

SGT University, Chandu-Budhera, Gurugram
Faculty of Engineering & Technology
Department of Computer Science & Engineering



Master of Computer Applications
Scheme & Syllabus (2022-23 Onwards)

Vision of SGT University

“Driven by Research & Innovation, we aspire to be
amongst the top ten Universities in the Country by 2025”

MCA

The syllabi of MCA program for all semesters are given in the following pages. These are arranged as semester-wise.

Two Year course MCA program at glance

	Semester I	Semester II	Semester III	Semester IV	Total
Course	9	8	7	1	25
Credit	21	20	18	16	75

Scheme of studies:

SEMESTER I

S.No	Course Code	Course Title	L	T	P	C
1		Python Programming	3	-	-	3
2		Web Design and Development	3	-	-	3
3		Database Technology	3	1	-	4
4		Computer Networking	3	-	-	3
5		Soft Skills	2	-	-	2
6		Python Programming Lab	-	-	4	2
7		Web Design and Development Lab	-	-	2	1
8		Database Technology Lab	-	-	4	2
9		System and Network Administration Lab	-	-	2	1
TOTAL			14	1	12	21

SEMESTER II

S.No	Course Code	Course Title	L	T	P	C
1		Data Structures	3	-	-	3
2		Object Oriented Programming using Java	3	-	-	3
3		Program Elective – I	3	-	-	3
4		Program Elective – II	3	-	-	3
5		Fundamentals of Management	3	-	-	3
6		Data Structures Lab	-	-	4	2
7		Object Oriented Programming using Java Lab	-	-	2	1
8		Program Elective - II Lab	-	-	4	2
TOTAL			15	0	10	20

*The students are compulsorily need to undergo 6 weeks of summer internship immediately after 2nd semester.

SEMESTER III

S.No	Course Code	Course Title	L	T	P	C
1		DevOps	3	-	-	3
2		Program Elective – III	3	-	-	3
3		Program Elective – IV	3	-	-	3
4		Non-Departmental Electives	3	-	-	3
5		DevOps Lab	-	-	2	1
6		Elective – IV Lab	-	-	4	2
7		Summer Internship	-	-	-	3
TOTAL			12	0	6	18

SEMESTER IV

S.No.	Course Code	Course Title	L	T	P	C
1		Industrial Internship	-	-	-	16
TOTAL			0	0	0	16

SPECIALIZATION

The students will have options of selecting the electives from the different baskets. Refer to Table 2 for list of subjects.

Table 2: List of subjects offered under electives

S.No.	Course Name		L	T	P	C
1	Introduction to AI and Machine Learning	Elective - I	3	0	0	3
2	Fundamentals of Blockchains	Elective - I	3	0	0	3
3	Steganography and Digital Watermarking	Elective - I	3	0	0	3
4	Introduction to Internet of Things	Elective - I	3	0	0	3
5	Introduction to Data Analytics	Elective - II	3	0	0	3
6	Introduction to Data Analytics Lab	Elective - II	0	0	4	2
7	Smart Contract and Solidity	Elective - II	3	0	0	3
8	Smart Contract and Solidity Lab	Elective - II	0	0	4	2
9	Data Encryption and Compression	Elective - II	3	0	0	3
10	Data Encryption and Compression Lab	Elective - II	0	0	4	2
11	IoT with Arduino, ESP and Raspberry pi	Elective - II	3	0	0	3
12	IoT with Arduino, ESP and Raspberry pi Lab	Elective - II	0	0	4	2
13	Applications of AI	Elective - III	3	0	0	3
14	Blockchain Security and Performance	Elective - III	3	0	0	3
15	Security Assessment and Risk Analysis	Elective - III	3	0	0	3
16	Web Data Mining	Elective - III	3	0	0	3
17	Deep Learning and Neural Networks	Elective - IV	3	0	0	3
18	Deep Learning and Neural Networks Lab	Elective - IV	0	0	4	2
19	Blockchain Platforms and Use Cases	Elective - IV	3	0	0	3
20	Blockchain Platforms and Use Cases Lab	Elective - IV	0	0	4	2
21	Database Security and Access Control	Elective - IV	3	0	0	3
22	Database Security and Access Control Lab	Elective - IV	0	0	4	2
23	Analysing, Visualizing and Applying Data Science with Python	Elective - IV	3	0	0	3
24	Analysing, Visualizing and Applying Data Science with Python Lab	Elective - IV	0	0	4	2

MCA

Non-Departmental Electives

S.No.	Course Name	L	T	P	C
1	Economic Analysis for Business	3	-	-	3
2	Accounting and Financial Management	3	-	-	3
3	People's Behaviour in an Organization	3	-	-	3
4	Business Analytics	3	-	-	3

SEMESTER I

S.No	Course Code	Course Title	L	T	P	C
1		Python Programming	3	-	-	3
2		Web Design and Development	3	-	-	3
3		Database Technology	3	1	-	4
4		Computer Networking	3	-	-	3
5		Soft Skills	2	-	-	2
6		Python Programming Lab	-	-	4	2
7		Web Design and Development Lab	-	-	2	1
8		Database Technology Lab	-	-	4	2
9		System and Network Administration Lab	-	-	2	1
TOTAL			14	1	12	21

1. Name of the Department- Computer Science Engineering						
2. Course Name	Python Programming	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0		Practical = 0		
8. Course Description						
Introduction to Computer and Programming in Python is intended for students with little or no programming experience. It aims to provide students with an understanding of the role computation can play in solving problems and to help students, regardless of their major, feel justifiably confident of their ability to write small programs that allow them to accomplish useful goals. The class will use the Python 3.5 programming language.						
9. Learning objectives:						
1. Master the fundamentals of writing Python scripts.						
2. Learn core Python scripting elements such as variables and flow control structures.						
3. Discover how to work with lists and sequence data.						
4. Write Python functions to facilitate code reuse.						
5. Use Python to read and write files.						
10. Course Outcomes (COs):						
a. Provide an understanding of the role computation can play in solving problems.						
b. Master the fundamentals of writing Python scripts.						
c. Learn core Python scripting elements such as variables and flow control structures.						
d. Discover how to work with lists and sequence data.						
e. Position students so that they can compete for projects and excel in subjects with programming components.						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)						
Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm:						
Flowchart / Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code						

Unit – 2	Number of lectures = 10	
Introduction to Python: The basic elements of python, Branching Programs, Control Structures, Strings and Input, Iteration, String Manipulation, Guess and Check, Approximations, Bisection, Functions, Scoping and Abstraction: Functions and scoping, Specifications, Recursion, Global variables, Modules, Files		
Unit – 3	Number of lectures = 10	
Classes and Object: Oriented Programming: Abstract Data Types and Classes, Inheritance, Encapsulation and Information Hiding, Handling Exceptions, Decorators		
Unit – 4	Number of lectures = 10	
Simple Algorithms and Data structures: File Handling, Search Algorithms, Sorting, Algorithms, Hash Tables,		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource:</p> <p>https://free.aicte-india.org/Introduction-to-Python.php</p>		
13. Books Recommended		
Text Books		
<ol style="list-style-type: none"> 1. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India 		
Reference Books		
<ol style="list-style-type: none"> 1. R. Nageswara Rao, “Core Python Programming”, Dreamtech 2. Wesley J. Chun. “Core Python Programming, Second Edition”, Prentice Hall 3. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, “Data Structures and Algorithms in Python”, Wiley 4. Kenneth A. Lambert, “Fundamentals of Python,First Programs”, CENGAGE Publication 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Web Design and Development	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0		Practical = 0		
8. Course Description						
This course concerns with the design and implementation of web apps with Python, JavaScript, and SQL using frameworks like Django, React, and Bootstrap. Topics include database design, scalability, security, and user experience. Through hands-on projects, students learn to write and use APIs, create interactive UIs, and leverage cloud services like GitHub and Heroku. By semester's end, students emerge with knowledge and experience in principles, languages, and tools that empower them to design and deploy applications on the Internet.						
9. Learning objectives:						
<ol style="list-style-type: none"> 1. Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice. 2. Develop skills in analyzing the usability of a web site. 3. Understand how to plan and conduct user research related to web usability. 4. Learn the language of the web: HTML and CSS. 						
10. Course Outcomes (COs):						
a. Provide an understanding of the role computation can play in solving problems.						
b. Master the fundamentals of Django framework.						
c. Discover how to work with Git and GitHub.						
d. Position students so that they can create, share, test and deploy web application projects						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Introduction, Web Programming, HTML (Hypertext Markup Language), Document Object Model (DOM), More HTML Elements, Forms, CSS (Cascading Style Sheets), Responsive Design, Bootstrap, SASS (Syntactically Awesome Style Sheets), Introduction to Git, GitHub, Commits, Merge Conflicts, Branching, More GitHub Features						
Unit – 2	Number of lectures = 10					

Decorators and Lambda Function in Python, Introduction to Web Applications, HTTP, Django, Routes, Templates: Conditionals and Styling, Tasks, Forms: Django Forms, Sessions

Introduction to SQL: Databases, Column Types; Tables ; SELECT: Working with SQL in the Terminal, Functions, UPDATE, DELETE, Other Clauses, Joining Tables: JOIN Query, Indexing, SQL Vulnerabilities;

Django Models, Migrations, Shell: Starting our application, Django Admin, Many-to-Many Relationships, Users

Unit – 3	Number of lectures = 10
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Introduction to JavaScript, Events, Variables, query Selector, DOM Manipulation: JavaScript Console, Arrow Functions, TODO List; Intervals, Local Storage, APIs: JavaScript Objects, Currency Exchange.

Introduction to User Interfaces, Single Page Applications, Scroll: Infinite Scroll; Animation, React: Addition

Unit – 4	Number of lectures = 10
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Introduction to Testing, Assert: Test-Driven Development, Unit Testing, Django Testing: Client Testing, Selenium, CI/CD, GitHub Actions, Docker

Scalability, Scaling, Load Balancing, Autoscaling: Server Failure, Scaling Databases: Database Replication, Caching, Security: Git and GitHub, HTML, HTTPS: Secret-Key Cryptography, Public-Key Cryptography, Databases: APIs, Environment Variables;

JavaScript: Cross-Site Request Forgery

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

Online Resource:

<https://www.coursera.org/courses?query=web%20development>

13. Books Recommended

Text Books

1. Internet and World Wide Web, Deitel H.M., P.J.Deitel , Pearson
2. Django for APIs: Build web APIs with Python and Django, Willam S. Vincent,

Reference Books

1. Web Technologies, Uttam K. Roy, Oxford University Press
2. HTML Black Book, Stephen Holzner, Wiley Dreamtech.
3. SQL, PL/SQL: Programming Language of Oracle, Ivan Bayross, BPB Publications

1. Name of the Department- Computer Science Engineering						
2. Course Name	Database Technology	L	T	P		
3. Course Code		3	1	0		
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 48		Tutorials = 0	Practical = 0			
8. Course Description						
This course uses the latest database tools and techniques to prepare the student to understand, develop, and manage advanced database applications. Students gain considerable hands-on experience with the Oracle family of databases and an understanding of how to define, design, and implement databases. Students learn how to use object-oriented technologies to design relational databases and how to design relational databases to support object-oriented applications. Students learn about database programming and develop triggers, stored procedures, and stored functions using Oracle's PL/SQL language or the Transact SQL language of Microsoft SQL Server						
9. Learning objectives:						
<ol style="list-style-type: none"> 1. Describe the differences between data, information, and knowledge; 2. Define the term <i>database</i> and identify the steps to creating one; 3. Describe the role of a database management system; 4. Describe the characteristics of a data warehouse; and 5. Define data mining and describe its role in an organization 						
10. Course Outcomes (COs):						
a. Implement database design techniques						
b. Implement normalization.						
c. Implement object relational database.						
d. Implement distributed and parallel dbms						
11. Unit wise detailed content						
Unit-1	Number of lectures = 12	DATABASE INTRODUCTION & DESIGN TECHNIQUES				
Introduction to Database Systems, DBMS Architecture, Introduction to Data Modeling, ER Model, EER Model -Specialization/Generalization, Aggregation, Composition, Relational model algebra operations, ER, EER to Relational Model.						
Unit – 2	Number of lectures = 12	ADVANCED DESIGN TECHNIQUE - NORMALIZATION				

