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





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

Three Year course BCA program at glance

	Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI	Total
Course	9	8	10	9	11	1	48
Credit	21	21	23	22	26	16	129

Scheme of studies:

Abbreviations:

* AECC - Ability Enhancement Compulsory Course

**VAC - Value Added Course

#MGE - Multidisciplinary Generic Elective

SEMESTER I

S.No	Course Code	Course Title	L	Т	Р	С
1		Mathematics	3	1	-	4
2		Web Technologies	3	-	-	3
3		Computer Fundamentals	3	-	-	3
4		Programming Fundamentals	3	-	-	3
5		AECC -1 [*]	2	-	-	2
6		VAC – 1**	2	I	-	2
7		Web Technologies Lab	-	-	2	1
8		Computer Fundamentals Lab	-	-	2	1
9		Programming Fundamentals Lab	-	-	4	2
TOTA	TOTAL			1	8	21

S.No	Course Code	Course Title	L	Т	Р	С
1		Statistics	3	1	-	4
2		Web based Programming using PHP	3	-	-	3
3		Programming in Java	3	-	-	3
4		MGE-1 [#]	4	-	-	4
5		AECC - 2*	2	-	-	2
6		VAC - 2**	2	-	-	2
7		Web based Programming using PHP Lab	-	-	2	1
8		Programming in Java Lab	-	-	4	2
TOTA	TOTAL		17	1	6	21

SEMESTER II

*The students are compulsorily need to undergo 4 weeks of summer internship immediately after 2^{nd} semester.

#After the completion of the first-year student is well-versed with the web application fundamentals including server-side scripting. Student is expected to be placed as web developers, and/or web administration in software industry or work independently as freelance web developer.

SEMESTER III

S.No	Course Code	Course Title	L	Т	Р	С
1		Specialization - I	3	-	-	3
2		Data Structure and Algorithms	3	-	-	3
3		Operating Systems	3	-	-	3
4		MGE – 2 [#]	4	-	-	4
5		$AECC - 3^*$	2	-	-	2
6		VAC - 3**	2	-	-	2
7		Data Structure and Algorithms Lab	-	-	4	2
8		Operating Systems Lab	-	-	2	1
9		Specialization-I Lab	-	-	2	1
10		Summer Internship-I	-	-	-	2
TOTA	TOTAL		17	0	8	23

S.No	Course Code	Course Title	L	Т	Р	С
1		Specialization - II	3	-	-	3
2		Computer Networks	3	-	-	3
3		Database Management Systems	3	1	-	4
4		MGE - 3 [#]	4	-	-	4
5		$AECC - 4^*$	2	-	-	2
6		VAC - 4**	2	-	-	2
7		Database Management Systems Lab	-	-	4	2
8		Computer Networks Lab	-	-	2	1
9		Specialization – II Lab	-	-	2	1
TOTA			17	1	8	22

SEMESTER IV

*The students are compulsorily need to undergo 6 weeks of summer internship immediately after 4^{th} semester.

#After the completion of the second-year student is capable of developing web applications, web administration, databases, and fundamentals of cloud computing or fundamentals of machine learning. Student is expected to be placed as application developer and system administrator in software industry.

SEMESTER V

S.No	Course Code	Course Title	L	Т	Р	С
1		Specialization - III	3	-	-	3
2		Departmental Elective – I	3	-	-	3
3		Departmental Elective – II	3	-	-	3
4		Data Visualization and Story Telling	3	-	-	3
5		$MGE - 4^{\#}$	4	-	-	4
6		Specialization - III Lab	-	-	2	1
7		Departmental Elective -I Lab	-	-	2	1
8		Departmental Elective-II Lab	-	-	2	1
9		Data Visualization and Story Telling Lab	-	-	2	1
10		Mobile Application Development	-	-	4	2
11		Summer Internship-II	-	-	-	4
TOTA	TOTAL		16	0	12	26

SEMESTER VI

S.No.	Course Code	Course Title	L	Т	Р	С
1		Industrial Internship	-	-	-	16
ТОТА	L		0	0	0	16

Total Credits: 129

SPECIALIZATION

The students will have options of selecting the electives from the different baskets depending on the specialization they wish to acquire. Refer to Table 2 for list of subjects.

S.No.	Cloud Computing	Artificial Intelligence and		т	Р	C
		Machine Learning	1	•	P	
1	Cloud Computing	Artificial Intelligence	3	0	2	4
2	Cloud Computing Architecture and Deployment Models	Foundation of Machine Learning	3	0	2	4
3	Virtualization and Cloud Security	R programming for Data Analytics	3	0	2	4

Table 2: List of subjects offered under various specializations

Skill Enhancement Courses

The students will have options of selecting the electives from the different baskets given in Table 3 and Table 4.

	Table 3: List of Departmental	Electives offered under	Cloud Computing s	specialization	s
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S.No.	Course Name	L	Т	Р	С
1	Basics of Machine Learning	3	0	2	4
2	Basics of Data Analysis	3	0	2	4
3	Basics of Internet of Things	3	0	2	4

Table 4: List of Departmental Electives offered under AI-ML specializations

S.No.	Course Name	L	Т	Р	С
1	Cloud Computing	3	0	2	4
2	Data Mining	3	0	2	4
3	Basics of Internet of Things	3	0	2	4

The student has to choose one subject from the pool of university umbrella course offered under MGE, AECC and VAC respectively.

S.No	Course Code	Course Title	L	Т	Р	С
1		Mathematics	3	1	-	4
2		Web Technologies	3	-	-	3
3		Computer Fundamentals	3	-	-	3
4		Programming Fundamentals	3	-	-	3
5		AECC -1*	2	-	-	2
6		VAC – 1**	2	I	-	2
7		Web Technologies Lab	-	-	2	1
8		Computer Fundamentals Lab	-	-	2	1
9		Programming Fundamentals Lab	-	-	4	2
TOTA	TOTAL			1	8	21

Semester – I

1. Name of the Department- Com	puter Science Engineering				
2. Course Name Mathematic	s L	Т		Р	
3. Course Code	3	1		0	
4. Type of Course (use tick mark)	Core (✓)	PE() OE ()			
5. Pre-requisite (if	6. Frequency (use	Even	Odd	Either	Every
any)	tick marks)	0	(🗸)	Sem ()	Sem ()
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)					
Lectures = 40	Tutorials = 0	Practical = 0			
8. Course Description					

Semester – I

This course is to enable students to understand concepts of determinants and matrices such as addition, subtraction, multiplication, system of linear equation by Cramer's rule. This course is also designed to develop and solidify basic arithmetic series like Arithmetic Progression (A.P), Geometric Progression (G.P), and algebra skills that will be required in future math courses.

In this course also include differentiation topics: derivative of a function, polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions and Logarithmic Differentiation. Integration topics includes: Indefinite integrals, Methods of integration: by substitution, by parts, by partial fractions, Integration of algebraic and transcendental functions. Because of the basic concepts of differentiation and integration are very useful for solving simple application problems related to computer science based on these.

9. Learning objectives:

After completion of this course the students may capable to investigate the structure of real-world problems and plan solution strategies. They might be able to solve the problems using appropriate tools and develop a mathematical vocabulary by expressing mathematical ideas orally and in writing. Enhance and reinforce the student's understanding of concepts through the use of technology when appropriate.

10. Course Outcomes (COs):

- a) Familiarity with Matrices and Determinants.
- b) To determine general term of series in AP and GP, Calculate sum of n terms of series
- c) To gain insight of differentiation and its applications
- d) To gain insight of integeration and its applications

11. Unit wise detailed content		
Unit-1	Number of	Determinants and Matrices
	lectures = 10	

Determinants: Definition, Minors, Co-factors, Properties of Determinants, Applications of determinants in finding area of triangle.

Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Solution of system of linear equation by Cramer's Rule.

Unit – 2	Number of	Sequences and Series
	lectures = 10	

Sequence and Series: Introduction, Sequences, Series, Arithmetic Progression (A.P), Geometric Progression (G.P), Relationship Between A. M. and G.M., Sum to N terms of Special Series, Principle of Mathematical Induction.

Unit – 3	Number of	Differentiation
	lectures = 10	

Differentiation: Derivative of a function, Derivatives of sum, differences, product, and quotient of functions, Derivative of polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions, Logarithmic Differentiation, Derivatives of functions in parametric forms, Differentiation by substitution.

Unit – 4	Number of	Integration
	lectures = 10	

Integration: Indefinite integrals, Methods of integration: by substitution, by parts, by partial fractions, Integration of algebraic and transcendental functions.

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. Shanti Narayan, Integral calculus, Sultan Chand & Co.
- 2. Shanti Narayan, Differential calculus, Sultan Chand & Company.
- 3. Babu Ram, Engineering Mathematics, Pearson Education

2.	Course Name	Web Technologies	L	T P		Р	
3.	Course Code	Teennologies	3	0		0	
4.	Type of Course (u	ise 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	s, Practical (assuming 1	4 weeks	of one se	mester)	
Le	ctures = 40		Tutorials = 0	Practic	al = 0		
8.	Course Description	n					
Гh	is course is an introdu	ction to Web site dev	elopment and the technolo	ogies behir	nd it. Stud	ents will le	earn hov
0	design and develop W	Veb pages using curre	nt technologies and tools.	Topics co	vered will	include th	ne Worle
	v ,		CSS) and XML. The focus	-			
		•••				•	
		e e	L and scripting languages	Ũ			
ani	mated Web pages. Stu	idents will learn to pro	gram client-side scripts usi	ng JavaSc	ript and th	e Docume	nt Objec
Mo	del to transform statio	c Web pages created v	with HTML and CSS into a	lynamic V	Veb pages.		
				•	10		
Th			involved in publishing co				
Th inc fui	ludes the 'language	e of the Web' – H' o expose students to	involved in publishing co TML, the fundamentals the basic tools and appl	of how	the Inter	net and t	he We
Th inc fui	eludes the 'language action. This will also Course Outcomes	e of the Web' – H o expose students to (COs): designed and well-	TML, the fundamentals	of how ications u	the Inter sed in W	net and t eb publish	he We
Th inc fui	eludes the 'language action. This will also Course Outcomes a) Create a well- standards and p	e of the Web' – H o expose students to (COs): designed and well- practices.	TML, the fundamentals the basic tools and appl	of how ications u Veb site	the Inter sed in W	net and t eb publish	he We
Th inc fui	 eludes the 'language action. This will also Course Outcomes a) Create a well-standards and p b) Create web page 	e of the Web' – H o expose students to a (COs): designed and well- practices. ges using HTML and	TML, the fundamentals the basic tools and apple formed, professional W	of how ications u Veb site	the Inter sed in W	net and t eb publish	he We
Th inc fur	 eludes the 'language netion. This will also course Outcomes a) Create a well-standards and p b) Create web pag c) Build dynamic 	e of the Web' – H o expose students to a (COs): designed and well- practices. ges using HTML and web pages using Ja	TML, the fundamentals the basic tools and apple formed, professional W	of how ications u Veb site s. grammin	the Inter sed in W	net and t eb publish	he We
Th inc fur 9.	 eludes the 'language action. This will also Course Outcomes a) Create a well-standards and p b) Create web pag c) Build dynamic d) Select appropri e) Build interactive 	e of the Web' – H o expose students to a (COs): designed and well- oractices. ges using HTML and web pages using Ja ate Web tools for a ve web applications	TML, the fundamentals the basic tools and apple formed, professional W d Cascading Style Sheets vaScript (Client side pro Web development proje	of how ications u Veb site s. grammin	the Inter sed in W	net and t eb publish	he We
Th inc fur 9.	 eludes the 'language ection. This will also course Outcomes a) Create a well-standards and p b) Create web pag c) Build dynamic d) Select appropri e) Build interactive 	e of the Web' – H o expose students to c (COs): designed and well- practices. ges using HTML and web pages using Ja ate Web tools for a ve web applications content	TML, the fundamentals the basic tools and apple formed, professional W d Cascading Style Sheets vaScript (Client side pro Web development proje	of how ications u Veb site s. grammin	the Inter sed in W	net and t eb publish	he Wel ning.
Th inc fur 9.	 eludes the 'language action. This will also Course Outcomes a) Create a well-standards and p b) Create web pag c) Build dynamic d) Select appropri e) Build interactive 	e of the Web' – H o expose students to a (COs): designed and well- oractices. ges using HTML and web pages using Ja ate Web tools for a ve web applications	TML, the fundamentals the basic tools and apple formed, professional W d Cascading Style Sheets vaScript (Client side pro Web development proje	of how ications u Veb site s. grammin	the Inter sed in W	net and t eb publish	he Wel ning.
inc fur 9.	 eludes the 'language ection. This will also course Outcomes a) Create a well-standards and p b) Create web pag c) Build dynamic d) Select appropri e) Build interactive 	e of the Web' – H o expose students to c (COs): designed and well- practices. ges using HTML and web pages using Ja ate Web tools for a ve web applications content	TML, the fundamentals the basic tools and apple formed, professional W d Cascading Style Sheets vaScript (Client side pro Web development proje	of how ications u Veb site s. grammin	the Inter sed in W	net and t eb publish	he Wel ning.

HTML: Introduction to HTML, HTML Document structure tags, HTML comments, Text formatting, inserting special characters, anchor tag, adding images and sound, lists: types of lists, tables, frames and floating frames, Developing Forms, Image maps, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets.

Unit – 2	Number of	
	lectures = 10	

Page Styling: Separation of content and presentation in HTML, Cascading Style Sheets - Types of Style Sheets – Internal, inline and External style sheets, customizing common HTML elements, types of CSS selectors.

Unit – 3	Number of
	lectures = 10

Client-side scripting: JavaScript - Data Types, Control Statements, operators, Built-in and User Defined Functions, Objects in JavaScript, Handling Events. HTML Document Object Model.

AJAX –Introduction to AJAX programming, improving web page performance using AJAX.

Unit – 4	Number of	
	lectures = 10	

Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation, Browser architecture and Web site structure.

11. 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://nptel.ac.in/courses/106/105/106105084 (Prof. Indranil Sengupta, IIT, Kharagpur)

12. Books Recommended

Text Books

1. Internet and World Wide Web, Deitel H.M., P.J.Deitel, Pearson

Reference Books:

- 1. Web Technologies, Uttam K. Roy, Oxford University Press
- 2. HTML Black Book, Stephen Holzner, Wiley Dreamtech.
- 3. Web Technology, Rajkamal, Tata McGraw-Hill.

1. Name of the Depa	artment- Computer	r Science Engineering				
2. Course Name	Computer	L	T P			
	Fundamentals					
3. Course Code		3	0		0	
4. Type of Course (u	ise tick mark)	Core (✓)	PE() OE ()			
5. Pre-requisite (if		6. Frequency (use	Even Odd Either Eve		Every	
any)		tick marks)	0	(•	Sem ()	Sem ()
7. Total Number of	Lectures, Tutorials	s, Practical (assuming 1	4 weeks	of one se	emester)	
Lectures = 40		Tutorials = 0	Practical = 0			
8. Course Description	on		•			

Computing and programming are essential to leverage the technical skills of a student. These techniques equip the students with know-how of the latest technologies and reduce considerable time in solving problems. This course has become essentially the present age of computer technology and information, as the applications of information technology can be found in all aspects of our lives.

9. Learning objectives:

The main objective is to introduce IT in a simple language to all undergraduate students, regardless of their specialization. It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry. The focus of the subject is on introducing skills relating to IT basics, computer applications, programming, interactive media, Internet basics, etc. At the end of this course, students should be able to

10. Course Outcomes (COs):

- a) Understand basic concepts and terminology of information technology.
- b) Understand the difference between an operating system and an application program, and what each is used for in a computer
- c) Understand the process of algorithm development and documentation
- d) Understand Basic concepts of digital electronic.

11. Unit wise detailed content		
Unit-1	Number of	Introduction to Computers:
	lectures = 10	

Evolution of computers: Computer Generation from First Generation to Fifth Generation. Classifications of Computers: Micro, Mini, Mainframe and super computers, Distributed Computer System, Parallel Computers.

Computer Hardware: Major Components of a digital computer, Block Diagram of a computer

Input devices, Output Device. Computer Memory: Memory Cell, Overview of Memory Organization,
Primary Memory: RAM & ROM, Secondary memory, Flash Drives, Solid State Drives.

Unit – 2	Number of lectures = 10	Introduction to System Software and Operating System

Computer Software: Machine language, Assembly language, high-level languages, fourth generation language, assemblers, compilers, interpreters, linkers, loaders.

Operating System concepts: different types of operating systems, functions of operating system, concept of multiprogramming, multitasking, multithreading, multiprocessing, time-sharing, real time, single-user & multi-user operating system.

iectures = 10		Unit – 3	Number of lectures = 10	Number Systems
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Number Systems: Introduction to number systems – positional and non-positional, Base /Radix. Decimal number system-Definition, digits, radix/base, Binary number system – Bit Byte, Conversions: Binary to Decimal and Decimal to Binary. Octal number system Conversion from Octal to Decimal to Octal, Octal to Binary and binary to Octal. Hexadecimal number system –Conversion: Decimal to Hex, Hex to decimal, Hex to Binary, Binary to Hex, Octal to Hex, Hex to Octal, Binary, arithmetic –binary addition, subtraction, multiplication and division (only Integer part). 1's and 2's complement: 2's complement subtraction.

Unit – 4	Number of	Programming Concepts & Techniques:
	lectures = 10	

Algorithms, flow chart, decision tables, pseudo code, characteristics of a good programming language, Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming, Advantages and disadvantages of Structured programming.

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:

<u>Computer Fundamentals - Course (swayam2.ac.in)</u> https://onlinecourses.swayam2.ac.in/cec22_cs14/preview

13. Books Recommended

Text Books

1. P. K. Sinha & Priti Sinha , "Computer Fundamentals", BPB Publications.

2. Anita Goel "Computer Fundamentals", Pearson.

2. Course	Programming	r Science Engineering	Т		Р	
Name	Fundamentals					
3. Course		3	0		0	
Code						
4. Type of Co	urse (use tick mark)	Core (✓)	PE()		OE ()	
5. Pre-		6. Frequency (use	Even	Odd	Either	Every
requisite		tick marks)	0	(√)	Sem ()	Sem (
(if any)			\checkmark	× ,	· ·	
7. Total Num	ber of Lectures, Tutorial	s, Practical (assuming 1	4 weeks	of one s	emester)	
Lectures = 40		Tutorials = 0	Practic	cal = 0		
8. Course De						
This course let	you learn computer progra	mming concepts that are	fundame	ental in n	early any	
computer progr	amming language. These	concepts can then be used	l in othe	r courses	to help yo	ou
create compute	r applications that can be u	sed to solve real-world p	roblems		-	
9. Learning o						
•	rstand programming basics					
	rstand conditional and itera					
,	in the differences between	1	rors and	l logic er	rors	
	derstand and apply the con			10510 01	1015.	
u) 10 ui	activities and apply the con-					
10. Course Ou	tcomes (COs):					
	strate problem solving skill	s by developing and imp	lementin	o algorit	hms to sol	Ve
problem		is by developing and mp		g uigoin		ve
	and and use the fundament	al concepts of data types				
	ent programs using function					
, 1	1 0 0	1 0 1 0 01	ters			
		array structures and noin				
		array, structures and point				
		array, structures and point				
11. Unit wise d	etailed content					
11. Unit wise d						
11. Unit wise d	etailed content					
11. Unit wise d Unit-1	etailed content	2		od progr	amming la	inguage
11. Unit wise d Unit-1 Algorithms, flo	etailed content Number of lectures = 1 w chart, decision tables, ps	2 seudo code, characteristic	s of a go		-	
11. Unit wise d Unit-1 Algorithms, flo Planning the C	etailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concep	2 seudo code, characteristic ot of problem solving, Pr	s of a go		-	
11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty	Number of lectures = 1 w chart, decision tables, ps omputer Program: Concep pes of errors in programmi	2 seudo code, characteristic ot of problem solving, Pr ng, Documentation.	s of a go oblem c	lefinition	, Program	design
11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty Structured pro	letailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concepted pes of errors in programming concepts, Programa concepts, Programming concepts, Programa concepts, Pr	2 seudo code, characteristic ot of problem solving, Pr ng, Documentation. gramming methodologie	s of a go coblem c es viz.	lefinition	, Program	design
11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty Structured pro programming, <i>J</i>	etailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concept pes of errors in programming gramming concepts, Programma Advantages and disadvanta	2 eeudo code, characteristic ot of problem solving, Pr ng, Documentation. gramming methodologie ges of Structured program	s of a go coblem c es viz.	lefinition	, Program	design
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11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty Structured pro programming, 2 Unit – 2	letailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concept pes of errors in programming gramming concepts, Proparation Advantages and disadvanta Number of lectures = 1	2 seudo code, characteristic ot of problem solving, Pr ng, Documentation. gramming methodologie ges of Structured program 0	s of a go coblem c es viz. nming.	lefinition top-dow	n, Program	design
11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty Structured pro programming, 2 Unit – 2 From algorithm	letailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concept pes of errors in programming gramming concepts, Programming Advantages and disadvanta Number of lectures = 1 us to programs; source code	2 seudo code, characteristic ot of problem solving, Pr ng, Documentation. gramming methodologie ges of Structured program 0	s of a go coblem c es viz. nming. es) varia	lefinition top-dow bles and	n, Program	design ottom-up
11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty Structured pro programming, 2 Unit – 2 From algorithm Syntax and Lo	letailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concept pes of errors in programming gramming concepts, Proparation Advantages and disadvanta Number of lectures = 1	2 seudo code, characteristic ot of problem solving, Pr ng, Documentation. gramming methodologie ges of Structured program 0	s of a go coblem c es viz. nming. es) varia	lefinition top-dow bles and	n, Program	design ottom-up
11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty Structured pro programming, A Unit – 2 From algorithm Syntax and Lo	letailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concept pes of errors in programming gramming concepts, Programming Advantages and disadvanta Number of lectures = 1 us to programs; source code	2 seudo code, characteristic ot of problem solving, Pr ng, Documentation. gramming methodologie ges of Structured program 0	s of a go coblem c es viz. nming. es) varia	lefinition top-dow bles and	n, Program	design ottom-up
11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty Structured pro programming, 2 Unit – 2 From algorithm Syntax and Lo precedence	letailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concept pes of errors in programming gramming concepts, Programming Advantages and disadvanta Number of lectures = 1 us to programs; source code gical Errors in compilation	2 seudo code, characteristic of problem solving, Pr ng, Documentation. gramming methodologie ges of Structured program 0 e, variables (with data type n, object and executable	s of a go coblem c es viz. nming. es) varia code- A	lefinition top-dow bles and Arithmeti	n and bo memory lo	design ottom-up ocations ons and
11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty Structured pro programming, A Unit – 2 From algorithm Syntax and Lo precedence	letailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concept pes of errors in programming gramming concepts, Programming Advantages and disadvanta Number of lectures = 1 us to programs; source code	2 seudo code, characteristic of problem solving, Pr ng, Documentation. gramming methodologie ges of Structured program 0 e, variables (with data type n, object and executable	s of a go coblem c es viz. nming. es) varia code- A	lefinition top-dow bles and Arithmeti	n and bo memory lo	design ottom-up ocations ons and
11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty Structured pro programming, A Unit – 2 From algorithm Syntax and Lo precedence Conditional Br	letailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concept pes of errors in programming gramming concepts, Programming Advantages and disadvanta Number of lectures = 1 us to programs; source code gical Errors in compilation	2 seudo code, characteristic of of problem solving, Pr ng, Documentation. gramming methodologie ges of Structured program 0 e, variables (with data type n, object and executable	s of a go coblem c es viz. nming. es) varia code- A	lefinition top-dow bles and Arithmeti and cons	n and bo memory lo	design ottom-up ocations ons and
11. Unit wise d Unit-1 Algorithms, flo Planning the C Debugging, Ty Structured pro programming, A Unit – 2 From algorithm Syntax and Lo precedence Conditional Br	letailed content Number of lectures = 1 w chart, decision tables, ps omputer Program: Concept pes of errors in programming gramming concepts, Proposed Advantages and disadvanta Number of lectures = 1 as to programs; source code gical Errors in compilation anching and Loops, Writin	2 Beudo code, characteristic ot of problem solving, Pr ng, Documentation. gramming methodologie ges of Structured program 0 c, variables (with data type n, object and executable g and evaluation of cond 2-D), Character arrays an	s of a go coblem c es viz. nming. es) varia code- A	lefinition top-dow bles and Arithmeti and cons	n and bo memory lo	design ottom-up ocations ons and

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Function: Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference.

Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function, Quick sort or Merge sort.

Structure: Structures, Defining structures and Array of Structures

Pointers: Idea of pointers

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

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Online Resources:

https://onlinecourses.nptel.ac.in/noc22_cs101/preview (Prof. Anupam Basu, IIT Kharagpur)

13. Books Recommended Text Books

- 1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- 2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

1. Name of the Depa	1. Name of the Department- Computer Science Engineering						
2. Course Name	Web	L	Т		P		
	Technologies						
	Lab						
3. Course Code		0	0		2		
4. Type of Course (u	ise tick mark)	Core (✓)	PE() OE ()				
5. Pre-requisite (if		6. Frequency (use	Even	Odd	Either	Every	
any)		tick marks)	0	(🗸)	Sem ()	Sem ()	
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Lectures = 0		Tutorials = 0	Practic	al = 28			
8. Course Description	n						

This course is an introduction to Web site development and the technologies behind it. Students will learn how to design and develop Web pages using current technologies and tools. Topics covered will include the World Wide Web, HTML, Cascading Style Sheets (CSS) and XML. The focus of this course is on dynamic HTML, a collection of web technologies such as HTML and scripting languages used together to create interactive and animated Web pages. Students will learn to program client-side scripts using JavaScript and the Document Object Model to transform static Web pages created with HTML and CSS into dynamic Web pages.

9. Learning objectives:

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function. This will also expose students to the basic tools and applications used in Web publishing.

10. Course Outcomes (COs):

- a. Create a well-designed and well-formed, professional Web site utilizing the most current standards and practices.
- b. Create web pages using HTML and Cascading Style Sheets.
- c. Build dynamic web pages using JavaScript (Client side programming).
- d. Select appropriate Web tools for a Web development project

11. List of Experiments (Indicative)

1 Write HTML/Java scripts to display your CV in Web Browser

2 Creation and annotation of static web pages using any HTML editor.

3 Write a program to use XML and JavaScript for creation of your homepage.

4 Write a program in XML for creation of DTD which specifies a particular set of rules.

5 Create a Stylesheet in CSS/XSL and display the document in Web Browser

6 Create a Registration Form with Table

7 CSS : Inline Style , Internal Style ,and External Style Sheets

8 JavaScript & HTML:

- Use user defined function to get array of values and sort them in ascending order
- Demonstrate String and Math Object's predefined methods
- Demonstrate Array Objects and Date Object's predefined methods
- Exception Handling
- Calendar Creation : Display all month
- Event Handling

- Validation of registration form
- Open a Window from the current window
- Change color of background at each click of button or refresh of a page
- Display calendar for the month and year selected from combo box
- •OnMouseover event
- 9 XML
- Create any catalog
- Display the catalog created using CSS or XS

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. Internet and World Wide Web, Deitel H.M., P.J.Deitel, Pearson

1.	1. Name of the Department- Computer Science Engineering						
2.	Course Name	Computer	L	Т		Р	
		Fundamentals					
		Lab					
3.	Course Code		0	0		2	
4.	Type of Course (u	se tick mark)	Core (✓)	PE()		OE ()	
5.	Pre-requisite (if		6. Frequency (use	Even	Odd	Either	Every
	any)		tick marks)	0	(🗸)	Sem ()	Sem ()
7.	7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Le	ctures = 0		Tutorials = 0	Practic	al = 28		

8. Course Description

Computing and programming are essential to leverage the technical skills of a student. These techniques equip the students with know-how of the latest technologies and reduce considerable time in solving problems. This course has become essentially the present age of computer technology and information, as the applications of information technology can be found in all aspects of our lives.

9. Learning objectives:

The main objective is to introduce IT in a simple language to all undergraduate students, regardless of their specialization. It will help them to pursue specialized programs leading to technical and professional careers and certifications in the IT industry. The focus of the subject is on introducing skills relating to IT basics, computer applications, programming, interactive media, Internet basics, etc. At the end of this course, students should be able to

10. Course Outcomes (COs):

- a. Understand basic concepts and terminology of information technology.
- b. Understand the difference between an operating system and an application program, and what each is used for in a computer
- c. Understand the process of algorithm development and documentation
- d. Understand Basic concepts of digital electronic.

11. List of Experiments (Indicative)

1 MS-Windows: Operating system-Definition & functions, basics of Windows. Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance. Using windows accessories.

2 Documentation Using MS-Word - Introduction to Office Automation, Creating & Editing Document, Formatting Document, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark, Advance Features of MS-WordMail Merge, Macros, Tables, File Management, Printing, Styles, linking and embedding object, Template.

