VIVEKANANDHA
COLLEGE OF ENGINEERING FOR WOMEN
**(An Autonomous Institution Affiliated to Anna University-Chennai
Approved by AICTE – Accredited by NAAC and ISO 9001:2008 Certified)
Elayampalayam , Tiruchengode – 637 205, Namakkal District, Tamilnadu.**

CURRICULUM & SYLLABI – 2019

FOR

UNDER GRADUATE(UG)

B.TECH. – INFORMATION TECHNOLOGY

REGULATION 2019

CHOICE BASED CREDIT SYSTEM

After 16th Board of Studies

(Applicable to the students admitted from the academic year 2021-2022 onwards)

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous)

B.TECH. INFORMATION TECHNOLOGY

Regulations - 2019

CHOICE BASED CREDIT SYSTEM

COLLEGE VISION

To impart value based education in Engineering and Technology to empower young women to meet the societal exigency with a global outlook

COLLEGE MISSION

- To provide holistic education through innovative teaching-learning practices
- To instill self confidence among rural students by supplementing with co-curricular and extra-curricular activities
- To inculcate the spirit of innovation through training, research and development
- To provide industrial exposure to meet the global challenges
- To create an environment for continual progress through lifelong learning

DEPARTMENT VISION

Providing quality education to transform students into technically competent skilled women to excel in IT profession, innovation and entrepreneurship

DEPARTMENT MISSION

- To empower knowledge on cutting-edge technologies in the field of Information Technology to develop innovative solutions for real-world problems
- To create a platform for innovation, research and new technology development

- To inculcate ethical practices, life-long learning and sense of societal responsibilities to support the career and personal development of the learner

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO 1: Graduates will have knowledge in various programming languages and continuous up-gradation in emerging IT technologies.

PEO 2: Graduates will be able to analyze and find solutions for current industrial needs.

PEO 3: Graduates will contribute to the society by their ethical behavior and effective teamwork

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1	**Optimal Solution :** Graduates will be able to develop computer applications for the real life problem using suitable programming platform
PSO2	**Successful Career :** Graduates will be able to think innovatively and work on multi-disciplinary areas

PROGRAMME OUTCOMES (POs):

Undergraduate engineering programmes are designed to prepare graduates to attain thefollowing program outcomes:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineeringproblems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public

health and safety, and the cultural, societal, and environmental considerations

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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

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

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

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

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

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

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

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

Mapping of Program Educational Objectives with Program Outcomes

A broad relation between the program objective and the outcomes is given in the following table

Programme Educational Objectives	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I	√	√	√		√	√			√	√			
II		√		√			√	√	√	√		
III		√	√		√		√		√	√	√	√

Mapping of Courses with Program Outcomes

SEM	COURSE CODE	COURSE NAME	PROGRAM OUTCOME(POs)												PSOs	
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
I	U19MA101	Calculus	3	3	3	3									2	1
	U19EN101	English For Communication- I						2			3	3		3		2
	U19PH105	Engineering Physics	3	2	1	2	1	2							1	2
	U19CS101	Programming for Problem Solving	3	3	3	2	2							2	3	2
	U19GE101	Engineering Graphics	3	3	2	3	3								2	2
	U19PH106	Physics Laboratory	3	3	1	2	2	1	1					1	1	2
	U19CS102	Computer Practices Laboratory	3	3	3	1	3			2	2	3		2	3	2
II	U19MA202	Linear Algebra and Ordinary Differential Equations	3	3	3	2	1								2	1
	U19EN202	English For Communication- II						2			3	3		3	2	2
	U19CH207	Engineering Chemistry	3	3	2	2	1	2	2				1	2	2	1
	U19EE201	Basic Electrical and Electronics	3	2		2								3	3	2

Sem	Code	Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
		Engineering															
	U19GE202	Basic Civil and Mechanical Engineering	3	3	2	1	2									2	1
	U19IT201	Object oriented Programming	3	3	2	2	3	3			1	2					3
	U19TA201	தமிழர் மரபு / Heritage of Tamils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	U19CH208	Chemistry Laboratory	3	3	1	2	2	1	1						1	1	2
	U19GE203	Engineering Practices Laboratory	3	2	3	3	2	1			2					2	1
III	U19MA304	Discrete Mathematics	3	3	2	2									2	2	2
	U19EC308	Electronic Devices and Circuits	3	2	2	1		2	1	1					1	2	1
	U19IT302	Data Communications	3	2	2	1		2	1	1					1	2	1
	U19IT303	Data Structures	3	3	3	2	2				1	2			2	2	3
	U19IT304	Computer Organization & Architecture	3	2	1		1								1	3	2
	U19IT305	Professional Ethics and Human Values	2	1	2			2	1	3						1	2
	U19TA302	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	U19EC309	Circuits and Devices Laboratory	3	2	2	1		2	1	1					1	3	2
	U19IT306	Data Structures Laboratory	3	3	3	2	2				2	2			2	3	3
IV	U19MA405	Statistics and Numerical Methods	3	3												2	
	U19IT407	Linear Integrated Circuits	3	2	1		1								1	3	2
	U19IT408	Operating Systems	3	3	2	2									2	2	2
	U19IT409	Design and Analysis of Algorithms	2	3	2	3										2	2
	U19IT410	Database Management Systems	3	3	3	2	2			1	1	1			1	2	2
	U19IT411	Operating Systems Laboratory	3	3	3	2									2	3	2
	U19IT412	Database Management	1	2	3	3	2			1	1	2			1	3	2

		Systems Laboratory															
V	U19IT513	Data Warehousing and Data Mining	2	2	1	2	2								3	3	2
	U19IT514	Microprocessor and Microcontroller	2	2	1		1	1			1	1				2	2
	U19IT515	Web Technology	3	1	3	1	3								2	2	3
	U19IT516	Python Programming	3	3	1	1	2								2	3	2
	U19IT517	Web Technology Laboratory	3	3	3	2	1				2				2	3	2
	U19IT518	Python Programming Laboratory	3	3	1	1	2								2	3	2
VI	U19CS626	Compiler Design	3	3	3	2	2		1		2	1			2	3	3
	U19IT619	Introduction to Machine Learning	3	2	2	2	2							2	2	2	2
	U19IT620	Software Engineering	3	2	1	1										3	3
	U19IT621	Computer Communication Networks	3	3	3	2	1					2			2	2	2
	U19IT622	Machine Learning Laboratory	3	2	2	2	2							2	2	2	2
	U19IT623	Case Tools Laboratory	3	2	1	1										3	3
	U19EN603	Communication Skills Laboratory						2				3	3			3	
VII	U19IT724	Big Data Analytics	3	3	3	2	1								2	3	2
	U19IT725	Building of Internet of Things	3	2	3	1	1				1	1			2	3	3
	U19IT726	IoT and Data Analytics Laboratory	3	3	3		2								2	2	2
	U19IT727	Internship Training andSummer Project	2	2	3	3	3			2	2	3	3		2	3	3
VIII	U19IT828	Project Work	2	2	3	3	3			2	2	3	3		2	3	3

LIST OF HS,BS, ES COURSES

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
U19EN101	English For Communication- I *	HSC	3	0	0	3	40	60	100
U19EN202	English For Communication- II *	HSC	3	0	0	3	40	60	100
U19TA201	தமிழர் மரபு / Heritage of Tamils	HSC	2	0	0	1	40	60	100
U19TA302	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HSC	2	0	0	1	40	60	100
U19MA101	Calculus*	BSC	3	1	0	4	40	60	100
U19PH105	Engineering Physics $	BSC	3	0	0	3	40	60	100
U19PH106	Physics Laboratory $	BSC	0	0	4	2	60	40	100
U19MA202	Linear Algebra and Ordinary Differential Equations*	BSC	3	1	0	4	40	60	100
U19CH207	Engineering Chemistry@	BSC	3	0	0	3	40	60	100
U19CH208	Chemistry Laboratory @	BSC	0	0	4	2	60	40	100
U19CS101	Programming for Problem Solving*	ESC	3	0	0	3	40	60	100
U19GE101	Engineering Graphics*	ESC	2	0	3	3	40	60	100
U19CS102	Computer Practices Laboratory*	ESC	0	0	4	2	60	40	100
U19EE201	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	40	60	100
U19GE202	Basic Civil and Mechanical Engineering*	ESC	3	0	0	3	40	60	100
U19IT201	Object oriented Programming	ESC	2	0	2	3	40	60	100
U19GE203	Engineering Practices Laboratory*	ESC	0	0	4	2	60	40	100

MANDATORY COURSES

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19MCFY1	Environmental Science and Engineering	3	0	0	0	100	--	100
U19MCFY2	Indian Constitution and Universal Human values	3	0	0	0	100	--	100
U19MCSY3	Numerical Ability	3	0	0	0	100	--	100
U19MCSY4	Verbal Ability	3	0	0	0	100	--	100
U19MCTY5	Logical Reasoning	3	0	0	0	100	--	100
U19MCTY6	Personality Development	3	0	0	0	100	--	100

CURRICULUM BREAKDOWN STRUCTURE(Applicable to the Students admitted in the Academic Year 2022 -23)

Summary of Credit Distribution

Category	Semester								Total No.of Credits	Curriculum Content (% of total number of credits of the program)
	SEM 1	SEM 2	SEM 3	SEM 4	SEM 5	SEM 6	SEM 7	SEM 8		
HS	3	4	1						8	4.84
BS	9	9	4	4					26	15.57
ES	8	11	5	3					27	16.16
PC			14	14	16	15	7		66	39.5
PE					3	3	6	6	18	10.77
OE					3	3	3		9	5.38
EC						1	4	8	13	7.78
Semester wise total	**20**	**24**	**24**	**21**	**22**	**22**	**20**	**14**	**167**	**100.00**

CURRICULUM BREAKDOWN STRUCTURE (Applicable to the Students admitted in the Academic year 2021 - 2022)

Summary of Credit Distribution

Category	Semester								Total No.of Credits	Curriculum Content (% of total number of credits of the program)
	SEM 1	SEM 2	SEM 3	SEM 4	SEM 5	SEM 6	SEM 7	SEM 8		
HS	3	3							6	3.64
BS	9	9	4	4					26	15.76
ES	8	11	5	3					27	16.36
PC			14	14	16	15	7		66	40.00
PE					3	3	6	6	18	10.91
OE					3	3	3		9	5.45
EC						1	4	8	13	7.88
Semester wise total	**20**	**23**	**23**	**21**	**22**	**22**	**20**	**14**	**165**	**100.00**

HS-HUMANITIES AND SOCIAL SCIENCE, **BS**-BASIC SCIENCES, **ES**- ENGINEERING SCIENCES, **PC**- PROFESSIONAL CORE, **PE**-PROFESSIONAL ELECTIVES, **OE**-OPEN ELECTIVES, **EEC**- EMPLOYABILITY ENHANCEMENT COURSES

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN					
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	Elayampalayam, Tiruchengode – 637 205					

Programme	**B.TECH**		Programme Code	104	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**I**

CURRICULUM
(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19MA101	Calculus*	BSC	3	1	0	4	40	60	100
U19EN101	English For Communication- I*	HSC	3	0	0	3	40	60	100
U19PH105	Engineering Physics $	BSC	3	0	0	3	40	60	100
U19CS101	Programming for Problem Solving*	ESC	3	0	0	3	40	60	100
U19GE101	Engineering Graphics*	ESC	2	0	3	3	40	60	100
PRACTICAL									
U19PH106	Physics Laboratory $	BSC	0	0	4	2	60	40	100
U19CS102	Computer Practices Laboratory*	ESC	0	0	4	2	60	40	100
MANDATORY COURSES									
	Mandatory course - I	MC	3	0	0	0	100	-	100
					Total	20	420	380	800

BSC - Basic Science Courses, ESC- Engineering Science Courses, PCC- Professional core courses, PEC- Professional Elective courses, OEC- Open Elective courses, MC-Mandatory courses, HS-Humanities and Social Sciences, EEC- Employability Enhancement Courses, SI- Summer Industry Internship, PROJ-IT-Project, CA-Continuous Assessment, ESE - End Semester Examination
 * Common for all branches
 $ Common for CSE, CST, IT, BT

Programme	**B.TECH**	Programme Code	104	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**	Semester				**II**

CURRICULUM

(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19MA202	Linear Algebra and Ordinary Differential Equations*	BSC	3	1	0	4	40	60	100
U19EN202	English For Communication- II *	HSC	3	0	0	3	40	60	100
U19CH207	Engineering Chemisrty@	BSC	3	0	0	3	40	60	100
U19EE201	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	40	60	100
U19GE202	Basic Civil and Mechanical Engineering*	ESC	3	0	0	3	40	60	100
U19IT201	Object oriented Programming	ESC	2	0	2	3	40	60	100
U19TA201	தமிழர் மரபு / Heritage of Tamils %	HSC	2	0	0	1	40	60	100
PRACTICAL									
U19CH208	Chemistry Laboratory @	BSC	0	0	4	2	60	40	100
U19GE203	Engineering Practices Laboratory*	ESC	0	0	4	2	60	40	100
MANDATORY COURSES									
	Mandatory course - II	MC	3	0	0	0	100	-	100
					Total	**24**	**500**	**500**	**1000**