Normalization – Informal Guidelines, Functional dependencies, decomposition algorithms , Normal Forms up to 5NF, SQL - Basic & Advanced Operations, Query Processing, Query optimization, Storage and File organization.		
Unit – 3	Number of lectures = 12	OBJECT RELATIONAL DBMS
Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence - Transaction - Concurrency - Recovery - Database Administration. Overview, Complex Data Types, ODBMS & ORDBMS, Structured Types and Inheritance in SQL, Table Inheritance, Object-Identity and Reference Types in SQL		
Unit – 4	Number of lectures = 12	DISTRIBUTED DATABASE AND PARALLEL DBMS
Concepts, advantages, types, functions, architecture, data allocation, fragmentation, replication, transparencies, Date's rules, transaction management, concurrency control, dead lock, recovery 2PC, 3PC. Partition techniques, Architecture, Parallel algorithms for sorting, Parallel join, Parallel Queries.		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University.</p> <p>The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource:</p> <p>https://www.coursera.org/learn/database-management</p>		
13. Books Recommended		
Text Books		
<p>1. Thomas M. Connolly and Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation, and Management, 2015, 6th Edition, Pearson India.</p> <p>2. Saeed K. Rahimi, Frank S. Haug :Distributed Database Management system”, 2015.</p>		
Reference Books		
<p>1. Ramez Elmasri & B.Navathe: Fundamentals of database systems, 2014, 7th Edition, Addison Wesley</p>		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Computer Networking	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0		Practical = 0		
8. Course Description						
This course provides an introduction to computer networks, with a special focus on the Internet architecture and protocols. Topics include layered network architectures, addressing, naming, forwarding, routing, communication reliability, the client-server model, web and email protocols.						
9. Learning objectives:						
<ul style="list-style-type: none"> • Describe the general principles of data communication. • Describe how computer networks are organized with the concept of layered approach. • Describe how signals are used to transfer data between nodes. • Implement a simple LAN with hubs, bridges and switches. • Describe how packets in the Internet are delivered. 						
10. Course Outcomes (COs):						
a) Illustrate the flow of information from one node to another node in the networks.						
b) Identify the components required to build different types of networks						
c) Understand the functionalities needed for data communication into layers						
d) Understand the working principles of various application protocols						
e) Acquire knowledge about security issues and services available.						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10	NETWORK FUNDAMENTALS and DATA LINK LAYER				
NETWORK FUNDAMENTALS : Uses of Networks – Categories of Networks -Communication model –Data transmission concepts and terminology – Protocol architecture – Protocols – OSI – TCP/IP – LAN Topology – Transmission media.						
DATA LINK LAYER : Data link control - Flow Control – Error Detection and Error Correction - MAC – Ethernet, Token ring, Wireless LAN MAC – Blue Tooth - Bridges.						
Unit – 2	Number of lectures = 10	NETWORK LAYER				
NETWORK LAYER : Network layer – Switching concepts – Circuit switching – Packet switching –IP – – Datagrams – IP addresses- IPV6– ICMP – Routing Protocols – Distance Vector – Link State- BGP.						
Unit – 3	Number of lectures = 10	Transport layer				

Transport layer : Transport layer –service –Connection establishment – Flow control – Transmission control protocol – Congestion control and avoidance – User datagram protocol. -Transport for Real Time Applications (RTP).		
Unit – 4	Number of lectures = 10	APPLICATION LAYER
APPLICATION LAYER : Applications - DNS- SMTP – WWW –SNMP- Security –threats and services – Dynamic domain name system – Encapsulation - web security –SSL.		
12. Brief Description of self-learning / E-learning component The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal. https://elearning.sgtuniversity.ac.in/course-category/ Online Resources: https://www.coursera.org/learn/computer-networking		
13. Books Recommended		
Text Books 1. Larry L. Peterson & Bruce S. Davie, “Computer Networks – A systems Approach”, Fourth Edition, Harcourt Asia / Morgan Kaufmann, 2011. 2. William Stallings, “Data and Computer Communications”, Ninth Edition, Prentice Hall, 2011.		
Reference Books 1. Forouzan, “Data Communication and Networking”, Fifth Edition, TMH 2012		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Soft Skills	L	T	P		
3. Course Code		2	0	0		
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 28		Tutorials = 0		Practical = 0		
8. Course Description						
The key areas addressed in Softskills are Communication skills, Body language and Etiquette, Group discussion skills, Interview skills, Presentation skills, and Emotional Intelligence, Time Management Skills, Preparation of CV and Life skills.						
9. Learning objectives:						
<ul style="list-style-type: none"> • To teach practical, everyday communication in English through innovative teaching methods to the students • To train the students on interview skills, group discussions, presentation, speaking and listening skills • To help the students understand the speech and communication process • To introduce the students to the variety of public speaking 						
10. Course Outcomes (COs):						
a) To equip the students with the skills to effectively communicate in English						
b) To help the students differentiate between public speaking and daily conversation						
c) To train the students on interview skills, group discussions, presentation, speaking and listening skills						
d) To introduce the students to the need of identifying the presentation						
11. Unit wise detailed content						
Unit-1	Number of lectures = 7					
Presentation Skill: Speaking to a small group and large audience, Barriers to communication and non-verbal communication, Language skills, Types of presentation and use of aids, Effective public speaking						
Technical Writing Skills: Defining Technical Communication and Organising Information, Language in Technical Communication, Description Vs Narration Vs Instruction, Letters, Memos, Electronic Communication, Formal and Informal Reports						
Unit – 2	Number of lectures = 7					
Interview Skills: Writing a resumé, Types of interviews, Self-grooming and body language, Interview preparation techniques, frequently asked questions.						

Group Discussion Skills: Principles of group discussion, Purpose of group discussion, Preparation, Skills to be acquired — communication, leadership, problem-solving, Effective participation		
Unit – 3	Number of lectures = 7	
<p>Personality Enrichment: Positive attitude, SWOT Analysis, Self-confidence and motivation, Inter-personal skills, Projecting a positive social image</p> <p>Time Management: Goal setting and prioritisation, ABC Analysis—preparing a personal schedule, Short term and long term goals, Implementing goals, Task list organisation</p>		
Unit – 4	Number of lectures = 7	
Reading and Listening Skills: Types of reading — pleasure/ info/ knowledge, Reading strategies — predicting, skimming, scanning, reading intensively, Active reading — understanding, highlighting, making notes, Listening effectively and identifying barriers, Listening for specific and general information		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p>		
13. Books Recommended		
<ol style="list-style-type: none"> 1. Developing Reading Skills – Françoise Grellet, Cambridge University Press, Cambridge 2007 2. Cambridge First Certificate: Listening and Speaking – Sue O’ Connell with Lousie Hashemi, Cambridge University Press, Cambridge 2000 3. Inspired to Write – Jean Withrow, Gay Brookers and Martha Cumings, Cambridge University Press, New York, 2004 4. How to Build a Better Vocabulary- Maxwell Nurnberg and Morris Rosenblum, Warner Books, New York 1989 5. Technical Communication: A Practical Approach, (Sixth edition) – William Sanborn Pfeifer and T.V.S. Padmaja, Pearson, New Delhi 2006 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Python Programming Lab	L	T		P	
3. Course Code		0	0	4		
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0	Practical = 28			
8. Course Description						
Problem-solving and Python programming emphasize on principles of software development, style, and testing. Topics include procedures and functions, iteration, recursion, arrays and vectors, strings, an operational model of procedure and function calls, algorithms, exceptions, object-oriented programming, and GUIs (graphical user interfaces). Weekly labs provide guided practice on the computer, with staff present to help. Assignments use graphics and GUIs to help develop fluency and understanding.						
9. Learning objectives:						
<ol style="list-style-type: none"> 1. Be fluent in the use of procedural statements — assignments, conditional statements, loops, function calls — and sequences. 2. Be able to design, code, and test small Python programs. 3. Understand the concepts of object-oriented programming as used in Python: classes, subclasses, inheritance, and overriding. 4. Understand the basics of OO design 5. Implement the data structures and use the built-in libraries for efficient codes. 						
10. Course Outcomes (COs):						
a) Develop solutions to simple computational problems using Python programs.						
b) Solve problems using conditionals and loops in Python. Develop Python						
c) programs by defining functions and calling them.						
d) Use Python lists, tuples and dictionaries for representing compound data.						
e) Develop Python programs using files						
11. LIST OF EXPERIMENTS						
1. Develop programs to understand the control structures of python						
2. Develop programs to implement list						
3. Develop programs to implement Dictionary						
4. Develop programs to implement tuples						
5. Develop programs to implement function with stress on scoping						
6. Develop programs to implement classes and objects						
7. Develop programs to implement exception handling						

8. Develop programs to implement linear search and binary search

9. Develop programs to implement insertion sort

10. Develop programs to implement bubble sort

11. Develop programs to implement quick sort

12. Develop programs to implement heap sort

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University.

The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

Online Resource:

<https://www.coursera.org/learn/python>

1. Name of the Department- Computer Science Engineering						
2. Course Name	Web Design and Development Lab	L	T		P	
3. Course Code		0	0		2	
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0	Practical = 28			
8. Course Description						
This course concerns the implementation of web apps with Python, JavaScript, and SQL using frameworks like Django, React, and Bootstrap. Through hands-on projects, students learn to write and use APIs, create interactive UIs, and leverage cloud services like GitHub and Heroku. By semester's end, students emerge with knowledge and experience in principles, languages, and tools that empower them to design and deploy applications on the Internet.						
9. Learning objectives:						
1. Become familiar with graphic design principles that relate to web design and learn how to implement theories into practice.						
2. Develop skills in analyzing the usability of a web site.						
3. Understand how to plan and conduct user research related to web usability.						
4. Learn the language of the web: HTML and CSS						
10. Course Outcomes (COs):						
a. Provide an understanding of the role computation can play in solving problems.						
b. Master the fundamentals of Django framework.						
c. Discover how to work with Git and GitHub.						
d. Position students so that they can create, share, test and deploy web application projects						
11. List Of Experiments						
1. Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient						
2. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format						
3. Develop and demonstrate a HTML5 file that includes JavaScript script that uses functions for the following problems:						
a. Parameter: A string						
Output: The position in the string of the left-most vowel						
b. Parameter: A number						
Output: The number with its digits in the reverse orde						
4. Write a Python program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.						

5. Write a Python program to display a digital clock which displays the current time of the server.
6. Write a Python program to sort the student records which are stored in the database using selection sort.
7. Building an RSS feed scraper with Python using BeautifulSoup
8. Create a web scrapping project using Python and Django
9. Install github and start using it to create and clone code repositories.
10. Use git to: undo changes before committing and how to amend commits; identify errors in commits that were submitted; explore the concept of branching and merging

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

Online Resource:

<https://www.coursera.org/courses?query=web%20development>

1. Name of the Department- Computer Science Engineering						
2. Course Name	Database Technology Lab	L	T	P		
3. Course Code		0	0	4		
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0		Practical = 28		
8. Course Description						
Database management has evolved from a specialized computer application to a central component of a modern computing environment and as a result knowledge about database system has become an essential part of computer science. The course serves as a visual guide to the material presented during our lectures. The aim of this course is to introduce Database management system, with an emphasis on foundational material. The fundamental concepts and algorithms covered are based on those used in existing commercial or experimental database systems. Our aim is to present these concepts and algorithms in general setting.						
9. Learning objectives:						
1) This Course will enable students to						
2) Populate and query a database using SQL DDL/DML Commands						
3) Declare and enforce integrity constraints on a database						
4) Writing Queries using advanced concepts of SQL						
5) Programming PL/SQL including procedures, functions, cursors and triggers						
10. Course Outcomes (COs):						
a) At the end of the course the student will be able to:						
b) Utilize SQL to execute queries for creating database and performing data manipulation operations						
c) Examine integrity constraints to build efficient databases						
d) Apply Queries using Advanced Concepts of SQL						
e) Build PL/SQL programs including stored procedures, functions, cursors and triggers						
11. List of Experiments:						
1) Execute all DDL, DML and DCL commands on sample tables.						
2) Implementation of different types of operators and built-in functions with suitable examples						
3) Implementation of different types of joins with suitable examples						
4) Create views, partitions, Sequence, Indexes and locks for a particular DB						
5) Implement different types of constraints on relations.						
6) Implementation of sub queries and nested queries.						
7) Implement Queries on Group By & Having Clauses, ALIAS, Sequence By, Order By						
8) Control Structure						
a) Write a PL/SQL block for Addition of Two Numbers						
b) Write a PL/SQL block for IF, IF and else condition						

- c) Write a PL/SQL block for implementation of loops
- d) Write a PL/SQL block for greatest of three numbers using IF and ELSEIF
- 9) Exception Handling- Implement the following with respect to exception handling. Raising Exceptions, User Defined Exceptions, Pre-Defined Exceptions
- 10) Write PL/SQL block for an application using exception handling *Procedures*
 - a) Write a PL/SQL Procedure using Positional Parameters
 - b) Write a PL/SQL Procedure using notational parameters
 - c) Write a PL/SQL Procedure for GCD Numbers
 - d) Write a PL/SQL Procedures for cursor implementation (explicit and implicit cursors)
- 11) Functions:
 - a) Write a PL/SQL block to implement factorial using functions
 - b) Write a PL/SQL function to search an address from the given database
- 12) Write a DBMS program to prepare PL/SQL reports for an application using functions.
- 13) Triggers:
 - a) Write a Trigger to pop-up the DML operations
 - b) Write a Trigger to check the age valid or not Using Message Alert.
 - c) Create a Trigger to Raise appropriate error code and error message.
 - d) Create a Trigger on a table so that it will update another table while inserting values
- 14) Write PL/SQL block for an application using cursors and all types of triggers.
- 15) Write a PL/SQL block for transaction operations of a typical application using package

12. Brief Description of self-learning / E-learning component

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<https://elearning.sgtuniversity.ac.in/course-category/>

Online Resource:

<https://nptel.ac.in/courses/106105175>

1. Name of the Department- Computer Science Engineering						
2. Course Name	System and Network Administration Lab	L	T		P	
3. Course Code		0	0		2	
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0		Practical = 28		
8. Course Description						
Course Outcomes The course will provide on-hands training to administer the computer systems and networks.						
9. Learning objectives:						
1. Install or upgrade a network operating system and gain practical experience in installing the Windows Server 200x operating System and Linux Operating System						
2. Analyses and implement a security policy through: accounts, general network policy, file attributes, disk quotas and the distributed file system.						
3. Manage and implement disaster recovery.						
4. Implement Web servers, terminal services						
5. Implement, administer and monitor a Windows-based LAN and Linux-based LAN including configuring hardware devices						
6. Evaluate troubleshooting alternatives						
10. Course Outcomes (COs):						
a) Define the role of system and network administrator and understand the various components of operating systems.						
b) Understand the installation process and manage the users and related process in various operation system environment.						
c) Implement Web servers, terminal services, administer and monitor a Windows-based LAN and Linux based LAN including configuring hardware devices.						
d) Analyze and implement a security policy through: accounts, general network policy, file attributes, disk quotas and the distributed file system						
11. List of Experiments						
1 Management of the users & the domain.						
2 Configuring DHCP						
3 Setting up of a DNS.						