3 Electronic Spread Sheet using MS-Excel - Introduction to MS-Excel, Creating & Editing Worksheet, Formatting and Essential Operations, Formulas and Functions, Charts, Advance features of MS-Excel-Pivot table & Pivot Chart, Linking and Consolidation, Database Management using Excel-Sorting, Filtering, Table, Validation, Goal Seek, Scenario. 4 Presentation using MS-PowerPoint: Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering art Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In-Built Sound Effect.

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

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The link to the E-Learning portal.

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

2.	Course Name	Programming Fundamentals Lab	L	Т		Р	
3.	Course Code	1.40	0	0		4	
4.	Type of Course (u	se tick mark)	Core (✓)			OE ()	
5.	Pre-requisite (if		6. Frequency (use	Even	Odd	Either	Every
	any)		tick marks)	0	(✔)	Sem ()	Sem ()
	<u>Total Number of 1</u> ectures = 0	Lectures, Tutorials	s, Practical (assuming 1 Tutorials = 0	4 weeks Practic		mester)	
	Course Descriptio	n	1 utorials = 0	Fractic	al = 20		
	-		nming concepts that are	fundamer	ntal in nea	arly any c	ompute
pro	ogramming language	e. These concepts c	an then be used in other				
	plications that can be		world problems				
У.	Learning objectiv a. Understand r	es: programming basics					
		onditional and itera					
			syntax errors, runtime e		logic erre	ors.	
10	d. To understan Course Outcomes		cept of memory address	es			
	a. Demonstrate p		ills by developing and	impleme	nting alg	orithms	to solv
11	 a. Demonstrate p problems. b. Understand and c. Implement pro 	roblem solving ski l use the fundament grams using function understanding of a its (Indicative)	al concepts of data types onal program pedagogy urray, structures and poir	3	nting alg	gorithms	to solve
<u>11</u> 1:	 a. Demonstrate p problems. b. Understand and c. Implement pro d. Demonstrate ar List of Experiment Familiarization with 	roblem solving ski l use the fundament grams using function understanding of a ts (Indicative)	al concepts of data types onal program pedagogy urray, structures and poir	3	nting alg	gorithms	to solve
11 1: 2:	 a. Demonstrate p problems. b. Understand and c. Implement pro d. Demonstrate ar List of Experiment Familiarization with 	roblem solving ski l use the fundament grams using function understanding of a ts (Indicative) programming envi al problems using a	al concepts of data types onal program pedagogy urray, structures and poir ronment rithmetic expressions	3	nting alg	gorithms	to solve
111 1: 2: 3:	 a. Demonstrate p problems. b. Understand and c. Implement produce d. Demonstrate ar List of Experiment Familiarization with Simple computation 	roblem solving ski l use the fundament grams using function understanding of a ts (Indicative) programming envi al problems using a if-then-else structur	al concepts of data types onal program pedagogy urray, structures and poir ronment rithmetic expressions	3	nting alg	gorithms	to solve
111 1: 2: 3: 4:	 a. Demonstrate p problems. b. Understand and c. Implement produce d. Demonstrate ar List of Experiment Familiarization with Simple computation Problems involving 	roblem solving ski l use the fundament grams using function understanding of a its (Indicative) programming envi al problems using a if-then-else structur .g., sum of series	al concepts of data types onal program pedagogy urray, structures and poir ronment rithmetic expressions	3	nting alg	gorithms	to solve
111 1: 2: 3: 4: 5:	 a. Demonstrate p problems. b. Understand and c. Implement prod d. Demonstrate ar . List of Experiment Familiarization with Simple computation Problems involving Iterative problems e 	roblem solving ski <u>l use the fundament</u> <u>grams using function</u> <u>understanding of a</u> <u>its (Indicative)</u> programming envi al problems using a if-then-else structur .g., sum of series ion	al concepts of data types onal program pedagogy urray, structures and poir ronment rithmetic expressions	3	nting alg	gorithms	to solv
111 1: 2: 3: 4: 5: 6:	 a. Demonstrate p problems. b. Understand and c. Implement prod d. Demonstrate ar . List of Experiment Familiarization with Simple computation Problems involving Iterative problems e 1D Array manipulat 	roblem solving ski <u>l use the fundament</u> <u>grams using function</u> <u>understanding of a</u> <u>its (Indicative)</u> programming envi al problems using a if-then-else structur .g., sum of series ion	al concepts of data types onal program pedagogy urray, structures and poir ronment rithmetic expressions	3	nting alg	gorithms	to solv
111 1: 2: 3: 4: 5: 6: 7:	 a. Demonstrate p problems. b. Understand and c. Implement prod d. Demonstrate ar . List of Experiment Familiarization with Simple computation Problems involving Iterative problems e 1D Array manipulat Matrix problems, St Simple functions 	roblem solving ski <u>l use the fundament</u> <u>grams using function</u> <u>understanding of a</u> <u>its (Indicative)</u> programming envi al problems using a if-then-else structur .g., sum of series ion ring operations	al concepts of data types onal program pedagogy urray, structures and poir ronment rithmetic expressions	3	nting alg	gorithms	to solv
11 1: 2: 3: 4: 5: 6: 7: 8:	 a. Demonstrate p problems. b. Understand and c. Implement prod d. Demonstrate ar . List of Experiment Familiarization with Simple computation Problems involving Iterative problems e 1D Array manipulat Matrix problems, St Simple functions 	roblem solving ski <u>l use the fundament</u> <u>grams using function</u> <u>understanding of a</u> <u>its (Indicative)</u> programming envi al problems using a if-then-else structur .g., sum of series ion ring operations	al concepts of data types onal program pedagogy array, structures and poin ronment arithmetic expressions res	3	nting alg	gorithms	to solv

12. 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 – II

S.No	Course Code	Course Title	L	Т	Р	С
1		Statistics	3	1	-	4
2		Web based Programming using PHP	3	-	-	3
3		Programming in Java	3	-	-	3
4		MGE-1 [#]	4	-	-	4
5		AECC - 2 [*]	2	-	-	2
6		VAC – 2**	2	-	-	2
7		Web based Programming using PHP Lab	-	-	2	1
8		Programming in Java Lab	-	-	4	2
TOTA	AL		17	1	6	21

2. Course Name	Statistics	L	Т		Р		
3. Course Code		3	1		0		
4. Type of Course (u	ise tick mark)	Core (✓)	PE()		OE ()	E ()	
5. Pre-requisite (if		6. Frequency (use	Even	Odd ()	Either	Every	
any)		tick marks)	(✔)		Sem ()	Sem ()	
7. Total Number of	Lectures, Tutorials	, Practical (assuming 1	4 weeks	of one se	mester)		
Lectures = 40		Tutorials = 0	Practic	al = 0			
8. Course Description	n						
 is applicable to a widhumanities, governm Learning objectiv This course teaches y and communicating indata analysis, under significance for multipursue more advance 10. Course Outcomes a) Summarize data based on a sam b) Analyze data u c) Apply the cond 	le variety of academ ent and business. res: you statistical thinking nsights. By the end of rstand key principle iple contexts. You we d topics in statistical of (COs): a in a useful and infor- ple and determine if sing measures of dis- repts of permutations	s and combinations.	natural a ential for able to p select ap al skills earning. ate and po resents th	and social learning to perform ex- propriate that prepa	sciences from data ploratory tests of re you to characte ion.	to the	
		event in which can be ap	plied in a	ny aspect	of life.		
11. Unit wise detailed							
Unit-1	Number of lectures = 10						
Donulation Commit-		tion					
Population, Sample a	nu Data Conuelisa	uuu					
	-	Concept of population a on, Frequency distribution	-			raw	
distribution		, requerey aburbuit	, Cuntu		1401109		
Unit – 2	Number of						
	lectures $= 10$						
Measures of Central		1					

Measures of Central Tendency:

Concept of central Tendency, Requirements of good measures of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data

Measures of Dispersion

Concept of dispersion, Absolute measure of dispersion, Relative measure of dispersion, Range variance, Standard deviation, Coefficient of variation

Unit – 3	Number of	
	lectures = 10	

Permutations and Combinations

Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions), ${}^{n}P_{r} = n!/(n-r)$!(without proof), Combinations of 'r' objects taken from 'n' objects, ${}^{n}C_{r} = n!/(r!(n-r)!)$ (Without proof), Simple examples of permutations and combinations, Applications

Unit – 4	Number of
	lectures = 10

Sample Space, Events and Probability

Experiments and random experiments, Ideas of deterministic and non-deterministic experiments, Definition of sample space, Discrete sample space, Events, Types of events, Union and intersections of two or more events, Mutually exclusive events, Complementary event, Exhaustive event, Simple examples, Classical definition of probability, Addition theorem of probability without Proof (up to three events are expected), Definition of conditional probability Definition of independence of two events, Simple numerical 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/

13. Books Recommended

Text Books

1. Levin, R.I. and Rubin D.S., Statistics for Management, Pearson Education.

2. Gupta, S.P. and Gupta, M.P., Business Statistics, Sultan Chand and Sons.

3. Sharma, J.K., Business Statistics, Vikas Publication House Pvt. Ltd.

4. Bajpai, Naval, Business Statistics, Pearson Education.

	Course Name	Web based Programming	L	Τ		Р	
		using PHP					
3.	Course Code	HTML and CSS	3	0		0	
4.	Type of Course (u	se 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	s, Practical (assuming)	· /	of one se	0	~ (
	ectures = 40		Tutorials = 0	Practic			
8.	Course Description	n					
Гh	is course aims at highl	lighting the features of	f different technologies inv	volved in V	Veb Devel	opment It	provide
	C	0 0	c			•	•
ιg	ground-up look at we	b-servers, scripting la	inguages (PHP), database	s and a cl	ear unders	tanding of	n how t
cre	eate web applications.						
9.	Learning objectiv						
	a. Learn a	bout web-servers					
	b. Underst	tanding the HTTP p	rotocol				
c. Understand scripting fundamentals							
	C. Underst	tand scripting funda	mentals				
		ction of PHP langua					
	d. Introduc	ction of PHP langua	ge and deployment				
	d. Introduc		ge and deployment				
10	d. Introduc	ction of PHP langua	ge and deployment				
10	d. Introduce. Underst	ction of PHP langua tanding application	ge and deployment				
10	 d. Introduce. Underst Course Outcomes a) Describe fundation 	ction of PHP langua tanding application	ge and deployment				
10	 d. Introduce e. Underst Course Outcomes a) Describe funda b) Write simple applied 	ction of PHP langua tanding application a (COs): mentals of web	age and deployment architectures				
10	 d. Introduce e. Underst Course Outcomes a) Describe fundation b) Write simple age c) Applying advantage 	ction of PHP langua tanding application a (COs): mentals of web pplication in PHP nce features of PHP	age and deployment architectures	DBMS wi	th PHP		
11	 d. Introduce e. Underst Course Outcomes a) Describe funda b) Write simple ap c) Applying advand d) Outline the print Unit wise detailed 	ction of PHP langua tanding application a (COs): mentals of web pplication in PHP nce features of PHP nciples behind using content	age and deployment architectures	DBMS wi	th PHP		
11	 d. Introduce e. Underst Course Outcomes a) Describe fundation b) Write simple age c) Applying advantion d) Outline the printice 	ction of PHP langua tanding application a (COs): mentals of web pplication in PHP nce features of PHP nciples behind using	age and deployment architectures	DBMS wi	th PHP		
11	 d. Introduce e. Underst Course Outcomes a) Describe funda b) Write simple ap c) Applying advand d) Outline the print Unit wise detailed 	ction of PHP langua tanding application a (COs): mentals of web pplication in PHP nce features of PHP nciples behind using content	age and deployment architectures	DBMS wi	th PHP		
11 Uı	 d. Introduce e. Underst Course Outcomes a) Describe fundation b) Write simple aport c) Applying advantion d) Outline the printical distribution the init of the initial distribution 	ction of PHP langua tanding application a (COs): mentals of web pplication in PHP nce features of PHP nciples behind using content Number of lectures = 10	age and deployment architectures			e Scriptin	ng, We
11 U1 In	 d. Introduce e. Underst Course Outcomes a) Describe fundation b) Write simple aport c) Applying advantion d) Outline the printimation troduction to web 	ction of PHP langua tanding application a (COs): mentals of web pplication in PHP nce features of PHP nciples behind using content Number of lectures = 10 applications: HTM	age and deployment architectures g MySQL as a backend l	ing Vs So	erver-Side	-	-
11 Ur In Se	 d. Introduce e. Understee course Outcomes a) Describe fundation b) Write simple age c) Applying advantion d) Outline the printice troduction to web rvers: Local Servers 	ction of PHP langua tanding application a (COs): mentals of web pplication in PHP nce features of PHP nciples behind using content Number of lectures = 10 applications: HTN s and Remote Server	age and deployment architectures g MySQL as a backend l ML, Client-Side Scripti	ing Vs Sorrs, Interno	erver-Side et Informa	-	-

Introduction to PHP: Start and End Tags of PHP, Data types in PHP, Variables, Constants, operators and Expressions, printing data on PHP page, Control statements – if, switch case, for, while, do while.

Arrays: Initialization of an array, Iterating through an array, Sorting arrays, Array Functions

Functions: Defining and Calling Functions, Passing by Value and passing by references, Inbuilt Functions.

Unit – 3	Number of	Working with Forms and Files
	lectures = 10	

Working with Forms: Get and Post Methods, Query strings, HTML form controls and PHP

Maintaining User State: Cookies, Sessions and Application State.

Working with Files: Opening and Closing Files, Reading and Writing to Files, Getting Information on Files, OOP's – Instantiation, Modifiers, Inheritance, Interfaces, Exceptions, Static Methods and properties, Auto load, Reflection, Type Hinting and class constant.

Unit – 4	Number of	Database Connectivity
	lectures = 10	

PHP Database Connectivity: Introduction to MYSQL, creating database and other operations on database, connecting to a database, use a particular database, sending query to database, Parsing of the query results, Checking data errors. MVC overview, security, Ajax basics, PHP with Ajax

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

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Online Resource:

https://onlinecourses.swayam2.ac.in/aic20_sp32/preview (Prof Kannan Moudgalya, IIT Bombay)

13. Books Recommended Text Books

- 1. Rasmus Lerdorf and Kevin Tatroe, "Programming PHP", O'Reilly.
- Robin Nixon, "PHP, MySQL, and JavaScript: A Step-By-Step Guide to Creating Dynamic Websites", O'Reilly Media

2. Course Name	Programming in Java	L	Т		Р	
3. Course Code	ili Java	3	0		0	
			PE()		OE ()	
5. Pre-requisite (if	Programming	Core (✓) 6. Frequency (use		Odd ()	Either	Every
any)	Fundamentals	tick marks)	(√)		Sem ()	Sem ()
7. Total Number of	Lectures, Tutorials	s, Practical (assuming 2	14 weeks of	f one sei	~	V
Lectures = 40	,	Tutorials = 0	Practical		/	
8. Course Description	n	1				
engaging activities		a and will create	Java prog	grams u	ising ha	inds-on,
9. Learning objectiv			1 . 1 .			
6		lls and knowledge to un			0	
	0	to Object-Oriented Prog nd Applets using AWT	gramming p	orinciples	5	
10. Course Outcomes	<u> </u>	id Applets using A w I				
	· /					
a) Describe Java	concepts					
a) Describe Javab) Identify variou	<u>.</u>					
b) Identify variou	<u>.</u>	g programs				
b) Identify variouc) Evaluate variou	s data types					
b) Identify variouc) Evaluate varioud) Event handling	s data types us java concept using and input/output pr					
 b) Identify variou c) Evaluate variou d) Event handling 11. Unit wise detailed	s data types us java concept usin and input/output pr content	ogramming in java				
b) Identify variouc) Evaluate varioud) Event handling	s data types us java concept usin and input/output pr content Number of					
 b) Identify variou c) Evaluate variou d) Event handling 11. Unit wise detailed Unit-1	s data types us java concept using and input/output pr content Number of lectures = 10	ogramming in java Preliminaries				
 b) Identify variou c) Evaluate variou d) Event handling 11. Unit wise detailed Unit-1 	s data types us java concept using and input/output pr content Number of lectures = 10	ogramming in java	constants,	variables	s and Dat	a Types,
 b) Identify variou c) Evaluate variou d) Event handling 11. Unit wise detailed Unit-1 Introduction to Java:	s data types us java concept usin and input/output pr content Number of lectures = 10 Importance and feat	ogramming in java Preliminaries				• 1
 b) Identify variou c) Evaluate variou d) Event handling 11. Unit wise detailed Unit-1 Introduction to Java: Operators and Expression	s data types us java concept usin and input/output pr content Number of lectures = 10 Importance and feat	Preliminaries	ing: ifelse,	switch,?	e operato?:	r, while
 b) Identify variou c) Evaluate variou d) Event handling 11. Unit wise detailed Unit-1 Introduction to Java: Operators and Expression do, for statements, labored	s data types us java concept usin and input/output pr content Number of lectures = 10 Importance and feat ions, Decision Makin elled loops, jump sta	Preliminaries Tures of Java, Keywords, ng, Branching and Loop	ing: ifelse, e return. In	, switch,? troducin	?: operato g classes	r, while,
 b) Identify variou c) Evaluate variou d) Event handling 11. Unit wise detailed Unit-1 Introduction to Java: Operators and Expression do, for statements, labored	s data types us java concept usin and input/output pr content Number of lectures = 10 Importance and feat ions, Decision Makin elled loops, jump sta	Preliminaries Preliminaries tures of Java, Keywords, ng, Branching and Loop atements: break, continu	ing: ifelse, e return. In	, switch,? troducin	?: operato g classes	r, while,
 b) Identify variou c) Evaluate variou d) Event handling 11. Unit wise detailed Unit-1 Introduction to Java: Operators and Expression do, for statements, laborant and methods: defining	s data types us java concept usin and input/output pr content Number of lectures = 10 Importance and feat ions, Decision Makin elled loops, jump sta	Preliminaries Preliminaries tures of Java, Keywords, ng, Branching and Loop atements: break, continu	ing: ifelse, e return. In	, switch,? troducin	?: operato g classes	r, while, , objects

Arrays and String: 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.

Unit – 3	Number of	Exception Handling
	lectures = 10	

Exception 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.

Unit – 4	Number of	I/O Programming and Event Handling
	lectures = 10	

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).

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes.

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. <u>https://elearning.sgtuniversity.ac.in/course-category/</u> <u>Online Resources:</u> <u>https://onlinecourses.nptel.ac.in/noc21_cs03/</u> (Prof. Debasis Samanta, IIT Kharagpur) <u>Java - Course (swayam2.ac.in)</u> (Prof Kannan Moudgalya, IIT Bombay)

13. Books Recommended Text Books

1. Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley.

1.	1. Name of the Department- Computer Science Engineering							
2.	Course Name	Web based	L		Τ		P	
		Programming						
		using PHP						
		Lab						
3.	Course Code	HTML and CSS	0		0		2	
4.	Type of Course (us	se tick mark)	Core (✓)		PE ()		OE ()	
5.	Pre-requisite (if		6. Fr	requency	Even	Odd ()	Either	Every
	any)		(u	se tick	(✔)		Sem ()	Sem ()
			m	arks)				
7.	7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
Le	ectures = 0		Tutorials	s = 0	Practic	al = 28		

8. Course Description

This course aims at highlighting the features of different technologies involved in Web Development. It provides a ground-up look at web-servers, scripting languages (PHP), databases and a clear understanding on how to create web applications.

9. Learning objectives:

- **a.** Learn about web-servers
- **b.** Understanding the HTTP protocol
- **c.** Understand scripting fundamentals
- d. Introduction of PHP language and deployment

10. Course Outcomes (COs):

- a. Describe fundamentals of web
- b. Write simple application in PHP
- c. Applying advance features of PHP
- d. Outline the principles behind using MySQL as a backend DBMS with PHP

11. List of Experiments (Indicative)

- 1. WAP using Client-side scripting to perform arithmetical tasks and display results.
- 2. WAP in PHP to accept values from user and check the eligibility to vote, and print result on screen.
- **3.** WAP in PHP to display table of a given no.
- **4.** WAP to transfer data from one page to another using PHP. Working in forms and using get and post method.
- 5. WAP to manage data and information across the pages like in shopping carts etc.

- **6.** WAP a program to count total numbers of hit (visitor no) on the site and also total no of users online.
- 7. Make a page to store the data in file and reading the data from file.
- **8.** Make an application to upload image file to website and display on site. Image to be uploaded dynamically using PHP controls etc.
- **9.** Write SQL Commands to create database, create a table in it and store data in this table. Also write commands to search and delete the record.
- 10. Write PHP code to connect to database (MySQL), and perform following operations
 - a. insert new record
 - b. search for record(s)
 - c. change any record
 - d. delete the record(s)

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	Programming	L		Т		P	
Name	in Java Lab						
3. Course Code	Programming	0		0		4	
	Fundamentals						
4. Type of Cours	e (use tick mark)	Core	(✓))	PE()	_	OE ()	-
5. Pre-requisite		6.	Frequency	Even	Odd ()	Either	Every
(if any)			(use tick	(🗸)		Sem ()	Sem ()
7 Total Number	of Lootumon Tutor	riala Dr	marks)		also of on		
7. 1 otal Number Lectures = 0	of Lectures, Tutor	,	$\frac{actical}{assu}$	Practic		e semesu	er)
8. Course Descri	ntion	Tutor	$a_{13} = 0$	Tracin	$a_1 - 20$		
This course of study by		ained by	students in I	ava nrogran	nming Stu	idents wi	ll design
object-oriented application	0			1 0	0		0
activities				1 0-0-00	-0	, -	0.00
9. Learning obje	ctives:						
_	ves students the skil		-			-	
	ava code according				principle	S	
	GUI applications an	nd Apple	ets using AW	Γ			
10. Course Outcon	nes (COs):						
a. Describe Java c	concepts						
b. Identify various	s data types						
c. Evaluate variou	is java concept usin	g progra	ims				
d. Event handling 11. List of Experin	and input/output pr nents (Indicative)	ogramn	ning in java				
1. Create a java progra		ck and q	ueue concept.				
2. Write a java package	e to show dynamic p	oolymor	phism and int	erfaces.			
3. Write a java program	n to show multithrea	aded pro	oducer and co	nsumer app	lication.		
4. Create a customized		-					
	•						
5. Convert the content	-	ne uppe	ercase content	of the same	e file.		
6. Develop an analog c	lock using applet.						
7. Develop a scientific	calculator using sw	ings.					
8. Create an editor like	MS-word using sw	ings.					
9. Create a servlet that	uses Cookies to sto	re the n	umber of time	s a user has	visited ye	our servle	et.

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/

Bachelor in Computer Applications with minor in Cloud Computing

S.No	Course Code	Course Title	L	Т	Р	С
1		Cloud Computing	3	-	-	3
2		Data Structure and Algorithms	3	-	-	3
3		Operating Systems	3	-	-	3
4		MGE – 2 [#]	4	-	-	4
5		$AECC - 3^*$	2	-	-	2
6		VAC - 3**	2	-	-	2
7		Data Structure and Algorithms Lab	-	-	4	2
8		Operating Systems Lab	-	-	2	1
9		Cloud Computing Lab	-	-	2	1
10		Summer Internship-I	-	-	-	2
TOTA	AL		17	0	8	23

Semester – III

1. Name of the Department- Computer Science Engineering						
2. Course Name	Cloud Computing	L	Т		T P	
3. Course Code		3	0		0	
4. Type of Course (use tick	Core (✓)	PE ()		OE ()		
5. Pre-requisite (if any)		6. Frequency	Even	Odd	Either	Every
		(use tick	0	(✔)	Sem	Sem
		marks)			0	0
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)						
Lectures = 40	Tutorials = 0	Pract	ical = (0		
8. Course Description		•				

The course presents a top-down view of cloud computing, from applications and administration to programming and infrastructure. Its focus is on parallel programming techniques for cloud computing and large-scale distributed systems which form the cloud infrastructure. The topics include overview of cloud computing, cloud systems, parallel processing in the cloud, distributed storage systems, virtualization, security in the cloud, and multicore operating systems. Students will study state-of-the-art solutions for cloud computing developed by Google, Amazon, Microsoft, Yahoo, VMWare, etc. Students will also apply what they learn in one programming assignment and one project executed over Amazon Web Services.

9. Learning objectives:

- 1. To provide students with the fundamentals and essentials of Cloud Computing.
- 2. To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real-life scenarios.
- 3. To enable students exploring some important cloud computing driven commercial systems and applications.
- 4. To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

10. Course Outcomes (COs):						
a. Understand the basic terminologies, characteristics and platforms of Cloud Computing						
b. Understand the	basic principles of virtualizat	ion				
c. Provide basics	of cloud files systems					
d. Understand bas	ic issues concerning cloud se	curity				
11. Unit wise detailed conten	t					
Unit-1	Number of lectures = 10	Introduction				
Cloud computing fundamenta	ls, the role of networks in C	Cloud computing, Essential characteristics of				
Cloud computing, Cloud deple	oyment model, Cloud service	models, Multi-tenancy, Cloud cube model,				
Cloud economics and benefits	s, Cloud types and service so	calability over the cloud, challenges in cloud				
NIST guidelines, Cloud econo	NIST guidelines, Cloud economics and benefits, Cloud computing platforms - IaaS: Amazon EC2, PaaS:					
Google App Engine, Microsoft Azure, SaaS. Open-Source platforms: OpenStack.						
Unit – 2	Number of lectures = 10	Virtualization, Server, Storage and				
		Networking				

Virtualization: Basic Concepts, Types, Server virtualization, Storage virtualization, Storage services, Network virtualization, service virtualization, Virtualization management, Virtualization technologies and architectures, Internals of virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, Hyper V, VMware hypervisors and their features.

Number of lectures = 10	Data in Cloud Computing					
Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. MapReduce and						
extensions: Parallel computing, the map-Reduce model, Parallel efficiency of MapReduce, Relational						
operations using Map-Reduce, Enterprise batch processing using MapReduce.						
	e systems: GFS and HDFS, B g, the map-Reduce model, F					

Unit – 4	Number of lectures = 10	Cloud Security		

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud. Cloud computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro - architectures; Identity Management and Access control, Autonomic security, Security challenges: Virtualization security management - virtual threats, VM Security Recommendations, VM - Specific Security techniques, Secure Execution Environments and Communications in cloud.

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://nptel.ac.in/courses/106/104/106104028/ (Prof. Soumya Kanti Ghosh, IIT Khargpur)

Books Recommended

Text Books

1. Enterprise Cloud Computing, Gautam Shroff, Cambridge Publication

Reference Books:

1. Cloud computing – Automated virtualized data center, Venkata Josyula, CISCO Press

2. Cloud and virtual data storage networking, Greg Schulr CRC Press

3. Handbook of Cloud Computing, Borko Furht, Springer

2. Course	Cloud	L	L T		Р		
Name	Computing Lab						
3. Course Code		0		0	2		
4. Type of Cours	e (use tick mark)	Core (✓)	PE ()		OE ()		
5. Pre-requisite		6. Frequency	Even	Odd	Either	ner Every	
(if any)		(use tick	0	(🗸)	Sem ()	Sem ()	
		marks)	14				
$\frac{7. \text{ Total Number}}{\text{Lectures} = 0}$	of Lectures, Tutor	rials, Practical (assumin Tutorials = 0		eks of or cal = 24	ne semesto	er)	
		1 utorials = 0	Practic	cal = 24			
8. Course Descrip		oud computing, from applie	cations on	d adminio	tration to n	rogramm	
•	*	lel programming techniqu				0	
	-					-	
•		nfrastructure. The topics ir			-	· -	
• • •	-	distributed storage system			-		
	•	ll study state-of-the-art sol				-	
-		Vare, etc. Students will also	o apply wh	hat they lea	arn in one p	orogramm	
assignment and one p	project executed over	Amazon Web Services.					
9. Learning obje	ctives:						
1. To provide students with the fundamentals and essentials of Cloud Computing.							
2. To provide stude	ents a sound foundati	on of the Cloud Computin	ng so that	t they are	able to sta	rt using	
adopting Cloud C	Computing services an	nd tools in their real-life sc	enarios.				
3. To enable studen	ts exploring some imp	portant cloud computing dr	riven com	mercial sy	stems and	application	
4. To expose the st	tudents to frontier are	eas of Cloud Computing a	and infor	mation sy	stems, whi	le provid	
-	tions to enable furthe	· ·		-		1	
		·					
10. Course Outcon	mes (COs):						
	* *	es on Google app engine	e				
b) Deploy private	cloud using Open S	Stack and Cloud Stack					
c) Deploy hyperv	visor and install OS	and applications					
d) Understand va	rious services offere	ed by Amazon Web Serv	vices.				
11. List of Experim	ments						
1. Development o	f applications on Go	• • • •					
-		brough OpenStack					
-	rivate Cloud setup th	nough Openstack					
2. Setting up of pr	rivate Cloud setup th rivate Cloud setup th						
 Setting up of pr Setting up of pr 	rivate Cloud setup th		e resourc	e of diffe	erent OS in	nstances	

1. Name of the Department- Com	puter Science Engineeri	ng					
2. Course Name	Data Structure &	L	Т		P		
	Algorithms						
3. Course Code		3	0		0		
4. Type of Course (use tick mark)		Core	PE ()		OE ()		
		(✔)					
5. Pre-requisite (if any)	Programming	6.Frequ	Even	Odd	Either	Every	
	Fundamentals	ency	0	(✔)	Sem	Sem ()	
		(use			0		
		tick					
7.Total Number of Lectures, Tutor	ials. Practical (assuming	marks)	one sen	l 1ester)			
Lectures = 40		Tutoria	Practical = 0				
		ls = 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 = 8	Introduction to Data Structures		
Definition of data structures and abstract data types, Static and Dynamic implementations, Examples and real life applications; Arrays: ordered lists, representation of arrays, sparse matrices, polynomial arithmetic					

Running time: Analysis of Algorithms and their complexities: Time Complexities, Big – Oh - notation, Running Times, Best Case, Worst Case, Average Case, Factors depends on running time, Introduction to Recursion, Divide and Conquer Algorithm, Time & Space Trade-off.