BSC - Basic Science Courses, ESC- Engineering Science Courses, PCC- Professional core courses, PEC- Professional Elective courses, OEC- Open Elective courses, MC- Mandatory courses, HS-Humanities and Social Sciences, EEC- Employability Enhancement Courses, SI- Summer Industry Internship, PROJ-IT-Project, CA- Continuous Assessment, ESE - End Semester Examination

* Common for all branches

@ Common for CSE, CST, IT, BT

% Courses offered for the students who admitted from 2022 - 23 Academic Year

| | VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205 | | | | | | | | | |

Programme	**B.TECH**			Programme Code	**104**	Regulation		**2019**	
Department	**INFORMATION TECHNOLOGY**					Semester		**III**	

CURRICULUM
(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19MA304	Discrete Mathematics *	BSC	3	1	0	4	40	60	100
U19EC308	Electronic Devices and Circuits	ESC	3	0	0	3	40	60	100
U19IT302	Data Communications	PCC	3	0	0	3	40	60	100
U19IT303	Data Structures	PCC	3	0	0	3	40	60	100
U19IT304	Computer Organization & Architecture	PCC	3	0	0	3	40	60	100
U19IT305	Professional Ethics and Human Values	PCC	3	0	0	3	40	60	100
U19TA302	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology%	HSC	2	0	0	1	40	60	100
PRACTICAL									
U19EC309	Circuits and Devices Laboratory	ESC	0	0	4	2	60	40	100
U19IT306	Data Structures Laboratory	PCC	0	0	4	2	60	40	100
MANDATORY COURSES									
	Mandatory Course - III	MC	3	0	0	0	100	-	100
				Total Credit		24	500	500	1000

BSC - Basic Science Courses, ESC- Engineering Science Courses, PCC- Professional core courses, PEC- Professional Elective courses, OEC- Open Elective courses, MC-Mandatory courses, HS-Humanities and Social Sciences, EEC- Employability Enhancement Courses, SI- Summer Industry Internship, PROJ-IT-Project, CA-Continuous Assessment, ESE - End Semester Examination

*Common to CSE & IT
% Courses offered for the students who admitted from the Academic Year 2022 - 23.

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	B.TECH		Programme Code		104	Regulation		2019
Department	INFORMATION TECHNOLOGY					Semester		IV

CURRICULUM
(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19MA405	Statistics and Numerical Methods*	BSC	3	1	0	4	40	60	100
U19IT407	Linear Integrated Circuits	ESC	3	0	0	3	40	60	100
U19IT408	Operating Systems	PCC	3	0	0	3	40	60	100
U19IT409	Design and Analysis of Algorithms	PCC	3	1	0	4	40	60	100
U19IT410	Database Management System	PCC	3	0	0	3	40	60	100
PRACTICAL									
U19IT411	Operating Systems Laboratory	PCC	0	0	4	2	60	40	100
U19IT412	Database Management Systems Laboratory	PCC	0	0	4	2	60	40	100
MANDATORY COURSES									
	Mandatory Course - IV	MC	3	0	0	0	100	-	100
					Total Credit	21	420	380	800

CA - Continuous Assessment, ESE - End Semester Examination, BSC - Basic Science Courses, ESC - Engineering Science Courses, PCC – Professional Core Courses, HSC - Humanities and Social Science Courses, MC- Mandatory courses

*Common to CSE & IT

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205		
Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**		Semester	**V**

CURRICULUM
(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19IT513	Data Warehousing and Data Mining	PCC	3	0	0	3	40	60	100
U19IT514	Microprocessor and Microcontroller	PCC	3	0	0	3	40	60	100
U19IT515	Web Technology	PCC	3	0	0	3	40	60	100
U19IT516	Python Programming	PCC	3	0	0	3	40	60	100
	Professional Elective -I	PEC	3	0	0	3	40	60	100
	Open Elective-I	OEC	3	0	0	3	40	60	100
PRACTICAL									
U19IT517	Web Technology Laboratory	PCC	0	0	4	2	60	40	100
U19IT518	Python Programming Laboratory	PCC	0	0	4	2	60	40	100
MANDATORY COURSES									
	Mandatory Course - V	MC	3	0	0	0	100	-	100
					Total Credit	22	460	440	900

CA - Continuous Assessment, ESE - End Semester Examination, BSC - Basic Science Courses, ESC - Engineering Science Courses, PCC – Professional Core Courses, HSC - Humanities and Social Science Courses, MC- Mandatory courses

Programme	**B.TECH**			Programme Code		**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**						Semester		**VI**

CURRICULUM
(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19CS626	Compiler Design *	PCC	3	0	0	3	40	60	100
U19IT619	Introduction to Machine Learning	PCC	3	0	0	3	40	60	100
U19IT620	Software Engineering	PCC	3	0	0	3	40	60	100
U19IT621	Computer Communication Networks	PCC	3	0	0	3	40	60	100
	Professional Elective-II	PEC	3	0	0	3	40	60	100
	Open Elective-II	OEC	3	0	0	3	40	60	100
PRACTICAL									
U19IT622	Machine Learning Laboratory	PCC	0	0	2	1	60	40	100
U19IT623	Case Tools Laboratory	PCC	0	0	4	2	60	40	100
U19EN603	Communication Skills Laboratory	EEC	0	0	3	1	100	-	100
MANDATORY COURSES									
	Mandatory Course - VI	MC	3	0	0	0	100	-	100
			Total Credit			**22**	**560**	**440**	**1000**

*Common syllabus for CSE & IT

CA - Continuous Assessment, ESE - End Semester Examination, BSC - Basic Science Courses, ESC - Engineering Science Courses, PCC – Professional Core Courses, HSC - Humanities and Social Science Courses, MC- Mandatory courses

Programme	**B.TECH**			Programme Code		**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**						Semester		**VII**

CURRICULUM
(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19IT724	Big Data Analytics	PCC	3	0	0	3	40	60	100
U19IT725	Building of Internet of Things	PCC	3	0	0	3	40	60	100
	Professional Elective-III	PEC	3	0	0	3	40	60	100
	Professional Elective-IV	PEC	3	0	0	3	40	60	100
	Open Elective-III	OEC	3	0	0	3	40	60	100
PRACTICAL									
U19IT726	IoT and Data Analytics Laboratory	PCC	0	0	2	1	60	40	100
U19IT727	Internship Training and Summer Project	EEC	0	0	8	4	100	-	100
					Total Credit	20	360	340	700

CA - Continuous Assessment, ESE - End Semester Examination, BSC - Basic Science Courses, ESC - Engineering Science Courses, PCC – Professional Core Courses, HSC - Humanities and Social Science Courses, MC- Mandatory courses

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(Autonomous Institution, Affiliated to Anna University, Chennai)

Elayampalayam, Tiruchengode – 637 205

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**VIII**

CURRICULUM

(Applicable to the students admitted from the academic year 2021 - 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
	Professional Elective-V	PEC	3	0	0	3	40	60	100
	Professional Elective-VI	PEC	3	0	0	3	40	60	100
PRACTICAL									
U19IT828	Project Work	EEC	0	0	16	8	60	40	100
					Total Credit	14	140	160	300

Cumulative Credits: 165 (Applicable to the students admitted in the academic year 2021-2022)

Cumulative Credits: 167 (Applicable to the students admitted in the academic year 2022-2023)

Type of Courses

PCC	:	Professional Core Courses
PEC	:	Professional Elective Courses
OEC	:	Open Elective Courses
ITSP	:	Internship Training and Summer Project
EEC	:	Employability Enhancement Course
MC	:	Mandatory Courses
HSC	:	Humanities And Sciences
ESC	:	Engineering Sciences
BSC	:	Basic Sciences

PROFESSIONAL ELECTIVE COURSES : VERTICALS

Vertical I NETWORKS	Vertical II CYBER SECURITY	Vertical III ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	Vertical IV INTERNET OF THINGS & CLOUD COMPUTING	Vertical V PROBLEM SOLVING & SOFTWARE DEVELOPMENT
Mobile Adhoc Networks	Information Security	Advanced Database Systems	Embedded Systems	Design Thinking
Wireless Sensor Networks	Cyber Security	Data Science	Smart Sensor Technologies	Agile Methodologies
Distributed Systems	Cryptography and Network Security	Deep Learning	Security in Computing	Software Project Management
Green Computing	Cyber Law and Ethical Hacking	Natural Language Processing	Software Defined Networks	Blockchain Technology
Java Programming	Social Network Analysis	Soft Computing	Fundamentals of Virtualization	Total Quality Management
Network Programming	Semantic Web	Business Intelligence & Its Applications	Information Storage Management	Building Enterprise Applications
Service Oriented Architecture	Cyber Forensics	Digital Image Processing	Big Data Tools and Techniques	Internet Marketing and E-Commerce
Socket Programming	Biometrics Systems	Knowledge Management	Cloud Computing	Game Theory and its Applications
				Full stack Development

Registration of Professional Elective Courses from Verticals: Professional Elective Courses are listed in groups called verticals that represent a particular area of specialisation / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V to VIII. The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also.

PROFESSIONAL ELECTIVE COURSES

VERTICAL I: NETWORKS

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**B.Tech.**		Programme Code	104		Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**					Semester	**-**

CURRICULUM
(Applicable to the students admitted from the academic year 2021- 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19CSV11	Mobile Adhoc Networks#	PEC	3	0	0	3	40	60	100
U19ITV11	Wireless Sensor Networks	PEC	3	0	0	3	40	60	100
U19ITV12	Distributed Systems	PEC	3	0	0	3	40	60	100
U19CSV14	Green Computing#	PEC	3	0	0	3	40	60	100
U19ITV13	Java Programming	PEC	3	0	0	3	40	60	100
U19ITV14	Network Programming$	PEC	3	0	0	3	40	60	100
U19ITV15	Service Oriented Architecture$	PEC	3	0	0	3	40	60	100
U19CTV12	Socket Programming#	PEC	3	0	0	3	40	60	100

$ common to CSE and IT

common to CSE,IT and CST

VERTICAL II : CYBER SECURITY

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205			

Programme	**B.Tech.**	Programme Code	104	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**-**

CURRICULUM
(Applicable to the students admitted from the academic year 2021- 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19ITV21	Information Security	PEC	3	0	0	3	40	60	100
U19ITV22	Cyber Security	PEC	3	0	0	3	40	60	100
U19CSV23	Cryptography and Network Security$	PEC	3	0	0	3	40	60	100
U19CSV24	Cyber Law and Ethical Hacking#	PEC	3	0	0	3	40	60	100
U19CSV25	Social Network Analysis#	PEC	3	0	0	3	40	60	100
U19CSV26	Semantic Web#	PEC	3	0	0	3	40	60	100
U19ITV23	Cyber Forensics #	PEC	3	0	0	3	40	60	100
U19CTV23	Biometrics Systems#	PEC	3	0	0	3	40	60	100

$ common to CSE and IT
# common to CSE,IT and CST

VERTICAL III : ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205					
Programme	**B.Tech.**	Programme Code	104	Regulation	**2019**	
Department	**INFORMATION TECHNOLOGY**			Semester	**-**	

<table>
<tr><td colspan="11" align="center">CURRICULUM
(Applicable to the students admitted from the academic year 2021- 2022 onwards)</td></tr>
<tr><td rowspan="2">Course
Code</td><td rowspan="2">Course Name</td><td rowspan="2">Category</td><td colspan="3">Periods / Week</td><td>Credit</td><td colspan="3">Maximum Marks</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>C</td><td>CA</td><td>ESE</td><td>Total</td></tr>
<tr><td colspan="11" align="center">THEORY</td></tr>
<tr><td>U19CSV34</td><td>Advanced Database Systems</td><td>PEC</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>U19ITV31</td><td>Data Science</td><td>PEC</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>U19ITV32</td><td>Deep Learning</td><td>PEC</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>U19CTV35</td><td>Natural Language Processing</td><td>PEC</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>U19ITV33</td><td>Soft Computing</td><td>PEC</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>U19ITV34</td><td>Business Intelligence and its Applications[$]</td><td>PEC</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>U19ITV35</td><td>Digital Image Processing[$]</td><td>PEC</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
<tr><td>U19CSV36</td><td>Knowledge Management[$]</td><td>PEC</td><td>3</td><td>0</td><td>0</td><td>3</td><td>40</td><td>60</td><td>100</td></tr>
</table>

$ common to CSE and IT
# common to CSE,IT and CST

VERTICAL IV : INTERNET OF THINGS & CLOUD COMPUTING

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205				

Programme	**B.Tech.**	Programme Code	104	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**-**

CURRICULUM
(Applicable to the students admitted from the academic year 2021- 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19CSV41	Embedded Systems[#]	PEC	3	0	0	3	40	60	100
U19CSV42	Smart Sensor Technologies[#]	PEC	3	0	0	3	40	60	100
U19CSV43	Security in Computing[#]	PEC	3	0	0	3	40	60	100
U19ITV41	Software Defined Networks[$]	PEC	3	0	0	3	40	60	100
U19CTV41	Fundamentals of Virtualization[#]	PEC	3	0	0	3	40	60	100
U19ITV42	Information Storage and Management[$]	PEC	3	0	0	3	40	60	100
U19CTV43	Big Data Tools and Techniques[#]	PEC	3	0	0	3	40	60	100
U19ITV43	Cloud Computing	PEC	3	0	0	3	40	60	100