- 4 Setting up the local security policy.
- 5 Start and stop services from user window and command prompt.
- 6 Use of event viewer.
- 7 Use of the performance monitor.
- 8 Management of the IIS and FTP server.
- 9 Setting up of local area network.
- 10 Use of utilities (a) Ping (b) Tracert (c) netstat (d) net (e) IP configuration (f) Path ping
- 11 Use of network monitor.
- 12 Setting up and use “Terminal Client Services”.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

Online Resource:

<https://www.coursera.org/learn/system-administration-it-infrastructure-services>

Semester – II

S.No	Course Code	Course Title	L	T	P	C
1		Data Structures	3	-	-	3
2		Object Oriented Programming using Java	3	-	-	3
3		Program Elective – I	3	-	-	3
4		Program Elective – II	3	-	-	3
5		Fundamentals of Management	3	-	-	3
6		Data Structures Lab	-	-	4	2
7		Object Oriented Programming using Java Lab	-	-	2	1
8		Program Elective - II Lab	-	-	4	2
TOTAL			15	0	10	20

*The students are compulsorily need to undergo 6 weeks of summer internship immediately after 2nd semester.

1. Name of the Department- Computer Science Engineering						
2. Course Name	Data Structures	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
This course imparts the basic concepts of data structures and algorithms. It enables them to write algorithms for solving problems with the help of fundamental data structures. The course of data structures help organizing the data in variety of ways to solve the problem efficiently. The course introduces the basic concepts about stacks, queues, lists, trees and graphs. It also discusses about daily problems like searching and sorting techniques						
9. Learning objectives:						
1. To be able to compute the efficiency of algorithms in terms of time and space complexities.						
2. To understand concepts of searching and sorting algorithms.						
3. Using various data structures viz. stacks, queues, linked list, trees and graphs to develop efficient algorithms through efficient representation of data and operations that can be applied.						
4. To enable them to develop algorithms for solving problem by applying concepts of data structures.						
10. Course Outcomes (COs):						
a) Analyze the algorithms to determine the time and computation complexity and justify the correctness.						
b) Implement a given Search problem (Linear Search and Binary Search).						
c) Write algorithms concerning various data structures like Stack, Queue, Linked list, Graph search and traversal techniques and analyze the same to determine the time and computation complexity						
d) Write an algorithm for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap sort and compare their performance in term of Space and time complexity.						
11. Unit wise detailed content						
Unit-1	Number of lectures = 12					
Python: types, expressions, strings, lists, tuples; Python memory model: names, mutable and immutable values; List operations: slices etc - Binary search; Inductive function definitions: numerical and structural induction; Elementary inductive sorting: selection and insertion sort; In-place sorting.						

Basic algorithmic analysis input size, asymptotic complexity, $O()$ notation ; Arrays vs lists; ; Merge sort ; Quick sort ; Stable sorting.		
Unit – 2	Number of lectures = 8	
Dictionaries; More on Python functions: optional arguments, default values; Passing functions as arguments; Higher order functions on lists: map, lter, list comprehension. Exception handling; Basic input/output; Handling Files; String processing.		
Unit – 3	Number of lectures = 10	
Backtracking: N Queens, recording all solutions; Scope in Python: local, global, nonlocal names; Nested functions; Data structures: stack, queue; Heaps. Abstract data types; Classes and objects in Python; "Linked" lists: find, insert, delete; Binary search trees: find, insert, delete; Height-balanced binary search trees.		
Unit – 4	Number of lectures = 10	
Efficient evaluation of recursive definitions: memorization Dynamic programming: examples Other programming languages: C and manual memory management Other programming paradigms: functional programming.		
<p>12. Brief Description of self-learning / E-learning component The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource: https://nptel.ac.in/courses/106102064</p>		
13. Books Recommended		
Text Books		
<ol style="list-style-type: none"> 1. Narasimha Karumanchi, Data Structures and Algorithms, Carrer Monk Publications 2. T. H. Cormen, C. E. Leiserson, R. L. Rivest, Clifford Stein, “Introduction to Algorithms”, 2nd Ed., PHI 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Object Oriented Programming using Java	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
Java's unique architecture enables programmers to develop applications that can run across multiple platforms seamlessly and reliably. In this hands-on course, students gain extensive experience with Java and its object-oriented features. Students learn to create robust console and GUI applications and store and retrieve data from relational databases.						
9. Learning objectives:						
<ol style="list-style-type: none"> 1. Explain the concepts of object-oriented paradigms to solve problems. 2. Appraise the concept of reusable software components using inheritance, packages and interfaces 3. Create scalable applications that can robustly handle errors and exceptions in runtime applications 4. Designing applications using pre-built frameworks. 						
10. Course Outcomes (COs):						
CO1. Learn the syntax of Java Programming Language and implement applications using it. CO2. Recognize features of object-oriented design such as encapsulation, polymorphism inheritance and composition of systems based on object identity. CO3. Articulate re-usable programming components using Abstract Class, Interfaces and other permitted ways in packages. CO4. Apply access control mechanism to safeguard the data and functions that can be applied by the object. CO5. Understand multithreading and evaluate exception handling to create new applications. CO6. Design GUI applications using pre-built frameworks available in Java.						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Introduction to Java: Introduction to Java: Importance and features of Java, Keywords, constants, variables and Data Types, Operators and Expressions, Decision Making, Branching and Looping: if..else, switch,?: operator, while, do, for statements, labeled loops, jump statements: break, continue return. Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance.						

Unit – 2	Number of lectures = 9	
<p>Arrays and Strings: Creating an array, one- and two-dimensional arrays, string array and methods, Classes: String and String Buffer classes, Wrapper classes: Basics types, using super, Multilevel hierarchy, abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.</p>		
Unit – 3	Number of lectures = 9	
<p>Exceptional Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions, Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Run able interface, inter thread Communication, suspending, resuming and stopping threads.</p>		
Unit – 4	Number of lectures = 12	
<p>Input/output Programming: Basics Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files. Using Standard Java Packages (Lang, util, io, net).</p> <p>Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes.</p>		
<p>12. Brief Description of self-learning / E-learning component The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal. https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource: https://onlinecourses.nptel.ac.in/noc22_cs47/preview</p>		
<p>13. Books Recommended</p>		
<p>Text Books</p> <ol style="list-style-type: none"> 1. Cay S. Horstmann, “Core Java Volume – I Fundamentals”, Pearson. 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Fundamentals of Management	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core ()	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0		Practical = 0		
8. Course Description						
<p>This course imparts the basic understanding of management history and functions of planning, organizing, leading, and controlling. The role of a manager is examined in promoting change, providing effective leadership, motivation, team building, communication, and decision making. This subject also provides the students with an understanding of the theories, models, problems, issues, and techniques related to the management of production and operations management , marketing & finance.</p>						
9. Learning objectives:						
<p>1.To be able to Provide understanding of management history and functions of planning, organizing, leading, and controlling. The role of a manager is examined in promoting change, providing effective leadership, motivation, team building, communication, and decision making.</p> <p>2.To learn & obtain skills to manage production, operations, and inventory control.</p> <p>3.Develop the 4 P's of marketing: Product, promotion, distribution (place), and pricing.</p> <p>4.To develop &learn about the accounting, finance, and financial markets within the business world.</p>						
10. Course Outcomes (COs):						
<p>CO1. Analyze & Attain management, leadership, and human resource management skills.</p> <p>CO2. Provide the students with an understanding of the theories, models, problems, issues, and techniques related to the management of production and operations management</p> <p>CO3.Develop an integrated marketing communications plan for a product, concept, good and/or service based on an identified market need or target.</p> <p>CO4. Provide the students with a tool for assessing the financial position of an organization</p>						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
<p>Meaning of management, Definitions of Management, Characteristics of management, Management vs. Administration. Management-Art, Science and Profession. Importance of Management. Development of Management thoughts. Principles of Management. The Management Functions, Inter-relationship of Managerial functions. Nature and Significance of staffing, Personnel management, Functions of personnel management, Manpower planning, Process of manpower planning, Recruitment, Selection; Promotion - Seniority Vs. Merit. Training - objectives and types of training.</p>						

Unit – 2	Number of lectures = 10	
Production Management: Definition, Objectives, Functions and Scope, Production Planning and Control; its significance, stages in production planning and control. Brief introduction to the concepts of material management, inventory control; its importance and various methods.		
Unit – 3	Number of lectures = 10	
Marketing Management - Definition of marketing, marketing concept, objectives & Functions of marketing. Marketing Research - Meaning; Definition; objectives; Importance; Limitations; Process. Advertising - meaning of advertising, objectives, functions, criticism.		
Unit – 4	Number of lectures = 10	
Introduction of Financial Management, Objectives of Financial Management, Functions and Importance of Financial Management. Brief Introduction to the concept of capital structure and various sources of finance.		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource:</p> <p>https://onlinecourses.nptel.ac.in/noc22_mg42/preview</p>		
13. Books Recommended		
<p>Text Books</p> <p>1.Gupta R. S., Sharma B. D., & Bhalla N. S. (2011). Principles and Practice of Management (11th Edition), Kalyani Publishers.</p> <p>2.Prasad L.M. (2016). Principles & Practices of Management (1st Edition). Sultan Chand & Sons.</p> <p>3.Gupta C. B. (2013). Management: Principles and Practice (3rd Edition). Sultan Chand and Sons.</p> <p>4.Tripathi, P.C. & Reddy P. N. (5th Edition). Principles of Management (5th Edition). McGraw Hill Education.</p>		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Data Structures Lab	L	T		P	
3. Course Code		0	0		4	
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0		Practical = 24		
8. Course Description						
This course imparts the basic concepts of data structures and algorithms. It enables them to write algorithms for solving problems with the help of fundamental data structures. The course of data structures help organizing the data in variety of ways to solve the problem efficiently. The course introduces the basic concepts about stacks, queues, lists, trees and graphs. It also discusses about daily problems like searching and sorting techniques						
9. Learning objectives:						
<ol style="list-style-type: none"> 1. To be able to compute the efficiency of algorithms in terms of time and space complexities. 2. To understand concepts of searching and sorting algorithms. 3. Using various data structures viz. stacks, queues, linked list, trees and graphs to develop efficient algorithms through efficient representation of data and operations that can be applied. 4. To enable them to develop algorithms for solving problem by applying concepts of data structures. 						
10. Course Outcomes (COs):						
a) Analyze the algorithms to determine the time and computation complexity and justify the correctness.						
b) Implement a given Search problem (Linear Search and Binary Search).						
c) Write algorithms concerning various data structures like Stack, Queue, Linked list, Graph search and traversal techniques and analyze the same to determine the time and computation complexity						
d) Write an algorithm for Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap sort and compare their performance in term of Space and time complexity.						
11. List Of Experiments						
<ol style="list-style-type: none"> 1. Write a program for multiplication and transpose of array. 2. Write a program to compute the transpose of a sparse matrix 3. Write a program to implement push and pop operation in Stack. 4. Write a program to convert an Infix notation to post fix notation using stacks 5. Write a program to evaluate postfix notation using stacks 6. Write a program to implement a linear queue 						

7. Write a program for swapping two numbers using call by value and call by reference strategies.
8. Write a program to insert and delete a node in linked list. The number of nodes to inserted and deleted should be governed by user.
9. Write a program to implement a linear search arrays and linked list.
10. Using iteration and recursion concepts write programs for finding the element in the array using the Binary search method.
11. Write the programs to implement bubble sort.
12. Write a program using iteration and recursion concepts for quick sort.

12. Brief Description of self-learning / E-learning component

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<https://elearning.sgtuniversity.ac.in/course-category/>

1. Name of the Department- Computer Science Engineering						
2. Course Name	Object Oriented Programming using Java Lab	L	T		P	
3. Course Code		0	0		2	
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0	Practical = 28			
8. Course Description						
This course of study builds on the skills gained by students in Java programming Students will design object-oriented applications with Java and will create Java programs using hands-on, engaging activities						
9. Learning objectives:						
<ul style="list-style-type: none"> • This module gives students the skills and knowledge to understand java programming. • How to write Java code according to Object-Oriented Programming principles • How to design GUI applications and Applets using AWT 						
10. Course Outcomes (COs):						
a. Describe Java concepts						
b. Identify various data types						
c. Evaluate various java concept using programs						
d. Event handling and input/output programming in java						
11. List Of Experiments						
1. Create a java program to implement stack and queue concept.						
2. Write a java package to show dynamic polymorphism and interfaces.						
3. Write a java program to show multithreaded producer and consumer application.						
4. Create a customized exception and also make use of all the 5 exception keywords.						
5. Convert the content of a given file into the uppercase content of the same file.						
6. Develop an analog clock using applet.						
7. Develop a scientific calculator using swings.						
8. Create an editor like MS-word using swings.						