Unit - 2Number of lectures = 12The Stacks Queues and Lists

The Stacks: ADT Stack and its operation, Array based implementation of stacks, Linked List based implementation of stacks, Examples: Infix, postfix, prefix representation, Conversions, Applications, Algorithms and their complexities

Queues and Lists: ADT Queue and its operation, Array based implementation of linear Queues, Circular implementation of Queues, Linked Lists: Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list Linked List implementation of Queues and Stacks Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority Queues, Applications, Algorithms and their complexities.

Unit – 3	Number of lectures = 12	Trees, Graphs

Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, Extended binary trees, traversing binary trees, Searching, Insertion and Deletion in binary search trees (with and without recursion), AVL trees, Threaded trees, B+ trees, algorithms and their analysis.

Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees, Shortest path, algorithms and their analysis.

Unit – 4	Number of lectures = 8	Sorting & Searching Algorithms

Sorting Algorithms: Introduction, Sorting by exchange, selection sort, insertion sort, Bubble sort, Straight selection sort, Efficiency of above algorithms, Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays& Algorithms; Quick sort Algorithm analysis, heap sort: Heap Construction, Heap sort, bottom – up, Top – down Heap sort approach;

Searching Algorithms: Straight Sequential Search, Binary Search (recursive & non-recursive Algorithm

e) 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. <u>https://elearning.sgtuniversity.ac.in/course-category/</u> <u>Online Resources:</u>

https://nptel.ac.in/content/syllabus_pdf/106106127.pdf; https://nptel.ac.in/courses/106/105/106105225/

Books Recommended

Text Books

- 1. E. Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Book source Pvt. Ltd.
- 2. R. L. Kruse, B. P. Leung, C. L. Tondo, "Data Structures and program design in C", PHI

Reference Books:

- 3. Schaum's outline series, "Data Structure", McGraw Hills.
- 4. Y. Langsamet. al., "Data Structures using C and C++", PHI.

2.	Course Name	Data Structure &	L		Т		Р
		Algorithms Lab					
3.	Course Code		0	0	0		4
	Type of Course (use tic	ck mark)	Core (✓)	PE ()		OE ()	
5.	Pre-requisite (if any)	Programming	6. Frequency	Even	Odd	Either	Every
		Fundamentals	(use tick marks)	0	(✓)	Sem ()	Sem
7. '	Total Number of Lectu	ıres, Tutorials, Practical (assuming 14 wee	eks of o	ne sen	nester)	I
Lect	tures = 0		Tutorials = 0	Pract	ical = 2	24	
	Course Description						
This	course imparts the basic c	concepts of data structures and	d algorithms. It ena	ables the	em to w	rite algo	rithms
solvii	ng problems with the help	of fundamental data structur	res. The course of c	lata stru	ctures l	nelp orga	nizing
data i	in variety of ways to solv	e the problem efficiently. Th	e course introduce	s the ba	sic con	cepts abo	out stac
queue	es, lists, trees and graphs. I	It also discusses about daily p	roblems like search	ing and	sorting	techniqu	les
9. Le	earning objectives:						
	*	efficiency of algorithms in ter	*	ace comp	olexitie	s.	
2. 7	To understand concepts of	searching and sorting algorith	hms.				
3.	Using various data structu	res viz. stacks, queues, linked	l list, trees and grap	ohs to de	velop e	efficient a	algorith
	-	res viz. stacks, queues, linked ation of data and operations the		ohs to de	velop e	efficient a	algorith
1	through efficient represent	-	hat can be applied.		-		-
1	through efficient represent	ation of data and operations the	hat can be applied.		-		-
4. <i>"</i>	through efficient represent	ation of data and operations the algorithms for solving proble	hat can be applied.		-		-
1 4. <i>"</i>	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms	ation of data and operations the algorithms for solving proble	hat can be applied. em by applying cor	cepts of	data st	ructures.	
4. ' 0. Co a)	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms correctness.	ation of data and operations the algorithms for solving proble	hat can be applied. em by applying cor computation com	ncepts of	data st	ructures.	
4. 7 0. Co a) b)	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms correctness. Implement a given Sear	ation of data and operations the algorithms for solving problem to determine the time and the problem (Linear Search	hat can be applied. em by applying cor computation com	plexity	data st	ructures.	
4. ' 0. Co a)	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms correctness. Implement a given Seat Write algorithms conce	ation of data and operations the algorithms for solving proble to determine the time and a rch problem (Linear Search erning various data structure	hat can be applied. em by applying con computation com and Binary Searce res like Stack, Qu	plexity ch).	data st and jus	stify the	ph sear
4. 7 0. Co a) b)	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms correctness. Implement a given Seat Write algorithms conce and traversal technique	ation of data and operations the algorithms for solving problem to determine the time and analyze the same to determine the same the same to determine the same the same the same the same the same to determine the same	hat can be applied. em by applying cor computation com and Binary Searce res like Stack, Qu letermine the time	plexity plexity ch). ueue, Li e and co	data st and jus nked 1 mputa	ructures. stify the ist, Graj tion com	ph sear
4. ' (0. Co a) b) c)	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms correctness. Implement a given Seat Write algorithms conce and traversal technique Write an algorithm for	ation of data and operations the algorithms for solving proble to determine the time and a rch problem (Linear Search erning various data structure	hat can be applied. em by applying cor computation com and Binary Searce res like Stack, Qu letermine the time rt, Insertion Sort,	plexity plexity ch). eue, Li and co Quick	data st and jus nked 1 mputa	ructures. stify the ist, Graj tion com	ph sear
4. ' 0. Co a) b) c) d)	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms correctness. Implement a given Seat Write algorithms conce and traversal technique Write an algorithm for	ation of data and operations the algorithms for solving problem to determine the time and erch problem (Linear Search erning various data structures and analyze the same to determine Sort, Bubble So	hat can be applied. em by applying cor computation com and Binary Searce res like Stack, Qu letermine the time rt, Insertion Sort,	plexity plexity ch). eue, Li and co Quick	data st and jus nked 1 mputa	ructures. stify the ist, Graj tion com	ph sear
4. 7 0. Co a) b) c) d) 11. I	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms correctness. Implement a given Seat Write algorithms conce and traversal technique Write an algorithm for sort and compare their List of Experiments	ation of data and operations the algorithms for solving problem and the time and the time and the training various data structures and analyze the same to describe Solution Sort, Bubble Solution performance in term of Spa	hat can be applied. em by applying cor computation com and Binary Searce res like Stack, Qu letermine the time rt, Insertion Sort, ace and time comp	plexity plexity ch). eue, Li and co Quick	data st and jus nked 1 mputa	ructures. stify the ist, Graj tion com	ph sear
4. <u>0. Co</u> a) b) c) d) 11. I 1. V	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms correctness. Implement a given Seat Write algorithms conce and traversal technique Write an algorithm for sort and compare their List of Experiments Write a program for mult	ation of data and operations the algorithms for solving problem and the same and analyze the same to determine the same the s	hat can be applied. em by applying con computation com and Binary Search res like Stack, Qu letermine the time rt, Insertion Sort, ace and time comp array.	plexity plexity ch). ieue, Li e and co Quick	data st and jus nked 1 mputa	ructures. stify the ist, Graj tion com	ph sear
4. 7 0. Co a) b) c) d) 11. I 1. V 2. V	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms correctness. Implement a given Seat Write algorithms conce and traversal technique Write an algorithm for sort and compare their List of Experiments Write a program for mult Write a program to comp	ation of data and operations the algorithms for solving proble to determine the time and rch problem (Linear Search erning various data structur s and analyze the same to d Selection Sort, Bubble So performance in term of Spa tiplication and transpose of oute the transpose of a spars	hat can be applied. em by applying cor computation com and Binary Searce res like Stack, Qu letermine the time rt, Insertion Sort, ace and time comp array. se matrix	plexity plexity ch). ieue, Li e and co Quick	data st and jus nked 1 mputa	ructures. stify the ist, Graj tion com	ph sear
4. 7 0. Co a) b) c) d) 11. I 1. V 2. V 3. V	through efficient represent To enable them to develop ourse Outcomes (COs): Analyze the algorithms correctness. Implement a given Seat Write algorithms conce and traversal technique Write an algorithm for sort and compare their List of Experiments Write a program for mult Write a program to comp Write a program to imple	ation of data and operations the algorithms for solving problem algorithms for solving problem to determine the time and analyze the same to determing various data structures and analyze the same to determine the transpose of a sparsement push and pop operations are provided by the pop operations and pop operations are provided by the pop operatio	hat can be applied. em by applying cor computation com <u>a and Binary Searc</u> res like Stack, Qu letermine the time rt, Insertion Sort, ace and time comp array. se matrix on in Stack.	plexity plexity ch). ieue, Li and co Quick plexity.	and just nked I mputa Sort, N	ructures. stify the ist, Graj tion com	ph sear
4. 7 0. Co a) b) c) d) 11. I 1. V 2. V 3. V 4. V	through efficient represent To enable them to develop Durse Outcomes (COs): Analyze the algorithms correctness. Implement a given Seat Write algorithms conce and traversal technique Write an algorithm for sort and compare their List of Experiments Write a program for mult Write a program to comp Write a program to imple Write a program to conve	ation of data and operations the algorithms for solving proble to determine the time and rch problem (Linear Search erning various data structur s and analyze the same to d Selection Sort, Bubble So performance in term of Spa tiplication and transpose of oute the transpose of a spars	hat can be applied. em by applying cor computation com <u>a and Binary Searc</u> res like Stack, Qu letermine the time rt, Insertion Sort, ace and time comp array. se matrix on in Stack.	plexity plexity ch). ieue, Li and co Quick plexity.	and just nked I mputa Sort, N	ructures. stify the ist, Graj tion com	ph sear
4. 7 0. Co a) b) c) d) 11. I 1. V 2. V 3. V 4. V 5. V	through efficient represent To enable them to develop Durse Outcomes (COs): Analyze the algorithms correctness. Implement a given Seat Write algorithms conce and traversal technique Write an algorithm for sort and compare their List of Experiments Write a program for mult Write a program to comp Write a program to imple Write a program to conve	ation of data and operations the algorithms for solving problem algorithms for solving problem to determine the time and analyze the same to determing various data structures and analyze the same to determing sort, Bubble Soperformance in term of Spattiplication and transpose of a sparse ement push and pop operation and pop operations are postfix notation using structures and postfix notation using structures and postfix notation using structures and postfix notation using structures are postfix notation using structures and postfix notation using structures and postfix notation using structures and postfix notation using structures are postfix notation using structures and postfix notation using structures are postfix notation using structures	hat can be applied. em by applying cor computation com <u>a and Binary Searc</u> res like Stack, Qu letermine the time rt, Insertion Sort, ace and time comp array. se matrix on in Stack.	plexity plexity ch). ieue, Li and co Quick plexity.	and just nked I mputa Sort, N	ructures. stify the ist, Graj tion com	ph sear

- 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

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://nptel.ac.in/content/syllabus_pdf/106106127.pdf; https://nptel.ac.in/courses/106/105/106105225/

13. Books Recommended

Text Books

- 1. E. Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Book source Pvt. Ltd.
- 2. R. L. Kruse, B. P. Leung, C. L. Tondo, "Data Structures and program design in C", PHI

Reference Books:

- 3. Schaum's outline series, "Data Structure", McGraw Hills.
- 4. Y. Langsamet. al., "Data Structures using C and C++", PHI.

	me of the Department- Comp urse Name	Operating	I.]	۲	1	P
2. 00		System	Ľ	•			L
3. Co	urse Code		3	Core (✓) PE () OE ()			0
4. Ty	pe of Course (use tick mark)		Core (🗸)				
5. Pre	e-requisite (if any)		6. Frequ	Even	Odd	Either	Every
			ency	0	(🗸)	Sem	Sem
			(use tick			0	0
			mark				
			s)				
	tal Number of Lectures, Tutor	rials, Practical (a					
Lectures =			Tutorials = 0	Pract	ical =	0	
	urse Description will provide an introduction to the	a internal operatio	n of modern oper	oting as	stome	In partic	ulor th
	•	-	-	•••		•	
	cover processes and threads, mutu	ial exclusion, CPU	scheduling, dead	lock, me	emory r	nanagem	ent, and
file systems	•						
9. Lea	arning objectives:						
1 To lea	rn the mechanisms of OS to handl	e processes and thr	eads and their cor	munica	tion		
	rn the mechanisms involved in me	*					
	in knowledge on distributed oper				atura I	Mutual a	rolucio
-	ns, deadlock detection algorithms		-	archite	cture, 1		xciusioi
C C	C C	0		4			
	ow the components and manageme		urrency managem	ent			
	rn to implement simple OS mecha	inisms					
	urse Outcomes (COs):						
,	reate processes and threads.						
b) D	evelop algorithms for process s	cheduling for a gi	iven specification	n of CP	U utili	zation,	
th	roughput, Turnaround Time, W	aiting Time, Res	ponse Time.				
c) Fe	or a given specification of mem	ory organization	develop the tech	niques t	for opt	imally	
al	locating memory to processes b	by increasing men	nory utilization a	nd for i	improv	ving the a	access
	me.		5		1	U	
	esign and implement file manag			_			
e) Fo	or a given I/O devices and OS (specify) develop	the I/O managen	nent fur	octions	in OS as	s part
of	f a uniform device abstraction b	y performing ope	rations for synch	ronizat	ion be	tween Cl	PU and
I/	O controllers.						
Unit wise	detailed content						
Unit-1		Number of	Introduction				
		lectures = 6					

Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS-Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.

Unit – 2	Number of	Process Management
	lectures = 12	

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching.

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time;

Scheduling algorithms: Pre-emptive and Non-preemptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Unit – 3	Number of	Memory Management
	lectures = 12	

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free- space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

Unit – 4	Number of	Deadlocks
	lectures = 10	

Process-Synchronization & Deadlocks: Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc. Definition of Deadlocks, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

I/O Systems: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

11. 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://nptel.ac.in/courses/106/105/106105214/ (Narayanaswamy N S, IIT Madras)

12. Books Recommended

Text Books

1. Silbersachatz and Galvin, "Operating System Concepts", Pearson

Reference Books:

- 1. Tannenbaum, "Operating Systems", PHI, 4th Edition.
- 2. William Stallings, "Operating Systems Internals and Design Principles", PHI
- 3. HallMadnick, J. Donovan, "Operating Systems", Tata McGraw Hill.
- 4. W. Tomasi, "Electronic Communication Systems" Pearson Education, 5th Edition

2.	Course Name	Operating		L	Г	T P				
		System Lab								
3.	Course Code			0	0	0		0 2		2
4.	Type of Course (use tick mark)		Co	ore (🗸)	PE ()		OE ()			
5.	Pre-requisite (if any)	Programming	6.	Frequency	Even	Odd	Either	Every		
		Fundamentals		(use tick	0	(✔)	Sem	Sem		
				marks)			0	0		
7.	Total Number of Lectures, Tute	orials, Practical	(ass	uming 14 weeks	of one s	semest	er)			
	Lectures = 0		Τι	itorials = 0	Practical = 14					
8.	Course Description				•					
This course will provide an introduction to the internal operation of modern operating systems. In particular, the										
course will cover processes and threads, mutual exclusion, CPU scheduling, deadlock, memory management, and										

file systems.

9. Learning objectives:

1. To learn the mechanisms of OS to handle processes and threads and their communication.

2. To learn the mechanisms involved in memory management in contemporary OS

3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols

- 4. To know the components and management aspects of concurrency management
- 5. To learn to implement simple OS mechanisms

10. Course Outcomes (COs):

a) Create processes and threads.

- b) Develop algorithms for process scheduling for a given specification of CPU utilization, throughput, Turnaround Time, Waiting Time, Response Time.
- c) For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
- d) Design and implement file management system.
- e) For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

11. List of Experiments

1. Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority

- 2. Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue.
- 3. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
- Write a C program to simulate the following file allocation strategies. a) Sequential b) Indexed c) Linked
- 5. Write a C program to simulate the MVT and MFT memory management techniques.
- Write a C program to simulate the following contiguous memory allocation techniques a) Worstfit b) Best-fit c) First-fit
- 7. Write a C program to simulate paging technique of memory management
- 8. Write a C program to simulate the following file organization techniques a) Single level directoryb) Two level directory c) Hierarchical
- 9. Write a C program to simulate Banker's algorithm for the purpose of deadlock avoidance.
- 10. Write a C program to simulate page replacement algorithms a) FIFO b) LRU c) LFU

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

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The link to the E-Learning portal.

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

13. Books Recommended

Text Books

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Reference Books:

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- 2. William Stallings, "Operating Systems Internals and Design Principles", PHI
- 3. HallMadnick, J. Donovan, "Operating Systems", Tata McGraw Hill.
- 4. W. Tomasi, "Electronic Communication Systems" Pearson Education, 5th Edition

1. Name of th	e Department-	Computer Science Engine	ering				
2. Course Na	me	Summer Internship - I	L]]	2
3. Course Co	de		0	(0 0)
4. Type of Co	ourse (use tick m	ark)	Core (✓)	PE ()		OE ()	
5. Pre-requis	ite (if any)		6. Frequenc	Even	Odd	Either	Every
			y (use tick	0	(🗸)	Sem	Sem
			marks)			0	0
		Tutorials, Practical (assu					
Lectures	-		Tutorials = 0	Pract	ical = (0	
8. Course De							
		rn technologies on industrial le				•	
technical team. T	This course enhance	es student's ability to think out	of the box and sug	ggest ne	w ways	ofimple	menting
ideas in a better	manner and should	be able to brainstorm and cor	ne up with innova	tive ide	as.		
9. Learning o	objectives:						
	-	ed so as to expose the studer trainees or interns.	nts to industry en	nvironn	nent an	d to take	up
10. Course C	outcomes (COs):						
On compl	etion of this cour	se, the students will be able	to				
CO1. Hav	e an exposure to	industrial practices and to v	vork in teams.				
CO2. Un	derstand the imp	act of engineering solution	ns in a global, e	conom	ic, env	ironmen	tal and
societal c	ontext.						
CO3. Dev	velop the ability to	o engage in research and to	involve in life-lo	ong lear	ming.		
CO4. Cor	nmunicate effecti	vely and learn to be a team	player.				
11. Course Co	ntent						
	ill be evaluated b an expert at the in	ased on 4 weeks of work at adustry.	industry site aft	er secoi	nd sem	ester.	

Modes of Evaluation: Internship Report, Presentation and Project Review

S.No	Course Code	Course Title	L	Т	Р	С
1		Cloud Computing Architecture and Deployment Models	3	-	-	3
2		Computer Networks	3	-	-	3
3		Database Management Systems	3	1	-	4
4		MGE - 3 [#]	4	-	-	4
5		$AECC - 4^*$	2	-	-	2
6		VAC - 4**	2	-	-	2
7		Database Management Systems Lab	-	-	4	2
8		Computer Networks Lab	-	-	2	1
9		Cloud Computing Architecture and Deployment Models Lab	-	-	2	1
TOTA	A L		17	1	8	22

Semester – IV

1. Name of the Departme	ent- Computer Science Engi	neering					
2. Course Name	Cloud Computing	L	Т	Р			
	Architecture and						
	Deployment Models						
3. Course Code		3	0	0			
4. Type of Course (use tie	ck mark)	Core (✓)	PE ()	OE ()			
5. Pre-requisite (if any)	Cloud Computing	6. Frequency	Even Odd	Either Every			
		(use tick	(✔) ()	Sem Sem			
		marks)		0 0			
	res, Tutorials, Practical (as						
Lectures = 40		Tutorials = 0	Practical =	0			
 8. Course Description To help the students 	to understand: The concept of c	loud computing an	d describe the	choices			
•	*		la deserroe the	enoices			
	developers when creating cloud	* *					
	re as a service, platform as a ser	rvice, and software	e as a service				
9. Learning objectives:							
Upon successful con	pletion of the course in this disc	cipline the student	will be able cre	eating cloud			
-	-	aphile the student	will be uble en	cating cloud			
applications and deploy on clo	-						
10. Course Outcomes (COs)		les of Cloud Took	nologia in ug	a tadawa			
At the end of the course, the stu		0	inologies in us	e today:			
	ve applications and services to the						
Understand Cloud Se	egments and Cloud Deployment	Models					
Importance of securi	ty in cloud computing						
Static Application Dev	elopment using Service models						
Unit wise detailed content							
Unit-1	Number of lectures = 10	OVERVIEW					
		IN CLOUD C	OMPUTING				
Introduction; Overview of Cloud	Computing; Cloud Service mod	els and Cloud Dep	oloyment Mode	ls; Cloud History			
- Internet technologies (SOA,	Web Services, Web 2.0, mash	ups), Distributed	computing –	Utility and Grid			
Computing, Hardware – VMWar	e ESXi, Xen, KVM: Virtual App	liances and the ope	en Virtualizatio	n format: System			
Management; Anatomy of Cloud		-		-			
		instormation roadi	nap, cioud den	very models and			
their advantages; Cloud computing architecture.							
Unit – 2	Number of lectures = 10	INFRASTRU	CTURE AS A	SERVICE			
		(IAAS)					
T (1) T C (1)			A 1 1	1 67 9			
Introduction to Infrastructure as	·			-			
Applicability of IaaS in the indust	try, Comparing ISPs and IaaS, N	lotivations for rent	ing the infrastr	ucture; IaaS Case			
studies; IaaS enabling Technolog	y; Trusted cloud, Amazon EC2.						

Unit - 3Number of lectures = 10PLATFORM AS A SERVICE (PAAS)

Introduction to Platform as a Service delivery model, characteristics of PaaS, patterns, architecture and examples of PaaS, Applicability of PaaS in the industry; Integrated Lifecycle Platform; Anchored Lifecycle platform; Enabling Technologies as a Platform; PaaS – best option or not; Google App Engine

Unit - 4Number of lectures = 10SOFTWARE AS A SERVICE (SAAS)

Introduction to Software as a Service delivery model, characteristics of SaaS, SaaS Origin; Evolvement of SaaS – Salseforce.com's approach; SaaS Economics and Ecosystem; Types of SaaS Platforms; Architecture, SaaS – Providers; Collaboration as a Service; Enabling and Management tools as a Service; Applicability of SaaS in the industry.

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

Online Resource:

https://www.coursera.org/learn/cloud-applications-part1#syllabus (University of Illinois at Urbana-Champaign)

12. Books Recommended

Text Books

1. Cloud Computing: Concepts, Technology & Architecture, Zaigham Mahmood, Ricardo Puttini, Thomas Erl, O'Rilley

1. Name of the Departm	ent- Computer Scienc	e Engineering				
2. Course Name	Cloud Computing	L	Г	.]	P
	Architecture and					
	Deployment Models					
2 Comme Code	Lab	0	0			,
3. Course Code	Cloud Computing	0 Carra (x2)	0 PE		OI	2
4. Type of Course (use t 5. Pre-requisite (if		Core (✓) 6. Frequency	Even	Odd		Every
any)		(use tick	(\checkmark)	0	Sem	Sem
		marks)		V	()	()
7. Total Number of Lect	tures, Tutorials, Practi	cal (assuming 14 we	eks of o	ne sen	0	~
Lectures = 0		Tutorials = 0	Practi			
8. Course Description						
• To help the students	to understand: The concep	ot of cloud computing an	nd descri	be the	choices	
that are available to	developers when creating	cloud applications				
Describe infrastructu	re as a service, platform a	s a service, and software	e as a sei	rvice		
9. Learning objectives:						
Upon successful completion of	•	line the student will be a	ble crea	ting clo	oud	
applications and deploy on clo	oud platform.					
10. Course Outcomes (COs						
At the end of the course, the st	tudent can: Earn basic k	nowledge of Cloud Te	echnolog	gies in	use toda	ıy
• Strategic plan to m	ove applications and ser	vices to the Cloud				
Understand Cloud	Segments and Cloud De	ployment Models				
Importance of secu	rity in cloud computing					
Static Application	Development using Serv	vice models				
11. List of Experiments						
1. Creating a Warehouse	Application in SalesFor	ce.com.				
2. Deploy the own cloud	storage server using Do	cker				
3. Implementation of SO.	AP Web services in C#/	JAVA Applications.				
4. Case Study: PAAS (Fa	cebook, Google App Er	ngine)				
5. Case Study: Amazon V	Web Services.					
12. Brief Description of self-l The students will be encourage delivered by subject experts of	ed to learn using the SG	ΓE-Learning portal ar		se the r	elevant l	ectures

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

1. Name of the Department	- Computer Science Engine	ering				
2. Course Name	Computer Networks	L	Т		F	2
3. Course Code		3	0		0)
4. Type of Course (use tick	mark)	Core (✓)	PE ()		OE ()	
5. Pre-requisite (if any)		6. Frequency	Even	Odd	Either	Every
		(use tick	(🗸)	0	Sem	Sem
		marks)			0	0
7. Total Number of Lecture	es, Tutorials, Practical (assu					
Lectures = 40		Tutorials = 0	Practic	cal = 0)	
8. Course Description	1 11 . 1 . 1.1				· .	G 1 1
Through this subject, student will		c				
will understand the applications o	f data structures and algorithms	in networks. The i	nternals of	of com	municati	ons will
be discussed throughout the cours	se duration.					
9. Learning objectives:						
1 11 1 1		• .• • •			1	
1. Help in underst	anding the concepts of comm	iunication and co	mputer	netwo	rks.	
	\ \					
10. Course Outcomes (COs	/	architacturas fro	m a daa	ion or	nd parfo	manaa
perspective.	tanding of modern network	architectures fro	in a des	aign ai	ia perior	mance
	nt to the major concepts invol	ved in wide-area	network	ks (WA	ANs). loc	cal area
	Wireless LANs (WLANs).				,,	
	nity to do network programm	-				
-	of the different layer of the O		、 -			
• •	nt (small scale) of wide-area n				etworks (LANs)
11. Unit wise detailed conten	VLANs) design it based on the	le market availab	ne comp	onent		
Unit-1	Number of lectures = 8	Data commun	ication (Comp	onents	
		I		-		
Representation of data and its flow	w Networks, Various Connection	on Topology, Proto	ocols and	Stand	ards, OSI	model,
Transmission Media, LAN: Wir	ed LAN, Wireless LANs, Cor	nnecting LAN and	d Virtual	LAN	Techniq	jues for
Bandwidth utilization: Multiplex	ing - Frequency division, Time	division and Way	ve divisio	on, Co	ncepts on	spread
spectrum.						
1						
Unit – 2	Number of lectures = 12	Data Link Lay	yer and I	Medi	um Acce	ess
		Sub Layer				
Error Detection and Error Correc	tion - Fundamentals, Block cod	ling, Hamming Di	istance, C	CRC; F	Flow Con	trol and
Error control protocols - Stop and	Wait, Go back – N ARQ, Selec	tive Repeat ARQ,	Sliding V	Window	w, Piggyb	acking,
Random Access, Multiple access	protocols -Pure ALOHA, Slotte	ed ALOHA, CSM	A/CD,CE	OMA/O	CA	
Unit – 3	Number of lectures = 12	Network Laye	r & Tra	inspo	rt Layer	

Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Unit – 4 Number of lectures = 8 Applica

Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

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

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Online Resources:

https://onlinecourses.nptel.ac.in/noc22_cs19/preview

13. Books Recommended

Text Books

- 1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
- 2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.