$ common to CSE and IT

common to CSE,IT and CST

Vertical V : PROBLEM SOLVING & SOFTWARE DEVELOPMENT

<table>
<tr><td colspan="2"></td><td>VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205</td><td colspan="3"></td></tr>
<tr><td>Programme</td><td>B.Tech.</td><td colspan="2">Programme Code</td><td>104</td><td>Regulation</td><td>2019</td></tr>
<tr><td>Department</td><td colspan="3">INFORMATION TECHNOLOGY</td><td colspan="2">Semester</td><td>-</td></tr>
</table>

CURRICULUM (Applicable to the students admitted from the academic year 2021- 2022 onwards)

CURRICULUM
(Applicable to the students admitted from the academic year 2021- 2022 onwards)

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19ITV51	Design Thinking	PEC	3	0	0	3	40	60	100
U19ITV52	Agile Methodologies	PEC	3	0	0	3	40	60	100
U19ITV53	Software Project Management	PEC	3	0	0	3	40	60	100
U19ITV54	Blockchain Technology	PEC	3	0	0	3	40	60	100
U19ITV55	Total Quality Management	PEC	3	0	0	3	40	60	100
U19ITV56	Building Enterprise Appilcations	PEC	3	0	0	3	40	60	100
U19ITV57	Internet Marketing and E - Commerce	PEC	3	0	0	3	40	60	100
U19ITV58	Game Theory and Its Applications	PEC	3	0	0	3	40	60	100
U19CSV58	Full Stack Development	PEC	2	0	2	3	40	60	100

DEPARTMENT OF INFORMATION TECHNOLOGY

MINOR DEGREE - INTERNET OF THINGS & CLOUD COMPUTING

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19CSV41	Embedded Systems	PEC	3	0	0	3	40	60	100
U19CSV42	Smart Sensor Technologies	PEC	3	0	0	3	40	60	100
U19CSV43	Security in Computing	PEC	3	0	0	3	40	60	100
U19ITV41	Software Defined Networks	PEC	3	0	0	3	40	60	100
U19CTV41	Fundamentals of Virtualization	PEC	3	0	0	3	40	60	100
U19ITV42	Information Storage and Management	PEC	3	0	0	3	40	60	100
U19CTV43	Big Data Tools and Techniques	PEC	3	0	0	3	40	60	100
U19ITV43	Cloud Computing	PEC	3	0	0	3	40	60	100

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

MINOR DEGREE - VERTICAL - CYBER SECURITY

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19CSV21	Information Security	PEC	3	0	0	3	40	60	100
U19CSV22	Cyber Security	PEC	3	0	0	3	40	60	100
U19CSV23	Cryptography and Network Security	PEC	3	0	0	3	40	60	100
U19CSV24	Cyber Law and Ethical Hacking	PEC	3	0	0	3	40	60	100
U19CSV25	Social Network Analysis	PEC	3	0	0	3	40	60	100
U19CSV26	Semantic Web	PEC	3	0	0	3	40	60	100
U19ITV23	Cyber Forensics [#]	PEC	3	0	0	3	40	60	100
U19CTV23	Biometrics Systems[#]	PEC	3	0	0	3	40	60	100

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MINOR DEGREE - VERTICAL - INSTRUMENTATION & CONTROL

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19EEV31	Communication Engineering	PEC	3	0	0	3	40	60	100
U19EEV32	Computer Architecture	PEC	3	0	0	3	40	60	100
U19EEV33	Intelligence Techniques	PEC	3	0	0	3	40	60	100
U19EEV34	Bio Medical Instrumentation	PEC	3	0	0	3	40	60	100
U19EEV35	Robotics and Control	PEC	3	0	0	3	40	60	100
U19EEV36	Modern Control Theory	PEC	3	0	0	3	40	60	100
U19EEV37	PLC & SCADA	PEC	3	0	0	3	40	60	100
U19EEV38	Intellectual Property Rights	PEC	3	0	0	3	40	60	100

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MINOR DEGREE - VERTICAL - ELECTRONICS ENGINEERING AND ADMINISTRATION SYSTEM

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
THEORY									
U19ECV71	Pattern Recognition	PEC	3	0	0	3	40	60	100
U19ECV72	Medical Electronics	PEC	3	0	0	3	40	60	100
U19ECV73	Remote Sensing	PEC	3	0	0	3	40	60	100
U19ECV74	Automotive Electronics	PEC	3	0	0	3	40	60	100
U19ECV75	Industry 4.0	PEC	3	0	0	3	40	60	100
U19ECV76	Digital Video Processing	PEC	3	0	0	3	40	60	100
U19ECV77	Principles of Public Administration	PEC	3	0	0	3	40	60	100
U19ECV78	Administrative Theories	PEC	3	0	0	3	40	60	100
U19ECV79	Indian Administrative System	PEC	3	0	0	3	40	60	100

DEPARTMENT OF BIOTECHNOLOGY

MINOR DEGREE - VERTICAL - ENTREPRENEURSHIP

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19BTV21	Principles of Management	3	0	0	3	40	60	100
U19BTV22	Bio-Entrepreneurship	3	0	0	3	40	60	100
U19BTV23	Industrial Biosafety	3	0	0	3	40	60	100
U19BTV24	Bioethics & IPR	3	0	0	3	40	60	100
U19BTV25	Bioindustries & Entrepreneurship	3	0	0	3	40	60	100
U19BTV26	Total Quality management	3	0	0	3	40	60	100
U19BTV27	Audit and Regulatory Compliance	3	0	0	3	40	60	100
U19BTV28	Biobusiness	3	0	0	3	40	60	100
U19BTV29	Resource Management & Lean Start-up Management	3	0	0	3	40	60	100

DEPARTMENT OF BIOMEDICAL ENGINEERING

MINOR DEGREE - VERTICAL - HEALTHCARE MANAGEMENT

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19BMV61	Clinical Engineering	3	0	0	3	40	60	100
U19BMV62	Hospital Planning and Management	3	0	0	3	40	60	100
U19BMV63	Medical WasteManagement	3	0	0	3	40	60	100
U19BMV64	Economics and Management for Engineers	3	0	0	3	40	60	100
U19BMV65	Bio Statistics	3	0	0	3	40	60	100
U19BMV66	Forensic Science in Healthcare	3	0	0	3	40	60	100
U19BMV67	AI and Its Medical Applications	3	0	0	3	40	60	100
U19BMV68	Health Informatics	3	0	0	3	40	60	100

DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY

MINOR DEGREE - VERTICAL - ARTIFICIAL INTELLIGENCE

Course Code	Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
U19CTV31	Pattern Recognition Techniques	PEC	3	0	0	3	40	60	100
U19CTV32	Deep Learning	PEC	3	0	0	3	40	60	100
U19CTV33	Business Intelligence and its Analytics	PEC	3	0	0	3	40	60	100
U19CTV34	Data Visualization	PEC	3	0	0	3	40	60	100
U19CTV35	Natural Language Processing	PEC	3	0	0	3	40	60	100
U19CTV36	Neuro Fuzzy and Genetic Programming	PEC	3	0	0	3	40	60	100
U19CTV37	Knowledge Based Decision Support System	PEC	3	0	0	3	40	60	100
U19ITV38	Data Science Techniques	PEC	3	0	0	3	40	60	100

DEPARTMENT OF INFORMATION TECHNOLOGY

LIST OF OPEN ELECTIVE COURSES

S.NO	COURSE CODE	COURSE NAME	CATEGORY	L	T	P	C	Maximum Marks		
								CA	ESE	T
1	U19ITOE1	Mobile Application Development	OEC	3	0	0	3	40	60	100
2	U19ITOE2	Robotics	OEC	3	0	0	3	40	60	100
3	U19ITOE3	Basics of Cloud Computing	OEC	3	0	0	3	40	60	100
4	U19ITOE4	Introduction to Data Structures	OEC	3	0	0	3	40	60	100
5	U19ITOE5	Cyber Security	OEC	3	0	0	3	40	60	100
6	U19ITOE6	Information Technology Essentials	OEC	3	0	0	3	40	60	100
7	U19ITOE7	Business Intelligence and its Applications	OEC	3	0	0	3	40	60	100
8	U19ITOE8	Internet of Things	OEC	3	0	0	3	40	60	100
9	U19ITOE9	Introduction to Java Programming	OEC	3	0	0	3	40	60	100
10	U19ITOE10	Introduction to R Programming	OEC	3	0	0	3	40	60	100
11	U19ITOE11	Ethical Hacking	OEC	3	0	0	3	40	60	100
12	U19ITOE12	Cyber Forensics	OEC	3	0	0	3	40	60	100
13	U19ITOE13	E Learning Techniques	OEC	3	0	0	3	40	60	100

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LIST OF OPEN ELECTIVE COURSES (OEC)

Course code	Course name	Category	L	T	P	C	CA	ESE	Total
U19CSOE1	Introduction to IoT	OEC	3	0	0	3	40	60	100
U19CSOE2	Ethical Hacking	OEC	3	0	0	3	40	60	100
U19CSOE3	Smart Sensor Technologies	OEC	3	0	0	3	40	60	100
U19CSOE4	Web Designing	OEC	3	0	0	3	40	60	100
U19CSOE5	Data Analytics	OEC	3	0	0	3	40	60	100
U19CSOE6	Enterprise Java	OEC	3	0	0	3	40	60	100
U19CSOE7	Open Source Software	OEC	3	0	0	3	40	60	100
U19CSOE8	Python Programming	OEC	3	0	0	3	40	60	100

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

LIST OF OPEN ELECTIVE COURSES (OEC)

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19EEOE1	Electron Devices	3	0	0	3	40	60	100
U19EEOE2	Electrical Safety	3	0	0	3	40	60	100
U19EEOE3	Energy Auditing	3	0	0	3	40	60	100
U19EEOE4	Energy Storage Technologies	3	0	0	3	40	60	100
U19EEOE5	Biomass Energy Systems	3	0	0	3	40	60	100
U19EEOE6	Energy Efficient Lighting System	3	0	0	3	40	60	100
U19EEOE7	Soft Computing techniques	3	0	0	3	40	60	100
U19EEOE8	Electrical Systems in industry	3	0	0	3	40	60	100

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

LIST OF OPEN ELECTIVE COURSES (OEC)

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ECOE1	Basics of Electronics in Automation Appliances	3	0	0	3	40	60	100
U19ECOE2	Biomedical Instrumentation	3	0	0	3	40	60	100
U19ECOE3	Automotive Electronics	3	0	0	3	40	60	100
U19ECOE4	Satellite Communication	3	0	0	3	40	60	100
U19ECOE5	VLSI Design and Its Applications	3	0	0	3	40	60	100
U19ECOE6	Digital Image Processing	3	0	0	3	40	60	100
U19ECOE7	Basics of Communication Systems	3	0	0	3	40	60	100
U19ECOE8	Wireless Sensor Networks	3	0	0	3	40	60	100
U19ECOE9	PCB Design and Fabrication	3	0	0	3	40	60	100

DEPARTMENT OF BIOTECHNOLOGY

LIST OF OPEN ELECTIVE COURSES (OEC)

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19BTOE1	Biology for Engineers	3	0	0	3	40	60	100
U19BTOE2	Biofuels and Bioenergy	3	0	0	3	40	60	100
U19BTOE3	Bio-Business	3	0	0	3	40	60	100
U19BTOE4	Basics of Bioinformatics	3	0	0	3	40	60	100
U19BTOE5	Human Health and Nutritional Disorders	3	0	0	3	40	60	100
U19BTOE6	Waste Management	3	0	0	3	40	60	100
U19BTOE7	Food Processing and Preservation Technology	3	0	0	3	40	60	100
U19BTOE8	Forensic Technology	3	0	0	3	40	60	100
U19BTOE9	Biodiversity and Bioprospecting	3	0	0	3	40	60	100

DEPARTMENT OF BIOMEDICAL ENGINEERING

LIST OF OPEN ELECTIVE COURSES (OEC)

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19BMOE1	Biotelemetry	3	0	0	3	40	60	100
U19BMOE2	Virtual Instrumentation	3	0	0	3	40	60	100
U19BMOE3	Hospital Waste Management	3	0	0	3	40	60	100
U19BMOE4	Medical Robotics	3	0	0	3	40	60	100
U19BMOE5	Healthcare Management Systems	3	0	0	3	40	60	100
U19BMOE6	Biometric Systems and Their Applications	3	0	0	3	40	60	100
U19BMOE7	Biomedical Instrumentation	3	0	0	3	40	60	100
U19BMOE8	Medical Informatics	3	0	0	3	40	60	100
U19BMOE9	ICU and Operation Theatre Equipments	3	0	0	3	40	60	100
U19BMOE10	Telemedicine	3	0	0	3	40	60	100

DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY

LIST OF OPEN ELECTIVE COURSES (OEC)

Course Code	Course Name	Periods / Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CTOE1	Fundamentals of Artificial Intelligence	3	0	0	3	40	60	100
U19CTOE2	Fundamentals of Information Security	3	0	0	3	40	60	100
U19CTOE3	Fundamentals of Data Science	3	0	0	3	40	60	100
U19CTOE4	Fundamentals of Machine Learning	3	0	0	3	40	60	100
U19CTOE5	Fundamentals of Data Visualization	3	0	0	3	40	60	100
U19CTOE6	Computer Forensics	3	0	0	3	40	60	100

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205		

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		**I**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19MA101	**Calculus**	3	1	0	4	40	60	100

Course Objective	The Main Objective of the course is to • Provide the information about Review of limits, continuity and differentiability. • Understand maxima and minima of functions of two variables. • Demonstrate Integral calculus. • Identify the problems based on area, surface and volume. • Recognize the Second order linear differential equations.