9. Create a servlet that uses Cookies to store the number of times a user has visited your servlet.

10. Create a simple java bean having bound and constrained properties.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

Program Elective -I

1. Name of the Department- Computer Science Engineering						
2. Course Name	Introduction to AI and Machine Learning	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0		Practical = 0		
8. Course Description						
Artificial intelligence (AI) is a research field that studies how to realize the intelligent human behaviours on a computer. The ultimate goal of AI is to make a computer that can learn, plan, and solve problems autonomously.						
9. Learning objectives:						
<ul style="list-style-type: none"> • To review and strengthen important mathematical concepts required for AI & ML. • Introduce the concept of learning patterns from data and develop a strong Theoretical foundation for understanding state of the art Machine Learning algorithms. 						
10. Course Outcomes (COs):						
a) 1. Design and implement machine learning solutions to classification, regression and clustering problems						
b) 2. Evaluate and interpret the results of the different ML techniques.						
c) 3. Design and implement various machine learning algorithms in a range of Real-world applications.						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Defining Artificial Intelligence, Defining AI techniques, Using Predicate Logic and Representing Knowledge as Rules, Representing simple facts in logic, Computable functions and predicates, Procedural vs Declarative knowledge, Logic Programming, Mathematical foundations: Matrix Theory and Statistics for Machine Learning.						
Unit – 2	Number of lectures = 10					
Idea of Machines learning from data, Classification of problem –Regression and Classification, Supervised and Unsupervised learning.						
Unit – 3	Number of lectures = 10					
Linear Regression: Model representation for single variable, Single variable Cost Function, Gradient Decent for Linear Regression, Gradient Decent in practice.						

Unit – 4	Number of lectures = 10	
<p>Logistic Regression: Classification, Hypothesis Representation, Decision Boundary, Cost function, Advanced Optimization, Multi-classification (One vs All), Problem of Overfitting.</p> <p>Clustering: Discussion on clustering algorithms and use-cases centered around clustering and classification.</p>		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resources:</p> <ol style="list-style-type: none"> 1. Artificial Intelligence, https://swayam.gov.in/nd2_cec20_cs10/preview. 		
<p>13. Books Recommended</p>		
<p>Text Books</p> <ol style="list-style-type: none"> 1. Saroj Kaushik, Artificial Intelligence, Cengage Learning, 1st Edition 2011. 2. Anindita Das Bhattacharjee, "Practical Workbook Artificial Intelligence and Soft Computing for beginners, Shroff Publisher-X team Publisher. 3. M.C. Trivedi, A Classical Approach to Artificial Intelligence, Khanna Publishing House, Delhi. 4. Jeeva Jose, Introduction to Machine Learning, Khanna Publishing House, Delhi. 5. Yuxi (Hayden) Liu, "Python Machine Learning by Example", Packet Publishing Limited, 2017. 6. Tom Mitchell, Machine Learning, McGraw Hill, 2017. 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Fundamentals of Blockchains	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
The blockchain certification program helps the learners start from the fundamentals and then cover all the technical and functional aspects needed to build any blockchain solution using the best tools and techniques in the industry. In this program, they will build smart contracts, bitcoin wallets, create transactions, fabricode and Chain SDK's and more.						
9. Learning objectives:						
<ul style="list-style-type: none"> • The students should be able to understand a broad overview of the essential concepts of blockchain technology. • To familiarize students with Bitcoin protocol followed by the Ethereum protocol – to lay the foundation necessary for developing applications and programming. • Students should be able to learn about different types of blockchain and consensus algorithms. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To explain the basic notion of distributed systems. 2. To use the working of an immutable distributed ledger and trust model that defines blockchain. 3. To illustrate the essential components of a blockchain platform. 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Basics: The Double-Spend Problem, Byzantine Generals' Computing Problems, Public-Key Cryptography, Hashing, Distributed Systems, Distributed Consensus.						
Unit – 2	Number of lectures = 10					
Technology Stack: Blockchain, Protocol, Currency. Bitcoin Blockchain Structure, Operations, Features, Consensus Model, Incentive Model.						
Unit – 3	Number of lectures = 10					
Ethereum Blockchain: Smart Contracts, Ethereum Structure, Operations, Consensus Model, Incentive Model.						

Unit – 4	Number of lectures = 10	
<p>Tiers of Blockchain Technology: Blockchain 1.0, Blockchain 2.0, Blockchain 3.0, Types of Blockchain: Public Blockchain, Private Blockchain, Semi-Private Blockchain, Sidechains.</p> <p>Types of Consensus Algorithms: Proof of Stake, Proof of Work, Delegated Proof of Stake, Proof Elapsed Time, Deposit-Based Consensus, Proof of Importance, Federated Consensus or Federated Byzantine Consensus, Practical Byzantine Fault Tolerance.</p> <p>Blockchain Use Case: Supply Chain Management.</p>		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University.</p> <p>The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Corresponding Online Resources:</p> <ol style="list-style-type: none"> https://www.coursera.org/specializations/blockchain. https://nptel.ac.in/courses/106105184/ Introduction to Blockchain Technology and Applications, https://swayam.gov.in/nd1_noc20_cs01/preview 		
<p>13. Books Recommended</p>		
<p>Text Books</p> <ol style="list-style-type: none"> 1. Kirankalyan Kulkarni, Essentials of Bitcoin and Blockchain, Packt Publishing. 2. Anshul Kaushik, Block Chain & Crypto Currencies, Khanna Publishing House. 3. Tiana Laurence, Blockchain for Dummies, 2nd Edition 2019, John Wiley & Sons. 4. Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Imran Bashir, Packt Publishing (2017). 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Steganography and Digital Watermarking	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
This course introduces the basic concepts, models, classical methods and evaluation criteria in digital watermarking and information hiding by using digital images as embedded carriers. The objective of this course is to establish fundamental concepts on digital watermarking and information hiding.						
9. Learning objectives:						
The objective of course is to provide an insight to steganography techniques. Watermarking techniques along with attacks on data hiding and integrity of data is included in this course.						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. Learn the concept of information hiding. 2. Survey of current techniques of steganography and learn how to detect and extract hidden information. 3. Learn watermarking techniques and through examples understand the concept. 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Steganography: Overview, History, Methods for hiding (text, images, audio, video, speech etc.). Steganalysis: Active and Malicious Attackers, Active and passive Steganalysis.						
Unit – 2	Number of lectures = 10					
Steganography techniques: Substitution systems, Spatial Domain, transform domain techniques, Spread spectrum, Statistical steganography.						
Unit – 3	Number of lectures = 10					
Detection, Distortion, Techniques: LSB Embedding, LSB Steganalysis using primary sets.						
Unit – 4	Number of lectures = 10					
Digital Watermarking: Introduction, Difference between Watermarking and Steganography, Classification (Characteristics and Applications), types and techniques (Spatial-domain, Frequency-domain, and Vector quantization-based watermarking), Watermark security & authentication.						

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

Online Resources:

1. Cyber Security, https://swayam.gov.in/nd2_cec20_cs09/preview.
2. Introduction to Cyber Security, https://swayam.gov.in/nd2_nou20_cs01/preview

13. Books Recommended**Text Books**

1. Peter Wayner, “Disappearing Cryptography – Information Hiding: Steganography & Watermarking”, Morgan Kaufmann Publishers, New York, 2002.
2. Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, TonKalker, “Digital Watermarking and Steganography”, Morgan Kaufmann Publishers, New York, 2008.
3. Information Hiding: Steganography and Watermarking-Attacks and Countermeasures by Neil F. Johnson, Zoran Duric, Sushil Jajodia.
4. Information Hiding Techniques for Steganography and Digital Watermarking by Stefan Katzenbeisser, Fabien A. P. Petitcolas.

1. Name of the Department- Computer Science Engineering						
2. Course Name	Introduction to Internet of Things	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
<p>This course will describe the market around the Internet of Things (IoT), the technology used to build these kinds of devices, how they communicate, how they store data, and the kinds of distributed systems needed to support them. Divided into four modules, we will learn by doing. We will start with simple examples and integrate the techniques we learn into a class project in which we design and build an actual IoT system. The client will run in an emulated ARM environment, communicating using common IoT protocols with a cloud enabled backend system.</p>						
9. Learning objectives:						
<ol style="list-style-type: none"> 1. Describe what IoT is and how it works today 2. Recognise the factors that contributed to the emergence of IoT 3. Design and program IoT devices 4. Use real IoT protocols for communication 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To understand the technology and standards relating to IoTs. 2. To understand the critical ecosystem required to mainstream IoTs. 3. To Acquire skills on developing their own national and enterprise level technical strategies 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
IoT & Web Technology: The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.						
Unit – 2	Number of lectures = 10					
IoT Architecture -State of the Art – Introduction, State of the art, Architecture Reference Model-Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.						
Unit – 3	Number of lectures = 10					

IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT for Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.		
Unit – 4	Number of lectures = 10	
Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smart Approach. Data Aggregation for the IoT in Smart Cities, Security.		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource:</p> <p>1. https://onlinecourses.nptel.ac.in/noc21_cs17/preview</p> <p>2. https://www.coursera.org/specializations/internet-of-things</p>		
13. Books Recommended		
<p>Text Books</p> <ol style="list-style-type: none"> 1. Dr. Jeeva Jose, Internet of Things, Khanna Publishing House. 2. Nitesh Dhanjani, Abusing the Internet of Things, Shroff Publisher/O'Reilly Publisher. 3. Internet of Things, RMD Sundaram Shriram K Vasudevan, Abhishek S Nagarajan, John Wiley and Sons. 4. Internet of Things, Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram, John Wiley & Sons. 5. Cuno Pfister, "Getting Started with the Internet of Things", Shroff Publisher/Maker Media. 6. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, Apress Publications. 7. Massimo Banzi, Michael Shiloh Make: Getting Started with the Arduino, Shroff Publisher/Maker Media Publishers. 		

Program Elective -II

1. Name of the Department- Computer Science Engineering						
2. Course Name	Introduction to Data Analytics	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
<p>This course presents a gentle introduction into the concepts of data analysis, the role of a Data Analyst, and the tools that are used to perform daily functions. You will gain an understanding of the data ecosystem and the fundamentals of data analysis, such as data gathering or data mining. You will then learn the soft skills that are required to effectively communicate your data to stakeholders, and how mastering these skills can give you the option to become a data driven decision maker.</p>						
9. Learning objectives:						
<ul style="list-style-type: none"> • Provide you with the knowledge and expertise to become a proficient data scientist • Demonstrate an understanding of statistics and machine learning concepts that are vital for data science; • Produce Python code to statistically analyse a dataset; • Critically evaluate data visualisations based on their design and use for communicating stories from data. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. Explain how data is collected, managed and stored for data science; 2. Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists. 3. Implement data collection and management scripts using MongoDB. 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
<p>Introduction to Data Science, Different Sectors using Data science, Purpose and Components of Python in Data Science. Data Analytics Process, Knowledge Check, Exploratory Data Analysis (EDA), EDA Quantitative technique, EDA- Graphical Technique, Data Analytics Conclusion and Predictions.</p>						
Unit – 2	Number of lectures = 10					
Feature Generation and Feature Selection (Extracting Meaning from Data)- Motivating						

application: user (customer) retention- Feature Generation (brainstorming, role of domain expertise, and place for imagination)- Feature Selection algorithms.		
Unit – 3	Number of lectures = 10	
Data Visualization- Basic principles, ideas and tools for data visualization, Examples of inspiring (industry) projects- Exercise: create your own visualization of a complex dataset.		
Unit – 4	Number of lectures = 10	
Applications of Data Science, Data Science and Ethical Issues- Discussions on privacy, security, ethics- A look back at Data Science- Next-generation data scientists.		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource:</p> <p>https://www.coursera.org/learn/introduction-to-data-analytics</p>		
13. Books Recommended		
Text Books		
<ol style="list-style-type: none"> 1. Joel Grus, Data Science from Scratch, Shroff Publisher /O'Reilly Publisher Media 2. V.K. Jain, Big Data and Hadoop, Khanna Publishing House 3. V.K. Jain, Data Sciences & Analytics, Khanna Publishing House 4. Annalyn Ng, Kenneth Soo, Numsense! Data Science for the Layman, Shroff Publisher Publisher 5. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk from The Frontline. O'Reilly Publisher Media. 6. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 7. Jake VanderPlas, Python Data Science Handbook, Shroff Publisher Publisher /O'Reilly Publisher Media 8. Philipp Janert, Data Analysis with Open Source Tools, Shroff Publisher Publisher /O'Reilly Publisher Media. 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Introduction to Data Analytics Lab	L	T		P	
3. Course Code		0	0		4	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0	Practical = 28			
8. Course Description						
<p>This course presents a gentle introduction into the concepts of data analysis, the role of a Data Analyst, and the tools that are used to perform daily functions. You will gain an understanding of the data ecosystem and the fundamentals of data analysis, such as data gathering or data mining. You will then learn the soft skills that are required to effectively communicate your data to stakeholders, and how mastering these skills can give you the option to become a data driven decision maker.</p>						
9. Learning objectives:						
<ul style="list-style-type: none"> • Provide you with the knowledge and expertise to become a proficient data scientist • Demonstrate an understanding of statistics and machine learning concepts that are vital for data science; • Produce Python code to statistically analyse a dataset; • Critically evaluate data visualisations based on their design and use for communicating stories from data. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. Explain how data is collected, managed and stored for data science; 2. Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists. 3. Implement data collection and management scripts using MongoDB. 						
11. List of Experiments						
<ol style="list-style-type: none"> 1. Python Environment setup and Essentials. 2. Mathematical computing with Python (NumPy). 3. Scientific Computing with Python (SciPy). 4. Data Manipulation with Pandas. 5. Prediction using Scikit-Learn 6. Data Visualization in python using matplotlib 						

1. Name of the Department- Computer Science Engineering						
2. Course Name	Smart Contract and Solidity	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)	Block chain	6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
This course Build multiple complex Smart Contracts from scratch for your portfolio! In these projects, you will learn how to think and properly develop your ideas into written code including how to maximize your time by finding and reading documentation and best practices.						
9. Learning objectives:						
1. Students should be able to understand the concept of smart contracts related to Block chain.						
2. Students should be able to understand the smart contract higher-level language Solidity and apply it to create smart contracts.						
3. Students should be able to learn Truffle IDE for creating and deploying a DApp.						
10. Course Outcomes (COs):						
1. To understand the working and importance of smart contracts.						
2. To learn the solidity language required for coding Ethereum smart contracts.						
3. To create and deploy a DApp on a Ethereum test network.						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Smart Contracts: Definition and Need, Features of Smart Contracts, Life Cycle of a Smart Contract, Introduction to Ethereum Higher-Level Languages.						
Unit – 2	Number of lectures = 10					
Development Environment: Building A Simple Smart Contract with Solidity, Solc-Compiler, Ethereum Contract ABI, Remix-IDE for Smart Contract Development.						
Unit – 3	Number of lectures = 10					
Introduction to Solidity: Contracts, Constructors & Functions, Variables, Getters & Setters, Arrays, Memory vs Storage, Mappings in Solidity Advanced Solidity: Structs, Error Handling & Restrictions, Libraries, Global Variables in Solidity, Abstract Contracts, Inheritance, And Interfaces, Events						
Unit – 4	Number of lectures = 10					

Truffle Framework & Ganache: Environment Setup for Truffle & Ganache, Truffle Project Creation, Truffle Compile, Migrate and Create Commands.