4. '							
4. '		Lab					
	Course Code		0	0		_	2
5.	Type of Course (use tick ma	ark)	Core (✓)	PE ()	0.11	OE ()	
	Pre-requisite (if any)		6. Frequency (use tick	Even		Either	Every
			(use tick marks)	(✓)	0	Sem ()	Sem ()
7.	Total Number of Lectures,	Tutorials, Practical (ass	uming 14 weeks Tutorials = 0				
0	Lectures = 0		1 utorials = 0	Pract	$ ca = \Delta$	24	
	Course Description bugh this subject, student will be	e able to understand the coars	se-grained aspects of	of Data (Commu	nication.	Studen
	understand the applications of c		0				
	iscussed throughout the course	-		inconnuns	01 0011	lindinouti	
	9. Learning objectives:						
2	7. Learning objectives.						
	1. Help in understanding the	e concepts of communicat	ion and computer	networ	ks.		
10	. Course Outcomes (COs):						
	1. To develop an understand	nding of modern network	architectures fro	m a de	sign a	nd perfo	rmanc
	perspective.	to the major concents invo	luad in wide area	notwor	lea (W	Na) la	aal ara
	2. To introduce the student networks (LANs) and W		orved in wide-area	networ	KS (WZ	418), 100	car area
	. ,	ty to do network program	ning				
	4. Explain the functions of		-				
	5. For a given requirement	· · · · · · · · · · · · · · · · · · ·	,				LANs
11 '		ANs) design it based on t	he market availab	ole com	ponent	•	
11.	List of Experiments						
	1. Study of Network device	s in detail					
/ 4	2. Connect the computers in	Local Area Network usin	ng packet tracer				
	3. Implementation of Data I	Link Framing method - Ch	aracter Count.				
2	4. Implementation of Error	detection method - even a	nd odd parity.				
-	5. Implementation of Error	detection method - CRC P	olynomials				
(6. Study of Network IP Add	lressing using packet trace	er				
,	7. Design TCP client and se	rver application to transfe	r file				
8	8. Design UDP client and se	erver application to transfe	er file				
(9. Working on Network Pro	tocol Analyzer Tool (Ethe	ereal/Wireshark)				
	10. Working on NMAP Tool	for Port scanning.					

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

2.	Course Name	Database Management	L	Т		I	
		Systems					
3.	Course Code		3	1		()
4.	Type of Course (use tick	mark)	Core (✓)	PE ()		OE ()	
5.	Pre-requisite (if any)		6. Frequency	Even	Odd	Either	Every
			(use tick marks)	(🗸)	0	Sem	Sem
7	Total Number of Lostury	a Trutoniala Dreatical (agai		of one		()	0
7.	$\frac{10 \text{ tai Number of Lecture}}{\text{Lectures} = 40}$	es, Tutorials, Practical (assu	Tutorials = 0		ical = (
8.				11400			
		be able to understand the coars	e-grained aspects of	of Data (Commu	nication.	Studen
wil	ll understand the applications of	of data structures and algorithms	in networks. The i	nternals	of com	municati	ons wil
be o	discussed throughout the cour	se duration.					
9.	Learning objectives:						
	1. To understand the diffe	erent issues involved in the de	esign and implem	entatio	n of a		
	database system.		6 I I I				
	-	nd la cical databasa dasiana	datahasa mendalim	1-4			
		nd logical database designs,	ualabase modelli	ig, relat	ionai,		
	hierarchical, and netwo	ork models					
	3. To understand and use	data manipulation language t	o query, update,	and ma	nage a	databas	e
	To develop an underst	anding of essential DBMS of	concepts such as	: databa	ase sec	curity, in	tegrity
	concurrency, distribute	d database, and intelligent da	atabase, Client/So	erver (I	Databas	se Servei	r), Data
	Warehousing.						
	4. To design and build a s	simple database system and d	emonstrate comp	oetence	with th	ne	
	fundamental tasks invo	lved with modeling, designing	ig, and implement	ting a l	OBMS		
1	10. Course Outcomes (COs			U			
-		e relational algebra expression	ns for that query	and opt	imize	the	
	developed expressions			_			
		on of the requirement design	the databases usi	ng E-R			
	method and normalizat						
			a for Onen cour	an and	Comm	amaial D	DMC
		on construct the SQL querie	s for Open sour	ce and	Comm	lercial D	DINIS
	MYSQL, ORACLE, ar						
	4. For a given query optim	nize its execution using Quer	y optimization al	gorithn	ns		
	5. For a given transaction	-processing system, determin	e the transaction	atomic	ity,		
	consistency, isolation,						

6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.
 11. Unit wise detailed content
 Unit-1
 Number of lectures = 8
 Database system architecture & Data Models

Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit – 2 Number	of lectures = 12	Relational query languages
-----------------	------------------	----------------------------

Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Unit - 3Number of lectures = 12Storage strategies

Indices, B-trees, hashing. Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp-based schedulers, multi-version and optimistic Concurrency Control schemes, Database recovery.

Unit – 4	Number of lectures = 8	Database Security

Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection. Advanced topics: Object oriented and object relational databases, Logical databases, Web databases,

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. <u>https://elearning.sgtuniversity.ac.in/course-category/</u> <u>Online Resources:</u> <u>https://nptel.ac.in/content/syllabus pdf/106105175.pdf;</u>

https://nptel.ac.in/courses/106/104/106104135

13. Books Recommended

Text Books

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F.

Korth, S. Sudarshan, McGraw-Hill

Reference Books

1 "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

2 "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education

3 "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

	Database Management Systems Lab	L	T		Р	
3. Course Code		0	0		4	l –
4. Type of Course (use t	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 Lect	ures, Tutorials, Practical (
Lectures = 0		Tutorials = 0	Practi	ical = 2	24	
8. Course Description	11 . 1 . 1.1		(D) (~		<u><u> </u></u>
Through this subject, student will l		0 1				
will understand the applications of	data structures and algorithms	in networks. The i	nternals	of com	municati	ons wil
be discussed throughout the course	e duration.					
9. Learning objectives:						
hierarchical, and net 3. To understand and u To develop an under concurrency, distrib Data Warehousing.	l and logical database desig work models se data manipulation langua standing of essential DBMS uted database, and intellige a simple database system ar	ge to query, upda concepts such a nt database, Clie	ate, and s: datab ent/Serv	manag ase sec ver (Da nce wit	ge a data curity, in atabase S h the	tegrity
	volved with modeling, desig	gning, and imple	menting			
fundamental tasks in 10. Course Outcomes (7. For a given query write	COs):					
10. Course Outcomes (COs):					
10. Course Outcomes (7. For a given query write	COs): relational algebra expression	ns for that query	and opt			
 Course Outcomes (For a given query write developed expressions For a given specification 	COs): relational algebra expression n of the requirement design t	ns for that query	and opt			
10. Course Outcomes (7. For a given query writedeveloped expressions	COs): relational algebra expression n of the requirement design to on. n construct the SQL querie	ns for that query	and opt ng E-R	imize t	he	OBMS
 Course Outcomes (For a given query write a developed expressions For a given specification method and normalization For a given specification 	COs): relational algebra expression n of the requirement design to on. n construct the SQL querie 1 DB2.	ns for that query the databases using the for Open sour	and opt ng E-R ce and	imize t Comm	he	OBMS
 10. Course Outcomes (7. For a given query write a developed expressions 8. For a given specification method and normalization 9. For a given specification MYSQL, ORACLE, and 	COs): relational algebra expression n of the requirement design to on. n construct the SQL querie 1 DB2. ize its execution using Quer	ns for that query the databases using the for Open sour y optimization al	and opt ng E-R ce and gorithn	imize t Comm	he	OBMS

12. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

11. List of Experiments

- 1. Design a Database and create required tables. For e.g. Bank, College Database
- 2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
- 3. Write a SQL statement for implementing ALTER, UPDATE and DELETE.
- 4. Write the queries to implement the joins.
- 5. Write the queries for implementing the following functions: MAX (), MIN (), AVG (), COUNT ().
- 6. Write the queries to implement the concept of Integrity constrains
- 7. Write the queries to create the views.
- 8. Perform the queries for triggers.
- 9. Perform the following operation for demonstrating the insertion, updating and deletion using the referential integrity constraints.
- 10. Do some more practice based on your class work.

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/

S.No	Course Code	Course Title	L	Т	Р	С
1		Virtualization and Cloud Security	3	-	-	3
2		Departmental Elective – I	3	-	-	3
3		Departmental Elective – II	3	-	-	3
4		Data Visualization and Story Telling	3	-	-	3
5		$MGE - 4^{\#}$	4	-	-	4
6		Virtualization and Cloud Security Lab	-	-	2	1
7		Departmental Elective -I Lab	-	-	2	1
8		Departmental Elective-II Lab	-	-	2	1
9		Data Visualization and Story Telling Lab	-	-	2	1
10		Mobile Application Development	-	-	4	2
11		Summer Internship-II	-	-	-	4
TOTA	AL		16	0	12	26

1. Name of the Depart	ment- Computer Science Er	ngineering				
2. Course Name	Virtualization and	L	Т		I	>
	Cloud Security					
3. Course Code		3	0		()
4. Type of Course (use	tick mark)	Core (✓)	PE ()		OE ()	
5. Pre-requisite (if	Cloud Computing	6. Frequency	Even	Odd	Either	Every
any)		(use tick	0	(✔)	Sem	Sem
		marks)			0	0
	s, Tutorials, Practical (assu					
Lectures = 40		Tutorials = 0	Practic	al = 0)	
8. Course Description This course provides the groun	d up coverage on the high le	val concents of	ploud lon	decon	o virtual	ization
r c		•		•		
architectural principles, technique		d best practices ap	plied to C	loud	service pi	oviders
and consumers and delivering sec	cure Cloud based services.					
9. Learning objectives:						
To provide knowledge on virt	ualization concepts and its a	pplication in clo	ud compu	uting.	To und	erstand
and implement the security con	nsideration in cloud environm	nent.				
10. Course Outcomes (COs):					
The course should enable the s	tudents to:					
1. Understand the basic concept	ots of virtualization.					
2. Learn the network and appli	cation virtualization.					
3. Describe the security archite	ecture of cloud computing and	d security service	e models.	•		
4. Analyse the Strategies for S	ecure Operation the cloud arc	chitecture and lis	t the secu	ırity r	equirem	ents.
Unit wise detailed content			• • •	• •		
Unit-1	Number of lectures = 10	Introduction t	o virtual	lizatio	on	
Traditional IT Infrastructure, Be	nefits of Virtualization, History	y of Virtualizatior	n, Types o	of Vir	tualizatio	n: Para
Virtualization, Full Virtualization	and Hybrid Virtualization, SLA	А.				
Unit – 2	Number of lectures = 10	Network and a	applicati	on vi	rtualiza	tion
Types of Server Virtualization, H	lypervisors, Anatomy of Server	Virtualization, Be	enefits of S	Storag	ge Virtual	ization,
Types of Storage Virtualization,	VPN, VLAN, Benefits of Applie	cation Virtualizati	on.			
Unit – 3	Number of lectures = 10	Introduction t	o Cloud	Secu	rity	
Introduction to Cloud Computing	and Security. Overview of Sec	urity Architecture	Control	over S	ecurity in	ı the
Cloud Model- Cloud Computing:	•	•			•	
	-	-				-
Requirements for the Architectur	e-security Patterns and Archited	aurai Elements-Cl	oud Secu	пцу А	renitectu	le-key
Strategies for Secure Operation						

Unit – 4 Number of lectures = 10 Securing the Cloud	U nit – 4	Number of lectures = 1	Securing the Cloud
---	------------------	------------------------	--------------------

Private Clouds: Motivation and Overview-Security Implications: Shared versus Dedicated Resources, Security Criteria for Ensuring a Private Cloud - Network Considerations- Data Centre Considerations- Operational Security Considerations, Selecting a CSP: Overview of Assurance, Overview of Risks

11. 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. <u>https://elearning.sgtuniversity.ac.in/course-category/</u> <u>Online Resources:</u>

https://www.coursera.org/learn/introduction-to-cloud#syllabus [IBM] https://www.coursera.org/learn/cloud-computing-basics?#about [LearnQuest]

12. Books Recommended

Text Books

1. Virtualization-A Beginner's Guide, Nelson Ruest (Author), Danielle Ruest, McGraw Hills

2. Practical Cloud Security, Zaigham Mahmood, Ricardo Puttini, Thomas Erl, O'Rilley

2. Course Name	Virtualization and	L]]	P
	Cloud Security Lab					
3. Course Code		0	0)	,	2
4. Type of Course (use tick	mark)	Core (✓)	PE ()		OE ()	
5. Pre-requisite (if any)	Cloud Computing	6. Frequency	Even	Odd	Either	Ever
		(use tick	0	(🗸)	Sem	Sem
		marks)			0	0
	es, Tutorials, Practical (assu					
Lectures = 0		Tutorials = 0	Pract	ical = 2	24	
3. Course Description • This course provid	es the ground-up coverage o	n the high-level	concen	ts of a	eloud la	ndscan
*	с , с	e	•			•
virtualization, archite	ectural principles, techniques, de	esign patterns and	real-woi	ld best	practices	applie
to Cloud service pro	viders and consumers and delive	ering secure Cloud	based s	ervices		
understand and imp	edge on virtualization concep plement the security consider				comput	ing. T
understand and imp 10. Course Outcomes (COs) The course should enable the solution 1. Understand the basic concess 2. Learn the network and apple 3. Describe the security archite	plement the security consideration. students to: pts of virtualization. ication virtualization. ecture of cloud computing an	ation in cloud en	vironm e model	ent.		
understand and imp 10. Course Outcomes (COs) The course should enable the solution 1. Understand the basic concess 2. Learn the network and apple 3. Describe the security archited 4. Analyse the Strategies for S	plement the security consideration. students to: pts of virtualization. ication virtualization. ecture of cloud computing an	ation in cloud en	vironm e model	ent.		
understand and imp 10. Course Outcomes (COs) The course should enable the solution 1. Understand the basic conce 2. Learn the network and appl 3. Describe the security archite 4. Analyse the Strategies for S	plement the security consider students to: pts of virtualization. ication virtualization. ecture of cloud computing an becure Operation the cloud are	ation in cloud en	vironm e model	ent.		
understand and imp 10. Course Outcomes (COs) The course should enable the solution 1. Understand the basic concept 2. Learn the network and appl 3. Describe the security archited 4. Analyse the Strategies for Solution 11. List of Experiments	plement the security consideration students to: pts of virtualization. ication virtualization. ecture of cloud computing an becure Operation the cloud are g VMware	ation in cloud en	vironm e model	ent.		
understand and imp 10. Course Outcomes (COs) The course should enable the solution 1. Understand the basic concept 2. Learn the network and apple 3. Describe the security archited 4. Analyse the Strategies for Solution 11. List of Experiments 1. Virtual Machine Using	plement the security consideration students to: pts of virtualization. ication virtualization. ecture of cloud computing an becure Operation the cloud are g VMware g QEMU	ation in cloud en	vironm e model	ent.		
understand and imp 10. Course Outcomes (COs) The course should enable the solution 1. Understand the basic concerts 2. Learn the network and apple 3. Describe the security architer 4. Analyse the Strategies for Solution 11. List of Experiments 1. Virtual Machine Using 2. Virtual Machine Using 3. KVM on Ubuntu 12.10	plement the security consideration students to: pts of virtualization. ication virtualization. ecture of cloud computing an becure Operation the cloud are g VMware g QEMU	ation in cloud en	vironm e model	ent.		
understand and imp 10. Course Outcomes (COs) The course should enable the solution 1. Understand the basic concerts 2. Learn the network and apple 3. Describe the security architer 4. Analyse the Strategies for Solution 11. List of Experiments 1. Virtual Machine Using 2. Virtual Machine Using 3. KVM on Ubuntu 12.10	plement the security consideration students to: pts of virtualization. ication virtualization. ecture of cloud computing an becure Operation the cloud are g VMware g QEMU c) ting system on CentOS6.3	ation in cloud en	vironm e model	ent.		

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. <u>https://elearning.sgtuniversity.ac.in/course-category/</u> Departmental Electives – I and Departmental Electives - II

1. Name of the Department	- Computer Science Engine	ering					
2. Course Name	Basics of Machine	L	T P)		
	Learning						
3. Course Code	Statistics	3	0 0)		
4. Type of Course (use tick	mark)	Core ()	PE (✓) OE ()				
5. Pre-requisite (if any)	Statistics	6. Frequency	Even Ode	d Either	Every		
		(use tick	() (🗸)	Sem	Sem		
		marks)		0	0		
	s, Tutorials, Practical (assu						
Lectures = 40		Tutorials = 0	P	ractical =	0		
8. Course Description	· · · · · · ·		1.1.0				
	ng basics program is designed t			ork-ready sl	kills for		
machine learning eng	gineers, data scientists, and artifi	cial intelligence p	rofessionals.				
9. Learning objectives:							
T 1 · 1 1		1 4	1, 1 .	•.1	1		
• To design and anal	yze various machine learnin	g algorithms an	d technique	s with a r	nodern		
outlook focusing on re	cent advances.						
 Explore supervised a 	nd unsupervised learning par	adigms of machi	ne learning.				
10. Course Outcomes (CO	Ds):						
• Illustrate and comprehend the	e basics of Machine Learning	with Python					
• Demonstrate the algorithms	of Supervised Learning an	d be able to dif	ferentiate li	near and l	ogistic		
regressions							
• Demonstrate the algorithms o	f Unsupervised Learning and	be able to unders	tand the clus	stering algo	orithms		
Unit wise detailed content							
Unit-1	Number of lectures = 10	Introduction t Python	o Machine I	Learning	with		
Introduction to Machine Learnin	g, basic terminology. Types of	Machine Learnin	g and Applic	ations. Der	ivative-		
Introduction to Machine Learning, basic terminology, Types of Machine Learning and Applications, Derivative- based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size							
Determination							
Unit – 2	Number of lectures = 10	Supervised Le	arning				
Types of Supervised Learning, Su	pervised Machine Learning Alg	orithms: k-Nearest	t Neighbors, I	Regression 1	Models,		
Naive Bayes Classifiers, Decision Trees.							
Unit – 3	Number of lectures = 10	Building good	training da	tasets:			

Dealing with missing data, Handling categorical data, partitioning a data set into separate training and test datasets, bringing features onto the same scale, selecting meaningful features, assessing feature importance with random forests. Unit – 4 Number of lectures = 10 Clustering K-Means clustering, Neural network: Perceptron, multilayer network- back propagation- introduction to deep neural network 11. 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://onlinecourses.nptel.ac.in/noc22_cs73/preview (Prof. Balaraman Ravindran, IIT Madras) **Books Recommended Text Books** 1) Introduction to Machine Learning with Python: A Guide for Data Scientists, Andreas C. Muller & Sarah Guido, Orielly Publications, 2019. 2) Python Machine Learning, Sebastian Raschka & Vahid Mirjalili, 3rd Edition, 2019.

3) Machine Learning using Python, Manaranjan Pradhan, U Dinesh Kumar, Wiley, 1st Edition, 2019

1. Name of the Department- C	•	0	1	1	_
2. Course Name	Basics of Machine	L	Т		P
	Learning Lab				
3. Course Code		0	0		2
4. Type of Course (use tick ma	nrk)	Core ()	PE (✓)	OE ()	
5. Pre-requisite (if any)	Statistics	6. Frequency	Even Odd	Either	Every
		(use tick	0 (1)	Sem	Sem
		marks)		0	0
7. Total Number of Lectures,	Futorials, Practical (assur	ning 14 weeks of	f one semeste	er)	
Lectures = 0		Tutorials = 0	Practical =	24	
8. Course Description					
The Machine Learning	basics program is designed	to offer a solid fou	ndation & wor	rk-ready s	kills fo
machine learning engin	neers, data scientists, and artif	icial intelligence p	rofessionals.		
9. Learning objectives:					
• To design and analyz	ze various machine learnin	ng algorithms an	d techniques	with a	moder
outlook focusing on rec	ent advances.				
• Explore supervised on	d unsupervised learning pa	radians of machi	ina laornina		
10. Course Outcomes (COs):					
• Illustrate and comprehend the	basics of Machine Learning	g with Python			
• Demonstrate the algorithms	of Supervised Learning an	d be able to dif	ferentiate lin	ear and	logisti
regressions					
• Demonstrate the algorithms of	Unsupervised Learning and	be able to under	tand the clust	oring alg	orithm
	Unsupervised Learning and	be able to unders	stand the clust	ering alg	onunn
List of Experiments					
Fyneriment 1.					
Experiment 1:Installation of Python	n and its packages (Pandas,	NumPy, SciPy	matplotlib and	d scikit-l	earn)
-	pyter Notebook, Programs		-		curri)
Programming)	15 / 8	U	1 5		
• Basics of Python:					
•	ead two numbers from user	and display the	result using b	itwise &	, and
^ operators on the nu		- •	-		
• Write a program to c or 5.	alculate the sum of number	rs from 1 to 20 w	hich are not d	ivisible ł	oy 2, 3
	ind the maximum of two nu	mbers using fun	ctions.		
 Implement slicing or 	peration on strings and lists				
Experiment 2:					
• Implement python pr data analysis	ogram to load structured d	ata onto DataFrai	ne and perfor	m exploi	atory
• Implement nuther a	corresp for data propagation	activities such a	filtaning and		

- Implement python program for data preparation activities such as filtering, grouping, ordering and
- joining of datasets. Experiment 3:

- Implement Python program to prepare plots such as bar plot, histogram, distribution plot, box plot,
- scatter plot.

Experiment 4:

- Implement Simple Linear regression algorithm in Python
- Implement Gradient Descent algorithm for the above linear regression model

Experiment 5:

• Implement Multiple linear regression algorithm using Python.

Experiment 6:

• Implement Python Program to build logistic regression and decision tree models using the Python package statsmodel and sklearn APIs.

Experiment 7:

- Implement Python Program to perform the activities such as
 - splitting the data set into training and validation datasets
 - building model using Python package on training dataset and test on the validation dataset

Experiment 8:

• Write a Python program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.

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

1. Name of the Department- Computer Science Engineering									
2.	Course Name	Basics of Data Analysis	L	Т		Р			
3.	Course Code	Statistics and Python	3	0		0			
4.	Type of Course (use tick	mark)	Core ()	PE (✓) OE ()					
5.	Pre-requisite (if any)	Statistics and Python		Even	Odd	Either	Every		
			(use tick marks)	0	(•	Sem	Sem		
						0	0		
7.		es, Tutorials, Practical (assu							
0	Lectures = 42		Tutorials = 0	Practi	ca = 0)			
0.	• This course presents	a gentle introduction into the co	ncepts of data ana	lysis, the	e role o	f a Data A	Analyst,		
	*	used to perform daily functions	-	J			5		
9.	Learning objectives:								
		1 1 1 2 2 1	C		. . ,				
		wledge and expertise to beco	-						
	Demonstrate an understanding of statistics and machine learning concepts that								
	are vital for data sc	ience;							
	Produce Python code to statistically analyze a dataset;								
	Critically evaluate	data visualizations based on t	heir design and u	use for c	commu	inicating	stories		
	from data;								
1	0. Course Outcomes (COs	,							
	1. To explain how data is	collected, managed and store	ed for data science	ce;					
	2. To understand the key	concepts in data science, incl	luding their real-	world					
	applications and the tool	kit used by data scientists;							
	3. To implement data col	lection and management scrip	pts using Mongo	DB.					
Un	it wise detailed content		1						
Un	it-1	Number of lectures = 14	Introduction						
Inti	Introduction to Data Science, Different Sectors using Data science, Purpose and								
Co	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.									
Un	it – 2	Number of lectures = 11	Feature Gener	ation a	nd Fe	ature Se	lection		
			(Extracting M	eaning	from 1	Data)-			
Nu	NumPy: Array and vectorized computation: Multidimensional array object. Creating ndarrays, arithmetic with								
nur	npy array, basic indexing ar	nd slicing, Boolean indexing,	transposing array	and sw	vapping	axes, u	niversal		

functions, array-oriented programming with arrays, conditional logic as arrays operations, file input and output with array.

Unit – 3	Number of lectures = 10	Data Visualization
Unit - 3	Number of lectures $= 10$	Data Visualization

Basic principles, Pandas: Pandas data structure, series, Data Frame, Index Object, Reindexing, dropping entities from an axis, indexing, selection and filtering, integer indexes, arithmetic and data alignment, function application and mapping, soring and ranking, correlation and covariance, unique values, values controls and membership, reading and writing data in text format.

Figures and subplots, colors, markers, line style, ticks, labels, legends, annotation and drawing on sublots, matplotlib configuration.

Plotting with pandas and seaborn: line plots, bar plots, histogram, density plots, scatter and point plots, facet grids and categorical data.

11. 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/python-data-analysis (Christopher Brooks, University of Michigan) Books Recommended

Text Books

1. Data Sciences & Analytics, V.K. Jain, Khanna Publishing House.

2. McKinney, W.(2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython.2nd edition.O'Reilly Media.

2. Course Name	Basics of Data	L	Т		Р		
	Analysis Lab						
3. Course Code		0	0		,	2	
4. Type of Course (use ti	ck mark)	Core ()	PE (✔)	OE ()		
5. Pre-requisite (if any)	Statistics and Python	6. Frequency	Even	Odd	Either	Every	
		(use tick marks)	0	(🗸)	Sem	Sem	
7 Total Number of Lost	una Tutariala Drastical	,	olya of o	n o co n	() ()	0	
$\frac{7.10 \text{ tar Number of Lect}}{\text{Lectures} = 0}$	ures, Tutorials, Practical	Tutorials = 0	Practi				
8. Course Description							
	a gentle introduction into the	concepts of data and	alysis, th	e role o	f a Data .	Analyst	
and the tools that are	used to perform daily function	ns.					
9. Learning objectives:							
T D 141	1 1 1 2 2 1	c	1	,• ,			
	wledge and expertise to bec	1					
• Demonstrate an uno	lerstanding of statistics and	machine learning	g concep	ts that			
are vital for data sci	ience;						
Produce Python cod	le to statistically analyze a	dataset;					
• Critically evaluate	data visualizations based or	their design and	use for a	commu	inicating	storie	
from data;							
10. Course Outcomes (COs):							
	collected, managed and sto	ored for data scier	ice;				
2. To understand the key	concepts in data science, in	cluding their real	-world				
applications and the toolk	tit used by data scientists;						
3. To implement data col	lection and management sc	ripts using Mongo	DB.				
1. List of Experiments	turn and East with 1						
1. Python Environment se							
2. Mathematical computin							
3. Scientific Computing w	ith Python (SciPy).						
4. Data Manipulation with	Pandas.						
5. Prediction using Scikit-	Learn						
6. Data Visualization in py							

1. Name of the Department- Computer Science Engineering							
2. Course Name	Internet of Things	L	Т		Р		
3. Course Code		3	0		0		
4. Type of Course (use ti	ck mark)	Core ()	PE (✓) OE ()				
5. Pre-requisite (if any)		6. Freque	Even	Odd	Either	Every	
		ncy	0	(✔)	Sem	Sem	
		(use			0	0	
		tick marks)					
7. Total Number of Lect	ures, Tutorials, Practical (as	/	s of one s	semest	er)		
Lectures = 40		Tutorials = 0	Practic		(1)		
8. Course Description							
	is everywhere. It provides adv	anced data collection	on, conne	ectivity	and ana	lysis of	
information collected by cor	nputers everywhere-taking the	e concepts of Mac	hine-to-N	Iachine	commu	nication	
farther than ever before. This	course gives a foundation in the	Internet of Things,	including	g the co	mponent	s, tools,	
and analysis by teaching the c	oncepts behind the IoT and a loc	ok at real-world solu	tions				
9. Learning objectives:							
The chiestive of this severe is	to import passage and presting	1 Imourladaa of com	nonanta	fIntom	ast of Thi	nacand	
develop skills required to buil	to impart necessary and practica	I knowledge of con	iponents c	of Intern	let of Thi	ngs and	
develop skins required to buil	d leai-time for based projects						
10. Course Outcomes (CC	Ds):						
a. Understand IoT	and its hardware and software	e components					
b. Interface I/O de	vices, sensors and communication	ation mobiles					
c. Remotely monit	or data and control devices						
1	e IoT based projects						
11. Unit wise detailed con							
Unit-1	Number of lectures = 10	Introduction to					
Defining IoT, Characteristic	cs of IoT, Physical design of	IoT, Logical desig	gn of IoT	, Func	tional blo	ocks of	
IoT, Communication model	s & APIs. Machine to Machine,	Difference between	n IoT and	M2M,	Software	Define	
Network							
Unit – 2	Number of lectures = 10	Network and C	ommuni	cation	Aspects	;	
Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment &							
Node discovery, Data aggregation & dissemination.							
Unit – 3	Number of lectures = 10	Challenges in Io7	ſ				
Design challenges, Development challenges, Security challenges, other challenges. Home automation, Industry							
applications, Surveillance applications, Other IoT applications.							
Unit – 4	Number of lectures = 10	Developing IoT	's				
Input/output Programming: Introduction to different IoT tools, Developing applications through IoT tools,							
Developing sensor based application through embedded system platform, Implementing IoT concepts with							
python							
12. Brief Description of se	elf-learning / E-learning com	ponent					