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Apply Mean value theorem and Taylor''s theorem.	K1,K3
	CO2: Analyze Total derivative.	K2,K4
	CO3: Formulate Reduction Formulae.	K3,K5
	CO4: Translate Change of order of integration	K2,K5
	CO5: Apply method of variation of parameters.	K3,K5

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	3											2		
CO 2	3	3											2		
CO 3	3	3											2		
CO 4	3	3											2		
CO 5	3	3											2		

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus				
Unit – I	**DIFFERENTIAL CALCULUS**		Periods	**12**
Limit, continuity, differentiability , rules of differentiation, differentiation of various functions, Rolle"s theorem(excluding proof), Mean value theorem(excluding proof), Taylor"s theorem(excluding proof), Maxima and Minima. Physical Applications (Newton"s law of cooling – Heat flow problems, Rate of decay of radioactive materials – Chemical reactions and solutions, Ohm"s law, Kirchoff"s law- Simple electric circuit problems)				
Unit - II	**FUNCTIONS OF SEVERAL VARIABLES**		Periods	**12**
Partial differentiation – Homogeneous functions and Euler"s theorem(excluding proof) – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor"s series for functions of two variables(excluding proof) – Maxima and minima of functions of two variables .				
Unit – III	**INTEGRAL CALCULUS**		Periods	**12**
Riemann integral- Fundamental theorem of calculus (excluding proof) - methods of integration (Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions) -Reduction formula on $\int_{0}^{\frac{\pi}{2}} \cos^{n} x dx$, $\int_{0}^{\frac{\pi}{2}} \sin^{n} x dx$.				
Unit - IV	**MUTIPLE INTEGRALS**		Periods	**12**
Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.				
Unit – V	**ORDINARY DIFFERENTIAL EQUATIONS**		Periods	**12**
Second order Linear ordinary differential equations with constant coefficients, Cauchy"s - Euler equations (excluding proof)- Legendre"s Linear differential equations(excluding proof) - Method of variation of parameters.				
			Total Periods	**60**

Text Books:

1.	Stewart, J. Calculus: Early Transcendentals (8th Edition), Cengage Learning, 2015.
2.	Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

References:

1.	Kreyszig E, Advanced Engineering Mathematics (10th Edition), John Wiley (2015).
2.	Boyce W E and DiPrima R, Elementary Differential Equations (9th Edition), John Wiley (2005).
3.	Nishant Shukla, Elementary Integral Calculus
4.	Anton H, Calculus: Early Transcendentals, 10th Edition, Wiley (2012).
5.	B V Ramana, Higher Engineering Mathematics, Tata McGraw Hill Education Pvt Ltd., New Delhi (2012)

E-Resources:

1.	https://freevideolectures.com › All Courses › Calculus › UCLA
2.	www.learnerstv.com/Free-engineering-Video-lectures
3.	www.nptel.ac.in

Programme	**B.E/B.TECH**		Programme code		104	Regulation		2019

<table>
<tr><td rowspan="3" style="text-align:center">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution Affiliated to Anna University Chennai)
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</table>

Programme	**B.E/B.TECH**		Programme code		104	Regulation		2019
Department	**INFORMATION TECHNOLOGY**					Semester		I

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19EN101	**English for Communication – I**	3	0	0	3	40	60	100

Objective	The main objective of this course is to: • Make learners listen to audio files and replicate it in speaking contexts. • Make learners read widely in order to practice writing • Make learners develop vocabulary and strengthen grammatical understanding • Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning. • Identify and begin to apply the language features of academic and professional writing and speaking

Outcomes	The students who complete this course successfully are expected to:	KL
	CO1: Speak adequately from the inputs they gained through listening.	K2
	CO2: Write appropriately based on the knowledge gained through reading of a variety of materials	K3
	CO3: Use language through their grammatical acquisition and their knowledge about using right word at the right context.	K3
	CO4: Listen the accents and tones of the language properly.	K2
	CO5: Comprehend and retain the contextual and syntax understanding from reading.	K4

Pre-Requisities	Nil	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO 9**	**PO10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1						2			3	3		3		2
CO 2						2			3	3		3		2
CO 3						2			3	3		3		2
CO 4						2			3	3		3		2
CO 5						2			3	3		3		2

Course Assessment Methods
direct

1. Continuous Assessment Test I, II & III
   2. Assignment
   3. End-Semester examinations

indirect
1. Course - end survey

Content of the syllabus			
Unit - I		Periods	**9**
Listening-Introduction to Different Types of Listening, Listening to Casual Conversations, **Speaking-** Introduction to develop the Art of Speaking, Giving Self Introduction, **Reading**–Understanding the Basics of Reading Skills, Reading Instructions and Technical Manuals, **Writing**- Introduction to writing strategies, Writing Definitions, **Focus on Language** - -Technical terms (Jargon), Word Formation with Prefixes and Suffixes, Using Active Voice and Passive Voice, Basic sentence patterns, Tenses (past, present, perfect and continuous tenses).			
Unit - II		Periods	**9**
Listening- Listening to lectures, listening to description of equipment, **Speaking-** Strategies for Developing Conversational Skills, Short Conversations through Role Play Activities, **Reading**– Reading Comprehension, Reading e-mails, Reading Headlines, Predicting the Content, **Writing**- Note making, Writing Descriptions, **Focus on Language**–Collocations, Functional Use of Tenses, Subject - verb agreement			
Unit - III		Periods	**9**
Listening- Listening to different kinds of interviews (Face - to - face, radio, TV and telephone interviews), **Speaking-**Describing an Object, Asking Questions, Participating in Discussions **Reading**– Intensive reading, Reading passages for gist. **Writing**- Informal writing -short e-mails with emphasis on Brevity, Clarity, Coherence and Cohesion), **Focus on Language**–Sequential Connectives, Impersonal Passive			
Unit - IV		Periods	**9**
Listening-Note Taking, **Speaking-** Improving Fluency through Narration.**Reading**–Reading passages for specific information- Phone messages, Reading and Transferring Information. **Writing**- Effective writing strategies, Informal writing, Writing a Memo, **Focus on Language**– Pronunciation Practice (Phonetic sounds - Vowels, Consonants and Diphthongs), Cause and Effect, Conditional Statements (if - clauses and types), Usage of Modal Verbs.			
Unit - V		Periods	**9**
Listening- Listening to understand Modulation, Listening to Welcome Speeches, **Speaking-** Delivering Welcome Add**ress,** Understanding Segmental and Suprasegmental Features-Practicing Stress, Pause and Intonation, **Reading**– Reading for a purpose, Reading Business Documents, Interpreting Charts and Graphs,. **Writing**- Writing Business e-mails, Describing a Process. **Focus on Language** -Synonyms and Antonyms, Common Errors in English.			
		Total Periods	**45**
Text Books:			
1.	Sumant. s, Pereira Joyce, Shameem.M, Selvarajan.R-English Communication Skills,Vijay Nicole imprints Pvt.Ltd, 2015.		
2.	Sokkaalingam, S.RM., The Art Of Speaking EnglishVersatile Publishing House,2018.		

References:	
1.	Dr. Padma Ravindran, Poorvadevi, M. Y. AbdurRazack- English for life, English for work, students Book, Ebek language laboratory pvt ltd, 2011.
2.	DuttRajeevan, Prakash. A Course in Communication Skill (Anna University, Coimbatore edition): Cambridge University Press India Pvt.Ltd, 2007.
3.	S.P. Dhanavel, English and Communication Skills for Students of Science and Engineering, Orient BlackswanPvt, Ltd, 2009.
4.	Technical English – I & II, Sonaversity, Sona College of Technology, Salem, First Edition, 2012.
5.	Meenakshmi Raman and Sangeeta Sharma- „Technical communication English Skills for Engineers; oxford University Press, 2008.
E-Resources:	
1	http://www.sparknotes.com/lit/the-alchemist/summary.html
2	https://www.stephencovey.com/7habits/7habits.php
3	http://en.wikipedia.org/wiki/The_Seven_Habits_of_Highly_Effective_People

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</table>

Programme	**B.TECH**	Programme Code		**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		**I**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19PH105	**Engineering Physics**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the basic concepts of properties of matter • Gain knowledge about the conduction properties of metals • Identify the different types of crystal structures and crystal growth techniques. Study the production and applications of ultrasonics. • Correlate better understanding the carrier concentration and its variations with temperature in a semiconductor. Study the properties of modern engineering materials and its uses • Categorize the types of laser and fiber optics

Course Outcome	At the end of the course, the student will be able to	Knowledge Level
	• Understand the elastic properties of the materials	K2
	• Gain knowledge about the conduction properties of metals	K3
	• Determine packing factor for various unit cells and understand different types of crystal imperfections and learn the engineering, medical applications.	K1
	• Discuss the basic idea of semiconducting materials and realize the function of modern engineering materials	K1
	• Learn the optical properties of materials and its uses	K3

Pre-requisites	---

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO 1	3	2	3	1	2									2
CO 2	3	2	3	3	1									
CO 3	3	2		3	1									2
CO 4	3		2	1	1								3	2
CO 5	3			1	2	2								2

Course Assessment Methods

Direct
1.Continuous Assessment Test I, II & III 2.End-Semester examinations
Indirect
1.Course - end survey

Content of the syllabus			
Unit – I	**PROPERTIES OF MATTER**	Periods	**9**
Elasticity: Types of moduli of elasticity - Stress - Strain Diagram – uses. Young"s modulus: Experimental determination by non-uniform bending - Twisting couple on a wire –Application: Torsional pendulum. **Viscosity:** Co-efficient of viscosity - Poiseuilles' formula - Experimental determination – uses.			
Unit - II	**ELECTRONS IN SOLID**	Periods	**9**
Classical theory: Classical free electron theory of metals- Expressions for electrical conductivity and Thermal Conductivity of metals – Wiedemann-Franz law (Qualitative) - Success and failures. **Quantum theory:** de Broglie"s hypothesis - Schrodinger"s time independent and time dependent wave equations (Qualitative) - Particle in a one-dimensional box- Fermi – Dirac Statistics - Density of energy states (Qualitative).			
Unit – III	**CRYSTAL PHYSICS AND ULTRASONICS**	Periods	**9**
Crystallography - Unit cell - Crystal systems - Bravais lattices- Lattice planes - Miller indices - Inter-planar spacing in cubic lattice- Calculation of number of atoms per unit cell- Atomic radius – Coordination number- Packing Factor for HCP structures. **Ultrasonics:** Introduction – Magnetostriction and Piezoelectric Oscillator methods – Applications: Sound Navigation and Ranging (SONAR), Non – Destructive Testing (NDT) and Sonogram.			
Unit - IV	**SEMICONDUCTING & MODERN ENGINEERING MATERIALS**	Periods	**9**
Intrinsic semiconductor: (Qualitative only) – Carrier concentration – Fermi level – Electrical conductivity - Band gap determination. Extrinsic semiconductors: Carrier concentration in n – type and p – type semiconductor (Qualitative) – Variation of Fermi level with temperature. **Metallic glasses:** preparation, properties and applications - Shape memory alloys (SMA): Characteristics and applications of NiTi alloy.			
Unit – V	**LASER AND FIBER OPTICS**	Periods	**9**
Laser: Characteristics of laser –Derivation of Einstein"s A and B coefficients. Types: Nd-YAG laser - Semiconductor laser: Homo junction - Applications. **Optical fiber:** Principle of propagation of light through optical fiber - Numerical aperture and acceptance angle (Qualitative)-Types of optical fibers -Fiber optical communication system (block diagram) -Application: Medical endoscope.			
		Total Periods	**45**

Text Books:	
1.	R.K.Gaur and Gupta. S.L, Engineering Physics, Dhanpat Rai Publishers, 2017.
2.	S.O Pillai., Solid state physics, New Age International Private Limited.
3.	. P.Mani, "Engineering Physics", Shri Dhanam publisher, Chennai – 600 042
References:	
1.	B.K. Pandey, S. Chaturvedi. "Engineering Physics", 1st Edition, Cengage Learning India Pvt Ltd, (2012).
2.	Fundamentals Of Physics Extended 8/Ed 8th Edition, David Halliday, Robert ResnickJearl Walker, Wiley India Pvt Ltd, 2008.
3.	Lawrence H.Vanvlack, "Elements of materials Science Engineering, 6th Edition, Pearson Publication.
4.	S.O.Pillai, "Solid State Physics", New Age International Publishers
5.	Dr.V.Rajendran, "Engineering Physics", Tata McGraw Hill Education Private Limited, New Delhi
E-Resources:	
1.	www.e-booksdirectory.com
2.	Home.iitk.ac.in
3.	physics.cu.ac.bd/

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Programme	**B.E./B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**CSE, EEE, ECE, IT, BT, CST & BME**			Semester	**I**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CS101	**Programming for Problem Solving**	3	0	0	3	40	60	100

