Security: Concept, Issues and Implementation by Alfred Basta and Wolf Halton.

List of Practicals:

1. Introduction Virtualization Environment configuration and Cyber Lab setup (Kali, VM ware and Oracle VirtulBox).
2. Information Gathering using NMAP framework and study about port scanning.
3. Understand packet capturing tool wireshark or Ethercap and analysis of those packets.
4. Using open port information perform MITM(Man In The Middle) attack using arpspoof, urlsnarf, dsniff, dnsspoof.
 - a. Interruption
 - b. Interception
5. BASIC configuration of Intrusion Detection System: Snort.
6. Network vulnerability assessment using OpenVAS/Necuss Framework.
7. Demonstrate automated SQL injection with SqlMap.
8. Demonstrate Application Injection using Zed Attack Proxy.
9. Perform web application testing using DVWA.
 - a. Perform Manual SQL injection
 - b. XSS using DVWA
10. Perform brute force attack using John the RIPPER.

Shroff S.R. Rotary Institute of Chemical Technology

Bachelor of Engineering
Subject Code: CO2318
Subject Name: Cyber Security

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Understand importance of Cyber Security.
CO-2	Explore various types of cyber-attacks.
CO-3	Evaluate penetration testing and analyzing vulnerability assessment techniques.
CO-4	Illustrate protection from the outside world, evaluate and secure Network and IT systems.
CO-5	Implement various web application inspection tools.
CO-6	Learn cyber laws and how to protect themselves.

List of Open Source Software/learning website:

1. vlabs.iitb.ac.in
2. <https://nptel.ac.in/courses/>
3. Cryptool - <https://www.cryptool.org/en/>
4. Wireshark - <https://www.wireshark.org/download.html>

(Established under Gujarat Private Universities Act, 2009)

Bachelor of Engineering

Subject Code: MH2302

Subject Name: Contributor Personality Development Program – II

Shroff S.R. Rotary Institute of Chemical Technology

Type of course: Work-Personality Development

Prerequisite: To keep open mind and will to learn humanity for oneself and society.

Rationale: The Contributor Program aims to accomplish the following outcomes in the lives of students–

- Improve the employability of students by giving them the right work ethic and thinking that employers are looking for.
- Build their confidence with which they can go into any job and contribute meaningfully.
- Improve their ability to engage better in the workplace and to be able to handle the challenges that come up there.
- Build their career-worthiness and help them develop into future-ready contributors with ability to navigate a career in a volatile, changing world.
- Widen their choices of career and success, so that they are able to open up more opportunities for themselves and take up unconventional career pathways.
- Enable them to recognize how they, as technical professionals, can participate and make a positive contribution to their communities and to their state.

Towards this goal, the Contributor Program has been designed to awaken and strengthen students from within, in terms of building positive self-esteem, increasing their confidence level and I-can attitude, improving their aspirations, giving them new methods of thinking, building their cognitive capacities, exposing them to the skills and practices associated with being contributors in the workplace (not mere employees).

The Program content is also designed to expose students to real-world workplace scenarios and sensitize them to some of the challenges faced in society around them, especially in the local communities around them and in their own state of Gujarat.

The Contributor Program syllabus has been evolved and fine-tuned over several years, (a) to address the changing need and contemporary challenges being faced by industry and what employers of today are looking for in the people they hire and (b) by working extensively with universities and students building an appreciation of their challenges and concerns. At the core, the program is guided by the higher ideas and principles of practical Vedanta in work.

(Established under Gujarat Private Universities Act, 2009)

Bachelor of Engineering

Subject Code: MH2302

Subject Name: Contributor Personality Development Program – II

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
1	1	0	2	50	30	00	20	100

Content:

Sr. No.	Content	Total Hrs.
SECTION-A		
1	<p>Finding Solutions</p> <p>The market environment in which organizations are operating, is becoming increasingly dynamic and uncertain. So, employers are increasingly seeking out people who can innovate and figure out solutions in the face of any challenge (unlike in the past when it was the people who were most efficient and productive, who were valued by organizations). At the heart of innovation lies this way of thinking of “finding solutions” rather than “seeing problems or roadblocks”.</p> <p>Students learn how to build this way of thinking, in this topic.</p>	04 hrs Classroom engagement (including self-discovery/ solutioning sessions)
2	<p>Creating Value</p> <p>Companies are also looking for employees who do not just work hard, or work efficiently or productively - but those who will make a valuable difference to the fortunes of the company. This difference may come from innovation, but it may also come from focusing on the right things and identifying what really matters – both to the company and to the customers. In this topic, students learn how to build this capability.</p>	04 hrs Classroom engagement (including self-discovery/ solutioning sessions)

(Established under Gujarat Private Universities Act, 2009)