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://online.Resource:
https://online.sgtuniversity.2010/104/106104028/
https://online.sgtuniversity.2010/104/106104028/
Online.sgtuniversity.2010/104/106104028/
https://online.sgtuniversity.2010/104/106104028/
https://online.sgtuniversity.2010/104/106104028/
https://online.sgtuniversity.2010/104/106104028/
https://online.sgtuniversity.2010/104/106104028/

https://online.sgtuniversity.2010/104/106104028/

1. Vijay Madisetti, ArshdeepBahga, "Internet of Things: A Hands-On Approach"

2. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"

Things Lab use tick mark)	0 Core ()		0		2		
ıse tick mark)	-		-		2		
use tick mark)	Core ()						
		PE (✓)		OE ()			
1	6. Frequency	Even	Odd	Either	Every		
	(use tick marks)	0	(🗸)	Sem ()	Sem ()		
Lectures, Tutorial		4 weeks	of one s	emester)			
	Tutorials = 0			,			
0 n	_L						
dation in the Internet	of Things, including the co	omponent	s, tools, a	nd analysis	by teaching		
IoT and a look at real	-world solutions.						
ectives:							
	sary and practical knowleds	ge of com	ponents o	f Internet of	f Things ar		
-			r shents 0.	- internet 0			
mes (COs):							
rstand IoT and its ha	ardware and software cor	nponents	5				
,		nobiles					
Remotely monitor	data and control devices						
Develop real life Io	T based projects						
ments							
1, · · ·			1 · 1				
-		l termina	l window	7			
-	-	ivision.					
count of a given stri	ing						
e (rectangle, triangle	e and circle) reading shap	e and ap	propriate	values fro	om standa		
s, where name and	n are read from standard	input, us	ing for a	nd while lo	pops.		
Zero Exception.							
r 10 times with an in	nterval of 10 seconds.						
-		Piandwri	teaprogra	amtoturnC	NLEDfor		
	····r·································		r - 01	•			
secafterevery2 seconds. 11 Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.							
	on dation in the Internet IoT and a look at real ectives: arse is to impart necess o build real-time IoT mes (COs): rstand IoT and its ha Interface I/O, senso Remotely monitor of Develop real life Io ments nd try various Linux l print Hello messag nd print their sum, of count of a given strift e (rectangle, triangle es, where name and no Zero Exception. r 10 times with an in ne and print the wor LED/Buzzer with s.	Lectures, Tutorials, Practical (assuming 1 Tutorials = 0 on idation in the Internet of Things, including the co IoT and a look at real-world solutions. Extives: mrse is to impart necessary and practical knowledge o build real-time IoT based projects. mes (COs): rstand IoT and its hardware and software con Interface I/O, sensors and communication m Remotely monitor data and control devices Develop real life IoT based projects ments nd try various Linux commands in command l print Hello message with name. nd print their sum, difference, product and d count of a given string e (rectangle, triangle and circle) reading shap s, where name and n are read from standard Zero Exception. r 10 times with an interval of 10 seconds. ne and print the word count of each line. LED/Buzzer with Arduino/Raspberry s.	Lectures, Tutorials, Practical (assuming 14 weeks Tutorials = 0 Practic on dation in the Internet of Things, including the component IoT and a look at real-world solutions. ectives: urse is to impart necessary and practical knowledge of components o build real-time IoT based projects. mes (COs): rstand IoT and its hardware and software components Interface I/O, sensors and communication mobiles Remotely monitor data and control devices Develop real life IoT based projects ments nd try various Linux commands in command termina print Hello message with name. nd print their sum, difference, product and division. count of a given string e (rectangle, triangle and circle) reading shape and apperts s, where name and n are read from standard input, us Zero Exception. r 10 times with an interval of 10 seconds. ne and print the word count of each line. LED/Buzzer with Arduino/Raspberry Piandwri s.	Lectures, Tutorials, Practical (assuming 14 weeks of one so Tutorials = 0 Practical = 20 on Idation in the Internet of Things, including the components, tools, a IoT and a look at real-world solutions. IoT and a look at real-world solutions. ectives: Irse is to impart necessary and practical knowledge of components or o build real-time IoT based projects. mes (COs): Interface I/O, sensors and communication mobiles Remotely monitor data and control devices Develop real life IoT based projects ments Interface I/O, sensors and communication mobiles Remotely monitor data and control devices Develop real life IoT based projects ments Interface sense with name. nd try various Linux commands in command terminal window print Hello message with name. nd print their sum, difference, product and division. count of a given string e (rectangle, triangle and circle) reading shape and appropriate s, where name and n are read from standard input, using for an Zero Exception. r 10 times with an interval of 10 seconds. ne and print the word count of each line. LED/Buzzer with Arduino/Raspberry Piandwriteaprogras.	Lectures, Tutorials, Practical (assuming 14 weeks of one semester) Tutorials = 0 Practical = 20 on Indiation in the Internet of Things, including the components, tools, and analysis IoT and a look at real-world solutions. Iot and a look at real-world solutions. retives: Inset is to impart necessary and practical knowledge of components of Internet of o build real-time IoT based projects. mes (COs): Interface I/O, sensors and communication mobiles Remotely monitor data and control devices Develop real life IoT based projects ments Interface I/O, sensors and communication mobiles Remotely monitor data and control devices Develop real life IoT based projects ments Interface I/O, sensors and command terminal window Iprint Hello message with name. Ind try various Linux commands in command terminal window Iprint Hello message with name. Ind print their sum, difference, product and division. count of a given string Icreating shape and appropriate values from standard input, using for and while low core Exception. r 10 times with an interval of 10 seconds. Interface I/Buzzer with Arduino/Raspberry PiandwriteaprogramtoturnC s.		

3. Course Code 4. Type of Course (use	and Story Telling					
4. Type of Course (use						
••		3	0)	(0
	tick mark)	Core (✓)	PE ()		OE ()	
5. Pre-requisite (if any)		6. Frequency	Even	Odd	Either	Ever
		(use tick	0	(✔)	Sem	Sem
		marks)			0	0
7. Total Number of Lec	tures, Tutorials, Practical	(assuming 14 w	eeks of	one se	emester))
Lectures = 40		Tutorials = 0	Pract	ical = (0	
8. Course Description						
Designed to help you become a	successful Data Analyst, this	Subject is for the	ose just	startin	g their c	areer i
Analytics. It will teach you how to	understand data fundamental, a	nalyse the data me	thodolo	gy, tech	niques, p	owerfu
lashboards, Power BI & Visualiza	ation power of data along with	a strong focus on	case stu	idies to	ensure h	ands o
earning. Once armed with analyti	cs. you will also learn the powe	erful data visualiza	ntion too	ol like A	Advanced	versio
of Excel, Power Map, Power BI, B						
•	asmess memzence sortware,		2151011 X		spen sou	
tc. to present your analysis.						
Learning objectives:						
understanding mode	ls not just a tool-oriented Ar	nalyst.				
	rse, the students will be able	e to learn: -				
1. Design and create data	visualizations.					
C	ata analysis using visualizat	ion				
· ·						
3. Craft visual presentation	ons of data for effective com	munication.				
1. Unit wise detailed content						
U nit-1	Number of lectures = 9	Introduction				
Descriptive Statistics, Basic of Gr	ouping ANOVA Correlation	Polynomial Regr	ession a	nd Pine	elines R-	-square
nd MSE for In-Sample Evaluation		•		•		•
*	Dii, Flediction and Decision M	laking, Onu Searc	II, MOU		liement, i	DIIIIIII
ndicator variables.						
U nit – 2	Number of lectures =	INTRODUCT	ION	T	0	DATA
$\int \mathbf{mt} - \mathbf{Z}$	$\frac{1}{11}$	MANIPULAT				
	11			DIII	rener	
Heat Map, Tree Map, Smart Char	t, Azure Machine learning , C	olumn Chart, Line	e Chart	, Pie, B	Bar, Area	, Scatte
Chart, Data Series, Axes, Chart Sho	eet , Trend line , Error Bars, Spa	ark lines, Combina	tion Cha	ırt, Gau	ge, Therr	nomete
	etc, Frequency Distribution, Pi				-	

Unit – 3	Number of lectures =	Tableau
	10	

Tableau: Exploring the program interface, Connecting to a data source, Joining related data sources, Reading loosely structured Excel files, Creating a visualization using Show Me, Changing the order of the fields in a visualization, Changing the summary operation, Splitting text into multiple columns, Presenting data using storylines, Presenting Tableau operators and built-in functions, Creating a calculated field ,Creating a custom field using a formula, Adding a table calculation, Using a level of detail expressions

Unit – 4	Number of lectures =	Sorting and Filtering Tableau Data
	10	

Sorting and Filtering Tableau Data: Sorting based on a field's values, creating a wildcard filter, creating a condition filter, Creating a top filter, Adding a quick filter to a worksheet, Editing, clearing, and deleting filters

Creating Basic Charts: Creating column and stacked column charts, creating bar charts, stacked bar charts, and sideby-side bars, creating line charts and area fill charts, Creating pie charts, Creating scatter plots, Creating histograms, Creating a treemap. Creating Maps and Dashboards

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/analytics-tableau#syllabus Duke University

Books Recommended

Text Books

1. Stephen Few, Information Dashboard Design: Displaying Data for At-a-glance Monitoring, Analytics Press.

2. McKinney, W.(2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython.2nd edition. O'Reilly Media..

2. Course Name	rtment- Computer S Data Visualization and Story Telling Lab	L	Т	Τ		
3. Course Code		0	0		2	
4. Type of Course (u	se 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 = 0	f Lectures, Tutorials,	Practical (assuming Tutorials = 0		<u>s of one</u> cal = 28	semester)	
8. Course Descript	ion	1 utor rais -0	Tacin	$a_{1} - 20$		
object-oriented appli engaging activities 9. Learning object	uilds on the skills gair ications with Java ives: ective is to understar	and will create	Java pr	ograms	using h	ands-on
	models not just a tool-		& visual	lize your	uata &	metriou,
10. Course Outcome	v	ononica analysti				
 c. Craft visual pro 11. List of Experime 1. Analysis of Data with the provided to the provided to	th Tableau	-	tion.			
 Formatting and Exp Using the Rows and 	0 1					
4. Understanding the N						
5. Removing Outliers	Using Scatterplot and	Filtering and Groups				
6. Analysing Data-Rel	ated over Time Using	Date Hierarchies, Tre	end Lines	, and Box	x Plots	
7. Dognition Data Set,	Description, and Ana	lysis Plan				
8. Implementation of I	Linear Regression					
9. Visual Story Points	in Tableau					
10. Using Visualizatio	on Science to Influence	e Business Decisions				
11. Storyboarding You	ar Presentation					
The students will be en lectures delivered by s	-	ng the SGT E-Learnir ' University.The link t	ng portal a			vant

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

2. Course Name	Mobile Application	L	Т		I	
	Development Lab					
3. Course Code		0	0		2	ł
4. Type of Course (use the	ick mark)	Core (✓)	PE ()		OE ()	
5. Pre-requisite (if any)	Java or Kotlin	6. Frequency			Either	Every
		(use tick marks)	0	(✔)	Sem	Sem
7 Total Number	of Lectures, Tutorials, I		14 wor	olza of	<u>()</u>	0
semester)	of Lectures, rutorials, r	Tactical (assumin	ig 14 wee	eks ui	one	
Lectures = 0		Tutorials = 0	Practica	al = 2	4	
8. Course Description						
This course introdu related to mobile ap	ces students to programm	ing technologies,	design an	id dev	elopmei	nt
This course complements ETCA		ts the students wit	th various	s featu	ires of A	Androi
programming. The aim of the cours	se is to organizing the data i	n variety of ways us	ing data st	tructur	es and s	olve th
given problem efficiently. Java is p	rimary language for develop	oing applications.				
• This course facilitate and confidence in and	s classroom and laborator droid programming and u as well as it would also e s.	nderstand the entit	e Androi	d App	DS 1	
 This course facilitate and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interfac CO2. Use Intent, Broadcas CO3. Design and implement 	droid programming and u as well as it would also e s. rse, the students will be ab e and develop activity for t receivers and Internet se nt Database Application a	nderstand the entir nable the students ole to Android App. ervices in Android and Content provid	re Android to indepe App. lers.	d App	DS 1	
 This course facilitate and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interfac CO2. Use Intent, Broadcas CO3. Design and implement CO4. Use multimedia, carr 	droid programming and u as well as it would also e s. rse, the students will be ab e and develop activity for t receivers and Internet se nt Database Application a	nderstand the entir nable the students ole to Android App. ervices in Android and Content provid	re Android to indepe App. lers.	d App	DS 1	
 This course facilitate and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interfac CO2. Use Intent, Broadcas CO3. Design and implement CO4. Use multimedia, carr 	droid programming and u as well as it would also e s. rse, the students will be ab e and develop activity for t receivers and Internet se nt Database Application a hera and Location based s	nderstand the entir nable the students ole to Android App. ervices in Android and Content provid	re Android to indepe App. lers.	d App	DS 1	
 This course facilitate and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interfac CO2. Use Intent, Broadcas CO3. Design and implement CO4. Use multimedia, carr List of Experiments 	droid programming and u as well as it would also e s. rse, the students will be ab e and develop activity for t receivers and Internet se nt Database Application a hera and Location based s droid Development.	nderstand the entir nable the students ole to Android App. ervices in Android and Content provid ervices in Android	App. App.	d Appendent	ly creat	e new
 This course facilitate and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interfac CO2. Use Intent, Broadcas CO3. Design and implement CO4. Use multimedia, cam List of Experiments Getting Started with An 	droid programming and u as well as it would also e s. rse, the students will be ab e and develop activity for t receivers and Internet se nt Database Application a hera and Location based s droid Development.	nderstand the entir nable the students ole to Android App. ervices in Android and Content provid ervices in Android	App. App.	d Appendent	ly creat	e new
 This course facilitate and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interfac CO2. Use Intent, Broadcas CO3. Design and implement CO4. Use multimedia, cam List of Experiments Getting Started with An Activities and Views: A and Buttons 	droid programming and u as well as it would also e s. rse, the students will be ab e and develop activity for t receivers and Internet se nt Database Application a hera and Location based s droid Development.	nderstand the entin nable the students ole to Android App. ervices in Android and Content provid ervices in Android	App. App. App. View Cor	mpone	ents: La	e new
 This course facilitate and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interfac CO2. Use Intent, Broadcas CO3. Design and impleme CO4. Use multimedia, cam List of Experiments Getting Started with An Activities and Views: A and Buttons Navigation with Data: V 	droid programming and u as well as it would also e s. rse, the students will be ab e and develop activity for t receivers and Internet se nt Database Application a hera and Location based s droid Development. ndroid Manifest.xml, Act	nderstand the entir nable the students ole to Android App. ervices in Android and Content provid ervices in Android ivity Class, Basic	App. App. App. View Con	mpond	ents: La	e new
 This course facilitate and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interfac CO2. Use Intent, Broadcas CO3. Design and impleme CO4. Use multimedia, cam List of Experiments Getting Started with An Activities and Views: A and Buttons Navigation with Data: V Android Resources: Strip 	droid programming and u as well as it would also e s. rse, the students will be ab e and develop activity for t receivers and Internet se nt Database Application a hera and Location based s droid Development. ndroid Manifest.xml, Act Vorking with Intent, Shari ng Resources, Loading S	nderstand the entir nable the students ole to Android App. ervices in Android and Content provid ervices in Android ivity Class, Basic	App. App. App. View Con	mpond	ents: La	e new
and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interfac CO2. Use Intent, Broadcas CO3. Design and impleme CO4. Use multimedia, carr List of Experiments 1. Getting Started with An 2. Activities and Views: A and Buttons 3. Navigation with Data: V	droid programming and u as well as it would also e s. rse, the students will be ab e and develop activity for t receivers and Internet se nt Database Application a hera and Location based s droid Development. ndroid Manifest.xml, Act Vorking with Intent, Shari ng Resources, Loading S	nderstand the entin nable the students ole to Android App. ervices in Android and Content provid ervices in Android ivity Class, Basic ing Data between A trings in XML, Lo	App. App. lers. App View Con Activities ading Stri	mpone s, App ings in	ents: La lication n Code,	e new youts Class. the

- 6. Lists Implementing an Android List, ListView, ListActivity, Empty Lists, ListAdapter, Sorting the Adapter, Overriding ArrayAdapter, List Interaction.
- Dialogs, New and Old: AlertDialog, Custom Dialog, Support Library, Fragments, DialogFragment.
- 8. Menus: Options Menu, Modifying an Options Menu, Context Menu
- 9. Saving Data with Shared Preferences: Shared Preferences, Getting Started with Shared Preferences, Preference Activity
- 10. Saving Data with a Database: Setting Up SQLite, Creating a Helper, using the Helper, Cursor and Cursor Adapater
- 11. Threading with AsyncTasks: Threading in Android, AsyncTask, Tracking Progress
- 12. Styles and Themes: Introduction to Styling: Defining Styles, Defining Themes, Style Inheritance, Direct Theme References
- 13. Develop an Android based Project

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

Books Recommended

Text Books

- 1. Data Sciences & Analytics, V.K. Jain, Khanna Publishing House.
- 2. McKinney, W.(2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython.2nd edition.O'Reilly Media.

Online Resources:

Android App Development | Coursera

https://www.coursera.org/specializations/android-app-development

1. N	1. Name of the Department- Computer Science Engineering							
2. C	Course Name	Summer Internship - II	L	T P				
3. C	Course Code		0	0		0 ()
4. T	Type of Course (use tick m	ark)	Core (✓))	PE ()		OE ()		
5. P	Pre-requisite (if any)		6. Frequenc	Even	Odd	Either	Every	
			y (use	0	(🗸)	Sem	Sem	
			tick			0	0	
			marks)			~	~	
7. T	Sotal Number of Lectures,	Tutorials, Practical (assum	ning 14 weeks	of one s	semest	er)		
	Lectures = 0		Tutorials =	Pract	ical = (0		
			0					
8. C	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. 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

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

Bachelor in Computer Applications

Semester VI

S.No.	Course Code	Course Title	L	Т	Р	С
1		Industrial Internship	-	-	-	16
ТОТА	L		0	0	0	16

1. Name of the Department- 0	Computer Science Enginee	ring						
2. Course Name	Industry Internship	L	T P					
3. Course Code		0	0 0)		
4. Type of Course (use tick m	ark)	Core (✓)	PE ()		OE ()			
5. Pre-requisite (if any)		6. Frequenc	Even	Odd	Either	Every		
		y (use	(🗸)	0	Sem	Sem		
		tick marks)			0	0		
7. Total Number of Lectures,	Tutorials, Practical (assur	/	of one s	semest	er)			
Lectures = 0		Tutorials =		ical = (-			
		0						
8. Course Description								
This course enables students to face	e the real time problems which	are usually face	d by wo	rking p	rofessiona	al while		
working in the industry. While on t	his training program, students	come to know a	bout tecl	nnical a	s well inc	lividual		
skills required by a professional for	survival in the market. In fact,	, this course is at	out indu	strial ir	nplement	ation of		
the technologies. This course enable	es students to learn technologie	es on industrial le	evel.					
9. Learning objectives:								
The course is designed so as to e	-	ry environment	and to	take up	on-site			
assignment as trainees or interns								
10. Course Outcomes (COs):	4 4 1 4 111 11							
-	se, the students will be able							
CO1. Have an exposure to	industrial practices and to w	ork in teams.						
CO2. Understand the impa	act of engineering solutions	s in a global, o	economi	ic, env	ironmen	tal and		
societal context.								
CO3. Develop the ability to	engage in research and to i	nvolve in life-l	ong lear	ning.				
CO4. Communicate effecti	vely and learn to be a team J	player.						
11. Course Content								
Full one semester of work at ind	Full one semester of work at industry site. Supervised by an expert at the industry.							
Modes of Evaluation: Internship	Report, Presentation and Pr	oject Review						

Bachelor in Computer Application with minor in Artificial Intelligence & Machine Learning

S.No.	Course Code	Course Title	L	Т	Р	С
1		Artificial Intelligence	3	-	-	3
2		Data Structure and Algorithms	3	-	-	3
3		Operating Systems	3	-	-	3
4		MGE - 2 [#]	4	-	-	4
5		$AECC - 3^*$	2	-	-	2
6		VAC - 3**	2	-	-	2
7		Data Structure and Algorithms Lab	-	-	4	2
8		Operating Systems Lab	-	-	2	1
9		Artificial Intelligence Lab	-	-	2	1
10		Summer Internship-I	-	-	-	2
ТОТА			17	0	8	23

Semester – III

2. Course Name	Artificial	I	4	Т]	P
	Intelligence						
3. Course Code	0	3		0		(0
4. Type of Course (use tick mark)	I	Core (✓)		PE ()		OE ()	
5. Pre-requisite (if any)			Frequ	Even	Odd	Either	Every
			ency	0	(✓)	Sem	Sem
			(use	V		0	0
			tick			0	0
			mark				
			s)				
7. Total Number of Lectures, Tute	orials, Practical (
Lectures = 40		Tutoria	als = 0	Pract	ical =	0	
8. Course Description							
Artificial Intelligence is a major step forv							
widespread application in almost every in							imilar
in scale to past events such as the industr		-			-		
revolution. This course will give an oppo	<i>v v i</i>					0	
fastest growing areas of Computer Science							
compelling topics related to human intell agriculture and many other areas.	igence and its app	neations	in indus	try, del	ence, r	ieanncar	e,
9. Learning objectives:							
1. Explain what constitutes "Artificial" In	ntelligence and ho	w to iden	tify eyet	eme wi	th Arti	ficial	
Intelligence.	inclingence and no	w to lucit	iny syst	cills wi	ui Aiu	licial	
2. Identify problems that are amenable to	solution by AI m	ethods ar	nd whiel	n			
AI methods may be suited to solving a gi	•	cuious, u		.1			
3. Formalise a given problem in the lange	-	f differen	t AI me	thods (e	e.g., as	a search	l
problem, a s a constraint satisfaction prol	•						
4. Implement basic AI algorithms (e.g., s							
propagation algorithms).							
5. Design and perform an empirical evalu	uation of different	algorithm	ns on a p	roblem	n forma	lisation,	and
state the conclusions that the evaluation s	supports.						
6. Explain the limitations of current Artif	ficial Intelligence	echnique	s				
10. Course Outcomes (COs):							
a. Build intelligent agents for search	n and games						
b. Solve AI problems through progr	<u> </u>						
c. Learn and apply classical and adv	vanced techniques	in field of	f AI				
d. Describe and understand the know	wledge representat	ion and r	easoning	2			
11. Unit wise detailed content							
Unit-1	Number of	Introd	uction				
	lectures = 10						
Introduction to Artificial Intelligence: De	finition of AI: Tur	ing Test:	Brief H	istory o	of AL F	roblem	Solving
and Search: Problem Formulation; Searc		-		-			-
Cost, Depth-First, Depth-Limited, Iterati				L	cuull		
Unit -2	Number of	1		Same	n Star	ago and	
	TATINGL OF	v in tual	แรลแบบ	, serve	1, 510[age and	
	lectures = 10	Networ	dring				

Informed Search: Greedy Search; A* Search; Heuristic Function; Admissibility and Consistency; Deriving Heuristics via Problem Relaxation. Local Search: Hill -Climbing; Simulated Annealing; Genetic Algorithms; Local Search in Continuous Spaces.

Unit – 3	Number of	Data in Cloud Computing
	lectures = 10	

Playing Games: Game Tree; Utility Function; Optimal Strategies; Minimax Algorithm; Alpha-Beta Pruning; Games with an Element of Chance. Beyond Classical Search: Searching with Nondeterministic Actions; Searching with Partial Observations; Online Search Agents.

Unit – 4 Nu		Cloud Security
lect	ectures = 10	

Knowledge Representation and Reasoning: Ontologies, Foundations of Knowledge Representation and Reasoning, Representing and Reasoning about Objects, Relations, Events, Actions, Time, and Space; Predicate Logic, Situation Calculus, Description Logics, Reasoning with Defaults, Reasoning about Knowledge, Sample Applications.

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

Online Resources:

https://nptel.ac.in/courses/106/102/106102220/;

https://onlinecourses.nptel.ac.in/noc21_cs85/preview

Books Recommended

Text Books

1. Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, Third Edition, McGraw Hill Edition

Reference Books:

1 Russell Stuart Jonathan and Norvig Peter, Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall, 2010

1. Name	of the Depa	rtment- Computer	Science Engineering				
2. Course	Name	Artificial	L		Т		Р
		Intelligence Lab					
3. Course	e Code		0		0		2
4. Type o	f Course (ı	ise tick mark)	Core (✓)	PE ()		OE ()	
5. Pre-ree	quisite (if		6. Frequency	Even	Odd	Either	Every
any)			(use tick	0	(🗸)	Sem ()	Sem ()
			marks)				
7. Total N	Number of	Lectures, Tutorials	s, Practical (assuming 1	l4 weeks	of one se	emester)	

Lectures = 0Tutorials = 0Practical = 24

8. Course Description

Artificial Intelligence is a major step forward in how computer system adapts, evolves and learns. It has widespread application in almost every industry and is considered to be a big technological shift, similar in scale to past events such as the industrial revolution, the computer age, and the smart phone revolution. This course will give an opportunity to gain expertise in one of the most fascinating and fastest growing areas of Computer Science through classroom program that covers fascinating and compelling topics related to human intelligence and its applications in industry, defence, healthcare, agriculture and many other areas.

9. Learning objectives:

1. Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial intelligence.

2. Identify problems that are amenable to solution by AI methods, and which

AI methods may be suited to solving a given problem.

3. Formalise a given problem in the language/framework of different AI methods (e.g., as a search problem, a s a constraint satisfaction problem, as a planning problem, etc).

4. Implement basic AI algorithms (e.g., standard search or constraint propagation algorithms).

5. Design and perform an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

6. Explain the limitations of current Artificial Intelligence techniques

10. Course Outcomes (COs):

- a) Solve AI problems through programming with Python
- b) Learning optimization and inference algorithms for model learning
- c) Design and develop programs for an agent to learn and act in a structured environment
- d) Describe and understand the knowledge representation and reasoning

11. List of Experiments (Indicative)

Write the following programs using PROLOG.

- 1. Write a program to solve 8-queens problem.
- 2. Solve any problem using depth first search.
- 3. Solve any problem using best first search.
- 4. Solve 8-puzzle problem using best first search
- 5. Solve Robot (traversal) problem using means End Analysis.
- 6. Solve traveling salesman problem.

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

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The link to the E-Learning portal.

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

2. Course Name	Computer Science Engineeri Data Structure &	L	Т			Р
	Algorithms					
3. Course Code		3	0)		0
4. Type of Course (use tick m	ark)	Core	PE ()		OE ()	
		(✔)				
5. Pre-requisite (if any)	Programming	6.Frequ	Even	Odd	Either	Every
	Fundamentals	ency	0	(✔)	Sem	Sem ()
		(use			0	
		tick			^v	
		marks)				
7. Total Number of Lectures, T	utorials, Practical (assuming	g 14 weeks of	one sen	nester))	
Lectures = 40		Tutoria	Pract	ical = (0	
		ls = 0				
8. Course Description						
This course imparts the basic concep	ots of data structures and algorith	ms. It enables th	nem to w	rite alg	orithms fo	or solving
problems with the help of fundamer	tal data structures. The course of	f data structures	help org	anizing	g the data	in variety
of ways to solve the problem efficie	ently. The course introduces the b	pasic concepts al	bout stac	ks. aue	ues. lists.	trees and

graphs. It also discusses about daily problems like searching and sorting techniques

9. Learning objectives:

- 5. To be able to compute the efficiency of algorithms in terms of time and space complexities.
- 6. To understand concepts of searching and sorting algorithms.
- 7. 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.
- 8. To enable them to develop algorithms for solving problem by applying concepts of data structures.

10. Cours	se Outcomes (COs):					
f)	Analyze the algorithms to determine the time and computation complexity and justify the					
	correctness.					
g)	Implement a given Search	problem (Linear Search and	Binary Search).			
h)	Write algorithms concernin	ng various data structures lil	ke Stack, Queue, Linked list, Graph search			
	and traversal techniques an	d analyze the same to determ	mine the time and computation complexity			
i)	Write an algorithm for Sele	ection Sort, Bubble Sort, Ins	sertion Sort, Quick Sort, Merge Sort, Heap			
	sort and compare their perf	formance in term of Space a	nd time complexity.			
11. Ur	nit wise detailed content					
Unit-1		Number of lectures = 8	Introduction to Data Structures			
	of data structures and abstract s; Arrays: ordered lists, represe		mic implementations, Examples and real life ices, polynomial arithmetic			

Running time: Analysis of Algorithms and their complexities: Time Complexities, Big – Oh - notation, Running Times, Best Case, Worst Case, Average Case, Factors depends on running time, Introduction to Recursion, Divide and Conquer Algorithm, Time & Space Trade-off.