Course Objective	The main objective of this course is to: • Learn the fundamentals of computers and acquire problem solving skills • Understand C programming concepts • Write the programs using arrays and strings • Write the programs using functions • Write the programs using structures

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Write the algorithms and to draw flowcharts for solving problems.	K3
	CO2: Analyze the basics of C programming language.	K4
	CO3: Implement the C programs using arrays and strings.	K4
	CO4: Develop C programs using the functions and pointers.	K3
	CO5: Solve the real time problems using Structures and union	K3

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO 1	3	3	3		2			3	3	3	3	2	3	
CO 2	3	3	3		2			3	3	3	3	2	3	
CO 3	3	3	3		2			3	3	3	3	2	3	
CO 4	3	3	3	2	2			3	3	3	3	2	3	
CO 5	3	3	3	3	2			3	3	3	3	2	3	3

Course Assessment Methods

DIRECT

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

INDIRECT

1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION TO PROBLEM SOLVING**	Periods	**9**
Basic Organization of Computer - Programming Languages- Flowchart – Pseudocode - Compilers-Interpreter-Algorithm - Building Blocks of Algorithm - Algorithmic Problem Solving-Simple Strategies for Developing Algorithms - Illustrative Problems: Find Minimum value from list of elements, Guess an Integer Number in a Range, Factorial of a given number.			
Unit - II	**C PROGRAMMING**	Periods	**9**
Introduction to C – Features - Data Types – Constants – Variables - I/O Statement - Operators – Expressions - Decision Making and Branching – Looping Statements - Break, Goto, Continue.			
Unit – III	**ARRAYS AND POINTERS**	Periods	**9**
Arrays: Concepts – Need – one dimensional array – array declaration – features – array initialization - Two- Dimensional Arrays- Multidimensional Arrays. Pointers: Introduction, pointer declaration-accessing variable through pointer-pointers and Arrays, Pointers and strings – Pointers structures-pointer Arithmetic - Array of Pointers – dynamic memory allocation.			
Unit - IV	**FUNCTIONS AND STRINGS**	Periods	**9**
Function: Introduction, function declaration, defining and accessing functions, User-defined Functions- storage classes-function prototypes-parameter passing methods-recursion. Strings: Concepts – Strings manipulation - String Input / Output Functions- Strings standard functions - Arrays of Strings.			
Unit – V	**STRUCTURES AND UNIONS**	Periods	**9**
Structures-Introduction- nested structures- Arrays of Structures - Structures and Functions - Pointers to Structures – Unions- Type Definition – Bitfields- Enumerated Types.			
		Total Periods	**45**
Text Books			
1.	Kernighan BW and Ritchie DM, "The C Programming Language", 2nd Edition, Prentice Hall of India, 2015.		
2.	E. Balagurusamy, Computer Programming, First Edition, Mc Graw Hill, 2016.		
References			
1.	Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition		
2.	Dr.V.Rameshbabu, Dr.R.Samyutha, M.Muni Rathnan, "Computer Programming", VRB Publishers Pvt.Ltd,		
3.	E. Balagurusamy, Programming in ANSI C, Seventh Edition, Mc Graw Hill, 2017.		
E-Resources			
1.	https://www.geeksforgeeks.org/c-language-set-1-introduction/		
2.	https://www.programiz.com/c-programming		
3.	https://www.cprogramming.com/		

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Programme	**B.Tech**		Programme Code	**104**	Regulation		**2019**	
Department	**INFORMATION TECHNOLOGY**				Semester		**I**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19GE101	**Engineering Graphics**	2	0	3	3	40	60	100

Course Objective	**The main objective of this course is to:** • Develop skills to enhance their ability to know the concept of engineering graphics and to draw the points kept in various positions, lines and planes. • Project the drawing of various solids. • Sketch sectioned views of solids. • Draw the development of surfaces. • Draw the isometric and orthographic projections for any given object to the required standard.

Course Outcomes	At the end of the course, the student should be able to	Knowledge Level
	CO1: Construct plane curves and develop projection of points , lines and plane surfaces	K2
	CO2: Construct projection of solids with various conditions.	K4
	CO3: Design the section of solids and analyze the true shape of the section	K3
	CO4: Design and develop the different solid surfaces.	K2
	CO5: Construct isometric and orthographic projection of different solids.	K1

re - requisites	Nil

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO 2	3	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO 3	3	2	2	2	3	-	-	-	-	-	-	-	2	-	-
CO 4	3	2	3	3	2	-	-	-	-	-	-	-	2	2	-
CO 5	3	3	2	3	3	-	-	-	-	-	-	-	3	-	-

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III   2. Assignment   3. End-Semester examination
Indirect
1. Course - end survey

Content of the Syllabus				
Concepts & Conventions(**Not for Examination**)	Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.	**Periods**	**1**	
Unit – I	**PROJECTION OF POINTS, LINES AND PLANE SURFACES**	**Periods**	**3+8**	
Introduction to Plane curves, Orthographic projection – principles – projection of points, straight lines (only first angle projections) and plane surfaces (polygonal and circular).				
Unit - II	**PROJECTION OF SOLIDS**	**Periods**	**3+8**	
Projections of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane.				
Unit - III	**SECTION OF SOLIDS**	**Periods**	**3+8**	
Sectioning of solids - prisms, pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other - Obtaining true shape of section.				
Unit - IV	**DEVELOPMENT OF SURFACES**	**Periods**	**3+8**	
Development of lateral surfaces of simple solids like prisms, pyramids, cylinders and cones – development of simple truncated solids involving prisms, pyramids, cylinders and cones.				
Unit - V	**ISOMETRIC PROJECTIONS, ORTHOGRAPHIC VIEWS FROM PICTORIAL VIEWS**	**Periods**	**5+10**	
Isometric Projection and Introduction to AutoCAD / Solid Edge: Principles of isometric projection - Isometric scale -Isometric projections of simple solids like prisms, pyramids, cylinders and cones & orthographic views from pictorial views.				
Demonstration only: **Computer Aided Drafting (Auto CAD / Solid Edge):** Introduction to drafting packages and demonstration of their use.				
		Total Periods	**60**	

Text Books:	
T1.	Basant Agrawal and C.M Agrawal ,"Engineering Drawing ",Tata McGraw Hill ,Third Edition,2019
T2	Jain and Gautam ,"Engineering Graphics & Design ",Khanna Publishing House, 2018

Reference Books:	
R1.	Dr.P.Kannan and Dr.J.Bensam Raj, "Engineering Graphics", JBR Tri Sea Publishers Pvt. Ltd,2018.
R2.	K.V Natarajan, "Engineering Drawing and Graphics", M/s. N.Dhanalakshmi, Chennai,2014.
R3.	K.Venugopal and V. Prabhu Raja, "Engineering Graphics"New Age International Publishers,2011.
R4.	N.S Parthasarathy and Velamurali, " Engineering Graphics", Oxford University, New Delhi,2015
R5.	Bhatt N.D and Panchal V.M, "Engineering Drawing", Charotar Publishing House,50th Edition,2010

E-Resources:	
E1.	http://nptel.ac.in/courses/105104148, "Engineering Graphics" - Dr. Nihar Ranjan Patra , IIT Kanpur
E2.	http://cfd.annauniv.edu/webcontent.htm, "Engineering Graphics" - Dr.Velamurali
E3.	http://link.springer.com/ "Engineering Graphics"-Springer Nature.

Programme	**B.Tech**					Regulation		**2019**

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Elayampalayam, Tiruchengode – 637 205

Programme	**B.Tech**					Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**					Semester		**I**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19PH106	**PHYSICS LABORATORY**	0	0	4	2	60	40	100

Course Objective	• Understand elastic behavior of Materials • Predict viscous force in liquids. • Gain knowledge in measuring the lowest thickness materials • To Identify wavelengths of prominent lines using polychromatic lamp • Observe heat conduction in bad conductor • Understand the principle of interferometer • To learn about the characteristics of Lasers

Course Outcome	At the end of the course, the student will be able to	Knowledge Level
	CO1: Measure the young"s modulus of the materials, Rigidity modulus – Torsion pendulum	K3
	CO2: Calculate Coefficient of viscosity of liquid and thickness of thin wire using Air wedge	K3
	CO3: Observe and measure the different wavelengths of mercury Spectrum and dispersive power of a prism	K3
	CO4: Illustrate the conductivity of bad conductors. To know how to determine the velocity of ultrasonic waves inliquid	K3
	CO5: To understand the importance of laser beam compared to ordinary light	K2

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	1													
CO 2	3	3	1	2	2									2	
CO 3	3	2			2										
CO 4	3	3		1											
CO 5	3	1	1		1										

Course Assessment Methods

Direct

1. Prelab and post lab test
2. End-Semester examinations

Indirect

1.Course - end survey

Content of the syllabus		
S.No.	**Experiments**	**CO**
1.	Determination of Young''s modulus of the material - Uniform bending method	**CO1**
2.	Determination of Young''s modulus of the material - Non uniform bending method	**CO1**
3.	Determination of Rigidity modulus – Torsion pendulum	**CO1**
4.	Determination of Coefficient of viscosity of a liquid – Poiseuille''s method	**CO2**
5.	Determination of thickness of a thin material – Air wedge method	**CO2**
6.	Determination of wavelength of mercury spectrum – spectrometer grating	**CO3**
7.	Determination of Dispersive power of a prism – Spectrometer	**CO3**
8.	Determination of thermal conductivity of metallic glass using Lee''s Disc Method	**CO4**
9.	Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer	**CO4**
10.	Determination of Wavelength and particle size using Laser	**CO5**
	Total Periods	**45**

Lab Manual	
1.	R. Jayaraman, Engineering Physics Laboratory Manual, Pearson Pub, Edition-2021.
2.	K. Katiyar &C.K. Pandey Engineering Physics: Theory and Practical, Wiley Pub,2 nd Edition.

Programme	**B. TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		**I**

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution, Affiliated to Anna University , Chennai)

Elayampalayam, Tiruchengode – 637 205

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CS102	**COMPUTER PRACTICES LABORATORY**	0	0	4	2	60	40	100

Course Objective	The Main Objective of the course is to • Make the students to learn the programming language • Understand the basic programming constructs and articulate how they are used • Develop a program with a desired runtime execution flow • Articulate where computer programs fit in the provision of computer based solutions toreal world problems

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Prepare document using word processor	K3
	CO2: Sketch flow of execution of C programs using algorithm and flowcharts	K3
	CO3: Write the simple C Programs using decision and looping statements	K3
	CO4: Demonstrate code reusability with the help of user defined functions and pointers.	K4
	CO5: Write programs that perform operations using derived data types.	K3

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	3	3	1				3	3	3	3	3	3	1
CO 2	3	3	3	1				3	3	3	3	3	3	1
CO 3	3	3	3	1				3	3	3	3	3	3	1
CO 4	3	3	3	3				3	3	3	3	3	3	1
CO 5	3	3	3	3				3	3	3	3	3	3	1

Course Assessment Methods

Direct
1. Prelab and post lab test 2. Record mark 3. End-Semester examinations
Indirect
1. Course - end survey

SUGGESTED LIST OF EXPERIMENTS	Course Outcome

1. Design an algorithm and flowchart using word processor that reads the customernumber and power consumed and prints the amount to be paid by the customer. An electric power distribution company charges its domestic consumers as follows
 	
    Consumption Units   Rate of Charge
    --- 	
      0-200   Rs.0.50 per unit
      201-400   Rs.100 plus Rs.0.65 per unit excess 200
      401-600   Rs.230 plus Rs.0.80 per unit excess of 400
	CO1

2. Design an algorithm and flowchart for a simple calculator program using word processor forperforming various arithmetic operations such as
 	
        "+"   - Addition
        "-"   - Subtraction
        "*"   -
Multiplication
        "/"   - Division
        "%"   - Modulus
	CO2

3. Design and develop a C program to accept a number from the user and check whether it is a
Palindrome or not.
    Palindrome number : (a number is a Palindrome which when read in reverse order is same asread in the right order)
    Example: Palindrome
    :11, 101, 151 Not a
    Palindrome:123 , 100
	CO3

4. Develop a C program to find the sum of the digits of an integer and the number of digits in theinteger that is given as input by the user. Test Case: Sample Input: 15390 Sample Output: Sum of the digits=18 No. of digits = 5 For an incorrect choice, an appropriate error message should be displayed.	CO3

5. Develop a program to perform the following operations using two dimensional or multi-dimensional matrices:
    a.   Addition of two matrices (3x3)
    b.   Subtraction of two matrices (2x2)
    c.   Multiplication of two matrices using dynamic memory allocation.
	CO3

6. Write a program to find the maximum and minimum element in a set of inputs using onedimensional array.	CO3

7. Write a program to count the total number of vowels and consonants in a string. For exampleInput string: I am proud to be an Indian Output: Total vowels – 10 and Total consonants – 10		**CO4**

8. Develop a program to perform the following string manipulations without using stringfunctions:
     d. String copy
     e. String Concatenate
     f. String length
     g. String Compare
		CO4

9. The Fibonacci numbers are defined recursively as follows:F1=1 F2=1 Fn= Fn-1 + Fn-2, n>2 Write a function that will generate and print the first n Fibonacci numbers.Test the function for n=5,10,15		**CO4**
10. Write a function using pointers to exchange the values stored in two locations inthe memory.Test Case : Input : A=10 , B=-5 Output : A= -5 , B=10		**CO4**
11. Develop a program to build a database of students with the following attribute: Roll no, Name, Course, Stream, Percentage, and Division. Take input for each student in all fields except division. Calculate division of each student such that those students having percentage >=60% are belongs to first division. Similarly, for second and third division students having conditions 50 %< =percentage<60% and 35 %< =percentage<50% respectively. If any student has percentage less than 35% then write "fail" in division field. After building the database display the database of the students. Hint: create database using structure.		**CO5**
Total Periods		**45**

	E-Resources
1.	https://www.programiz.com/c-programming
2.	https://www.cprogramming.com/
3.	https://beginnersbook.com/2015/02/simple-c-programs/

<table>
<tr><td rowspan="3"></td><td colspan="2" align="center">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN</td><td></td></tr>
</table>

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN	
	(Autonomous Institution Affiliated to Anna University Chennai) Elayampalayam, Tiruchengode – 637 205	

Programme	**B.E /B.TECH**	Programme code	104	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		I

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19MCFY1	**Environmental Science and Engineering**	3	0	0	0	100	0	100

Course Objective	The main objective of this course is to: • Familiarize basics of ecosystem and creating environmental awareness. • Congregate quality and standards requirement of water. • Contrast water management procedures. • Acquire knowledge on air pollution and its control. • Summarize Solid waste and its prevention methods.