Decentralized App Creation: Smart Contract Creation, Front-End Creation, Connecting Smart Contract with Front-End Application, Deploying Dapp, Validation, And Testing of Dapp.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

Online Resource:

1. <https://www.coursera.org/learn/smarter-contracts>
2. <https://www.udemy.com/course/solidity-smart-contracts-build-dapps-inethereum-blockchain/>
3. Introduction to Blockchain Technology and Applications, https://swayam.gov.in/nd1_noc20_cs01/preview

13. Books Recommended

Text Books

1. Tiana Laurence, Blockchain for Dummies, 2nd Edition 2019, John Wiley & Sons.
2. Anshul Kaushik, Block Chain & Crypto Currencies, Khanna Publishing House.
3. Building Blockchain Projects, Narayan Prusty, Packt Publishing.
4. Mastering Ethereum: Building Smart Contracts and Dapps Book by Andreas Antonopoulos and Gavin Wood, Shroff Publisher/O'Reilly Publisher.

1. Name of the Department- Computer Science Engineering						
2. Course Name	Smart Contract and Solidity Lab	L	T		P	
3. Course Code		0	0		4	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0	Practical = 28			
8. Course Description						
This course Build multiple complex Smart Contracts from scratch for your portfolio! In these projects, you will learn how to think and properly develop your ideas into written code including how to maximize your time by finding and reading documentation and best practices.						
9. Learning objectives:						
<ul style="list-style-type: none"> ➤ To understand the basic knowledge of solidity programming language ➤ To get familiarized with smart contract ➤ To gain the knowledge of secure payment ➤ To know how to work in Ethereum platform ➤ To implement the smart contract for various application 						
10. Course Outcomes (COs):						
CO1: Understand the basics & advanced features of Solidity & Ethereum Virtual Machine CO2: Ability to analyse and develop algorithms for smart contract CO3: Able to do the secure payment between the owner and the customer CO4: Able to work with multiple smart contracts for various real time applications CO5: Familiar to Develop their own decentralized blockchain applications CO6: Develop Ethereum smart contract using Solidity						
11. LIST OF EXPERIMENTS						
1. Program to implement simple counter smart contract using solidity programming language 2. Program to implement variables, datatypes and structs in smart contract 3. Program to implement data structures inside smart contract using solidity programming language (Array and Mapping) 4. Program to check the given number is even or not using conditionals and looping inside smart contract using Solidity Programming Language 5. Program to implement smart contract for simple marketplace						

6. Program to build a code cryptocurrency payment in smart contract for hotel rooms
7. Program to perform the operation in multiple smart contracts inside solidity using inheritance and factories
8. Program to create a shipping contract by using the blockchain development kit for Ethereum

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

1. Name of the Department- Computer Science Engineering						
2. Course Name	Data Encryption and Compression	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
This course will cover the concept of security, types of attack experienced, encryption and authentication for deal with attacks, what is data compression, need and techniques of data compression.						
9. Learning objectives:						
At the end of this course the student will have the knowledge of plain text, cipher text, RSA and other cryptographic algorithm, Key Distribution, communication model, Various models for data compression.						
10. Course Outcomes (COs):						
<ul style="list-style-type: none"> • Be familiar with the distinction between public and private key encryption systems, and some of the more notable encryption schemes. • Be familiar with classical error correcting codes. • Be familiar with the elements of Shannon's theory of Information and some methods for data compression. • Be familiar with the distinction between public and private key encryption systems, and some of the more notable encryption schemes. • Be familiar with classical error correcting codes. 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Introduction to Security: Need for security, Security approaches, Principles of security, Types of attacks. Encryption Techniques: Plaintext, Cipher text, Substitution & Transposition techniques, Encryption & Decryption, Types of attacks, Key range & Size.						
Unit – 2	Number of lectures = 10					
Symmetric & Asymmetric Key Cryptography: Algorithm types & Modes, DES, IDEA, Differential & Linear Cryptanalysis, RSA, Symmetric & Asymmetric key together, Digital signature, Knapsack algorithm.						

Unit – 3	Number of lectures = 10	
<p>Case Studies of Cryptography: Denial of service attacks, IP spoofing attacks, Conventional Encryption and Message Confidentiality, Conventional Encryption Algorithms, Key Distribution.</p> <p>Public Key Cryptography and Message Authentication: Approaches to Message Authentication, SHA-1, MD5, Public-Key Cryptography Principles, RSA, Digital Signatures, Key Management, Firewall.</p>		
Unit – 4	Number of lectures = 10	
<p>Introduction: Need for data compression, Fundamental concept of data compression & coding, Communication model, Compression ratio, Requirements of data compression, Classification.</p> <p>Methods of Data Compression: Data compression-- Loss less & Lossy.</p> <p>Entropy encoding-- Repetitive character encoding, Run length encoding, Zero/Blank encoding; Statistical encoding-- Huffman, Arithmetic & Lempel-Ziv coding; Source encoding-- Vector quantization (Simple vector quantization & with error term).</p>		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource:</p> <p>https://nptel.ac.in/courses/106105031</p>		
13. Books Recommended		
<p>Text Books</p> <ol style="list-style-type: none"> 1. Cryptography and Network Security, Mohammad Amjad, John Wiley & Sons. 2. Cryptography & Network Security by Atul Kahate, TMH. 3. Information Theory and Coding, Muralidhar Kulkarni, K S Shivaprakasha, John Wiley & Sons. 4. Cryptography and Network Security by B. Forouzan, McGraw-Hill. 5. The Data Compression Book by Nelson, BPB. 6. Cryptography & Network Security, V.K. Jain, Khanna Publishing House. 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Data Encryption and Compression Lab	L	T		P	
3. Course Code		0	0		4	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0		Practical = 28		
8. Course Description						
Data Compression and Encryption detailed syllabus scheme for Electronics & Telecommunication Engineering (EC), 2018 regulation has been taken from the <u>MU</u> official website and presented for the Bachelor of Engineering students. For Course Code, Course Title, Test 1, Test 2, Avg, End Sem Exam, Team Work, Practical, Oral, Total, and other information.						
9. Learning objectives:						
This course will cover the concept of security, types of attack experienced, encryption and authentication for deal with attacks, what is data compression, need and techniques of data compression.						
10. Course Outcomes (COs):						
<ul style="list-style-type: none"> • Be familiar with the distinction between public and private key encryption systems, and some of the more notable encryption schemes. • Be familiar with classical error correcting codes. • Be familiar with the elements of Shannon's theory of Information and some methods for data compression. • Be familiar with the distinction between public and private key encryption systems, and some of the more notable encryption schemes. • Be familiar with classical error correcting codes. 						
11. List Of Experiments						
<ol style="list-style-type: none"> 1 Huffman Encoding of a sequence 2 Huffman Decoding of a compressed bit sequence. 3 Implementation of RSA Algorithm. 4 Diffie Hellman Key Exchange Method. 5 Image Compression Using Block Truncation Coding. 6. To generate and verify MD5 hashes for files. 7. Implement the encryption and decryption of 8-bit data using Simplified DES Algorithm 8. Implement the Euclid Algorithm to generate the GCD of an array of 10 integers in C 						

9. Configure SSH (Secure Shell) and send/receive a file on this connection to verify the correctness of this system using the configured parameters
10. Implement encryption and decryption with openssl.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

1. Name of the Department- Computer Science Engineering						
2. Course Name	IoT with Arduino, ESP and Raspberry PI	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)	WSN	6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
This course involves integration and interfacing. IoT have a lot of proprietary technologies and thus a good number of protocols and interfacing techniques like UART, SPI, I2C, PCIe, SWP, DWP, which makes the life of a new IoT Engineer really challenging.						
9. Learning objectives:						
<ul style="list-style-type: none"> • To give students hands-on experience using different IoT architectures. • To provide skills for interfacing sensors and actuators with different IoT architectures. • To develop skills on data collection and logging in the cloud. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To understand Arduino Uno, NODE MCU 8266 and Raspberry PI along with critical protocols and its communication to cloud. 2. To apply commonly used IOT protocols such as REST API, MQTT through IOT based demonstration. 3. To solve analog sensor and digital sensor Interfacing with IOT devices 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
IoT- introduction and its components, IoT building blocks, Sensors and Actuators, IoT Devices, IoT boards (Arduino Uno, ESP 8266-12E Node MCU, and Raspberry Pi 3). Arduino Uno – getting started with the Uno boards, blink program, connection of sensors to the Uno board, reading values of sensors from the Uno board, interrupts. Case study: Temperature/Humidity Control; Case Study: Sending values Temperature/Humidity values to the Internet via GSM module.						
Unit – 2	Number of lectures = 10					
ESP 8266-12E Node MCU – getting started with the ESP board, Micro python and Explorer IDE, Flushing the ESP8266 board with micro python, connecting sensors to the ESP board, Connecting ESP board to Wi-Fi, Interfacing ESP with the Cloud (REST API GET, POST, MQTT), interrupts, comparison of ESP 32 board with the ESP 8266 board. Case Study: Switching light on /off remotely. Case Study: Voice-based Home 57 Automation for switching lights on/off (Android phone – Google Assistant (Assistant <- > IFTTT), MQTT (ESP <-> IFTTT), ESP 8266 <-> Lights).						

Unit – 3	Number of lectures = 10	
Raspberry Pi 3 - Rpi3 introduction and installing the Raspbian Stretch OS, Headless - Computer and Rpi3 configuration to connect through SSH via Ethernet, Headless - connecting Rpi3 remotely without Ethernet cable via SSH, IP address, Rpi 3 - Testing the GPIO pins through Scripts.		
Unit – 4	Number of lectures = 10	
Raspberry pi3 interfacing with Sensor DHT11, Raspberry pi3 python library install and reading sensor feed, 'Plug and play ' type cloud platform overview for integration to IOT devices, 'Plug and play' cloud platform for integration to IOT device - actuator (LED), Plug and play platform - Custom widget (DHT11-Sensor) integration through Python. New - Raspberry Pi 4 Vs Raspberry Pi3 Model B Comparison, LoRa WAN /LPWAN – Overview.		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource:</p> <p>https://www.coursera.org/specializations/iot</p> <p>https://onlinecourses.nptel.ac.in/noc20_cs66/preview</p>		
13. Books Recommended		
Text Books		
<ol style="list-style-type: none"> 1. Dr. Jeeva Jose, Internet of Things, Khanna Publishing House. 2. Rao, M. (2018). Internet of Things with Raspberry Pi 3: Leverage the power of Raspberry Pi 3 and JavaScript to build exciting IoT projects. Packt Publishing Ltd 3. Baichtal, J. (2013). Arduino for beginners: essential skills every maker needs. Pearson Education. 4. Schwartz, M. (2016). Internet of Things with ESP8266. Packt Publishing Ltd. 5. Richardson, M., & Wallace, S. (2012). Getting started with raspberry PI. " O'Reilly Publisher Media, Inc." 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	IoT with Arduino, ESP and Raspberry PI Lab	L	T		P	
3. Course Code		0	0		4	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0		Practical = 28		
8. Course Description						
This course involves integration and interfacing. IoT have a lot of proprietary technologies and thus a good number of protocols and interfacing techniques like UART, SPI, I2C, PCIe, SWP, DWP, which makes the life of a new IoT Engineer really challenging.						
9. Learning objectives:						
<ul style="list-style-type: none"> • To give students hands-on experience using different IoT architectures. • To provide skills for interfacing sensors and actuators with different IoT architectures. • To develop skills on data collection and logging in the cloud. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To understand Arduino Uno, NODE MCU 8266 and Raspberry Pi along with critical protocols and its communication to cloud. 2. To apply commonly used IOT protocols such as REST API, MQTT through IOT based demonstration. 3. To solve analog sensor and digital sensor Interfacing with IOT devices 						
11. List Of Experiments						
<ol style="list-style-type: none"> 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 relay with 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.
9. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thing speak cloud.
10. To install MySQL database on Raspberry Pi and perform basic SQL queries.
11. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

SEMESTER III

S.No	Course Code	Course Title	L	T	P	C
1		DevOps	3	-	-	3
2		Program Elective – III	3	-	-	3
3		Program Elective – IV	3	-	-	3
4		Non-Departmental Electives	3	-	-	3
5		DevOps Lab	-	-	2	1
6		Elective – IV Lab	-	-	4	2
7		Summer Internship	-	-	-	3
TOTAL			12	0	6	18