Unit - 2Number of lectures = 12The Stacks Queues and Lists

The Stacks: ADT Stack and its operation, Array based implementation of stacks, Linked List based implementation of stacks, Examples: Infix, postfix, prefix representation, Conversions, Applications, Algorithms and their complexities

Queues and Lists: ADT Queue and its operation, Array based implementation of linear Queues, Circular implementation of Queues, Linked Lists: Singly linked lists: Representation of linked lists in memory, Traversing, Searching, Insertion into, Deletion from linked list Linked List implementation of Queues and Stacks Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority Queues, Applications, Algorithms and their complexities.

|--|

Trees: Basic Terminology, Binary Trees and their representation, expression evaluation, Complete Binary trees, Extended binary trees, traversing binary trees, Searching, Insertion and Deletion in binary search trees (with and without recursion), AVL trees, Threaded trees, B+ trees, algorithms and their analysis.

Graphs: Terminology and Representations, Graphs & Multigraphs, Directed Graphs, Sequential representation of graphs, Adjacency matrices, Transversal Connected Component and Spanning trees, Shortest path, algorithms and their analysis.

Unit – 4	Number of lectures = 8	Sorting & Searching Algorithms

Sorting Algorithms: Introduction, Sorting by exchange, selection sort, insertion sort, Bubble sort, Straight selection sort, Efficiency of above algorithms, Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays& Algorithms; Quick sort Algorithm analysis, heap sort: Heap Construction, Heap sort, bottom – up, Top – down Heap sort approach;

Searching Algorithms: Straight Sequential Search, Binary Search (recursive & non-recursive Algorithm

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

https://nptel.ac.in/content/syllabus_pdf/106106127.pdf; https://nptel.ac.in/courses/106/105/106105225/

13. Books Recommended

Text Books

- 1. E. Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Book source Pvt. Ltd.
- 2. R. L. Kruse, B. P. Leung, C. L. Tondo, "Data Structures and program design in C", PHI

Reference Books:

- 3. Schaum's outline series, "Data Structure", McGraw Hills.
- 4. Y. Langsamet. al., "Data Structures using C and C++", PHI.

	rse Name	Data Structure &	L		Т		Р
		Algorithms Lab					
3. Cou	rse Code		0	0			4
• 1	e of Course (use tio		Core (✓)	PE ()	PE () OE ()		1
5. Pre-	requisite (if any)	Programming	6. Frequency	Even	Odd	Either	Every
		Fundamentals	(use tick marks)	0	(•)	Sem ()	Sem (
		res, Tutorials, Practical (
Lectures			Tutorials = 0	Practi	$\mathbf{cal} = 2$	24	
	se Description		1 1 1 1 T .	11 .1		• •	•.1 (
	*	concepts of data structures and	0			C C	
solving p	roblems with the help	of fundamental data structur	es. The course of c	lata struc	ctures h	nelp orga	nizing t
data in va	ariety of ways to solv	e the problem efficiently. Th	e course introduce	s the bas	sic con	cepts abo	out stack
queues, li	sts, trees and graphs.	It also discusses about daily p	roblems like search	ing and	sorting	techniqu	es
Learnin	g objectives:						
1. To b	e able to compute the	efficiency of algorithms in te	rms of time and spa	ace comp	plexitie	s.	
• •	nderstand concepts of		hma				
2. To u	inderstand concepts of	searching and sorting algorit					
	-	res viz. stacks, queues, linked		ohs to de	velop e	efficient a	lgorith
3. Usin	g various data structu	res viz. stacks, queues, linked	l list, trees and grap	ohs to de	velop e	efficient a	lgorith
3. Usin throu	g various data structu agh efficient represent	res viz. stacks, queues, linked	l list, trees and grap hat can be applied.		-		llgorithi
3. Usin throu	g various data structu agh efficient represent	res viz. stacks, queues, linked	l list, trees and grap hat can be applied.		-		lgorithi
 Usin throu To e 	g various data structu 1gh efficient represent nable them to develop	res viz. stacks, queues, linked ation of data and operations the algorithms for solving proble	l list, trees and grap hat can be applied.		-		llgorithr
 Usin throu To e 	g various data structu 1gh efficient represent nable them to develop e Outcomes (COs):	res viz. stacks, queues, linked ation of data and operations the algorithms for solving proble	l list, trees and grap hat can be applied. em by applying cor	ncepts of	data str	ructures.	
 Usin throu To e 	g various data structu 1gh efficient represent nable them to develop e Outcomes (COs):	res viz. stacks, queues, linked ation of data and operations the algorithms for solving proble	l list, trees and grap hat can be applied. em by applying cor	ncepts of	data str	ructures.	
 Usin throu To e 10. Course a) 	g various data structu 1gh efficient represent nable them to develop e Outcomes (COs): Analyze the algor correctness.	res viz. stacks, queues, linked ation of data and operations the algorithms for solving proble	l list, trees and grap hat can be applied. em by applying cor e and computation	ncepts of	data str	ructures.	
 Usin throu To e 10. Course a) b) Imp 	g various data structu igh efficient represent nable them to develop e Outcomes (COs): Analyze the algor correctness. plement a given Sea	res viz. stacks, queues, linked attion of data and operations the algorithms for solving proble rithms to determine the time	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Searc	ncepts of n compl ch).	data str	ructures.	Ty the
 3. Usin throu 4. To e 10. Course a) b) Imp c) Wr and 	g various data structu igh efficient represent nable them to develop e Outcomes (COs): Analyze the algorithms concernent plement a given Sea ite algorithms concernent l traversal technique	res viz. stacks, queues, linked ation of data and operations the algorithms for solving proble rithms to determine the time rch problem (Linear Search erning various data structur s and analyze the same to d	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Searc res like Stack, Qu letermine the time	ncepts of n compl ch). ueue, Li e and co	data str exity a nked 1 mputat	ructures. and justif ist, Grap tion com	by the
 3. Usin throu 4. To e 10. Course a) b) Imp c) Wr and 	g various data structu igh efficient represent nable them to develop e Outcomes (COs): Analyze the algorithms concernent plement a given Sea ite algorithms concernent l traversal technique	res viz. stacks, queues, linked attion of data and operations the algorithms for solving proble rithms to determine the time rch problem (Linear Search erning various data structur	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Searc res like Stack, Qu letermine the time	ncepts of n compl ch). ueue, Li e and co	data str exity a nked 1 mputat	ructures. and justif ist, Grap tion com	by the
3. Usin throu 4. To e 10. Course a) b) Imp c) Wr and d) Wr	g various data structu 1gh efficient represent nable them to develop e Outcomes (COs): Analyze the algor correctness. blement a given Sea ite algorithms conce l traversal technique ite an algorithm for t and compare their	res viz. stacks, queues, linked ation of data and operations the algorithms for solving proble rithms to determine the time rch problem (Linear Search erning various data structur s and analyze the same to d	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Searc res like Stack, Qu letermine the time rt, Insertion Sort,	ncepts of n compl ch). ueue, Li e and co Quick	data str exity a nked 1 mputat	ructures. and justif ist, Grap tion com	by the
 3. Usin throu 4. To e 10. Course a) b) Imp c) Wr and d) Wr 	g various data structu igh efficient represent nable them to develop e Outcomes (COs): Analyze the algor correctness. plement a given Sea ite algorithms conce I traversal technique ite an algorithm for	res viz. stacks, queues, linked attion of data and operations the algorithms for solving proble rithms to determine the time rch problem (Linear Search erning various data structur s and analyze the same to d Selection Sort, Bubble So	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Searc res like Stack, Qu letermine the time rt, Insertion Sort,	ncepts of n compl ch). ueue, Li e and co Quick	data str exity a nked 1 mputat	ructures. and justif ist, Grap tion com	by the
 3. Usin throu 4. To e 0. Course a) b) Imp c) Wr and d) Wr 	g various data structu 1gh efficient represent nable them to develop e Outcomes (COs): Analyze the algor correctness. blement a given Sea ite algorithms conce l traversal technique ite an algorithm for t and compare their	res viz. stacks, queues, linked attion of data and operations the algorithms for solving proble rithms to determine the time rch problem (Linear Search erning various data structur s and analyze the same to d Selection Sort, Bubble So	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Searc res like Stack, Qu letermine the time rt, Insertion Sort,	ncepts of n compl ch). ueue, Li e and co Quick	data str exity a nked 1 mputat	ructures. and justif ist, Grap tion com	by the
3. Usin throu 4. To e (0. Course a) b) Imp c) Wr and d) Wr sort . List of F	g various data structu igh efficient represent nable them to develop e Outcomes (COs): Analyze the algor correctness. blement a given Sea ite algorithms conce I traversal technique ite an algorithm for t and compare their Experiments	res viz. stacks, queues, linked attion of data and operations the algorithms for solving proble rithms to determine the time rch problem (Linear Search erning various data structur s and analyze the same to d Selection Sort, Bubble So	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Searce res like Stack, Qu letermine the time rt, Insertion Sort, ace and time comp	ncepts of n compl ch). ueue, Li e and co Quick	data str exity a nked 1 mputat	ructures. and justif ist, Grap tion com	by the
 Usin throu To e To e To e To e a) b) Imp c) Wr and d) Wr sort List of F 1. Write 	g various data structu igh efficient represent nable them to develop e Outcomes (COs): Analyze the algor correctness. olement a given Sea ite algorithms conce I traversal technique ite an algorithm for t and compare their Experiments e a program for multi-	res viz. stacks, queues, linked attion of data and operations the algorithms for solving proble rithms to determine the time rch problem (Linear Search erning various data structur s and analyze the same to d Selection Sort, Bubble So performance in term of Spa	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Search res like Stack, Qu letermine the time rt, Insertion Sort, ace and time comp array.	ncepts of n compl ch). ueue, Li e and co Quick	data str exity a nked 1 mputat	ructures. and justif ist, Grap tion com	by the
 Usin throu To e To e To e To e To e a) b) Imp c) Wr and d) Wr sort List of F 1. Write 2. Write 	g various data structu igh efficient represent nable them to develop e Outcomes (COs): Analyze the algor correctness. olement a given Sea ite algorithms conce I traversal technique ite an algorithm for t and compare their Experiments e a program for mult e a program to comp	res viz. stacks, queues, linked attion of data and operations the algorithms for solving proble rithms to determine the time rch problem (Linear Search erning various data structur s and analyze the same to d Selection Sort, Bubble So performance in term of Spa	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Search res like Stack, Qu letermine the time rt, Insertion Sort, ace and time comp array. se matrix	ncepts of n compl ch). ueue, Li e and co Quick	data str exity a nked 1 mputat	ructures. and justif ist, Grap tion com	by the
 Usin throu To e To e To e To e a) b) Imp c) Wr and d) Wr sort List of F 1. Write Write Write 	g various data structu igh efficient represent nable them to develop e Outcomes (COs): Analyze the algor correctness. olement a given Sea ite algorithms conce I traversal technique ite an algorithm for t and compare their Experiments e a program for mult e a program to comp e a program to imple	res viz. stacks, queues, linked attion of data and operations the algorithms for solving proble rithms to determine the time rch problem (Linear Search erning various data structur s and analyze the same to d Selection Sort, Bubble So performance in term of Spa	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Searce res like Stack, Qu letermine the time rt, Insertion Sort, ace and time comp array. se matrix on in Stack.	n compl n compl leue, Li e and co Quick plexity.	data str exity a nked 1 mputat Sort, N	ructures. and justif ist, Grap tion com	by the
 Usin throu To e To e To e To e a) b) Imp c) Wr and d) Wr sort List of F 1. Write Write Write Write Write 	g various data structu igh efficient represent nable them to develop e Outcomes (COs): Analyze the algoristic correctness. olement a given Sea ite algorithms conce traversal technique ite an algorithm for t and compare their Experiments e a program for multi- e a program to compare a program to compare a program to conver-	res viz. stacks, queues, linked attion of data and operations the algorithms for solving proble rithms to determine the time rch problem (Linear Search erning various data structur s and analyze the same to d Selection Sort, Bubble So performance in term of Spa	l list, trees and grap hat can be applied. em by applying cor e and computation and Binary Search res like Stack, Qu letermine the time rt, Insertion Sort, array. se matrix on in Stack. fix notation using	n compl n compl leue, Li e and co Quick plexity.	data str exity a nked 1 mputat Sort, N	ructures. and justif ist, Grap tion com	by the

- 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

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. <u>https://elearning.sgtuniversity.ac.in/course-category/</u> <u>Online Resources:</u> <u>https://nptel.ac.in/content/syllabus_pdf/106106127.pdf;</u>

https://nptel.ac.in/courses/106/105/106105225/

13. Books Recommended

Text Books

- 1. E. Horowitz and S. Sahani, "Fundamentals of Data Structures", Galgotia Book source Pvt. Ltd.
- 2. R. L. Kruse, B. P. Leung, C. L. Tondo, "Data Structures and program design in C", PHI

Reference Books:

- 3. Schaum's outline series, "Data Structure", McGraw Hills.
- 4. Y. Langsamet. al., "Data Structures using C and C++", PHI.

2.	Course Name	Operating System		L		Г]	P
3.	Course Code		3		0		0	
4.	Гуре of Course (use tick m	ark)	Core ((✓)	PE ()		OE ()	
5.]	Pre-requisite (if any)		6.	Frequ ency (use tick mark s)	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. 7	Fotal Number of Lectures ,	Tutorials, Practical	(assumin	/	eks of o	ne sen	nester)	
Lecture	es = 40		Tutor	ials = 0	Pract	ical = ()	
	irse Description		_	_				
l'his cou	rse will provide an introduction	on to the internal operat	ion of mo	dern oper	ating sy	stems.	In partic	ular, the
course w	vill cover processes and thread	s, mutual exclusion, CP	U schedul	ing, dead	lock, me	emory r	nanagem	ent, and
file syste	ems.							
Lear	ning objectives:							
1	1	. 1		(1	•			
	learn the mechanisms of OS to	-				ition.		
	learn the mechanisms involve	• •						
	gain knowledge on distribute		•	includes	archite	cture, I	Mutual e	xclus10
-	ithms, deadlock detection algo							
	know the components and ma	č	currency r	nanageme	ent			
5. To	learn to implement simple OS	mechanisms						
	irse Outcomes (COs):							
6	a) Create processes and thr	eads.						
b)	Develop algorithms for pro	ocess scheduling for a	given spe	cification	n of CP	'U utili	zation,	
	throughput, Turnaround Ti	me, Waiting Time, Re	sponse T	ime.				
c)	For a given specification o	f memory organization	n develop	the tech	niques t	for opt	imally	
	allocating memory to proc	esses by increasing me	emory util	ization a	nd for i	improv	ing the a	access
	time.		·			•	U	
d)	Design and implement file	management system						
ĺ.	For a given I/O devices an		$h = 1/\Omega$	nonocom	nont fur	otions	in OS a	nort
e)	-		-	-				-
	of a uniform device abstrac	ction by performing of	perations f	for synch	ironizat	tion bet	ween C	PU and
	I/O controllers.							
	t wise detailed content							

Unit-1	Number of	Introduction		
	lectures = 6			
Concept of Operating Systems, Generations	of Operating syste	ems, Types of Operating Systems, OS Services,		
System Calls, Structure of an OS-Layered,	d, Monolithic, Microkernel Operating Systems, Concept of Virtual			
Machine. Case study on UNIX and WINDOW	OWS Operating System.			
Unit – 2	Number of	Process Management		

rumber of	1 Toccss Management
lectures = 12	

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching.

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time;

Scheduling algorithms: Pre-emptive and Non-preemptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.

Unit – 3	Number of	Memory Management
	lectures = 12	

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free- space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

Unit – 4	Number of	Deadlocks
	lectures = 10	

Process-Synchronization & Deadlocks: Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer\ Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc. Definition of Deadlocks, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

I/O Systems: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

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://nptel.ac.in/courses/106/105/106105214/ (Narayanaswamy N S, IIT Madras)

13. Books Recommended

Text Books

2. Silbersachatz and Galvin, "Operating System Concepts", Pearson

Reference Books:

- 1. Tannenbaum, "Operating Systems", PHI, 4th Edition.
- 2. William Stallings, "Operating Systems Internals and Design Principles", PHI
- 3. HallMadnick, J. Donovan, "Operating Systems", Tata McGraw Hill.
- 4. W. Tomasi, "Electronic Communication Systems" Pearson Education, 5th Edition

1.	Name of the Department- Com	puter Science Ei	ngin	eering				
2.	Course Name	Operating		L	Г		Р	
		System Lab						
3.	Course Code			0	0		2	2
4.	Type of Course (use tick mark)		Co	ore (✓)	PE ()		OE ()	
5.	Pre-requisite (if any)	Programming	6.	Frequency	Even	Odd	Either	Every
		Fundamentals		(use tick	0	(✔)	Sem	Sem
				marks)			0	0
7.	Total Number of Lectures, Tute	orials, Practical	(ass	uming 14 weeks	of one s	semest	er)	•
	Lectures = 0		Τι	torials = 0	Pract	ical = 1	14	
8.	Course Description							
Th	is course will provide an introduction	n to the internal op	perat	ion of modern oper	ating sy	stems.	In particu	ular, the
cou	urse will cover processes and threads,	mutual exclusion	, CP	U scheduling, dead	lock, me	emory r	nanagem	ent, and

file systems.

9. Learning objectives:

1. To learn the mechanisms of OS to handle processes and threads and their communication.

2. To learn the mechanisms involved in memory management in contemporary OS

3. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols

- 4. To know the components and management aspects of concurrency management
- 5. To learn to implement simple OS mechanisms

10. Course Outcomes (COs):

a) Create processes and threads.

- b) Develop algorithms for process scheduling for a given specification of CPU utilization, throughput, Turnaround Time, Waiting Time, Response Time.
- c) For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
- d) Design and implement file management system.
- e) For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

11. List of Experiments

11. Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority

- 12. Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue.
- 13. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
- 14. Write a C program to simulate the following file allocation strategies. a) Sequential b) Indexed c)Linked
- 15. Write a C program to simulate the MVT and MFT memory management techniques.
- 16. Write a C program to simulate the following contiguous memory allocation techniques a) Worst-fit b) Best-fit c) First-fit
- 17. Write a C program to simulate paging technique of memory management
- 18. Write a C program to simulate the following file organization techniques a) Single level directoryb) Two level directory c) Hierarchical
- 19. Write a C program to simulate Banker's algorithm for the purpose of deadlock avoidance.
- 20. Write a C program to simulate page replacement algorithms a) FIFO b) LRU c) LFU

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

2. Silbersachatz and Galvin, "Operating System Concepts", Pearson

Reference Books:

- 1. Tannenbaum, "Operating Systems", PHI, 4th Edition.
- 2. William Stallings, "Operating Systems Internals and Design Principles", PHI
- 3. HallMadnick, J. Donovan, "Operating Systems", Tata McGraw Hill.
- 4. W. Tomasi, "Electronic Communication Systems" Pearson Education, 5th Edition

1. N	Name of the Department- (Computer Science Engine	ering				
2. (Course Name	Summer Internship - I	L	J	Γ	I	
3. (Course Code		0	(0 0)
4. 1	Гуре of Course (use tick m	ark)	Core (✓)	PE ()		OE ()	
5. F	Pre-requisite (if any)		6. Frequenc	Even	Odd	Either	Every
			y (use tick	0	(🗸)	Sem	Sem
			marks)			0	0
7. 1	Fotal Number of Lectures,	Tutorials, Practical (assu					
	Lectures = 0		Tutorials = 0	Pract	ical = (0	
	Course Description						
This	course enables students to lear	n technologies on industrial lo	evel. The student	will be v	working	g closely	with the
techn	nical team. This course enhance	s student's ability to think out	of the box and sug	ggest ne	w ways	ofimple	menting
ideas	in a better manner and should	be able to brainstorm and cor	ne up with innova	tive ide	as.		
9. I	Learning objectives:						
	• The course is designe on-site assignment as	d so as to expose the studen trainees or interns.	nts to industry er	nvironn	nent an	d to take	up
10. (Course Outcomes (COs):						
	On completion of this cours	se, the students will be able	to				
	CO1. Have an exposure to	industrial practices and to v	vork in teams.				
	CO2. Understand the impa	act of engineering solutior	is in a global, e	conom	ic, env	ironmen	tal and
	societal context.						
	CO3. Develop the ability to	engage in research and to	involve in life-lo	ong lear	ming.		
	CO4. Communicate effectiv	vely and learn to be a team	player.				
11. (Course Content						
	students will be evaluated ba ervised by an expert at the in		industry site aft	er secoi	nd sem	ester.	

Modes of Evaluation: Internship Report, Presentation and Project Review

Semester	_]	IV
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S.No	Course Code	Course Title	L	Т	Р	С
1		Foundation of Machine Learning	3	-	-	3
2		Computer Networks	3	-	-	3
3		Database Management Systems	3	1	-	4
4		MGE - 3 [#]	4	-	-	4
5		$AECC - 4^*$	2	-	-	2
6		VAC - 4**	2	-	-	2
7		Database Management Systems Lab	-	-	4	2
8		Computer Networks Lab	-	-	2	1
9		Foundation of Machine Learning Lab	-	-	2	1
TOTA	TOTAL			1	8	22

 Name of the Department Course Name 	- Computer Science Engine Foundation of Machine	L	ſ	٦	1	Р
	Learning				ر ا	L
3. Course Code	Leanning	3	0			0
			-		Sem Se () () ter) 0 ter) 0 for It is a tion theory, a and adapt for Machine for Machine fo	-
4. Type of Course (use tick		$Core(\checkmark)$	PE			, , , , , , , , , , , , , , , , , , ,
5. Pre-requisite (if any)	Statistics	6. Frequency	Even	Odd		Every
		(use tick marks)	(✓)	0		Sem ()
	s, Tutorials, Practical (assu		1			
Lectures $=$ 40		Tutorials = 0	Pract	ical = ()	
8. Course Description						
 probability theory, among othe using examples from real-worl 9. Learning objectives: The objective of this course is Learning and develop program 10. Course Outcomes (COs) 1. Differentiate between super 2. Understand and Apply Lines 3. Understand and Apply Logi 4. Understand the underlying r Unit wise detailed content Unit-1 Introduction: Concept of Mach Machine Learning, Supervised Naive Bayes Classifier 	ers. The course will explain h d applications. to impart necessary knowled, ming skills required to build : vised, unsupervised machine ar Regression stic Regression nathematical of Neural Netw Number of lectures = 10 nine Learning, Applications o	ow to build syste ge of the foundat machine learnin learning approac orks Introduction f Machine Learn	ems that tions ne g. hes ing, Ke	eded fo	and adap or Mach	ine
Software's for Machine Learni Matrices and Vectors: Addition Python.						as
Unit – 2	Number of lectures = 10	Linear Regres	sion			
Linear Regression: Prediction Variable, Linear Regression w	using Linear Regression, G	radient Descent,	Linear	_		
Unit – 3	Number of lectures = 10	Logistic Regre	ession			
Logistic Regression: Classifica Regression, Logistic Regressio Overfitting, Bias/Variance.	0 0 0					
Unit – 4	Number of lectures = 10	Neural Netwo	orks			
Neural Networks: Introduction Stochastic Gradient Descent, M Algorithm.	Aultilayer Perceptron, Multic	lass Representati	-		0	
11. Brief Description of self-l	earning / E-learning compo	nent				

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:

http://onlinecourses.nptel.ac.in/noc20_cs29/preview (Prof. Balaraman Ravindran, II Madras)

Books Recommended

Text Books

- 1. Ethem Alpaydin, "Introduction to Machine Learning" 2nd Edition, The MIT Press, 2009.
- 2. Tom M. Mitchell, "Machine Learning", First Edition by Tata McGraw-Hill Education, 2013.
- 3. Christopher M. Bishop, "Pattern Recognition and Machine Learning" by Springer, 2007.
- 4. Mevin P. Murphy, "Machine Learning: A Probabilistic Perspective" by The MIT Press, 2012.

1.	Name of the Departmen	nt- Computer Science E	ngir	neering						
2.	Course Name	Foundation of		L	Г	.]			
		Machine Learning								
		Lab								
3.	Course Code			0	0	0		0 2		2
4.	Type of Course (use tic	k mark)		Core (✓))	PE ()		PE ()		OE ()	
5.	Pre-requisite (if any)	Statistics and Python	6.	Frequency	Even	Odd	Either	Every		
				(use tick	(🗸)	0	Sem	Sem		
				marks)			0	0		
7.	Total Number of Lectu	res, Tutorials, Practical	(as	suming 14 weeks	of one s	semest	er)			
	Lectures = 0		Τι	itorials = 0	Practi	ical = 2	24			
8.	Course Description									
	chine Learning is the study	*	•		•					

Artificial Intelligence and intersects with statistics, cognitive science, information theory, and probability theory,

among others. The course will explain how to build systems that learn and adapt using examples from real-world applications.

9. Learning objectives:

The objective of this course is to impart necessary knowledge of the foundations needed for Machine Learning and develop programming skills required to build machine learning.

10. Course Outcomes (COs):

1. Ability to choose appropriate machine learning algorithm for solving a problem

2. Design and adapt existing machine learning algorithms to suit applications

3. Understand the underlying mathematical relationships across various machine learning algorithms

4. Design and implement machine learning algorithms to real world applications

11. List of Experiments (Indicative)

1. Write a programme in Python to predict the class of the flower based on available attributes.

2. Write a programme in Python to predict if a loan will get approved or not.

3. Write a programme in Python to predict the traffic on a new mode of transport.

4. Write a programme in Python to predict the class of user.

5. Write a programme in Python to identify the tweets which are hate tweets and which are not.

6. Write a programme in Python to predict the age of the actors.

1. Name of the Department	- Computer Science Engine	ering				
2. Course Name	Computer Networks	L	Т		F	
3. Course Code		3	0		0)
4. Type of Course (use tick	mark)	Core (✓)	PE ()		OE ()	
5. Pre-requisite (if any)		6. Frequency		Ddd	Either	Every
		(use tick marks)	(✓) ())	Sem	Sem
					0	0
7. Total Number of Lecture Lectures = 40	es, Tutorials, Practical (assu	ming 14 weeks Tutorials = 0	of one sen Practica			
8. Course Description		1 utomais = 0	Fractica	$\mathbf{n} = 0$		
Through this subject, student will	be able to understand the coarse	e-grained aspects of	of Data Cor	mmur	nication.	Student
will understand the applications of						
be discussed throughout the course	-		incontails of	com	indinouti,	
9. Learning objectives:						
1. Help in underst	anding the concepts of comm	unication and co	mputer ne	etwor	·ks.	
10. Course Outcomes (COs	,	analaita ataunaa fua	un o donio		d manfai	
b. To develop an unders perspective.	tanding of modern network	architectures fro	m a desig	gn an	a perior	rmance
	nt to the major concepts invol	ved in wide-area	networks	(WA	Ns). loc	cal area
	Wireless LANs (WLANs).					
	nity to do network programm	-				
-	of the different layer of the O					
• •	nt (small scale) of wide-area n $M_{\rm L}$ A No) design it based on the				tworks (LANs)
11. Unit wise detailed conten	VLANs) design it based on the	ie market availab	de compoi	nent		
Unit-1	Number of lectures = 8	Data commun	ication Co	ompo	onents	
Representation of data and its flor	u Naturalia Various Connacti	n Topology Prot	pools and S	Standa	rda OSI	modal
*	·				-	
Transmission Media, LAN: Wir		C				
Bandwidth utilization: Multiplex	ing - Frequency division, Time	division and Way	ve division	ı, Con	cepts on	spread
spectrum.						
Unit – 2	Number of lectures = 12	Data Link Lay	ver and M	lediu	m Acce	ess
		Sub Layer				
Error Detection and Error Correc	ction - Fundamentals, Block coc	ling, Hamming Di	stance, CR	RC; Fl	low Cont	trol and
Error control protocols - Stop and	Wait, Go back – N ARQ, Selec	tive Repeat ARQ,	Sliding Wi	indow	, Piggyb	acking,
Random Access, Multiple access	protocols -Pure ALOHA, Slotte	ed ALOHA, CSM	A/CD,CDN	MA/C	А	
Unit – 3	Number of lectures = 12	Network Laye	r & Tran	Ispor	t Laver	
				F		

Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Unit – 4 Number of lectures = 8	Application Layer:
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Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography

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://onlinecourses.nptel.ac.in/noc22_cs19/preview

13. Books Recommended

Text Books

- 3. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
- 4. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.