Course Outcome	The students who complete this course successfully are expected to:	Knowledge Level
	CO1: Distinguish the types of Ecosystem and implicit the knowledge.	K1
	CO2: Recognize quality, standard and control strategies of polluted water.	K3
	CO3: Infer and express air pollution and its control.	K3
	CO4: Acquire Knowledge about Radioactive pollution and disposalmethod	K3
	CO5: Awareness about population growth, human rights and Environment	K2

Pre- requisites	**Nil**	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
	Programme Outcomes (POs)												PSOs	
COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	1	1			2	3				1	2		
CO 2	1	2	2			2	3					3		1
CO 3	2	2	1			3	3				1	2		1
CO 4	1	1	1			2	3				1	2		
CO 5	1	2	1			2	2				1	3	2	

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations	
Indirect	
1. Course - end survey	

Content of the syllabus

Unit – I	**Introduction to Environmental Science and Engineering**	Periods	**9**

Nature and scope of environmental education- Natural Resources – (Forest, Water, Food, Energy & Land Resources) problems and remedial measures, Ecosystem and Biodiversity- Ecosystem-Structure, Characteristics and functions of ecosystem (in general)- Biodiversity – Definition – Conservation of Biodiversity (in-situ and Ex-situ)- Environmental awareness and sustainable development

Unit – II	**Water pollution and Waste water treatment process.**	Periods	9

Water pollution-causes, effects and control measures of water pollution- case study- Waste water treatment process- Primary, Secondary, Tertiary and desalination-Water quality parameters- Hardness, Alkalinity, DO, COD, BOD-Water quality standard-
WHO and BIS.

Unit – III	**Air Pollution and its Control**	Periods	9

Air pollution-Types of Air Pollutants- CO_2,SO_2, NO_2, PAN etc Sources- causes, effects (Acid rain, use eGreen hoffect, Ozone layer depletion and global warming)- control measures (Electro static precipitator, Gravitational settling chamber, Baghouse filter, Wet Scrubber and cyclone separator).

Unit – IV	**Radioactive Pollution and Solid waste management**	Periods	9

Radio active pollutants-sources, effects , Nuclear Energy – Nuclear Fusion –Nuclear Fission-Nuclear power plant- Light water nuclear power plant- Diagram- illustration-working – pollution- impacts-and control measures- case study- solid waste-definition-Types of solid waste- Disposal method and its problem in solid waste management-Significance for prevention of hazardous waste management.

Unit – V	**Human population and the Environment**	Periods	9

Population growth, Human rights, Value education, environment and Human health, Family welfare Program, Women and Child welfare, Role of information technology in environment – Satellite, Data base, Geographical Information System (GIA), Environmental impact Analysis (EIA) and Human health.

	Total Periods	**45**

Text books

1.	Dr.S. Vairam, "Environment Science and Engineering" Gems publication. Edition 2018
2.	Gilbert.M.Masters-"Environmental Science"-Pearson education. Edition-2-2013

Reference books	
1.	Linda Williams- "Environmental Science"-Tata McGRAW – Hill Edition. Edition-I-2008
2.	T.G.Miller Jr-"Environmental Science"-Wadsworth publishing Co. Edition -10-2004
3.	William P. Cunningham, Barbara Woodworth Saigo- Tata McGraw Hill.Edition-4-2011
4.	NPTEL Course Notes
5.	Cunnighum and cooper-"Environmental Science"-Jaico Publ, House Edition-4-2007
E-Resources	
1	https://libraries.ou.edu/
2	https://libguides.reading.ac.uk/
3	https://libguides.reading.ac.uk/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205					

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		**II**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19MA202	**Linear Algebra and Ordinary Differential Equations**	3	1	0	4	40	60	100

Course Objective	The Main Objective of the course is to • Understand Eigen values and Eigen vectors and its role in the system of equations. • Proficiently understand the vector differential calculus. • Demonstrate vector integral calculus. • Know about Cartesian and Polar co-ordinates and also transformations. • Identify the Laplace transform of derivatives and integrals.

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Analyze the Reduction of a quadratic form.	K3, K4
	CO2: Identify vector differential calculus.	K2, K3
	CO3: Apply Green's , Stoke's and Gauss Divergence theorems	K1, K5
	CO4: Identifying the analytic functions	K2, K5
	CO5: Recognize the Laplace transform of unit step and unit impulse functions.	K5, K3

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO 1	3	3												2	
CO 2	3	3												2	
CO 3	3	3												2	
CO 4	3	3												2	
CO 5	3	3												2	

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III   2. Assignment.   3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**MATRICES**	Periods	**12**
Characteristic equation – Eigen values and Eigenvectors of a real matrix– Properties of Eigen values and Eigenvectors – Cayley-Hamilton theorem(excluding proof) – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms. Simple application in encoding message using 2×2 matrix. Simple application in encoding message using 2×2 matrix.			
Unit - II	**VECTOR DIFFERENTIAL CALCULUS**	Periods	**12**
Vector Differentiation: Vector and Scalar Functions- Derivatives- Curves, Gradient of a Scalar Field-Directional Derivative -Divergence of a Vector Field - Curl of a Vector Field – Tangents and Normals.			
Unit – III	**VECTOR INTEGRAL CALCULUS**	Periods	**12**
Line, Surface and Volume integrals, Green‟s theorem in a plane(excluding proof), Gauss Divergence theorem(excluding proof), Stokes theorem (Excluding proof) - simple applications involving rectangular parallelepipeds and spheres.			
Unit - IV	**ANALYTIC FUNCTIONS**	Periods	**12**
Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions c+z, cz,1/z and Bilinear transformation.			
Unit – V	**LAPLACE TRANSFORMS**	Periods	**12**
Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems(excluding proof) -Transforms of derivatives and integrals – Initial and final value theorems(excluding proof) – Inverse transforms – Convolution theorem(excluding proof) – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.			
		Total Periods	**60**

Text Books:

1. T.Veerarajan, Engineering Mathematics, Tata McGraw Hill Education Pvt. Ltd-2012
2. Ravish R Sing , Mukul Bhatt, "Engineering Mathematics", Mc Graw Hill Education Pvt. Ltd-2018

References:

1. Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics" , Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.
2. Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John Wiley (2015).
3. Alan Jefferis , Advanced Engineering Mathematics,Academic Press- New Delhi-2003
4. Yunus A.Cengel, William J.Palm III," Differential equations for Engineers & Scientists", Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.
5. John Bird, Higher Engineering Mathematics, Anuradha Agencies(2004)

E-Resources:

1. https://en.wikipedia.org › wiki › Ordinary differential equation
2. www.learnerstv.com/Free-engineering-Video-lectures
3. www.nptel.ac.in

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<tr><td colspan="2" rowspan="2"></td><td colspan="2">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Elayampalayam, Tiruchengode – 637 205</td><td colspan="2"></td></tr>
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Programme	**B.E /B.TECH**	Programme code	104	Regulation		2019
Department	**INFORMATION TECHNOLOGY**		Semester			II

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19EN202	**English for Communication - II**	3	0	0	3	40	60	100

Course Objective	The main objective of this course is to: • Provide suitable listening tasks to develop communicative ability for academic and professional progress • Inculcate channelized reading to make learners proficient in the chosen professional writing contexts. • Improve learners" vocabulary and grammar to supplement their language use at professional contexts • Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning. • Identify and begin to apply the language features of academic and professional writing and speaking

	The students who complete this course successfully are expected to:	KL
Course Outcomes	**CO1:**Acquire sufficient command over language to speak at an academic or professional context through continuous exposure to similar listening tasks.	K2
	CO2: Write technically well at a professional contexts through exposing them to similar readings.	K3
	CO3: Use language at length at technical and professional situations through the enrichment of vocabulary and strengthening of grammatical knowledge.	K3
	CO4: Students should be able to ethically gather, understand, evaluate and synthesize information from a variety of written and electronic sources.	K2
	CO5: Students should be proficient in oral communication and writing.	K4

Pre-requisites	Nil	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO 1						2			3	3		3		2
CO 2						2			3	3		3		2
CO 3						2			3	3		3		2
CO 4						2			3	3		3		2
CO 5						2			3	3		3		2

Course Assessment Methods		
Direct		
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations		
Indirect		
1. Course – end survey		
Content of the syllabus		
Unit - I	Periods	9
Listening- Listening for Cultural Awareness, Listening to Professional Conversations, Talks, Interviews and Lectures **Speaking-** Developing Confidence to get rid of Fear on the Dias, Discussion at a Corporate Context. **Reading**– Inferential Reading, Reading Short Messages and Technical Articles, **Writing**- Introduction to Letter Writing, Writing Formal and Informal Letters, Thanking Letters, Letters Calling for Quotations, Letters Placing an Order, Seeking clarification, Letters of Complaint. **Focus on Language**–Adjectives and Degrees of Comparisons		
Unit - II	Periods	9
Listening- Listening to specific information relating to technical content, Listening for statistical information **Speaking-** Expressing opinions, Formal Discussions, Describing Role Play at Business Context and Consolidating Ideas. **Reading**–Reading Technical Articles in Journals and Comparing Articles. **Writing**- Letter seeking permission to undergo practical training and to undertake project work. **Focus on Language**– Simple, compound and complex sentences and Transformation of Sentences.		
Unit - III	Periods	9
Listening- Listening to understand the overall meaning, Listening to Interviews and Presentations. **Speaking-** Giving Instructions and Showing Directions and Rephrasing Instructions. **Reading**– Skimming and Scanning, Reading Job Advertisements. **Writing**- Applying for a Job, Writing a CV. **Focus on Language**– Pronouns, Phrasal verbs, Restrictive and Non - restrictive clauses.		
Unit - IV	Periods	9
Listening- Listening and retrieving Information. **Speaking-** Developing fluency and Coherence, Accent Neutralization, Voice Modulation, and Intonation, Improving Voice Quality. **Reading**– Reading and understanding Advertisements. **Writing**- Letters to the Editor, Letter of Complaint, Various kinds of Reports, Permission to go for Industrial visits. **Focus on Language**– Countable, Uncountable nouns, Recommendations, Discourse Markers and Comparative and Contrastive Connectives, Imperatives.		
Unit - V	Periods	9
Listening- Listening to Fragmented Texts and Filling in the Blanks. **Speaking-**Mind Mapping, Developing Coherence and Self-Expression, Making presentations, Paralinguistic and Extra linguistic Features (body language), **Reading**– Predicting content, Interpreting Reports. **Writing**- Writing Proposals, Agenda, Minutes of the Meeting. **Focus on Language**– British and American Vocabulary, Editing, Error Detection, and Punctuation.		
	Total Periods	**45**

	Text books
1.	Sumant.S, Pereira Joyce, English for Communication, Vijay Nicole Imprints Pvt.Ltd., 2014.
2.	Sokkaalingam, S.R.M., The Art Of Speaking English Versatile Publishing House,2018.
	Reference books
1.	Norman Whitby - Business Benchmark Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2008. , 1997.
2.	Dutt, Rajeevan, Prakash .A Course in Communication Skills (Anna University, Coimbatore edition) :. Cambridge University Press India Pvt.Ltd, 2007.
3.	Meenakshi Raman and Sangeeta Sharma-'Technical Communication English Skills for Engineers'; Oxford University Press, 2008.
4.	S.P. Dhanavel, English and Communication Skills for Students of Science and Engineering, Orient BlackswanPvt, Ltd, 2009.
5.	Technical English – I & II, Sonaversity, Sona College of Technology, Salem, First Edition, 2012.
	E-Resources
1	http://www.kalevleetaru.com/Publish/Book_Review_Who_Moved_My_Cheese.pdf
2	http://www.bookbrowse.com/reviews/index.cfm/book_number/304/who-moved-my-cheese
3	http://www.imdb.com/title/tt0482629/plotsummary

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University , Chennai) Elayampalayam, Tiruchengode – 637 205		

Programme	**B.TECH**	Programme code	104	Regulation	2019
Department	**INFORMATION TECHNOLOGY**		Semester		II

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CH207	**Engineering Chemistry**	3	0	0	3	40	60	100

Course Objective	The main objective of this course is to: • Recognize the basic technology requirements in water treatment • Gain knowledge in Polymeric materials towards engineering applications. • Enrich the Knowledge of the students with the basics of Nano materials, their properties and applications. • Familiarize about the renewable energy and different types of batteries in the engineering application. • Gain knowledge in destruction of metals and protection for engineering applications.