1. Name of the Department- Computer Science Engineering						
2. Course Name	DevOps	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core(✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0		Practical = 0		
8. Course Description						
<p>Modern software systems are becoming increasingly complex, to meet quality, availability, and security demands. And these systems are changing rapidly to keep up with the needs of end-users. In this course, we look at how the DevOps philosophy can provide a holistic way to look at software development, deployment, and operations. And provide some tenets to help improve quality, and stability.</p>						
9. Learning objectives:						
<p>DevOps is basically creating a niche or environment that emphasize bringing both development and operational team together. The key objective is to concentrate on the requirements of the project or the entire business requirement.</p> <ul style="list-style-type: none"> • Analysis: Analysis of the entire business requirement and then gathering the necessary information or data. • Design: Putting all the gathered data into a proper format and then proceed with the development activity. • The development teams should develop code: Optimized and ready to move codes. • Compilation: Simultaneous compilation of codes to keep a check on the beauty of the code. • Test: Without this phase, any software product is not ready for deployment; therefore, it is very much needed to go through testing in each phase. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. Identify the difference between Agile and Devops. 2. Practice of GitHub 3. Illustrate various Building tools 4. Analyse various Testing tools 5. Illustrate various Configuration management tools 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					

Learning Objectives, DevOps Overview, Relationship between Agile and DevOps, DevOps Tool chain, Challenges with the traditional approach, Addressing challenges through DevOps, DevOps approach to the challenges, Overview of the DevOps tools, workflow of DevOps, JIRA		
Unit – 2	Number of lectures = 10	
VERSION CONTROL SYSTEMS: Overview of version control systems – role of version control systems – Types of control systems and their supporting tools – Overview of Git – Overview of Source code and Version Control hosts – Deploy the files to GitHub.		
Unit – 3	Number of lectures = 10	
CONTINUOUS INTEGRATION AND BUILDING TOOL: Importance of continuous Integration, Overview and Features of Jenkins, Set up Jenkins, Overview and Features of Maven,- Setup Maven, Overview and Features of TeamCity, Setup TeamCity		
Unit – 4	Number of lectures = 10	
SOFTWARE AND AUTOMATION TESTING FRAMEWORKS: Software Testing overview, Testing levels Approach and Automation Tools, Test driven development approaches and JUnit5, Behavior driven development approach with cucumber.		
CONFIGURATION MANAGEMENT TOOLS: Overview of configuration management tools, overview of puppet, puppet configuration, overview of Chef, Chef configuration, overview of Ansible,Ansible configuration, containerization and Docker.		
<p>12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource:</p> <ol style="list-style-type: none"> I. https://devops.com/downloads/7-best-devops-ebooks-2018-collection/ II. http://images.itrevolution.com/documents/DevOps_Handbook_Intro_Part1_Part2.pdf III. https://www.microfocus.com/media/ebook/Software-DevOps-eBook.pdf MOOC 1 IV. https://www.coursera.org/learn/uva-darden-continous-delivery-devops 		

13. Books Recommended

Text Books

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| <ol style="list-style-type: none">1. Jez Humble and David Farley, Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation, Pearson Education, Inc.20112. Jennifer Davis, Katherine Daniels, Effective DevOps: Building a Culture of Collaboration, Affinity, and Tooling at Scale, O'Reilly, 2016 REFERENCE BOOKS3. . Gene Kim, Jez Humble, Patrick Debois, and John Willis, THE DEVOPS HANDBOOK How to Create World-Class Agility, Reliability, & Security in Technology Organizations, IT Revolution Press, 2016. |
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1. Name of the Department- Computer Science Engineering						
2. Course Name	DevOps Lab	L	T		P	
3. Course Code		0	0		2	
4. Type of Course (use tick mark)		Core(✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0		Practical = 28		
8. Course Description						
Modern software systems are becoming increasingly complex, to meet quality, availability, and security demands. And these systems are changing rapidly to keep up with the needs of end-users. In this course, we look at how the DevOps philosophy can provide a holistic way to look at software development, deployment, and operations. And provide some tenets to help improve quality, and stability.						
9. Learning objectives:						
DevOps is basically creating a niche or environment that emphasize bringing both development and operational team together. The key objective is to concentrate on the requirements of the project or the entire business requirement.						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. Identify the difference between Agile and DevOps. 2. Practice of GitHub 3. Illustrate various Building tools 4. Analyse various Testing tools 5. Illustrate various Configuration management tools 						
11. List Of Experiments						
<ol style="list-style-type: none"> 1. Installing and Configuring Jenkins to Test, And Deploy Java 2. Version Control System with Git 3. Installing and Configuring Docker for Creating Containers Of Different System Images 4. Creating Docker File & Docker Volume 5. Installation and Configuration of Puppet 6. Software Configuration Provisioning Using Chef Management 						
12. Brief Description of self-learning / E-learning component						
The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal. https://elearning.sgtuniversity.ac.in/course-category/						

Non – Departmental Electives

1. Name of the Department- Computer Science Engineering						
2. Course Name	Accounting and Financial Management	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core()	PE()	OE (✓)		
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
<p>This course imparts the basic concepts of data structures and algorithms. It enables them to write algorithms for solving problems with the help of fundamental data structures. The course of data structures help organizing the data in variety of ways to solve the problem efficiently. The course introduces the basic concepts about stacks, queues, lists, trees and graphs. It also discusses about daily problems like searching and sorting techniques</p>						
9. Learning objectives:						
<ol style="list-style-type: none"> 1. To be able to compute the efficiency of algorithms in terms of time and space complexities. 2. To understand concepts of searching and sorting algorithms. 3. Using various data structures viz. stacks, queues, linked list, trees and graphs to develop efficient algorithms through efficient representation of data and operations that can be applied. 4. To enable them to develop algorithms for solving problem by applying concepts of data structures. 						
10. Course Outcomes (COs):						
<p>CO1. The first part is designed to make students understand the basics of accounting and importance of financial statements with reference to different users of accounting information</p> <p>CO2. To understand the various types of costs and preparation of cost sheet and its importance in decision making</p> <p>CO3. Learn the importance and various types of budgets and its role in performance evaluation</p> <p>CO4. Decision making through life cycle, target, and activity-based costing and learn how CVP analysis helps in decision making</p>						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Nature of Accounting Information: Scope of Accounting, Accounting concepts, Principles & Standards, Journal, Ledger, Trial Balance, Depreciation Accounting (straight line and diminishing balance methods), Preparation of Final Accounts Trading Account, Profit and Loss Account; Balance Sheet (with adjustments)						
Unit – 2	Number of lectures = 10					

Cost Accounting: Meaning, Objectives Importance, Methods, Classification of Cost, Preparation of Cost Sheet, Material Cost Accounting, Perpetual Inventory Control, Inventory Valuation, EOQ, ABC Analysis, Setting of Reorder Level, Maximum Level, Minimum Level.		
Unit – 3	Number of lectures = 10	
Performance Evaluation Techniques: Introduction to Budgeting and Budgetary Control; Installation of Budgetary Control system; Classification of Budget; Fixed and Flexible Budgeting; Standard Costing and Variance Analysis (Labour and Materials); Balanced Scorecard; Responsibility Accounting.		
Unit – 4	Number of lectures = 10	
Decision Making Techniques: Marginal Costing; Absorption Costing; Contribution; Key factor; Cost-Volume-Profit Analysis; Decision making under decision involving alternative choice; Introduction to Activity Base Costing, Targeting Costing, Life Cycle Costing; Uniform Costing		
<p>12. Brief Description of self-learning / E-learning component The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal. https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource: https://nptel.ac.in/courses/110107144</p>		
13. Books Recommended		
Text Books		
1. Maheshwari, S.N. Accounting for Management. Vikas Publishing House. New Delhi:		
Reference Books/Materials		
1. Shashi K Gupta, Sharma R.K. Management Accounting, Kalyani publications		
2. Arora, M. N. (2015). Cost Accounting (12th ed). New Delhi: Vikas Publishing House.		
3. Khan, M.Y., & Jain, P.K. (2015). Financial Management, Text, Problems & Cases (7th ed). New Delhi: Tata McGraw Hill Company.		
4. Maheshwari, S.N. Financial and Cost Accounting. New Delhi: Sultan Chand & Sons.		
5. ICAI, Accounting Standards.		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Economic Analysis for Business	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core()	PE()		OE (✓)	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0		Practical = 0		
8. Course Description						
<p>The fundamental and unique course of Micro Economics would encourage the action - leaning and value adding potential business learners who are enthusiastic and passionate with the thought of working in international behemoths and soon-to-be-Indian behemoths of today. Also, then they need to apprehend about Business Economics jargons which are basically related to various disciplines like Management, Accounting, Economics, Basic Finance, Engineering and the like. As Micro economics gives practical inside to solve business dilemmas by using its tools for other disciplines</p>						
9. Learning objectives:						
<p>a. To get an overview of economic tools, theories and principles, the exciting concepts of Marginal Decisions and Incremental Decisions.</p> <p>b. To understand the factors, influence Customers choice and how their decisions affect the goods markets by affecting the price, the supply and demand?</p> <p>c. To understand the various types of elasticity as consumer shift from one market to another as this adds an insight about the fluctuations in commodity market</p> <p>d. To understand profit maximization and cost minimization as the fundamental goals of any firm through the dynamics of Cost Analysis & Price Output Decisions</p>						
10. Course Outcomes (COs):						
<p>1. Microeconomics as a discipline develops skills in the students to understand functioning of entire economy on the basis of individual.</p> <p>2. Students would be exposed to economic dilemmas as per the course boundaries which will be updated with new thinking and gears while delivering the course.</p> <p>3. Microeconomics enables studying the causes, effects and solutions of general redundancy.</p> <p>4. Structural market framework gives immense understanding about the market at a large level.</p>						
11. Unit wise detailed content						

Unit-1	Number of lectures = 10	
Nature, Scope and Significance of Managerial Economics, its Relationship with other Disciplines, Role of Managerial Economics in Decision Making, Decision Making under Risk and Uncertainty.		
Unit – 2	Number of lectures = 10	
Cardinal and Ordinal Approaches to Consumer Behavior; Demand Functions; Determinants of Demand; Elasticity of Demand; Derivation of Market Demand; Demand Estimation and Forecasting.		
Unit – 3	Number of lectures = 10	
Managerial uses of Production Function, Short Run and Long Run Production Analysis, Isoquants, Optimal Combination of Inputs, Empirical Estimation of Production Functions; Traditional and Modern Theory of Cost in Short and Long Run, Economies of Scale and Economies of Scope, Empirical Estimation of Cost Function.		
Unit – 4	Number of lectures = 10	
Profit Maximization; Alternative Objectives of Business Firms; Price Output Decisions; under Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly; Pricing Policies and Methods, Strategic Behavior of Firms; Game Theory : Nash Equilibrium, Prisoner's Dilemma Price & Non-Price Competition.		
<p align="center">12. Brief Description of self-learning / E-learning component</p> <p>The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p>		
13. Books Recommended		
Text Books		
1. Salvatore, D. Managerial economics in a global economy. Irwin, McGraw-Hill.		
Reference Books/Materials		
1. Geetika, Ghosh, P., & Choudhury, P.R. (2 nd ed). Managerial economics. New Delhi: McGraw Hill Education.		
2. Dwivedi, D. N. Managerial economics. New Delhi, ND: Vikas Publication House.		
3. Christopher, R. Thomas, & S. Charles, Maurice. Managerial economics. New Delhi: Tata McGraw Hill.		
4. Dholakia, R.H., & Oza, A.N. Micro economics for management students. New Delhi: Oxford University Press.		

1. Name of the Department- Computer Science Engineering						
2. Course Name	People's Behaviour in an organisation	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core()	PE()		OE (✓)	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0		Practical = 0		
8. Course Description						
<p>The main objective of Organizational Behavior course is to help the students to acquire and develop skill to take rational decisions in the process of O.B. People have always been regarded as important in managing organizations. Human aspects are critical in each functional aspects of management and equally so for the effective utilization of resources. In view of this, organizational behavior has assumed great importance. This course is designed primarily for students who are being exposed to Organizational Behavior for the first time.</p>						
9. Learning objectives:						
<ol style="list-style-type: none"> 1. To help the students to develop cognizance of the importance of human behaviour. 2. To enable students to describe how people behave under different conditions and understand why people behave as they do. 3. To provide the students to analyse specific strategic human resources demands for future action. 4. To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behaviour and improve results. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1: Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization. 2: Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization. 3: Analyze the complexities associated with management of the group behavior in the organization. 4: Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization. 						