2.	Course Name	Computer Networks	L	ſ]	P
		Lab					
3.	Course Code		0	(2
4.	Type of Course (use tick)	mark)	Core (🗸)	PE ()	0.11	OE ()	-
5.	Pre-requisite (if any)		6. Frequency (use tick	Even		Either	Every
			(use tick marks)	(•	0	Sem ()	Sem ()
7.	Total Number of Lecture	s. Tutorials. Practical (ass	suming 14 weeks	of one :	semest	~	U
	Lectures = 0		Tutorials = 0	Pract			
8.	Course Description						
Th	rough this subject, student will	be able to understand the coard	rse-grained aspects	of Data (Commu	nication.	Studen
wi	ll understand the applications o	f data structures and algorithm	ns in networks. The	internals	of com	municati	ons wil
be	discussed throughout the cours	se duration.					
	9. Learning objectives:						
	1. Help in understanding f	the concepts of communica	tion and computer	netwoi	KS.		
1	0. Course Outcomes (COs)•					
		tanding of modern networl	k architectures fro	m a de	sign a	nd perfo	rmanc
	perspective.	-			-	-	
		nt to the major concepts inv	olved in wide-area	networ	ks (W	ANs), lo	cal are
	. ,	Wireless LANs (WLANs).					
		nity to do network program of the different layer of the	-				
	1	nt (small scale) of wide-area), local	area ne	etworks	LANs
	and Wireless LANs (W	VLANs) design it based on	,				
11	. List of Experiments						
	1. Study of Network device	ces in detail					
	2. Connect the computers	in Local Area Network usi	ng packet tracer				
	3. Implementation of Data	a Link Framing method - C	haracter Count.				
	4. Implementation of Erro	or detection method - even a	and odd parity.				
	5. Implementation of Erro	or detection method - CRC	Polynomials				
	6. Study of Network IP A	ddressing using packet trac	er				
	7. Design TCP client and	server application to transfe	er file				
	8. Design UDP client and	server application to transf	er file				
	9. Working on Network P		anaal/Winaahanla)				
	9. WORKING ON NELWORK I	rotocol Analyzer Tool (Eth	ereal/wireshark)				

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

2.	Course Name	Database Management	L	Т		1	P
		Systems					
	Course Code		3	1			0
	Type of Course (use tick	mark)	Core (🗸)	PE ()	0.11	OE ()	-
5.]	Pre-requisite (if any)		6. Frequency (use tick	Even	Odd	Either	Ever
			marks)	(•)	0	Sem ()	Sem ()
7. '	Total Number of Lecture	s, Tutorials, Practical (assu	ming 14 weeks	of one s	semest	V	U
	Lectures = 40	.,,	Tutorials = 0		ical = (
	Course Description						
Thro	ough this subject, student will	be able to understand the coarse	e-grained aspects of	of Data (Commu	nication.	Studer
vill	understand the applications o	f data structures and algorithms	in networks. The i	nternals	of com	municati	ons wi
e di	iscussed throughout the cours	se duration.					
).]	Learning objectives:						
4	5. To understand the diffe	rent issues involved in the de	sign and implan	ontatio	n of a		
-		Tent issues involved in the de	sign and implen	lentatio	11 01 a		
	database system.						
e	5. To study the physical a	nd logical database designs, o	database modelir	ıg, relat	ional,		
	hierarchical, and netwo	rk models					
7	7. To understand and use	data manipulation language t	o query, update,	and ma	nage a	databas	e
	To develop an underst	anding of essential DBMS c	concepts such as	: databa	ase sec	urity, in	tegrity
	concurrency, distribute	d database, and intelligent da	tabase, Client/So	erver (I	Databas	se Server	r), Dat
	Warehousing.						
9	C	imple database system and d	emonstrate comr	etence	with th	1e	
(0	· ·	1				
		lved with modeling, designin	g, and implement	iting a I	JRM2		
	. Course Outcomes (COs): relational algebra expression	a for that quary	and ont	imizo t	ho	
		Telational algebra expression	is for that query	and opt		.110	
	developed expressions						
]	14. For a given specification	n of the requirement design t	the databases using	ng E-R			
	method and normalizat	ion.					
1	15. For a given specification	on construct the SQL querie	s for Open sour	ce and	Comm	ercial D	BMS
	MYSQL, ORACLE, an	d DB2.					
1	16. For a given query optin	nize its execution using Quer	y optimization al	lgorithn	ns		
		-processing system, determin		-			
1				atonne	,		

consistency, isolation, and durability.

18. Implement the isolation	n property, including locking,	, time stamping based on concurrency control
and Serializability of sc	cheduling.	
11. Unit wise detailed conten	t	
Unit-1	Number of lectures = 8	Database system architecture & Data Models
Data Abstraction, Data Independe	ence, Data Definition Language	(DDL), Data Manipulation Language (DML).
Data models: Entity-relationship	o model, network model, relati	ional and object oriented data models, integrity
constraints, data manipulation op	erations.	
Unit – 2	Number of lectures = 12	Relational query languages
Relational algebra, Tuple and d Commercial DBMS - MYSQL, C	_	.3, DDL and DML constructs, Open source and
Relational database design: Dor preservation, Lossless design.	main and data dependency, A	rmstrong's axioms, Normal forms, Dependency
Query processing and optimization Query optimization algorithms.	on: Evaluation of relational algeb	ra expressions, Query equivalence, Join strategies,
Unit – 3	Number of lectures = 12	Storage strategies
		ontrol, ACID property, Serializability of ion and optimistic Concurrency Control schemes,
Unit – 4	Number of lectures = 8	Database Security
		C and RBAC models, Intrusion detection, SQL databases, Logical databases, Web databases,
12. Brief Description of self-l	earning / E-learning compo	nent
C C	xperts of SGT University. Th ac.in/course-category/ llabus_pdf/106105175.pdf;	earning portal and choose the relevant e link to the E-Learning portal.
13. Books Recommended		
Text Books 2. "Database System Con	cepts", 6th Edition by Abraha	am Silberschatz, Henry F.

Korth, S. Sudarshan, McGraw-Hill

Reference Books

1 "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

2 "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education

3 "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

2. C	ours	se Name	Database Management Systems	L	Т		Р	
2 0			Lab	0	0			
		e Code of Course (use tick m	ark)	0 Core (✓)	0 PE ()		OE ()	•
		Pre-requisite (if any)		6. Frequency	Even	Odd	Either	Every
	. 1	re requisite (ir any)		(use tick marks)	(✓)	0	Sem ()	Sem ()
		•	Tutorials, Practical (assu					
		ures = 0		Tutorials = 0	Pract	$\mathbf{ical} = 2$	24	
		Description	e able to understand the coars	e-grained aspects of	of Data (Commu	nication	Studen
			lata structures and algorithms					
		d throughout the course	C	in networks. The l	mernais		innunicati	
		2						
9. L	earn	ing objectives:						
	5.	To understand the dif	ferent issues involved in th	e design and imp	lement	ation o	f a	
		database system.						
	6.	To study the physical	and logical database desig	ns, database mod	leling, r	elation	ıal,	
		hierarchical, and netw	vork models		-			
	7.	To understand and us	e data manipulation langua	ge to query, upda	ate, and	mana	ge a data	base
			tanding of essential DBMS				-	
		-	ted database, and intellige	-			•	
		Data Warehousing.	tea addease, and memge	in unuouso, ein		UI (DI		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	8	-	simple database system an	nd demonstrate co	omneter	nce wit	h the	
	0.	0	volved with modeling, desig					
0 0			orved with modeling, desig	gning, and imple			MD.	
		e Outcomes (COs):	elational algebra expression	s for that query a	and opt	imize t	he	
		veloped expressions						
\mathbf{r}			of the requirement design t	the detabases usi	ng E D			
۷.		C 1		ine databases usi	iig E-K			
0		thod and normalization				a		DICO
3.		0	construct the SQL querie	es for Open sour	ce and	Comm	ercial D	BMS
		YSQL, ORACLE, and						
4.	For	r a given query optimiz	ze its execution using Quer	y optimization al	gorithn	ns		
_	For	r a given transaction-n	rocessing system, determin	e the transaction	atomic	ity		
5.	ΓU	a given dunsaetion p	iocessing system, determini	e the transaction	atomic	nty,		

6. Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.

11. List of Experiments

- 11. Design a Database and create required tables. For e.g. Bank, College Database
- 12. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
- 13. Write a SQL statement for implementing ALTER, UPDATE and DELETE.
- 14. Write the queries to implement the joins.
- 15. Write the queries for implementing the following functions: MAX (), MIN (), AVG (), COUNT ().
- 16. Write the queries to implement the concept of Integrity constrains
- 17. Write the queries to create the views.
- 18. Perform the queries for triggers.
- 19. Perform the following operation for demonstrating the insertion, updating and deletion using the referential integrity constraints.
- 20. Do some more practice based on your class work.

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/

Somester V	
Semester – V	

S.No	Course Code	Course Title	L	Т	Р	С
1		R Programming for Data Analytics	3	-	-	3
2		Departmental Elective – I	3	-	-	3
3		Departmental Elective – II	3	-	-	3
4		Data Visualization and Story Telling	3	-	-	3
5		MGE – 4 [#]	4	-	-	4
6		R Programming for Data Analytics Lab	-	-	2	1
7		Departmental Elective -I Lab	-	-	2	1
8		Departmental Elective-II Lab	-	-	2	1
9		Data Visualization and Story Telling Lab	-	-	2	1
10		Mobile Application Development	-	-	4	2
11		Summer Internship-II	-	-	-	4
TOTA	AL		16	0	12	26

*	- Computer Science Engine	ering					
2. Course Name	R Programming for	L	Т	I			
	Data Analytics						
3. Course Code		3	0 0 PE () OE ())		
4. Type of Course (use tick	mark)	Core (✓)	PE ()				
5. Pre-requisite (if any)	Statistics	6. Frequency	Even Odd	Either	Every		
		(use tick marks)	() (•	Sem	Sem		
		,		0	0		
7. Total Number of Lecture Lectures = 40	es, Tutorials, Practical (assu	Tutorials = 0	of one semest Practical = (
8. Course Description		1 utor fais $= 0$	Tactical –	0			
The course begins with the study	y of R Programming. R is a pro	gramming langua	ge for statistica	al comput	ing and		
graphics that you can use to cle	an, analyze, and graph your da	ta. It is widely us	ed by research	ers from	diverse		
disciplines to estimate and displa		-	-				
9. Learning objectives:							
To understand and implement	the R programming for solvin	ng problems con	cerning data s	cience.			
10. Course Outcomes (COs):			U				
On completion of this course, the							
a. Machine Lear	ming Operations.						
	pport for data wrangling.						
	ng and graphing.						
d. The array of p	backages, Statistics.						
11. Unit wise detailed conten	ıt						
Unit-1	Number of lectures = 10	Getting Starte	d with R and	R Worl	kspace		
Introducing R, R as a programm	ning Language, the need of R,	Installing R, RS	tudio, RStudio	's user in	terface,		
console, editor, environment par	ne, history pane, file pane, plo	ts pane, package	pane, help and	viewer j	pane, R		
Workspace, R's working director	ry, R Project in R Studio, absol	ute and relative pa	ath, Inspecting	an Enviro	onment,		
Inspect existing Symbols, View t	he structure of object, Removin	g symbols, Modify	ying Global Op	tions, Mc	difying		
warning level, Library of Package	c c				• •		
		0 0		1 0			
from CRAN, Installing package from online repository, Package Function, Masking and name conflicts							
Unit - 2Number of lectures = 10Basic Objects and Basic Expressions							
Vectors, Numeric Vectors, Logical Vectors, Character Vectors, subset vectors, Named Vectors, extracting							
element, converting vector, A	rithmetic operators, create N	Aatrix, Naming	row and colu	mns, sub	setting		
matrix, matrix operators, creat	ting and subsetting an Array,	Creating a List,	extracting ele	ement fro	om list,		
subsetting a list, setting value, creating a value of data frame, subsetting a data frame, setting values,							

factors, useful functions of a data frame, loading and writing data on disk, creating a function, calling a function, dynamic typing, generalizing a function. Assignment Operators, Conditional Expression, using if as expression and statement, using if with vectors, vectorized if: ifelse, using switch, using for loop, nested for loop, while loop

Unit - 3Number of lectures = 10Working with Basic Objects and StringsWorking with object function, getting data dimensions, reshaping data structures, iterating over one dimension,
logical operators, logical functions, dealing with missing values, logical coercion, math function, number rounding
functions, trigonometric functions, hyperbolic functions, extreme functions, finding roots, derivatives and
integration, Statistical function, sampling from a vector, Working with random distributions, computing summary
statistics, covariance and correlation matrix, printing string, concatenating string, transforming text, Formatting text,
formatting date and time, formatting date and time to string, finding string pattern, using group to extract data,
reading data.

Unit – 4	Number of lectures = 10	Working with Data
$\operatorname{Umt} = 4$	1 unifiel of fectures = 10	Working with Data

Visualize and Analyze Data: Reading and Writing Data, importing data using built-in-function, READR package, export a data frame to file, reading and writing Excel worksheets, reading and writing native data files, loading built-in data sets, create scatter plot, bar chart, pie chart, histogram and density plots, box plot, fitting linear model and regression tree.

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

Online Resources:

https://www.coursera.org/specializations/data-science-foundations-r (Johns Hopkins University)

13. Books Recommended

1. R for Data Science, Garrett Grolemund, Hadley Wickham, O'Reilly Media

1.	1. Name of the Department- Computer Science Engineering							
2.	Course Name	R Programming for		L	Т		I	
		Data Analytics Lab						
3.	Course Code			0	0		2	2
4.	Type of Course (use tick m	ark)	C	ore (🗸))	PE ()		OE ()	
5.	Pre-requisite (if any)	Statistics and	6.	Frequency	Even	Odd	Either	Every
		Programming		(use tick	0	(✔)	Sem	Sem
		Fundamentals		marks)			0	0
7.	7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)							
	Lectures = 0		Τι	utorials = 0	Pract	$\mathbf{ical} = 2$	24	
8.	Course Description							

The course begins with the study of R Programming. R is a programming language for statistical computing and graphics that you can use to clean, analyze, and graph your data. It is widely used by researchers from diverse disciplines to estimate and display results and by teachers of statistics and research methods.

9. Learning objectives:

To understand and implement the R programming for solving problems concerning data science.

10. Course Outcomes (COs):

On completion of this course, the students will be able to learn:

- a. Machine Learning Operations.
- b. Exemplary support for data wrangling.
- c. Quality plotting and graphing.
- d. The array of packages, Statistics.

11. List of Experiments

- 1. Study of basic Syntaxes in R
- 2. Implementation of vector data objects operations
- 3. Implementation of matrix, array and factors and perform va in R
- 4. Implementation and use of data frames in R
- 5. Create Sample (Dummy) Data in R and perform data manipulation with R
- 6. Study and implementation of various control structures in R
- 7. Data Manipulation with dplyr package
- 8. Data Manipulation with data.table package
- 9. Study and implementation of Data Visualization with ggplot2
- 10. Study and implementation data transpose operations in R

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/

Departmental Electives - I and Departmental Electives - II

	Data Mining	L	T P			•		
3. Course Code		3	0 0)			
4. Type of Course (use ti	ck mark)	Core ()	PE (✓)	(OE ()			
5. Pre-requisite (if any)	Statistics	$(use tick ())$ (\checkmark) Sem S				Every Sem ()		
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)								
Lectures = 40	ures, rutoriais, rractical (ass	Tutorials = 0	Practica		1)			
8. Course Description								
<u> </u>	nts a gentle introduction into the c	oncepts of data min	ing and the	e tools	that are	used to		
perform daily fun	-	•	0					
9. Learning objectives:								
1. To learn Data mining me	thods and its importance.							
2. To learn about Business	Intelligent and Decision Support	rt system						
3. To apply Data mining								
10. Course Outcomes (CO	Ds):							
1. Demonstrate advanced kr	nowledge of data mining conce	pts and technique	s.					
2. Apply the techniques of a	clustering, classification, associ	ation finding, fea	ture selec	tion a	nd			
visualisation on real world	data							
3. Determine whether a real	l-world problem has a data min	ing solution						
4. Apply data mining softw	are and toolkits in a range of ap	plications						
11. Unit wise detailed cont	tent							
Unit-1	Number of lectures = 10	Introduction						
Introduction to Data Mining	g, Understanding Data, Relation	ns to Database, St	atistics, N	Aachin	ne Lear	ning		
			1					
Unit – 2	Number of lectures = 10	Association R	ules					
Unit – 2	Number of lectures = 10	Association R	ules					
	Number of lectures = 10Level-wise Method, FP-Tree Method, FP-Tree Method		ules					
Association Rule Mining, L								
Association Rule Mining, L Unit – 3	Level-wise Method, FP-Tree Me	ethod Classification		oping, s	scoring	and		
Association Rule Mining, L Unit – 3 Classification, Decision Tre	Level-wise Method, FP-Tree Mo	ethod Classification Classification Tree	e and map		0			
Unit – 3 Classification, Decision Tre	Level-wise Method, FP-Tree Mo Number of lectures = 10 ee Algorithm, CART, Pruning G iance, unique values, values contr	ethod Classification Classification Tree	e and map		0			
Association Rule Mining, L Unit – 3 Classification, Decision Tre ranking, correlation and covar	Level-wise Method, FP-Tree Met	ethod Classification Classification Tree	e and map		0			
Association Rule Mining, L Unit – 3 Classification, Decision Tre ranking, correlation and covar text format. Unit – 4	Level-wise Method, FP-Tree Method, FP-Tree Method, FP-Tree Method Number of lectures = 10 tee Algorithm, CART, Pruning Generation, unique values, values contresting Number of lectures = 9	ethod Classification Classification Tre- ols and membershi Clustering	e and map p, reading		0			
Association Rule Mining, L Unit – 3 Classification, Decision Tre ranking, correlation and covar text format. Unit – 4 Clustering Techniques, Clustering Techniques, Clustering Techniques, Clustering Content of the second	Level-wise Method, FP-Tree Mo Number of lectures = 10 ee Algorithm, CART, Pruning G iance, unique values, values contr	ethod Classification Classification Tree ols and membershi Clustering dinal Data, Efficie	e and map p, reading		0			
Association Rule Mining, L Unit – 3 Classification, Decision Tre ranking, correlation and covar text format. Unit – 4 Clustering Techniques, Clus Clustering, Consensus Clus	Level-wise Method, FP-Tree Method, FP-Tree Method, FP-Tree Method, FP-Tree Method Number of lectures = 10 ee Algorithm, CART, Pruning Griance, unique values, values contrainder, unique values, values contrainder, unique values, values contrainder, unique values, values, values contrainder, unique values, values, values contrainder, unique values, values	ethod Classification Classification Tre- ols and membershi Clustering dinal Data, Efficie C Analysis	e and map p, reading		0			
Association Rule Mining, L Unit – 3 Classification, Decision Tree ranking, correlation and covar text format. Unit – 4 Clustering Techniques, Clus Clustering, Consensus Clus 12. Brief Description of sel	Level-wise Method, FP-Tree Method, FP-Tree Method, FP-Tree Method Number of lectures = 10 tee Algorithm, CART, Pruning Generation, values, values contresting, values, values contresting of lectures = 9 Stering of Numeric Data, of Ortering, Spectral Clustering, RO	ethod Classification Classification Tre- ols and membershi Clustering dinal Data, Efficie C Analysis onent	e and map p, reading ency of	and w	riting da	ıta in		
Association Rule Mining, L Unit – 3 Classification, Decision Tre ranking, correlation and covar text format. Unit – 4 Clustering Techniques, Clus Clustering, Consensus Clus 12. Brief Description of set The students will be encour	Level-wise Method, FP-Tree Method, FP-Tree Method, FP-Tree Method, FP-Tree Method Number of lectures = 10 tee Algorithm, CART, Pruning Generation, unique values, values contrection Number of lectures = 9 stering of Numeric Data, of Oratering, Spectral Clustering, RO If-learning / E-learning compared to learn using the SGT E-	ethod Classification Classification Tre- ols and membershi Clustering dinal Data, Efficie C Analysis onent Learning portal a	e and map p, reading ency of nd choose	e the re	riting da	ıta in		
Association Rule Mining, L Unit – 3 Classification, Decision Tre ranking, correlation and covar text format. Unit – 4 Clustering Techniques, Clus Clustering, Consensus Clus 12. Brief Description of sel The students will be encour	Level-wise Method, FP-Tree Method, FP-Tree Method, FP-Tree Method, FP-Tree Method, FP-Tree Method Number of lectures = 10 Dee Algorithm, CART, Pruning Ontering, Unique values, values contraction Number of lectures = 9 stering of Numeric Data, of Ortering, Spectral Clustering, RO If-learning / E-learning comp raged to learn using the SGT E-text experts of SGT University. T	ethod Classification Classification Tre- ols and membershi Clustering dinal Data, Efficie C Analysis onent Learning portal a	e and map p, reading ency of nd choose	e the re	riting da	uta in		

<u>https://swayam.gov.in/explorer?searchText=Data+Mining</u> (Prof. Gaurav Dixit, IIT Roorkee)

13. Books Recommended

Text Books

1. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan Kaufmann Publishers

2. Course Name	Data Mining Lab	L	1]	P		
3. Course Code		0	0 2			2	
4. Type of Course (use tic	k mark)	Core ()	PE (✓) OE ()				
5. Pre-requisite (if any)		6. Frequency	Even	Odd	Either	<u> </u>	
		(use tick	0	(√)	Sem	Sem	
		marks)			0	0	
7. Total Number of Lectu	res, Tutorials, Practical (as	ssuming 14 weeks	of one	semest	er)	v	
Lectures = 0		Tutorials = 0		ical = 2			
8. Course Description							
This course presents a gentle i	ntroduction into the concepts of	of data mining and th	ne tools	that are	used to	perform	
daily functions.							
9. Learning objectives:							
1. To learn Data mining met	-						
	ntelligent and Decision Supp	ort system					
3. To apply Data mining							
10. Course Outcomes (Co							
	n large volume of historical c	ata that helps to m	anage	an orga	anizatior	ו	
efficiently.	of various data mining Tech	niquos					
 Understand the concepts Understand the concepts 		niques.					
4. Create user friendly report							
List of Experiments	V						
1. 1. To list all the cate	gorical (or nominal) attribute	s and the real-value	ed attrib	outes se	eparately	7	
2. To convert a text file	e to ARFF (Attribute-Relation	n File Format) usin	g Weka	3.8.2			
	ttribute-Relation File Forma	· ·					
11.	t of Linear Regression for tra	0 0					
11 0	Bayes Classification for testin	0 0					
	and testing data using numer	ical data set in orde	r to get	accura	ite mode	l for	
classification.	• • • • • •	·1,					
1	pre-processing by applying f			- 4			
	ning technique clustering alg	-					
9. To find association b	between data and to find the f	requent nem set 10		ming			
11. Brief Description of sel	f-learning / E-learning com	ponent					
The students will be encoura	aged to learn using the SGT l	E-Learning portal a	nd choo	ose the	relevant	-	
	t experts of SGT University.	• •					
https://elearning.sgtuniversi			B	1			

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

1. Name of the Department- Compu	iter Science Eng	ineer	ring						
2. Course Name	Cloud		L	Т		I	2		
	Computing								
3. Course Code			3	0		0 0			
4. Type of Course (use tick mark)	·	Core () PE (✓) C		Core () PE (✓) OE		PE (✓)		OE ()	
5. Pre-requisite (if any)		6.	Frequency	Even	Odd	Either	Every		
			(use tick	0	(✔)	Sem	Sem		
			marks)			0	0		
7. Total Number of Lectures, Tutor	ials, Practical (a	ssun	ning 14 weeks	s of one s	semest	er)			
Lectures = 40		Tu	torials = 0	Practic	cal = 0				
8. Course Description		•		•					

The course presents a top-down view of cloud computing, from applications and administration to programming and infrastructure. Its focus is on parallel programming techniques for cloud computing and large-scale distributed systems which form the cloud infrastructure. The topics include overview of cloud computing, cloud systems, parallel processing in the cloud, distributed storage systems, virtualization, security in the cloud, and multicore operating systems. Students will study state-of-the-art solutions for cloud computing developed by Google, Amazon, Microsoft, Yahoo, VMWare, etc. Students will also apply what they learn in one programming assignment and one project executed over Amazon Web Services.

9. Learning objectives:

- 1. To provide students with the fundamentals and essentials of Cloud Computing.
- 2. To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real-life scenarios.
- 3. To enable students exploring some important cloud computing driven commercial systems and applications.
- 4. To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

10. Course Outcomes (COs):

a. Understand the basic terminologies, characteristics and platforms of Cloud Computing

- b. Understand the basic principles of virtualization
- c. Provide basics of cloud files systems

d. Understand basic issues concerning cloud security

11. Unit wise detailed content					
Unit-1	Number of	Introduction			
	lectures = 10				
		~	_	 	

Cloud computing fundamentals, the role of networks in Cloud computing, Essential characteristics of Cloud computing, Cloud deployment model, Cloud service models, Multi-tenancy, Cloud cube model, Cloud economics and benefits, Cloud types and service scalability over the cloud, challenges in cloud NIST guidelines, Cloud economics and benefits, Cloud computing platforms - IaaS: Amazon EC2, PaaS: Google App Engine, Microsoft Azure, SaaS. Open-Source platforms: OpenStack.

Unit – 2	Number of	Virtualization, Server, Storage and
	lectures = 10	Networking

Virtualization: Basic Concepts, Types, Server virtualization, Storage virtualization, Storage services, Network virtualization, service virtualization, Virtualization management, Virtualization technologies and architectures, Internals of virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, Hyper V, VMware hypervisors and their features.

Unit – 3	Number of	Data in Cloud Computing
	lectures = 10	

Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. MapReduce and extensions: Parallel computing, the map-Reduce model, Parallel efficiency of MapReduce, Relational operations using Map-Reduce, Enterprise batch processing using MapReduce.

Unit – 4	Number of	Cloud Security
	lectures = 10	

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud. Cloud computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro - architectures; Identity Management and Access control, Autonomic security, Security challenges: Virtualization security management - virtual threats, VM Security Recommendations, VM - Specific Security techniques, Secure Execution Environments and Communications in cloud.