Bachelor of Engineering

Subject Code: MH2302

Subject Name: Contributor Personality Development Program – II

3	<p>Engaging deeply</p> <p>The environment we live in is becoming increasingly complex because more and more things are getting interconnected, new fields are emerging, technologies are rapidly changing, capabilities and knowledge one is trained in will become fast obsolete. In such a scenario, the student’s ability to quickly understand and master what is going on, dive deep, get involved in any area, rapidly learn new capabilities that a job demands, is important. Engaging deeply is a core way of thinking that can help them in this. In this topic, students learn how to engage deeply.</p>	04 hrs Classroom engagement (including self-discovery/ solutioning sessions)
SECTION-B		
4	<p>Enlightened self-interest & collaboration at work</p> <p>The changing nature of work in organizations and in the global environment is increasingly demanding that people work more collaboratively towards shared goals and more sustainable goals. A key to working successfully when multiple stakeholders are involved is “thinking in enlightened self-interest”. In this topic, students learn how to develop this way of thinking (going beyond “narrow self-interest”).</p>	04 hrs Classroom engagement (including self-discovery/ solutioning sessions)
5	<p>Human-centered thinking & Empathy</p> <p>In this topic, students explore a human-centric approach to work – where the ability to recognize and respond to other people (whether they are users or customers or team members) as a human being with human needs and difficulties, is essential. This is at the heart of user-centric design of products and solutions, at the heart of genuine customer- centricity in services, and of any successful interaction with other people.</p>	04 hrs Classroom engagement (including self-discovery/ solutioning sessions)
6	<p>Trust Conduct</p> <p>The biggest currency in a sustainable career is “trust” i.e. being trusted by team members, bosses, and customers. When we are trusted, people listen to us, they are willing to give us the chance to grow, give us the space to make</p>	04 hrs Classroom engagement (including self-discovery/ solutioning sessions)

(Established under Gujarat Private Universities Act, 2009)

Bachelor of Engineering

Subject Code: MH2302

Subject Name: Contributor Personality Development Program – II

	mistakes, and work seamlessly with each other without always having to “prove ourselves”. In this topic, students learn how to demonstrate conduct that builds the trust of people.	
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Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
-	20	20	20	20	20

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate
C: Create and above Levels (Revised Bloom’s Taxonomy)**

Reference resources:

- A. Basic reference for both students and teachers
 1. Contributor Personality Program textbook cum workbook developed by Illumine
 2. Web-based ActivGuide™ for self-exploration of rich media resources to vividly understand many of the ideas, watch role models, learn from industry people, get reference readings – that help them enrich the understanding they gained in the class published by Illumine Foundation

- B. Advanced reference for teachers
 1. On Contributors, Srinivas V.; Illumine Ideas, 2011
 2. Enlightened Citizenship and Democracy; Swami Ranganathananda, Bharatiya Vidya Bhavan, 1989
 3. Eternal Values for a Changing Society – Vol I-IV, Swami Ranganathananda; Bharatiya Vidya Bhavan
 4. Karma Yoga, Swami Vivekananda; Advaita Ashrama
 5. Vivekananda: His Call to the Nation, Swami Vivekananda; Advaita Ashrama
 6. Six Pillars of Self Esteem, Nathaniel Branden; Bantam, 1995
 7. Mindset: The New Psychology of Success, Carol S. Dweck; Random House Publishing Group, 2007
 8. Lasting Contribution: How to Think, Plan, and Act to Accomplish Meaningful Work, Tad Waddington; Agate Publishing, 2007

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9. Why not?: how to use everyday ingenuity to solve problems big and small, Barry Nalebuff, Ian Ayres; Harvard Business School Press, 2003
10. The value mindset: returning to the first principles of capitalist enterprise (Ch 8 & 9); Erik Stern, Mike Hutchinson; John Wiley and Sons, 2004
11. The Power of Full Engagement: Managing Energy, Not Time, is the Key to High Performance and Personal Renewal, Jim Loehr, Tony Schwartz; Simon and Schuster, 2003
12. Creating Shared Value, Michael E. Porter and Mark R. Kramer; Harvard Business Review; Jan/Feb2011, Vol. 89 Issue 1/2
13. The Speed of Trust: The One Thing That Changes Everything, Stephen M. R. Covey, Rebecca R. Merrill, Stephen R. Covey; Free Press, 2008
14. The Courage to Meet the Demands of Reality, Henry Cloud; HarperCollins, 2009
15. Responsibility at work: how leading professionals act (or don't act) responsibly, Howard Gardner; John Wiley & Sons, 2007

Course Outcomes:

Students will be able to:

Sr. No.	CO statement
CO-1	Students will be able to recognize & appreciate the thinking required to find solutions in the face of any challenge.
CO-2	Students will be able to recognize & appreciate different types of value that can be created and the different ways to create value for others.
CO-3	Students will be able to recognize & appreciate how to engage deeply, and its need, value, payoffs and consequences in different contexts.
CO-4	Students will be able to differentiate between 'enlightened self-interest' and 'narrow self-interest' & appreciate the payoffs/ consequences of both when working with multiple stakeholders.
CO-5	Students will be able to recognize & appreciate the human side of situations or interactions or projects that will help them develop a more human-centric approach/ response to work.
CO-6	Students will be able to recognize & appreciate conduct which builds trust of people in contrast to conduct which breaks trust of people - in teams / organization & the value of trust conduct in various situations.

Prepared By: Ms. Aakancha Sanjeev Kumar

Moderated By: Dr. Purvi Naik.