11. Unit wise detailed content		
Unit-1	Number of lectures = 10	Foundation and background of OB
concept, nature & scope of OB, Foundations of OB, challenges & opportunities, ethical issues in OB.		
Unit – 2	Number of lectures = 10	Individual behaviour and processes
individual differences–values and attitudes; Perception concept, process and applications; Personality-concept, determinants and theories applications; Learning and Reinforcement, Stress–symptoms, causes, consequences and management.		
Unit – 3	Number of lectures = 10	Interpersonal and team processes
group behaviour, group development, group dynamics, social loafing; developing teams–self-directed work teams, virtual teams; team building; Empowerment-concept, significance, Conflict–Concept, sources, types, management of conflict, Power–concept, sources, approaches; organizational politics		
Unit – 4	Number of lectures = 10	Organizational processes and structure
organizational structure and design, Work and job design; organizational learning; organizational culture; organizational change and development.		
12. Brief Description of self-learning / E-learning component		
The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.		
https://elearning.sgtuniversity.ac.in/course-category/		
13. Books Recommended		
Text Books		
1. Robbins, S.P. (2008) Organizational Behaviour, (7 th Edition), New Delhi ND: Prentice Hall of India.		
Reference Books/Materials		
1. Pareek, Udai. (2012). Understanding Organisational Behaviour (3 rd Edition). New Delhi ND: Oxford University Press.		
2. Prasad, L.M. (2014). Organizational Behaviour (5 th Revised Edition) Sultan Chand & Sons.		
3. Aswathappa, K. (2007). Organizational Behavior, (7 th Edition) New Delhi ND: Himalaya Publishing House.		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Business Analytics	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core()	PE()		OE (✓)	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
Business Analytics introduces quantitative methods used to analyze data and make better management decisions. This course is not based on rote memorization of equations or facts, but focuses on honing student's understanding of key concepts, managerial judgment, and ability to apply course concepts to real business problems						
9. Learning objectives:						
1. To help the students to develop of the importance of data nalysis.						
2. To enable students to predict the market behaviour on what-if analysis.						
3. To provide the students to analyse specific strategic patterns for future action.						
4. To enable students to more informed managerial decisions.						
10. Course Outcomes (COs):						
1: Analyze relationships between variables.						
2: Create representative samples and draw conclusions about the larger population.						
3: Quantify the evidence in favor of or against your hypothesis in order to make managerial decision.						
4: Analyze the relationship between two variables and develop forecasts for values outside the data sey.						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10	Describing and Summarizing Data				
Central Tendency, Measuring Spread, Variance, Standard Deviation, Coefficient of Variation, Aggregating and Summarizing data, Summarizing data in Excel, Standardization, Normalization, Data Pre-processing techniques.						
Unit – 2	Number of lectures = 10	Sampling and Estimation				

Basic Definitions and Fundamentals, Methods of data collection, SRSWOR, SRSWR and basic concepts, Estimation of population mean and variance, Estimation of variance and confidence interval estimation, Types of Sampling: simple random sampling, stratified sampling, sampling with varying inclusion probabilities (known as ps), cluster sampling, multistage sampling and systematic sampling.		
Unit – 3	Number of lectures = 10	Hypothesis Testing
Normal (Gaussian) Distribution, Standard Error of the Mean, Confidence Intervals, Statistical Hypothesis Test, p-Value: Effect Size and Sample Size Influence, ANOVA		
Unit – 4	Number of lectures = 10	Regression
Simple linear regression. Multiple linear regression. Variable selection. F-tests. Least-squares estimation. Collinearity. Residual analysis. Nonlinear regression. R commands.		
<p>12. Brief Description of self-learning / E-learning component The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p>		
13. Books Recommended		
Text Books		
<ol style="list-style-type: none"> 1. Introduction to Linear Regression Analysis by Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining (Wiley) 2. Statistics, Robert S. Witte and John S. Witte 		

Program Elective – III

1. Name of the Department- Computer Science Engineering						
2. Course Name	Applications of AI	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
This course focus on how to realize the intelligent human behaviours on a computer. The ultimate goal of AI is to make a computer that can learn, plan, and solve problems autonomously.						
9. Learning objectives:						
To give deep knowledge of AI and how AI can be applied in various fields to make the life easy.						
10. Course Outcomes (COs):						
1. To correlate the AI and solutions to modern problem. 2. To decide when to use which type of AI technique.						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Linguistic aspects of natural language processing, A.I. And Quantum Computing, Applications of Artificial Intelligence (AI) in business.						
Unit – 2	Number of lectures = 10					
Emotion Recognition using human face and body language, AI based system to predict the diseases early, Smart Investment analysis, AI in Sales and Customer Support.						
Unit – 3	Number of lectures = 10					
Robotic Processes Automation for supply chain management.						
Unit – 4	Number of lectures = 10					
AI-Optimized Hardware, Digital Twin i.e. AI Modelling, Information Technology & Security using AI.						

Recent Topics in AI/ML: AI/ML in Social Problems handling, Block chain and AI.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

Online Resource:

https://onlinecourses.nptel.ac.in/noc22_cs56/preview

13. Books Recommended**Text Books**

1. Sameer Dhanrajani, AI and Analytics, Accelerating Business Decisions, John Wiley & Sons.
2. Life 3.0: Being Human in the Age of Artificial Intelligence by Max Tegmark, published July 2018.
3. Homo Deus: A Brief History of Tomorrow by Yuval Noah Harari, published March 2017.
4. Artificial Intelligence in Practice: How 50 Successful Companies Used AI and Machine Learning to Solve Problems, Bernard Marr, Matt Ward, Wiley.

1. Name of the Department- Computer Science Engineering						
2. Course Name	Blockchain Security and Performance	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
This course has Identifying and differentiating between security threats and attacks on a Blockchain network. Blockchain security methods, best practices, risk mitigation, and more. All known (to date) cyber-attack vectors on the Blockchain. Performing Blockchain network security risk analysis. A complete understanding of lockchain's inherent security features and risks.						
9. Learning objectives:						
<ul style="list-style-type: none"> • Students should be able to understand the security and performance-related issues of blockchain. • Students should be able to learn techniques and tools to tackle the security related issues of blockchain. • Students should be able to learn new approaches required for enhancing blockchain performance. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To understand the security and performance perspective of blockchain technology. 2. To learn and apply security analysis and performance-enhancing techniques related to blockchain. 3. To understand the real-life applications of blockchain technology and apply it to provide solutions to some real-life problems. 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Security Issues: Blockchain Related Issues, Higher-Level Language (Solidity) Related Issues, EVM Bytecode Related Issues, Real-Life Attacks on Blockchain Applications/ Smart Contracts, Trusted Execution Environments.						
Unit – 2	Number of lectures = 10					
Security Tools for Smart Contracts: Working, Advantages, And Disadvantages of Tools- Oyente, Securify, Maian, Manticore, Mythril, SmartCheck, Verx. Secure Key Management, Quantum Resilience Keys.						

Unit – 3	Number of lectures = 10	
Performance Related Issues: Transaction Speed, Transaction Fees, Network Size, Complexity, Interoperability Problems, Lack of Standardization. Lack of Supportive Regulations Related to Blockchain Applications.		
Unit – 4	Number of lectures = 10	
Performance Improvements: Off-Chain State Channels, Sidechains, Parallels Chains, Concurrent Smart Contract Transactions, Sharding Technique and Its Benefits, Atomic Swaps Between Smart Contracts.		
<p>12. Brief Description of self-learning / E-learning component The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resources: 1. https://www.edx.org/course/blockchain-and-fintech-basics-applications-andlimitations</p>		
13. Books Recommended		
<p>Text Books</p> <p>1. Mastering Ethereum: Building Smart Contracts and Dapps Book by Andreas Antonopoulos and Gavin Wood, Shroff Publisher/O'Reilly Publisher.</p>		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Web Data Mining	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0		Practical = 0		
8. Course Description						
Web mining aims to discover useful information and knowledge from the Web hyperlink structure, page contents and usage logs. It has direct applications in e-commerce, Web analytics, information retrieval/filtering, personalization, and recommender systems.						
9. Learning objectives:						
<ul style="list-style-type: none"> • To learn how to extract data from the Web. • To understand how to analyze collected data to derive the most information 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To explain how data is can be collected from the Web. 2. To extract data and information from the webpages. 3. To make decision based on the data collected. 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Introduction to internet and WWW, Data Mining Foundations, Association Rules and Sequential Patterns, Basic Concepts of Association Rules, Apriori Algorithm, Frequent Itemset Generation, Association Rule Generation, Data Formats for Association Rule Mining, Mining with multiple minimum supports, Extended Model, Mining Algorithm, Rule Generation						
Unit – 2	Number of lectures = 10					
Mining Class Association Rules, Basic Concepts of Sequential Patterns, Mining Sequential Patterns on GSP, Mining Sequential Patterns on Prefix Span, Generating Rules from Sequential Patterns						
Unit – 3	Number of lectures = 10					
Concepts of Information Retrieval, IR Methods, Boolean Model, Vector Space Model and						

<p>Statistical Language Model, Relevance Feedback, Evaluation Measures, Text and Web Page Pre-processing, Stopword Removal, Stemming, Web Page Preprocessing, Duplicate Detection, Inverted Index and Its Compression, Inverted Index, Search using Inverted Index, Index Construction, Index Compression, Latent Semantic Indexing, Singular Value Decomposition, Query and Retrieval, Web Search, Meta Search, Web Spamming.</p>		
Unit – 4	Number of lectures = 10	
<p>Web Crawling, A Basic Crawler Algorithm – Breadth First Crawlers, Preferential Crawlers, Implementation Issues – Fetching, Parsing, Stopword Removal, Link Extraction, Spider Traps, Page Repository, Universal Crawlers, Focused Crawlers, Topical Crawlers, Crawler Ethics and Conflicts. Opinion Mining, Sentiment Classification, Classification based on Sentiment Phrases, Classification Using Text Classification Methods, Feature based Opinion Mining and Summarization</p>		
<p>12. Brief Description of self-learning / E-learning component The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal. https://elearning.sgtuniversity.ac.in/course-category/ Online Resource: https://onlinecourses.nptel.ac.in/noc21_cs06/preview</p>		
<p>13. Books Recommended</p>		
<p>Text Books</p> <ol style="list-style-type: none"> 1. Mining the Web: Discovering Knowledge from Hypertext Data, Soumen Chakrabarti, Morgan Kaufmann Publishers. 2. Bing Liu, Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data, Springer Publications, 2011. 3. Jiawei Han, Micheline Kamber, Data Mining: Concepts and Techniques, Second Edition, Elsevier Publications 2010. 4. Anthony Scime, Web Mining: Applications and Techniques, 2005. 5. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997. 6. Mathew Russell, Mining the Social Web 2nd Edition, Shroff Publisher/O'Reilly Publisher Publication. 7. Data Mining and Data Warehousing Principles and Practical Techniques, Parteek Bhatia, Cambridge University Press. 8. Data Mining & Business Intelligence, Balram Krishan, Khanna Publishing House 		

Program Elective – IV

1. Name of the Department- Computer Science Engineering						
2. Course Name	Deep Learning and Neural Networks	L	T	P		
3. Course Code		3	0	0		
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)	AI	6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
The Deep Learning Specialization is our foundational program that will help you understand the capabilities, challenges, and consequences of deep learning and prepare you to participate in the development of leading-edge AI technology. It provides a pathway for you to gain the knowledge and skills to apply machine learning to your work, level up your technical career, and take the definitive step in the world of AI.						
9. Learning objectives:						
<ul style="list-style-type: none"> • To strengthen important Mathematical concepts required for Deep learning and neural network. • To get a detailed insight of advanced algorithms of ML. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To design and implement Artificial Neural networks. 2. To design and implement recurrent Neural networks. 3. To design and implement Convolutional Neural networks. 4. To use and deploy networks using Keras and Tensor flow 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Information flow in a neural network, understanding basic structure and ANN. Training a Neural network, how to determine hidden layers, recurrent neural network.						
Unit – 2	Number of lectures = 10					
Convolutional neural networks, image classification and CNN.						
Unit – 3	Number of lectures = 10					
RNN and LSTMs. Applications of RNN in real world.						
Unit – 4	Number of lectures = 10					
Creating and deploying networks using Tensor Flow and KERAS.						

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

Online Resources:

1. Fuzzy Logic and Neural Networks,

https://swayam.gov.in/nd1_noc20_ge09/preview.

13. Books Recommended**Text Books**

1. Rajiv Chopra, Deep Learning, Khanna Publishing House.
2. John Paul Mueller, Luca Massaron, Deep Learning for Dummies, John Wiley & Sons.
3. Adam Gibson, Josh Patterson, Deep Learning, A Practitioner's Approach, Shroff Publisher /O'Reilly Publisher Media.
4. Christopher M. Bishop, Neural Networks for Pattern Recognition, Oxford.
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5. Russell Reed, Robert J MarksII, Neural Smithing: Supervised Learning in Feedforward Artificial Neural Networks, Bradford Book Publishers.