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://nptel.ac.in/courses/106/104/106104028/ (Prof. Soumya Kanti Ghosh, IIT Khargpur) 13. Books Recommended

Text Books

1. Enterprise Cloud Computing, Gautam Shroff, Cambridge Publication

Reference Books:

1.. Handbook of Cloud Computing, Borko Furht, Springer

2. Cloud Security, Ronald Krutz and Russell Dean Vines, Wiley- India

2.	Course Name	Cloud	er Science Engineering		Г	Р		
		Computing Lab			_		_	
3.	Course Code		0		0		2	
4.	Type of Course (u	use tick mark)	Core ()	PE (✓)		OE ()		
5.	Pre-requisite (if		6. Frequency	Even	Odd	Either	Every	
	any)		(use tick	0	(✔)	Sem ()	Sem ()	
			marks)	Ū.		~	, v	
7.		Lectures, Tutorials	s, Practical (assuming 1			emester)		
	Lectures = 0		Tutorials = 0	Practic	al = 24			
8.	Course Descriptio							
	•	•	oud computing, from appli			-		
		-	lel programming techniq		-	· -	-	
			nfrastructure. The topics in			-		
	• • •	-	distributed storage system			-		
		•	ll study state-of-the-art so				-	
	e		Vare, etc. Students will also	appiy wn	at they lea	rn in one p	brogrammin	
0	Learning objectiv		Amazon Web Services.					
۶.	00		amontals and assontials of	Cloud Co	montina			
	-		amentals and essentials of			al-1 - 4 4		
	-		lation of the Cloud Compu	-	-	e able to sta	art using an	
			as and tools in their real li	to coomon	20			
	· •		es and tools in their real-li					
	3. To enable	students exploring so	es and tools in their real-li ome important cloud cor			nmercial	systems an	
	3. To enable applications	students exploring so	ome important cloud cor	nputing d	riven cor			
	 To enable applications To expose the 	students exploring so he students to frontier	ome important cloud cor areas of Cloud Computing	nputing d	riven cor			
	 To enable applications To expose the 	students exploring so he students to frontier	ome important cloud cor	nputing d	riven cor			
0. (To enable applications To expose the sufficient for 	students exploring so ne students to frontier undations to enable fu	ome important cloud cor areas of Cloud Computing	nputing d	riven cor			
0. (To enable applications To expose the sufficient for 	students exploring so ne students to frontier undations to enable fu (COs):	ome important cloud cor areas of Cloud Computing orther study and research.	mputing d	riven cor			
0. (To enable applications To expose the sufficient for Course Outcomes (a. Create basic d 	students exploring so ne students to frontier undations to enable fu (COs): eployment of service	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine	mputing d	riven cor			
0. (To enable applications To expose the sufficient for Course Outcomes (a. Create basic description) Deploy private 	students exploring so ne students to frontier undations to enable fu (COs): eployment of service e cloud using Open S	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine Stack and Cloud Stack	mputing d	riven cor			
0. (To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy hypery 	students exploring so ne students to frontier undations to enable fu (COs): eployment of service e cloud using Open S visor and install OS	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine Stack and Cloud Stack and applications	mputing d g and infor	riven cor			
	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy hypery 	students exploring so ne students to frontier undations to enable fu (COs): eployment of service cloud using Open S visor and install OS prious services offere	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine Stack and Cloud Stack	mputing d g and infor	riven cor			
11	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy hypery Understand va List of Experiment 	students exploring so ne students to frontier undations to enable function (COs): eployment of service e cloud using Open S visor and install OS a prious services offerents	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine Stack and Cloud Stack and applications ed by Amazon Web Serv	mputing d g and infor	riven cor			
11 . La	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy private Deploy hypervid. Understand va List of Experiment 	students exploring so ne students to frontier undations to enable fu (COs): eployment of service cloud using Open S visor and install OS trious services offerents f applications on Go	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine Stack and Cloud Stack and applications ed by Amazon Web Serv pogle app engine.	mputing d g and infor	riven cor			
11 Lal	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy hypery Understand va List of Experiment b 1. Development of private 	students exploring so ne students to frontier undations to enable function (COs): eployment of service e cloud using Open S visor and install OS a rious services offere nts f applications on Go ivate Cloud setup th	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine Stack and Cloud Stack and applications ed by Amazon Web Serve oogle app engine. arough OpenStack	mputing d g and infor	riven cor			
11 Lal Lal	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy private Deploy hypervide Understand validation List of Experiment of the problem of the problem of the problem of the problem. 	students exploring so ne students to frontier undations to enable fu (COs): eployment of service cloud using Open S visor and install OS trious services offerents f applications on Go ivate Cloud setup th ivate Cloud setup th	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine Stack and Cloud Stack and applications ed by Amazon Web Serve bogle app engine. arough OpenStack arough CloudStack	mputing d g and infor e vices.	riven cor mation sy	stems, whi	ile providin	
11 Lal Lal Lal Lal	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy hypery Understand valid List of Experiment Development of production of production	students exploring so ne students to frontier undations to enable fu (COs): eployment of service cloud using Open S visor and install OS rious services offerents f applications on Go ivate Cloud setup th ivate Cloud setup th ivate Cloud setup th	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine Stack and Cloud Stack and applications ed by Amazon Web Serve oogle app engine. arough OpenStack	mputing d g and infor e vices.	riven cor mation sy	stems, whi	ile providin	
11 Lal Lal Lal Lal	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy private Deploy hyperved. Understand val List of Experiment of Setting up of prosent of the sufficient of the	students exploring so ne students to frontier undations to enable fu (COs): eployment of service cloud using Open S visor and install OS a trious services offerents f applications on Go ivate Cloud setup th ivate Cloud setup th KEN/VMware/KVM amazon ec2.	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine Stack and Cloud Stack and applications ed by Amazon Web Serve bogle app engine. urough OpenStack urough CloudStack I hypervisor and Manage	mputing d g and infor e vices.	riven cor mation sy	stems, whi	ile providin	
11 Lal Lal Lal Lal 12	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy hypery Understand va List of Experiment b 1. Development of projection of 2 setting up of projection Setting up of projection Setting up of A 	students exploring so ne students to frontier undations to enable fu (COs): eployment of service e cloud using Open S visor and install OS visor and install OS rious services offerents f applications on Go ivate Cloud setup th ivate Cloud setup th ivate Cloud setup th XEN/VMware/KVM Amazon ec2. of self-learning / E	ome important cloud cor areas of Cloud Computing orther study and research. es on Google app engine Stack and Cloud Stack and applications ed by Amazon Web Serve oogle app engine. arough OpenStack arough CloudStack I hypervisor and Manage	nputing d g and infor e vices.	riven cor mation sy	rent OS ir	ile providin	
11. Lal Lal Lal Lal 12. The	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy private Deploy hyperved. Understand valor List of Experiment of problement problement of problem	students exploring so ne students to frontier undations to enable fu (COs): eployment of service e cloud using Open S visor and install OS trious services offerents f applications on Go ivate Cloud setup th ivate Cloud setup th XEN/VMware/KVM Amazon ec2. of self-learning / E ncouraged to learn u	ome important cloud cor areas of Cloud Computing in ther study and research. es on Google app engine Stack and Cloud Stack and applications ed by Amazon Web Serve bogle app engine. arough OpenStack irough CloudStack I hypervisor and Manage C-learning component sing the SGT E-Learnin	nputing d g and infor e vices.	riven cor mation sy	rent OS ir	ile providin	
11 Lal Lal Lal Lal 12 The lec	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy private Deploy private Deploy hypery Understand va List of Experiment Setting up of private Seting up of private Setting up of p	students exploring so ne students to frontier undations to enable fu (COs): eployment of service e cloud using Open S visor and install OS visor and install OS rious services offerents f applications on Go ivate Cloud setup th ivate Cloud setup th ivate Cloud setup th KEN/VMware/KVM amazon ec2. of self-learning / E ncouraged to learn usubject experts of SG	ome important cloud cor areas of Cloud Computing in ther study and research. es on Google app engine Stack and Cloud Stack and applications ed by Amazon Web Serve bogle app engine. arough OpenStack irough CloudStack I hypervisor and Manage C-learning component sing the SGT E-Learnin	nputing d g and infor e vices.	riven cor mation sy	rent OS ir	ile providin	
11. Lal Lal Lal Lal Lal Iac The Iec	 To enable applications To expose the sufficient for Course Outcomes (a. Create basic d) Deploy privates Deploy privates Deploy hyperved. Understand values List of Experiment of probability Setting up of probability Seting up of probability Setting up of probability	students exploring so ne students to frontier undations to enable fu (COs): eployment of service e cloud using Open S visor and install OS visor and install OS rious services offerents f applications on Go ivate Cloud setup th ivate Cloud setup th ivate Cloud setup th KEN/VMware/KVM amazon ec2. of self-learning / E ncouraged to learn usubject experts of SG	ome important cloud cor areas of Cloud Computing in ther study and research. es on Google app engine Stack and Cloud Stack and applications ed by Amazon Web Serve bogle app engine. arough OpenStack arough CloudStack I hypervisor and Manage C-learning component sing the SGT E-Learnin FT University.	nputing d g and infor e vices.	riven cor mation sy	rent OS ir	ile providin	

1. Name of the Departme	ent- Computer Science Engi	neering				
2. Course Name	Internet of Things	L	Т		I	•
3. Course Code		3	0)
4. Type of Course (use ti	ck mark)	Core ()	PE (✓) OE ()			
5. Pre-requisite (if any)		6. Freque	Even	Odd	Either	Every
		ncy	0	(✔)	Sem	Sem
		(use			0	0
		tick marks)				
7. Total Number of Lect	ures, Tutorials, Practical (as	/	s of one s	semest	er)	
Lectures = 40		Tutorials = 0	Practic		(1)	
8. Course Description						
*	is everywhere. It provides adv	anced data collection	on, conne	ectivity	and ana	lysis of
information collected by cor	nputers everywhere-taking the	e concepts of Mac	hine-to-N	Iachine	commu	nication
farther than ever before. This	course gives a foundation in the	Internet of Things,	including	g the co	mponent	s, tools,
and analysis by teaching the c	oncepts behind the IoT and a loc	ok at real-world solu	tions			
9. Learning objectives:						
The chieve of this serves is	4	1 les avriladas af acu		fTutom		
develop skills required to buil	to impart necessary and practica	I knowledge of com	iponents o	of Interi	let of Thi	ngs and
develop skins required to buil	d real-time for based projects					
10. Course Outcomes (CC	Ds):					
· · · · · · · · · · · · · · · · · · ·	and its hardware and software	e components				
f. Interface I/O de	vices, sensors and communication	ation mobiles				
g. Remotely monit	or data and control devices					
h. Develop real life	e IoT based projects					
11. Unit wise detailed con	tent					
Unit-1	Number of lectures = 10	Introduction to				
Defining IoT, Characteristic	cs of IoT, Physical design of	IoT, Logical desig	gn of IoT	, Func	tional blo	ocks of
IoT, Communication model	s & APIs. Machine to Machine,	Difference between	n IoT and	M2M,	Software	Define
Network						
Unit – 2	Number of lectures = 10	Network and C	ommuni	cation	Aspects	}
Wireless medium access iss	sues, MAC protocol survey, S	urvey routing prot	tocols, S	ensor c	leployme	ent &
Node discovery, Data aggre	egation & dissemination.					
Unit – 3	Number of lectures = 10	Challenges in Io7	Г			
Design challenges, Developn	nent challenges, Security challe	nges, other challen	ges. Hon	ne auto	mation, I	ndustry
applications, Surveillance app	lications, Other IoT applications					
Unit – 4	Number of lectures = 10	Developing IoT	's			
Input/output Programming:	Introduction to different IoT	ools, Developing	applicati	ons th	ough Io	Γ tools,
Developing sensor based ap	plication through embedded s	ystem platform, Ir	nplemen	ting Io'	Г conceр	ts with
python						
12. Brief Description of se	elf-learning / E-learning com	ponent				

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. <u>https://elearning.sgtuniversity.ac.in/course-category/</u> <u>Online Resource:</u> <u>https://nptel.ac.in/courses/106/104/106104028/</u> (Prof. Sudip Misra, IIT Kharagpur) 13. Books Recommended

Text Books

1. Vijay Madisetti, ArshdeepBahga, "Internet of Things: A Hands-On Approach"

2. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"

Things Lab Course Code Cype of Course (use tick mark) Pre-requisite (if ny) Cotal Number of Lectures, Tutorial Cotal Number of Lectures, Tutorial Accures = 0 Course Description course gives a foundation in the Internet Description Course behind the IoT and a look at real Learning objectives: bjective of this course is to impart necess	Tutorials = 0	PE (✓) Even () 314 weeks Praction	$\begin{array}{c c} Odd \\ (\checkmark) \\ \hline of one s \\ cal = 20 \end{array}$		2 Every Sem ()
Cype of Course (use tick mark) Pre-requisite (if ny) Cotal Number of Lectures, Tutorial Course of Lectures, Tutorial Lectures = 0 Course Description course gives a foundation in the Internet oncepts behind the IoT and a look at real- . Learning objectives:	Core () 6. Frequency (use tick marks) s, Practical (assuming Tutorials = 0	PE (✓) Even () 314 weeks Praction	$\begin{array}{c} \text{Odd} \\ (\checkmark) \\ \text{of one s} \\ \text{cal} = 20 \end{array}$	Either Sem () emester)	Every Sem ()
Pre-requisite (if ny) Cotal Number of Lectures, Tutorial Course = 0 Course Description course gives a foundation in the Internet oncepts behind the IoT and a look at real . Learning objectives:	6. Frequency (use tick marks) s, Practical (assuming Tutorials = 0	Even () 14 weeks Praction	$\begin{array}{c c} Odd \\ (\checkmark) \\ \hline of one s \\ cal = 20 \end{array}$	Either Sem () emester)	Sem ()
ny) Cotal Number of Lectures, Tutorial Acctures = 0 Course Description course gives a foundation in the Internet oncepts behind the IoT and a look at real Learning objectives:	(use tick marks) s, Practical (assuming Tutorials = 0	() 3 14 weeks Praction	(\checkmark) of one s cal = 20	Sem () emester)	Sem ()
Cotal Number of Lectures, Tutorial Course = 0 Course Description course gives a foundation in the Internet oncepts behind the IoT and a look at real Learning objectives:	marks) s, Practical (assuming Tutorials = 0 t of Things, including the	14 weeks Practic	of one s cal = 20	emester)	
Lectures = 0 Course Description course gives a foundation in the Internet oncepts behind the IoT and a look at real Learning objectives:	s, Practical (assuming Tutorials = 0	Practio	cal = 20		by teachin
Lectures = 0 Course Description course gives a foundation in the Internet oncepts behind the IoT and a look at real Learning objectives:	Tutorials = 0	Practio	cal = 20		by teachin
Course Description course gives a foundation in the Internet oncepts behind the IoT and a look at real- . Learning objectives:	of Things, including the			nd analysis	by teachin
course gives a foundation in the Internet oncepts behind the IoT and a look at real . Learning objectives:		component	s, tools, a	nd analysis	by teachin
oncepts behind the IoT and a look at real. . Learning objectives:		component	s, toois, a	nd analysis	by teachin
op skills required to build real-time IoT	• •	dge of com	ponents o	f Internet o	f Things an
0. Course Outcomes (COs):	and want and a ofference a	ommonant			
e. Understand IoT and its ha f. CO2. Interface I/O, senso			5		
g. CO3. Remotely monitor					
h. CO4. Develop real life Io		5			
List of Experiments					
rt Raspberry Pi and try various Linux	x commands in comma	nd termina	l window	7	
ad your name and print Hello messag	ge with name.				
as your nume and print meno messag					
ad two numbers and print their sum, o	difference, product and	division.			

5 Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input

6 Print a name 'n' time, where name and n are read from standard input, using for and while loops.

7 Handle Divided by Zero Exception.

8 Print current time for 10 times with an interval of 10 seconds.

9 Read a file line by line and print the word count of each line.

10 To inter face LED/Buzzer with Arduino/Raspberry PiandwriteaprogramtoturnONLEDfor1 secafterevery2 seconds.

11 Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.

1. Name of the Department-	Computer Science Engine	ering							
2. Course Name	Data Visualization	L	ſ	ר	I				
	and Story Telling								
3. Course Code		3	0)					
4. Type of Course (use tick m	ark)	Core (✓)	PE ()		OE ()				
5. Pre-requisite (if any)		6. Frequency	Even	Odd	Either	Every			
		(use tick	0	Sem	Sem				
marks) 0 0									
7. Total Number of Lectures,	Tutorials, Practical (assu								
Lectures = 40		Tutorials = 0	Pract	ical = ()				
8. Course Description Designed to help you become a s	waaaaaful Data Analyst this	Subject is for th	aga inat	atortin	a thain a	oncon in			
	-	-	•		-				
Analytics. It will teach you how to u	inderstand data fundamental, a	nalyse the data me	thodolo	gy, tech	niques, p	owerful			
dashboards, Power BI & Visualizat	tion power of data along with	a strong focus on	case stu	idies to	ensure h	ands on			
learning. Once armed with analytic	s, you will also learn the powe	erful data visualiza	ation too	ol like A	dvanced	version			
of Excel, Power Map, Power BI, Bu	usiness Intelligence software,	Tableau desktop vo	ersion &	t other of	open sour	ce tools			
etc. to present your analysis.									
9. Learning objectives:									
• The basic objective	is to understand the data	analysis & vis	ualize	your d	ata & n	nethod,			
understanding model	s not just a tool-oriented Ar	nalyst.							
10. Course Outcomes (COs):									
On completion of this cour	se, the students will be able	e to learn: -							
4. Design and create data	visualizations.								
5. Conduct exploratory da	ata analysis using visualizat	ion.							
6. Craft visual presentation	ons of data for effective com	munication.							
11. Unit wise detailed content									
Unit-1	Number of lectures = 9	Introduction							
Descriptive Statistics, Basic of Gro	ouping ANOVA Correlation	Polynomial Regr	ession a	nd Pine	elines R-	squared			
and MSE for In-Sample Evaluation				-		-			
*	ii, i iculcului and Decision w	laking, Ond Searc	ii, wou		lement, 1	Jiiiiig,			
Indicator variables.									
Unit – 2	Number of lectures =	INTRODUCT	ION	T	_				
Omt = 2	Number of fectures –			1	0	DATA			
$\operatorname{Omt} = 2$	11	MANIPULAT							
Heat Map, Tree Map, Smart Chart	11	MANIPULAT	'ION U	SING	FUNCT	TION			

Unit – 3	Number of lectures = 10	Tableau
Tableau: Exploring the p	program interface, Connecting to a data	source, Joining related data sources, Reading
loosely structured Excel	files, Creating a visualization using Sh	ow Me, Changing the order of the fields in a
visualization, Changing	the summary operation, Splitting text in	nto multiple columns, Presenting data using
storylines, Presenting Ta	bleau operators and built-in functions,	Creating a calculated field ,Creating a custom field
using a formula, Adding	a table calculation, Using a level of de	tail expressions
		-
Unit – 4	Number of lectures = 10	Sorting and Filtering Tableau Data
Sorting and Filtering Tal	oleau Data: Sorting based on a field's v	alues, creating a wildcard filter, creating a condition
filter. Creating a top filte	er, Adding a quick filter to a worksheet,	Editing, clearing, and deleting filters
		<i>c, c, c</i>
Creating Basic Charts: C	reating column and stacked column cha	arts, creating bar charts, stacked bar charts, and side
by-side bars, creating lin	e charts and area fill charts, Creating pi	e charts, Creating scatter plots, Creating histograms
Creating a treemap. Creat	ating Maps and Dashboards	
10 D ' CD ' '		onent
12.Brief Description	of self-learning / E-learning comp	
-	of self-learning / E-learning comp	
The students will be en	ncouraged to learn using the SGT E-	Learning portal and choose the relevant
The students will be en lectures delivered by s	ncouraged to learn using the SGT E- ubject experts of SGT University. T	Learning portal and choose the relevant
The students will be en lectures delivered by s https://elearning.sgtun	ncouraged to learn using the SGT E-	Learning portal and choose the relevant
The students will be en lectures delivered by s <u>https://elearning.sgtun</u> <u>Online Resource:</u>	ncouraged to learn using the SGT E- ubject experts of SGT University. T iversity.ac.in/course-category/	Learning portal and choose the relevant he link to the E-Learning portal.
The students will be en lectures delivered by s <u>https://elearning.sgtun</u> <u>Online Resource:</u> https://www.coursera.	ncouraged to learn using the SGT E- ubject experts of SGT University. T iversity.ac.in/course-category/ org/learn/analytics-tableau#syllabus	Learning portal and choose the relevant he link to the E-Learning portal.
The students will be en lectures delivered by s <u>https://elearning.sgtun</u> <u>Online Resource:</u> https://www.coursera. 13.Books Recommen	ncouraged to learn using the SGT E- ubject experts of SGT University. T iversity.ac.in/course-category/ org/learn/analytics-tableau#syllabus	Learning portal and choose the relevant he link to the E-Learning portal.
The students will be en lectures delivered by s <u>https://elearning.sgtun</u> <u>Online Resource:</u> https://www.coursera. 13.Books Recommen Text Books	ncouraged to learn using the SGT E- ubject experts of SGT University. T iversity.ac.in/course-category/ org/learn/analytics-tableau#syllabus ded	Learning portal and choose the relevant the link to the E-Learning portal.
The students will be en lectures delivered by s <u>https://elearning.sgtun</u> <u>Online Resource:</u> https://www.coursera. 13.Books Recommen Text Books	ncouraged to learn using the SGT E- ubject experts of SGT University. T iversity.ac.in/course-category/ org/learn/analytics-tableau#syllabus ded	Learning portal and choose the relevant he link to the E-Learning portal.
The students will be en lectures delivered by s <u>https://elearning.sgtun</u> <u>Online Resource:</u> https://www.coursera.or 13.Books Recommen Text Books 1.Stephen Few, Infor	ncouraged to learn using the SGT E- ubject experts of SGT University. T iversity.ac.in/course-category/ org/learn/analytics-tableau#syllabus ded	Learning portal and choose the relevant the link to the E-Learning portal.

2.	Course Name	rtment- Computer S Data Visualization and Story Telling Lab	L	T	ſ		T P		
3.	Course Code		0 0 2						
4.	Type of Course (us	se tick mark)	Core (✓))	PE()	I	OE ()	T		
5.	Pre-requisite (if any)		6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem (
		Lectures, Tutorials,	Practical (assuming			semester)			
	ectures = 0 . Course Descripti		Tutorials = 0	Practio	cal = 28				
ob en	ject-oriented applie gaging activities Learning objective	uilds on the skills gair cations with Java ves: ective is to understar	and will create	Java pr	ograms	using h	ands-on		
1	understanding 1	models not just a tool-	-						
1	0. Course Outcome								
	d. Design and crea	ate data visualizations							
	e. Conduct explor	atory data analysis us	ing visualization.						
1	f. Craft visual pre 1. List of Experime	esentations of data for nts (Indicative)	effective communica	ation.					
1.	Analysis of Data wit	th Tableau							
2.	Formatting and Expe	orting of Graphs							
3.	Using the Rows and	Columns Shelves							
4.	Understanding the M	Iarks Card							
5.	Removing Outliers V	Using Scatterplot and	Filtering and Groups						
6.	Analysing Data-Rela	ated over Time Using	Date Hierarchies, Tr	end Lines	, and Box	k Plots			
7.	Dognition Data Set,	Description, and Ana	lysis Plan						
8.	Implementation of L	inear Regression							
9.	Visual Story Points	in Tableau							
10	. Using Visualization	n Science to Influence	Business Decisions						
11	. Storyboarding You	r Presentation							
	2. Brief Description	of self-learning / E-	e i		and choos	se the rele	vant		

2. Course Name	Mobile Application	L	ſ	[]	P
	Development Lab					
3. Course Code		0	0)	4	4
4. Type of Course (use tick m	ark)	Core (✓)	PE ()		OE ()	
5. Pre-requisite (if any)	Java or Kotlin	6. Frequency (use tick marks)	Even ()	Odd (✓)	Either Sem ()	Every Sem
7. Total Number of Lectures,	Tutorials, Practical (ass	uming 14 weeks	of one	 semest	~	0
$\frac{1 \text{ for a real real set of local res}}{\text{Lectures}} = 0$	1 utorius, 1 i utoriui (uss	Tutorials = 0		ical = 2		
8. Course Description This course introdu- related to mobile ap This course complements ETCA2 programming. The aim of the course	228A. The course acquaint	s the students wi	th vario	us feat	ures of .	Androi
given problem efficiently. Java is p			e			
	s classroom and laboratory					petenc
and confidence in and Development Cycle, Android Applications	droid programming and ur as well as it would also en	nderstand the enti	re Andr	oid Ap	ps	L
and confidence in and Development Cycle, Android Applications	droid programming and ur as well as it would also en 3.	nderstand the enti hable the students	re Andr	oid Ap	ps	L
and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs):	droid programming and ur as well as it would also en s. se, the students will be ab	nderstand the enti hable the students	re Andr	oid Ap	ps	L
and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour	droid programming and ur as well as it would also en s. se, the students will be ab e and develop activity for	nderstand the enti hable the students le to Android App.	re Andro to indep	oid Ap	ps	L
and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interface	droid programming and un as well as it would also en s. se, the students will be ab e and develop activity for t receivers and Internet ser	nderstand the enti hable the students le to Android App. rvices in Android	re Andro to indep	oid Ap	ps	L
and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interface CO2. Use Intent, Broadcas	droid programming and ur as well as it would also en s. se, the students will be ab e and develop activity for t receivers and Internet sen nt Database Application an	nderstand the enti hable the students le to Android App. rvices in Android nd Content provid	re Andro to indep App. ders.	oid Ap	ps	L
and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interface CO2. Use Intent, Broadcass CO3. Design and implement CO4. Use multimedia, cam	droid programming and ur as well as it would also en s. se, the students will be ab e and develop activity for t receivers and Internet sen nt Database Application an era and Location based se	nderstand the enti hable the students le to Android App. rvices in Android nd Content provid	re Andro to indep App. ders.	oid Ap	ps	L
and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interface CO2. Use Intent, Broadcass CO3. Design and implement CO4. Use multimedia, cam	droid programming and ur as well as it would also en s. se, the students will be ab e and develop activity for t receivers and Internet sen at Database Application an era and Location based se droid Development.	nderstand the enti- nable the students le to Android App. rvices in Android nd Content providervices in Android	App. ders.	oid Ap penden	ps tly creat	e new
and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interface CO2. Use Intent, Broadcass CO3. Design and implement CO4. Use multimedia, cam 11. List of Experiments 1. Getting Started with And	droid programming and ur as well as it would also en s. se, the students will be ab e and develop activity for t receivers and Internet sen at Database Application an era and Location based se droid Development.	nderstand the enti- nable the students le to Android App. rvices in Android nd Content providervices in Android	App. ders.	oid Ap penden	ps tly creat	e new
and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interface CO2. Use Intent, Broadcass CO3. Design and implement CO4. Use multimedia, cam 11. List of Experiments 1. Getting Started with And 2. Activities and Views: At and Buttons	droid programming and ur as well as it would also en s. se, the students will be ab e and develop activity for t receivers and Internet sen at Database Application an era and Location based se droid Development.	nderstand the enti- nable the students le to Android App. rvices in Android nd Content provid rvices in Android	App. ders. View C	oid Ap penden	hents: La	e new
and confidence in and Development Cycle, Android Applications 10. Course Outcomes (COs): On completion of this cour CO1. Design User Interface CO2. Use Intent, Broadcass CO3. Design and implement CO4. Use multimedia, cam 11. List of Experiments 1. Getting Started with And 2. Activities and Views: At and Buttons 3. Navigation with Data: W	droid programming and ur as well as it would also en s. se, the students will be ab- e and develop activity for t receivers and Internet sen at Database Application an era and Location based se droid Development. ndroid Manifest.xml, Acti Vorking with Intent, Sharin ng Resources, Loading St	nderstand the enti- nable the students le to Android App. rvices in Android nd Content provid rvices in Android rvices in Android	App. ders. View C	oid Ap penden	hents: La	e new

- 6. Lists Implementing an Android List, ListView, ListActivity, Empty Lists, ListAdapter, Sorting the Adapter, Overriding ArrayAdapter, List Interaction.
- Dialogs, New and Old: AlertDialog, Custom Dialog, Support Library, Fragments, DialogFragment.
- 8. Menus: Options Menu, Modifying an Options Menu, Context Menu
- 9. Saving Data with Shared Preferences: Shared Preferences, Getting Started with Shared Preferences, Preference Activity
- 10. Saving Data with a Database: Setting Up SQLite, Creating a Helper, using the Helper, Cursor and Cursor Adapater
- 11. Threading with AsyncTasks: Threading in Android, AsyncTask, Tracking Progress
- 12. Styles and Themes: Introduction to Styling: Defining Styles, Defining Themes, Style Inheritance, Direct Theme References
- 13. Develop an Android based Project

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

Books Recommended

Text Books

- 1. Data Sciences & Analytics, V.K. Jain, Khanna Publishing House.
- 2. McKinney, W.(2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython.2nd edition.O'Reilly Media.

Online Resources:

Android App Development | Coursera

https://www.coursera.org/specializations/android-app-development

1. Name of the Department- (Computer Science Enginee	ring					
2. Course Name	Summer Internship - II	L		T P			
3. Course Code		0		0		0 0	
4. Type of Course (use tick m	ark)	Core (🗸))	PE () OE		OE ()	
5. Pre-requisite (if any)		6. Frequ	enc	Even	Odd	Either	Every
		y (use		0	(✔)	Sem	Sem
		tick				0	0
		marks	3)			· ·	~
7. Total Number of Lectures,	Tutorials, Practical (assur	ning 14 w	eeks	of one s	semest	er)	
Lectures = 0		Tutorials	s =	Practi	ical = ()	
		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. 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

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

Bachelor in Computer Applications

Semester VI

S.No.	Course Code	Course Title	L	Т	Р	С
1		Industrial Internship	-	-	-	16
ТОТА	L		0	0	0	16

1. Name of the Department- (Computer Science Enginee	ring						
2. Course Name	Industry Internship	L	T P			•		
3. Course Code		0	0 0)		
4. Type of Course (use tick m	ark)	Core (✓)	PE ()		OE ()			
5. Pre-requisite (if any)		6. Frequenc	Even	Odd	Either	Every		
		y (use	(🗸)	0	Sem	Sem		
		tick marks)			0	0		
7. Total Number of Lectures, Tutorials, Practical (assuming 14 weeks of one semester)								
Lectures = 0		Tutorials =	1	ical = (
		0						
8. Course Description		•						
This course enables students to face	e the real time problems which	are usually face	d by wo	rking p	rofession	al while		
working in the industry. While on t	his training program, students	come to know al	oout tech	nnical a	s well ind	dividual		
skills required by a professional for	survival in the market. In fact,	this course is ab	out indu	strial in	nplement	ation of		
the technologies. This course enable	es students to learn technologie	es on industrial le	vel.					
9. Learning objectives:								
The course is designed so as to e	-	ry environment	and to	take up	on-site			
assignment as trainees or interns								
10. Course Outcomes (COs):								
On completion of this cours	se, the students will be able	to						
CO1. Have an exposure to	industrial practices and to w	ork in teams.						
CO2. Understand the impa	act of engineering solutions	s in a global, e	conomi	ic, env	ironmen	tal and		
societal context.								
CO3. Develop the ability to	engage in research and to i	nvolve in life-lo	ong lear	ming.				
CO4. Communicate effecti	vely and learn to be a team p	olayer.						
11. Course Content								
Full one semester of work at ind	ustry site. Supervised by an	expert at the ind	lustry.					
Modes of Evaluation: Internship	Report, Presentation and Pr	oject Review						