Course Outcomes	The students who complete this course successfully are expected to:	KL
	CO1: Implement innovative solutions in wastewater treatment process.	K3
	CO2: Identify the applications of a specific polymer in the field of engineering.	K2
	CO3: Forecast the information of Nano particles and their industrial applications	K2
	CO4: Recognize the renewable energy devices for sustainable energy.	K3
	CO5: Identify the rate of corrosion of a metal in a given environment and find out appropriate control techniques to avoid corrosion.	K3

Pre-Requisities	Nil

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO 1	3	3	2	2		2	2				1	2	2	1	
CO 2	3	2	2	1		2	2				1	1	2	1	
CO 3	3	2	3	2	1	2	1				1	1	1	1	
CO 4	3	3	2	2	2	3	3				1	2	3	2	
CO 5	3	3	2	2	1	3	2				2	2	1	1	

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit - I	**WATER TECHNOLOGY**	Periods	9
Introduction-Sources and impurities in Water, Soft and Hard water, Water quality parameters, Types of Hardness – Determination of Hardness by EDTA method, Domestic Water Treatment. Boiler Feed Water –Requisites, Problems due to hard water in boilers - Scale and Sludge formation in boilers- Caustic Embrittlement-Boiler corrosion, Treatment of boiler feed Water – Internal conditioning (Carbonate, Phosphate, and Calgon conditioning) External conditioning – Ion exchange process, Zeolite process, Brackish water –Water purification by Reverse osmosis.			
Unit - II	**POLYMER CHEMISTRY**	Periods	9
Introduction - Occurrence, definitions – Functionality - Degree of Polymerization, Classification of polymers – structure (Linear, Branched & network polymer structure) block, random & graft copolymers, properties of polymers, Tacticity, Tg, molecular weight - number and weight average method. Types of polymerizations: Addition, condensation and copolymerization. Mechanism of polymerization: Addition - Free radical, cationic and anionic polymerization). Preparation, properties and applications of PE, PMMA, PC, nylon6, nylon 66, PET, and Bakelite.			
Unit - III	**NANO CHEMISTRY**	Periods	9
Basics- distinction between molecules, nanoparticles and bulk materials; size dependent properties. Nanoparticles: nanocluster, nanorod, nanotube (CNT) and nanowires. Synthesis: Sol-gel, Precipitation, Thermolysis - hydrothermal, solvothermal, Electro deposition, Spray Pyrolysis, Chemical Vapour deposition, Laser ablation; Properties and applications of nano materials in medical and electronic devices.			
Unit - IV	**RENEWABLE ENERGY AND STORAGE DEVICES**	Periods	9
Renewable energy and its sources - Solar Energy - Photo voltaic cells, Importance of Solar cells - p-n junctions in Solar cells - Working of Photovoltaic cell, Recent advances in solar cell materials, Wind energy - Types of Wind Power Plants (WPPs), Components and working of WPPs, Tidal energy - Types of Tidal power plants (TPPs), Barrage and Non-Barrage Tidal power systems. Batteries and fuel cells: Types of batteries - Dry cells-Alkaline battery, lead storage battery, Ni-Cd battery, lithium battery, Fuel cell - H_2-O_2 fuel cell-applications.			
Unit - V	**CORROSION AND ITS CONTROL**	Periods	9
Introduction, Types of corrosion - chemical and electrochemical corrosion, mechanism, Pilling - Bedworth rule, Types of electrochemical corrosion – Galvanic corrosion, Pitting corrosion, Crevice corrosion, Corrosion on wire fence and Pipeline corrosion, Factors influencing rate of corrosion, corrosion control methods – Sacrificial anode and impressed cathodic current. Protective coatings – Paints: constituents and functions, Metallic coatings - steps involved in cleaning the surface for Electroplating, Electroplating (Au), Electro less plating (Ni).			
		Total Periods	**45**

Text Books:	
1.	O.G.Palanna, "Engineering Chemistry "Tata Mc GrawHill PVT,Ltd. Second Edition -2017
2.	Dr.S.Vairam ,Dr.S.Mageswari,Dr.K.Balachandran, Engineering Chemistry : First Edition, Wiley publication,Reprint-2016
References:	
1.	Engineering Chemistry: Jain & Jain, Dhanpat Rai Publishing Company Edition- 16- 2015.
2.	Arun Bahl, B.S. Bahl, G.D. Tuli, Essentials of Physical Chemistry, Published by S. Chand & Company Ltd, 2014
3.	Puri, Sharma and Pathnia, Physical Chemistry-II, Vishal Publishers,.Edition- 2019.
4.	Engineering Chemistry: Sashi Chawla, Dhanpat Rai & Co (pvt.)ltd. Edition- 5- 2013.
5.	Dr.S.Vairam ,Dr.Suba Ramesh, Engineering Chemistry: First Edition, Wiley publication,Reprint-2016
E-Resources:	
1	https://www.who.int/water_sanitation_health/dwq/arsenicun6.pdf
2	https://www.schandpublishing.com/books/tech-professional/applied-science/a-textbook-polymer-chemistry/9788121941129/#.XdZ214MzY2w
3	https://www.elsevier.com/books/nanochemistry/klabunde/978-0-444-59397-9

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205		

Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**II**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19EE201	**Basic Electrical and Electronics Engineering**	3	0	0	3	40	60	100

Course Objective	The students should made to • Learn the basic concepts of electrical parameters and electrical machines • Learn the electrical wiring methods • Learn the basics about semiconductor families and digital logics	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Understand the basics of electric circuits and type of the connection	K2
	CO2: Understand the basics of electromagnetic laws and basic working principle of DC and AC machines.	K2
	CO3: Understand the concepts of tariff, energy saving, illumination, electric lamps and safety measures.	K2
	CO4: Understand the basic operating characteristics of semiconductor devices.	K2
	CO5: Understand the fundamentals of digital logics and integrated circuits.	K2
Pre-requisites	Basic concepts and understanding of magnetic fields	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
	Programme Outcomes (POs)												PSOs	
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO 1	3	2										3	3	
CO 2	3	2										3	3	
CO 3	3											3	3	
CO 4	3	2										3	3	
CO 5	3	2										3	3	

Course Assessment Methods
Direct
1.Continuous Assessment Test I, II & III   2.Assignment   3.End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION OF ELECTRICAL CIRCUITS**	**Periods**	**9**
Definition of Voltage, Current, Power, Energy, Power factor, Circuit parameters, Ohms law, Kirchoff's law. Concepts of AC Circuits- RMS value, Average value, Form and Peak factors, Concept of real and reactive power. Introduction to three phase systems - types of connections, relationship between line and phase values. Concept ofDC circuits			
Unit - II	**INTRODUCTION OF ELECTRICAL MACHINESAND MEASUREMENTS**	**Periods**	**9**
Faraday's laws of electromagnetic induction - Lens law - Fleming's left hand rule and Righthand rule. Working principle and construction of AC and DC machines -Working principle and construction of Transformer- Introductionto electrical measuring instruments – Analog and Digital Instruments **(Qualitative)**			
Unit– III	**WIRING AND ILLUMINATION**	**Periods**	**9**
Types of wiring-staircase and corridor wiring - wiring accessories. Different types of safety measures - Earthing. Electrical tariff - Energy conservation. Simple layout of power system- various energy resources,. The Laws ofIllumination - Different types of electrical lamps.			
Unit - IV	**SEMICONDUCTOR DEVICES**	Periods	**9**
PN junction diodes - Zener diodes - characteristics. Transistors: PNP and NPN transistors - Theory of operation - Transistor configurations -characteristics - comparison. Special semiconductor devices: FET - SCR - LED – V-I characteristics –UPS – SMPS.			
Unit – V	**DIGITAL FUNDAMENTALS**	Periods	**9**
Number systems - Boolean Theorems – De Morgan's Theorem - Logic gates -Implementation of Boolean Expressionusing Gates - Introduction to Operational Amplifier.			
		Total Periods	**45**

Text Books

1.	D.P. Kotharti and I.J Nagarath, Basic Electrical and Electronics Engineering, Mc Graw Hill, Third Edition,2016.
2.	M.S. Sukhija and T.K. Nagsarkar, Basic Electrical and Electronics Engineering, Oxford, 2016.

References

1.	S.B. Lal Seksena and Kaustuv Dasgupta, Fundaments of Electrical Engineering, Cambridge, 2016
2.	Mittle,Mittal, Basic Electrical Engineering‖, 2nd Edition, Tata McGraw-Hill Edition, 2016.
3.	S.K.Sahdev, Basic of Electrical Engineering, Pearson, 2015.
4.	John Bird, ―Electrical and Electronic Principles and Technology, Fourth Edition, Elsevier, 2010.
5.	K Murugesh Kumar, Elements of Electrical Engineering, Vikas Publishing House Pvt. Ltd.2011.

E-Resources

1.	https://nptel.ac.in/courses
2.	https://www.electrical4u.com/electrical-engineering-articles/illumination-engineering/
3.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/lecture-notes

<table>
<tr>
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<td colspan="8">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205</td>
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</table>

Programme	**B.Tech**		Programme Code	**104**	Regulation		**2019**	
Department	**Information Technology**				Semester		**II**	

Course Code	Course Name		Periods Per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
U19GE202	**Basic Civil and Mechanical Engineering**		3	0	0	3	40	60	100

Course Objective	**The main objective of this course is to:** • Familiarize the materials and measurements used in Civil Engineering. • Provide the exposure on the fundamental elements of civil engineering components and structures. • Impart basic knowledge of power plants, pumps & boilers. • Study the various types of IC engines and understand the features of IC engine. • Enable the students to distinguish the components and working principle of refrigeration and air conditioning system.

Course Outcomes	At the end of the course, the student should be able to	Knowledge Level
	CO 1: Explain the usage of civil engineering materials and measure the location of points in surveying	K2
	CO 2: Identify the nature of building components, structures and material qualities.	K1
	CO 3: Classify the various types of power plant, pump, turbine & boiler	K2
	CO 4: Compare spark ignition and compression ignition of two stroke and four stroke engine.	K2
	CO 5: Elaborate the working principle of refrigeration and air conditioning system.	K3

Pre -requisites	Nil

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	2	3	-	-	-	-	-	-	-	3	2	-
CO 2	3	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO 3	3	2	2	-	2	-	-	-	-	-	-	-	2	3	-
CO 4	3	3	2	-	2	-	-	-	-	-	-	-	2	-	-
CO 5	3	2	2	-	2	-	-	-	-	-	-	-	3	2	-

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examination
Indirect
1. Course - end survey

Content of the Syllabus			
Unit – I	**CIVIL ENGINEERING MATERIALS AND SURVEYING**	**Periods**	**9**
Civil Engineering Materials: Bricks – Stones – Sand – Cement – Concrete – Steel sections. **Surveying**: Introduction to Surveying & Leveling.			
Unit - II	**BUILDING COMPONENTS AND STRUCTURES**	**Periods**	**9**
Foundations: Site selection, Foundation – Types – Requirement of good foundations. **Superstructure:** Brick masonry – Stone masonry – Beams – Columns – Lintels – Roofing – Flooring - Plastering.			
Unit - III	**POWER PLANT ENGINEERING**	**Periods**	**9**
Introduction, Classification of Power Plants – Boiler - Working principle of steam , Gas , Diesel , Hydro-electric, Solar, Wind and Nuclear Power plants – Merits and Demerits – Pumps and turbines – Working principle of reciprocating pumps (single acting and double acting) – Centrifugal Pump.			
Unit - IV	**IC ENGINES AND AUTOMOTIVE VEHICLES**	**Periods**	**9**
Internal combustion engines as automotive power plant – Four stroke and two stroke cycles – Working of SI and CI engines - Comparison of four stroke and two stroke engines - Introduction to Electric vehicles.			
Unit - V	**REFRIGERATION AND AIR CONDITIONING SYSTEM**	**Periods**	**9**
Terminology of refrigeration and air conditioning. Principle of vapour compression and vapour absorption refrigeration system – Layout of typical domestic refrigerator – Window and split type room air conditioner.			
		Total Periods	**45**

Text Books:	
T1.	Dr.P.Kannan, "Basic Mechanical Engineering", JBR Tri Sea Publishers Pvt. Ltd., 2019.
T2	Pravin Kumar, "Basic Mechanical Engineering", Pearson Publishers, New Delhi, 2013.
Reference Books:	
R1.	Dr.S.Ramachandaran, " Basic Civil and Mechanical Engineering " Air Walk Publication,2016
R2.	R.Gupta, "Basic Civil Engineering", RPH Publication, 2016.
R3.	Mrs.V.Valarmathi, Mr.K.Rajasekar & Mr.T.Satheeskumar,"Basic Civil Engineering", JBR Tri Sea Publishers Pvt. Ltd., 2017.
R4.	G.Shanmugam and M.S Palanichamy, "Basic Civil and Mechanical Engineering ",Tata McGraw Hill Publishing Company Limited, New Delhi,2014
R5.	S.Seetharaman, " Basic Civil Engineering ",Anuradha Agencies,2005
e-Resources:	
E1.	https://nptel.ac.in/downloads/105105104/
E2.	https://nptel.ac.in/courses/112107216/
E3.	http://link.springer.com/ "Basic Civil and Mechanical Engineering"-Springer Nature.