1. Name of the Department- Computer Science Engineering						
2. Course Name	Deep Learning and Neural Networks Lab	L	T		P	
3. Course Code		0	0		4	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0	Practical = 28			
8. Course Description						
The Deep Learning Specialization is our foundational program that will help you understand the capabilities, challenges, and consequences of deep learning and prepare you to participate in the development of leading-edge AI technology. It provides a pathway for you to gain the knowledge and skills to apply machine learning to your work, level up your technical career, and take the definitive step in the world of AI.						
9. Learning objectives:						
<ul style="list-style-type: none"> • To strengthen important Mathematical concepts required for Deep learning and neural network. • To get a detailed insight of advanced algorithms of ML. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To design and implement Artificial Neural networks. 2. To design and implement recurrent Neural networks. 3. To design and implement Convolutional Neural networks. 4. To use and deploy networks using Keras and Tensor flow 						
11. List of Experiments						
<ol style="list-style-type: none"> 1. Introduction to Kaggle and how it can be used to enhance visibility. 2. Build general features to build a model for text analytics. 3. Build and deploy your own deep neural network on a website using tensor flow. 						
12. Brief Description of self-learning / E-learning component						
The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal. https://elearning.sgtuniversity.ac.in/course-category/						

1. Name of the Department- Computer Science Engineering						
2. Course Name	Blockchain Platforms and Use Cases	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
This course Build multiple complex Smart Contracts from scratch for your portfolio! In these projects, you will learn how to think and properly develop your ideas into written code including how to maximize your time by finding and reading documentation and best practices.						
9. Learning objectives:						
<ul style="list-style-type: none"> • Students should be able to learn different types of blockchain platforms. • Students should be able to understand different types of Decentralized applications developed using blockchain technology. • Students should be able to understand several types of blockchain use cases. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To distinguish between different types of blockchain platforms. 2. To understand different types of uses of blockchain and apply it to some real-life scenarios accordingly. 3. To learn about the shortcomings of blockchain technology and their corresponding solutions. 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
<p>Permissioned Blockchains: Hyperledger Fabric Services, Model and Functions, Hyperledger Composer, Microsoft Azure Blockchain Platform and Services, Other Platforms: IOTA, TRON, Ziliqa, Cosmos, Ripple.</p> <p>Decentralized Application Platforms: Augur-Decentralised Prediction Market Platform, Grid+-Energy Ecosystem Platform.</p>						
Unit – 2	Number of lectures = 10					
Challenges and Solutions Related to Blockchain: Consensus, Scalability, Privacy and Confidentiality, Escrow, and Multi signature.						
Unit – 3	Number of lectures = 10					

Alternative Decentralized Solutions: Interplanetary File System (IPFS) Working and Uses, Hash graph- Working, Benefits, And Use-Cases.		
Unit – 4	Number of lectures = 10	
Blockchain Use Cases: Financial Services Related Use Cases, Revolutionization of Global Trade, Digital Identity, Auditing Services, Supply Chain Management, Healthcare Related Services, Blockchain and IOT, Blockchain and AI.		
<p>12. Brief Description of self-learning / E-learning component The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resources:</p> <ol style="list-style-type: none"> https://nptel.ac.in/courses/106105184/ https://www.coursera.org/learn/blockchain-platforms. Introduction to Blockchain Technology and Applications, https://swayam.gov.in/nd1_noc20_cs01/preview. 		
13. Books Recommended		
<p>Text Books</p> <ol style="list-style-type: none"> 1. Tiana Laurence, Blockchain for Dummies, 2nd Edition 2019, John Wiley & Sons. 2. Anshul Kaushik, Block Chain & Crypto Currencies, Khanna Publishing House. 3. Building Blockchain Projects, Narayan Prusty, Packt Publishing. 4. Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Imran Bashir, Packt Publishing (March 17, 2017). 5. Blockchain: Blueprint for a New Economy by Melanie Swan, Shroff Publisher publisher/O'Reilly Publisher Media; 1st edition (2015). 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Blockchain Platforms and Use Cases Lab	L	T		P	
3. Course Code		0	0		4	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0		Practical = 28		
8. Course Description						
This course Build multiple complex Smart Contracts from scratch for your portfolio! In these projects, you will learn how to think and properly develop your ideas into written code including how to maximize your time by finding and reading documentation and best practices.						
9. Learning objectives:						
<ul style="list-style-type: none"> • Students should be able to learn different types of blockchain platforms. • Students should be able to understand different types of Decentralized applications developed using blockchain technology. • Students should be able to understand several types of blockchain use cases. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To distinguish between different types of blockchain platforms. 2. To understand different types of uses of blockchain and apply it to some real-life scenarios accordingly. 3. To learn about the shortcomings of blockchain technology and their corresponding solutions. 						
11. List Of Experiments						
<ol style="list-style-type: none"> 1. Study and implementation of hash chain. 2. Study and implementation of index structure. 3. Implementation of asymmetric key algorithms. 4. Analysis and Implementation of soft fork and hard fork structures. 5. Experiments based on Hyperledger. 6. Experiment based on ripple 7. Experiment based on Ethereum 8. Analysis of crypto currencies (Bitcoin, Litecoin, Ripple) 9. Analysis of blockchain concurrency and scalability. 						
12. Brief Description of self-learning / E-learning component						
The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.						
https://elearning.sgtuniversity.ac.in/course-category/						

1. Name of the Department- Computer Science Engineering						
2. Course Name	Database Security and Access Control	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)	Database	6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
This course is designed to provide a wide knowledge of database security issues and deep understanding of the database security techniques. The course main aims are: Introduce the database security issues. Cover in details the various state-of-art database security methods and techniques.						
9. Learning objectives:						
The objective of the course is to provide fundamentals of database security. Various access control techniques mechanisms were introduced along with application areas of access control techniques.						
10. Course Outcomes (COs):						
1. To understand and implement classical models and algorithms. 2. To analyze the data, identify the problems, and choose the relevant models and algorithms to apply. 3. To assess the strengths and weaknesses of various access control models and to analyze their behaviour.						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Introduction to Access Control, Purpose and fundamentals of access control. Policies of Access Control, Models of Access Control, and Mechanisms, Discretionary Access Control (DAC), Non-Discretionary Access Control, Mandatory Access Control (MAC). Capabilities and Limitations of Access Control Mechanisms: Access Control List (ACL) and Limitations, Capability List and Limitations.						
Unit – 2	Number of lectures = 10					
Role-Based Access Control (RBAC) and Limitations, Core RBAC, Hierarchical RBAC, Statically Constrained RBAC, Dynamically Constrained RBAC, Limitations of RBAC. Comparing RBAC to DAC and MAC Access Control policy, Integrating RBAC with enterprise IT infrastructures: RBAC for WFMSs, RBAC for UNIX and JAVA environments.						
Unit – 3	Number of lectures = 10					
Smart Card based Information Security, Smart card operating system-fundamentals,						

design and implantation principles, memory organization, smart card files, file management. PPS Security techniques- user identification, smart card security, quality assurance and testing, smart card life cycle-5 phases, smart card terminals.

Unit – 4

Number of lectures = 10

Cloud Data Security: Recent trends in Database security and access control mechanisms.
Cloud Data Audit: Intro, Audit, Best Practice, Key management, Cloud Key Management Audit.

12. Brief Description of self-learning / E-learning component

The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.

<https://elearning.sgtuniversity.ac.in/course-category/>

Online Resources:

1. <http://www.smartcard.co.uk/tutorials/sct-itsc.pdf> : Smart Card Tutorial.
2. Advanced System Security Topics, <https://www.coursera.org/lecture/advancedsystem-security-topics/role-based-access-control-rbac-bYvzS>.

13. Books Recommended

Text Books

1. Role Based Access Control: David F. Ferraiolo, D. Richard Kuhn, Ramaswamy Chandramouli.

1. Name of the Department- Computer Science Engineering						
2. Course Name	Database Security and Access Control Lab	L	T		P	
3. Course Code		0	0		4	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0		Practical = 28		
8. Course Description						
This course is designed to provide a wide knowledge of database security issues and deep understanding of the database security techniques. The course main aims are: Introduce the database security issues. Cover in details the various state-of-art database security methods and techniques.						
9. Learning objectives:						
The objective of the course is to provide fundamentals of database security. Various access control techniques mechanisms were introduced along with application areas of access control techniques.						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To understand and implement classical models and algorithms. 2. To analyze the data, identify the problems, and choose the relevant models and algorithms to apply. 3. To assess the strengths and weaknesses of various access control models and to analyze their behaviour. 						
11. List Of Experiment						
<ol style="list-style-type: none"> 1. Perform experiment based on Discretionary Access Control 2. Perform experiment based on Mandatory Access Control 3. Perform experiment based on Statistical Database Control 4. Perform experiment based on Role-based Access Control 						
12. Brief Description of self-learning / E-learning component						
The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal. https://elearning.sgtuniversity.ac.in/course-category/						

1. Name of the Department- Computer Science Engineering						
2. Course Name	Analysing, Visualizing and Applying Data Science with Python	L	T		P	
3. Course Code		3	0		0	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description						
Python programming is relatively quick to learn and has a great set of tools for importing, transforming, exploring, extracting insights from, making predictions with, and exporting the data. This course introduces the major Python tools used for preparing the data for analysis, the tools available for understanding the data, and using the data for insights and predictions.						
9. Learning objectives:						
<ul style="list-style-type: none"> • To learn how to use python for data science. • To understand and use all the tools and libraries of python for data science. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To explain how data is can be collected from the Web. 2. To extract data and information from the webpages. 3. To make decision based on the data collected. 						
11. Unit wise detailed content						
Unit-1	Number of lectures = 10					
Data Analysis libraries: will learn to use Pandas Data Frames, Numpy multi-dimensional arrays, and SciPy libraries to work with a various dataset.						
Unit – 2	Number of lectures = 10					
Pandas, an open-source library, and we will use it to load, manipulate, analyze, and visualize various datasets.						
Unit – 3	Number of lectures = 10					
Scikit-learn, and we will use some of its machine learning algorithms to build smart models and make predictions, various parameters that can be used to compare various parameters.						

Unit – 4	Number of lectures = 10	
Descriptive Statistics, Basic of Grouping, ANOVA, Correlation, Polynomial Regression and Pipelines, R-squared and MSE for In-Sample Evaluation, Prediction and Decision Making Grid Search, Model Refinement, Binning, Indicator variables		
<p>12. Brief Description of self-learning / E-learning component The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal.</p> <p>https://elearning.sgtuniversity.ac.in/course-category/</p> <p>Online Resource:</p> <p>https://onlinecourses.nptel.ac.in/noc22_cs32/preview</p>		
13. Books Recommended		
<p>Text Books</p> <ol style="list-style-type: none"> 1. Taming Python by Programming, Jeeva Jose, Khanna Publishing House. 2. Data Visualization with Python and JavaScript, Kyran Dale, Shroff Publisher/O'Reilly Publisher Publication. 3. Data Science Using Python and R by Chantal D. Larose and Daniel T. Larose, Wiley Publication. 4. Data Science & Analytics (with Python, R, SPSS Programming), V.K. Jain, Khanna Publishing House. 5. Python for Data Science and Visualization -Beginners to Pro, Udemy. 		

1. Name of the Department- Computer Science Engineering						
2. Course Name	Analysing, Visualizing and Applying Data Science with Python Lab	L	T		P	
3. Course Code		0	0		4	
4. Type of Course (use tick mark)		Core()	PE(✓)		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0		Practical = 28		
8. Course Description						
Python programming is relatively quick to learn and has a great set of tools for importing, transforming, exploring, extracting insights from, making predictions with, and exporting the data. This course introduces the major Python tools used for preparing the data for analysis, the tools available for understanding the data, and using the data for insights and predictions.						
9. Learning objectives:						
<ul style="list-style-type: none"> • To learn how to use python for data science. • To understand and use all the tools and libraries of python for data science. 						
10. Course Outcomes (COs):						
<ol style="list-style-type: none"> 1. To explain how data is can be collected from the Web. 2. To extract data and information from the webpages. 3. To make decision based on the data collected. 						
11. List Of Experiment						
<ol style="list-style-type: none"> 1. Demonstrate knowledge of Data Science and Machine Learning. 2. Apply Data Science process to a real-life scenario. 3. Explore New York City - 311 Complaints and Housing datasets. 4. Analyze and Visualize data using Python. 5. Perform feature engineering exercise using Python. 6. Build and validate predictive machine learning model using Python. 7. Create and share Actionable Insights to real life data problems. 						
12. Brief Description of self-learning / E-learning component						
The students will be encouraged to learn using the SGT E-Learning portal and choose the relevant lectures delivered by subject experts of SGT University. The link to the E-Learning portal. https://elearning.sgtuniversity.ac.in/course-category/						

1. Name of the Department- Computer Science Engineering						
2. Course Name	Summer Internship	L	T	P		
3. Course Code		0	0	0		
4. Type of Course (use tick mark)		Core (✓)	PE()		OE ()	
5. Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0		Tutorials = 0	Practical = 0			
8. Course Description						
This course enables students to face the real time problems which are usually faced by working professional while working in the industry. While on this training program, students come to know about technical as well individual skills required by a professional for survival in the market. In fact, this course is about industrial implementation of the technologies. This course enables students to learn technologies on industrial level.						
9. Learning objectives:						
The course is designed so as to expose the students to industry environment and to take up on-site assignment as trainees or interns.						
10. Course Outcomes (COs):						
On completion of this course, the students will be able to						
1. Have an exposure to industrial practices and to work in teams.						
2. Understand the impact of engineering solutions in a global, economic, environmental and societal context.						
3. Develop the ability to engage in research and to involve in life-long learning.						
4. Communicate effectively and learn to be a team player.						
Course Content						
The student will be evaluated based on six weeks of work at industry site. Supervised by an expert at the industry.						
Modes of Evaluation: Internship Report, Presentation and Project Review						

SEMESTER IV

S.No.	Course Code	Course Title	L	T	P	C
1		Industrial Internship	-	-	-	16
TOTAL			0	0	0	16

1. Name of the Department- Computer Science Engineering						
2. Course Name		Industrial Internship	L	T	P	
3. Course Code			0	0	0	
4. Type of Course (use tick mark)			Core (✓)	PE()		OE ()
5. Pre-requisite (if any)			6. Frequency (use tick marks)	Even (✓)	Odd ()	Either Sem () Every Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 0			Tutorials = 0	Practical = 0		
8. Course Description						
This course enables students to learn technologies on industrial level. The student will be working closely with the technical team. This course enhances student's ability to think out of the box and suggest new ways of implementing ideas in a better manner and should be able to brainstorm and come up with innovative ideas.						
9. Learning objectives:						
The course is designed so as to expose the students to industry environment and to take up on-site assignment as trainees or interns.						
10. Course Outcomes (COs):						
On completion of this course, the students will be able to						
CO1. Have an exposure to industrial practices and to work in teams.						
CO2. Understand the impact of engineering solutions in a global, economic, environmental and societal context.						
CO3. Develop the ability to engage in research and to involve in life-long learning.						
CO4. Communicate effectively and learn to be a team player.						
Course Content						
Full one semester of work at industry site. Supervised by an expert at the industry.						
Modes of Evaluation: Internship Report, Presentation and Project Review						

MCA