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Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**		Semester	**II**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT201	**Object Oriented Programming**	2	0	2	3	40	60	100

Course Objective	The main objective of this course is to: • Understand the OOP concepts using Classes, Objects and Pointers to Objects in C++ • Learn the concepts of Memory allocation using constructors and Operator overloading • Learn the different types of Member functions, Templates and handling Exceptions • Understand the levels of Inheritance, concepts of Streams and File handling methods • Learn the fundamentals of Java, Inheritance and Exception Handling in Java

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Analyze the OOP concepts using C++ programming language.	K3
	CO2: Implement OOP concepts such as Encapsulation, Data abstraction and Polymorphism through C++ Classes and Objects	K4
	CO3: Implement OOP concepts such as Message Passing using Member functions, Data hiding using Templates and to handle various exceptions	K4
	CO4: Implement Inheritance and develop C++ programs using the streams and member functions to enable File Handling.	K4
	CO5: Develop Java Programs to Implement Inheritance using Overriding and Exception Handling using try-catch blocks.	K3

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	3	3	3	3	2	1				2	2	3	3
CO 2	3	3	3	3	3	2	1				2	2	3	3
CO 3	3	3	3	3	3	2	1				2	2	3	3
CO 4	3	3	3	3	3	2	1				2	2	3	3
CO 5	3	3	3	3	3	2	1				2	2	3	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Content of the syllabus

Unit – I	**INTRODUCTION**	Periods	**10**

Object oriented approach - Characteristics of Object-oriented languages – C++ Programming basics – Loops and Decisions – Structures - Objects and Classes: A Simple class – C++ objects as physical objects – Classes, Objects and Memory – Static Class data – Const and classes- Pointers: Memory management – Pointers to objects- Pointers to Pointers.

Unit - II	**CONSTRUCTORS AND OPERATOR OVERLOADING**	Periods	**8**

Constructors – Objects as Function Arguments -   Default Copy Constructor –Assignment and Copy Initialization -Returning Objects – Operator Overloading: Unary Operators – Binary Operators – Data Conversion – Pitfalls.

Unit – III	**FUNCTIONS, TEMPLATES AND EXCEPTIONS**	Periods	**8**

Simple Functions – Passing Arguments – Returning Values – Reference Arguments – Default Arguments – Overloaded Functions – Inline Functions – Friend functions - Variables and Storage Classes – Function Templates – Class Templates – Exceptions

Unit - IV	**INHERITANCE, STREAMS AND FILES**	Periods	**10**

Inheritance: Derived and Base Classes – Derived class Constructors – Overriding member functions – Class hierarchy – Public and Private Inheritance – Levels of Inheritance – Multiple Inheritance – Ambiguity - Virtual Functions – Static functions- this pointer.
Stream Classes – Stream Errors – Disk File I/O wit streams – File pointers –Error Handling in File I/O – File I/O with member functions

Unit – V	**INTRODUCTION TO JAVA PROGRAMMING**	Periods	**9**

Overview of Java - Data Types, Variables, and Arrays - Operators - Control Statements - Introducing Classes - Methods and Classes. Inheritance: Basics - Using Super – Creating a Multilevel Hierarchy - Method overriding – Using Abstract Classes.Exception Handling: Types - Try and Catch - Throw - Finally – User defined exceptions

	Total Periods	**45**

Text Books

1.	Robert Lafore, "Object Oriented Programming in C++" 4th Edition, SAMS, Pearson India.
2.	Herbert Schildt, Java 2-The Complete Reference, Tata Mc Graw Hill, 2017

References

1.	Bhushan Trivedi, "Programming with ANSI C++", Oxford University Press.
2.	Paul Deitel & Harvey Deitel, "C++ How to program",8th Edition, PHI.
3.	E.Balagurusamy,"Object Oriented Programming with C++,5th Edition, Tata McGraw-Hill Education
4.	Yashavant P. Kanetkar, "Let Us C++", 2nd Edition, BPB Publications.
5.	Deitel & Deitel, Java How to Program, Prentice Hall of India, 2010

E-Resources

1.	https://www.geeksforgeeks.org
2.	https://www.programiz.com
3.	https://www.cprogramming.com/

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Programme	B.E./B.Tech.	Programme code		Regulation			2019
Department				Semester			II

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19TA201	**Heritage of Tamils / தமிழர் மரபு**	2	0	0	1	40	60	100

Content of the syllabus

அலகு 1	மொழி மற்றும் இலக்கியம்	Periods	3

இந்திய மொழிக்குடும்பங்கள் – திராவிடமொழிகள் – தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயச் சார்பற்றத்தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் திருக்குறளில் மேலாண்மைக்கருத்துக்கள் – தமிழ்க்காப்பியங்கள் – தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம்,ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசனின் பங்களிப்பு.

அலகு 2	மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை –சிற்பக்கலை	Periods	3

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன்சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப்பொருட்கள்,பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறதெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக்கருவிகள் – மிருதங்கம், பறை,யாழ்,வீணை,நாதஸ்வரம் – தமிழர்களின் பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு 3	நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுக்கள்	Periods	3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஒயிலாட்டம் ,தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம் , தமிழர்களின் விளையாட்டுக்கள்.

அலகு 4	தமிழர்களின் திணைக்கோட்பாடுகள்	Periods	3

தமிழகத்தின் தாவரங்களும் விலங்குகளும்– தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடுகள் – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவு, கல்வியறிவு – சங்ககால நகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு 5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு	Periods	3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப்பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்தமருத்துவத்தின் பங்கு – கல்வெட்டுகள் கையெழுத்துப்படிகள் – தமிழ்ப்புத்தகங்களின் அச்சுவரலாறு.

		Total Periods	**15**

	VIVEKANANDHA **COLLEGE OF ENGINEERING FOR WOMEN** (Autonomous Institution Affiliated to Anna University Chennai) Elayampalayam, Tiruchengode – 637 205					

Programme	B.TECH	Programme code		104	Regulation			2019
Department	**INFORMATION TECHNOLOGY**			Semester			II	

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19TA201	தமிழர்மரபு / **Heritage of Tamils**	2	0	0	1	40	60	100

Content of the syllabus

UNIT I	LANGUAGE AND LITERATURE	**Periods**	**3**

Language Families in India – Dravidian Languages – Tami las a Classical Language – Classical Literature in Tamil –Secular Nature of Sangam Literature — Distributive Justice in Sangam Literature – Management Principles in Thirukural-Tamil Epics and Impact of Buddhism & Jainism in Tamil Land – Bakthi Literature Azhwars and Nayanmars –Forms of minor Poetry – Development of Modem literature in Tamil – Contribution of Bharathiyar and Bharathidhasan.

UNIT II	HERITAGE – ROCK ART PAINTINGS TO MODERN ART – SCULPTURE	**Periods**	**3**

Herostone to modern sculpture – Bronze icons – Tribes and their handicrafts – Art of temple carmaking –Massive Terracotta sculptures Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments -Mridhangam, Parai Veenai, Yazh and Nadhaswaram – Role of Temples in Social and Economic Life of Tamils.

UNIT Ill	FOLK AND MARTIAL ARTS	**Periods**	**3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance – Sports and Games of Tamils.

UNIT IV	THINAI CONCEPT OF TAMILS	**Periods**	**3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature – Aram Concept of Tamils – Education and Literacy during Sangam Age – Ancient Cities and Ports of Sangam Age –Export and Import during Sangam Age – Overseas Conquest of Cholas.

UNIT V	CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	**Periods**	**3**

Contribution of Tamils to Indian Freedom Struggle – The Cultural Influence of Tamils over the other parts of India.- Self-Respect Movement –Role of Siddha Medicine in Indigenous Systems of Medicine-Inscriptions & Manuscripts – Print History of Tamil Books.

TEXT-CUM-REFERENCE BOOKS

1	தமிழக வரலாறும் – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித்தமிழ் – முனைவர்இல. சுந்தரம். (விகடன் பிரசுரம்).
3	கீழடி – வைகை நதிக்கரையில் சங்க நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4	பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் வெளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies
7	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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Programme	**B.E/B.TECH**		Programme code		104	Regulation		2019
Department	**INFORMATION TECHNOLOGY**					Semester		II

Course code	**Course name**		**Periods per week**			**Credit**	**Maximum Marks**		
			L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
U19CH208	**CHEMISTRY LABORATORY**		0	0	4	2	60	40	100

Objective	The main objective of this course is to: • Gather basic simple acid-base reactions and study the mechanism of acid mixture with base. • Learn pH and potential of hydrogen in a sample solution. • Study the redox reaction through potential difference. • Quote iron forms complex with thiocyanate. • Gather knowledge on hardness producing salts and removal of hardness through estimation. • Collect data required for dissolved oxygen present in water sample. • Understand alkalinity and available chlorine present in water sample.

Outcomes	The students who complete this course successfully are expected to:	KL
	CO1: Infer knowledge on neutralization reaction between acid, acid mixture with base and identify the concentrations.	K3
	CO2: Spot the concentration of sample solution through potential of hydrogen and redox reaction.	K3
	CO3: Estimate Iron by complexation reaction spectrometrically.	K5
	CO4: Determine hardness and dissolved oxygen present in domestic water supply.	K5
	CO5: Identify alkalinity and available chlorine present in the given sample.	K5

Pre-requisites	Nil	

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**	**PSO 3**
CO 1	3	3		2	2	1	1					2			1
CO 2	3	3		2	1							1			1
CO 3	3	3		2	1										2
CO 4	3	3	1	2	2	2	2					2			2
CO 5	2	3	1	2	2	2	2					2			2

Course Assessment Methods
Direct
1.Pre lab and Post lab test
2.Record mark
3.End- Semester Examinations
Indirect
   1.Course –End survey

LIST OF EXPERIMENTS

1.Estimation of HCL using NaOH by Conductometric titration	CO1
2. Estimation of Mixture of acid using NaOH by Conductometric titration.	CO1
3. Estimation of Barium chloride using sodium sulphate by Conductometric precipitation titration	CO1
4. Estimation of ferrous iron by Potentiometric titration.	CO2
5. Determination of HCL using NaOH by pH metry	CO1
6.Estimation of Ferric ion by Spectrophotometry	CO3
7. Determination of Total, temporary and permanent hardness of water by EDTA method.	CO4
8. Estimation of Dissolved Oxygen content in water by Winkler‟s method	CO4
9. Estimation of alkalinity in water sample.	CO5
10. Estimation of available chlorine in bleaching powder.	CO5
Total Periods	**45**

Lab Manuals suggested:		
1.	Chemistry laboratory I & II by Dr.A.Ravikrishnan,Sri Krishna Pub,Revised Edition-2017	
2.	Chemistry laboratory Manual by Dr.Veeraiyan, Revised Edition-2017	

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205							

Programme	**B.TECH**	Programme Code	**104**	Regulation		**2019**		
Department	**INFORMATION TECHNOLOGY**			Semester		**II**		
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19GE203	**Engineering Practices Laboratory**	0	0	4	2	60	40	100

Course Objective	The main objective of this course is to: • Know the plumbing line assemblies. • Weld lap joint, butt joint and T-joint. • Learn the assembling and dismantling methodology of home appliances. • Learn the resistor value identification through colors coated on resistor. • Learn the basics of signal generation in CRO. • Learn the soldering techniques in PCB board for designing the projects

Course Outcomes	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Perform basic machining operations and finish the job to the requirements and quantify the accuracy.	K2
	CO2: Make various joints such as cross lap joint and Tee lap joint in the carpentry.	K2
	CO3: Understand the basics of house wiring techniques and the measurements of basic electrical quantities.	K2
	CO4: Understand the resistor value identification through colors coated on resistor.	K2
	CO5: Understand the soldering techniques in PCB board for designing the projects.	K2

Pre - requisites	Nil

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO3
CO 1	3	2	3	2	2	-	-	-	2	-	-	-	2	3	-
CO 2	3	2	3	2	2	-	-	-	2	-	-	-	2	-	-
CO 3	3	2	2	3	2	2	-	-	2	-	-	-	2	2	-
CO 4	3	2	2	3	2	2	-	-	2	-	-	-	3	-	-
CO 5	3	2	3	3	2	2	-	-	2	-	-	-	2	3	-

Course Assessment Methods
Direct
1.Pre lab and Post lab test
2.Record mark
3.End- Semester Examinations
Indirect
1.Course –End survey

GROUP A (CIVIL & MECHANICAL ENGINEERING) (CIVIL ENGINEERING PRACTICE)	
Plumbing : 1. Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers and elbows in household fittings.	CO2
2. Hands-on-exercise: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components	CO2
Carpentry: 3. Study of the joints in roofs, doors, windows and furniture.	CO2
4. Hands-on-exercise: Wood work, joints by sawing, planning and cutting.	CO2
MECHANICAL ENGINEERING PRACTICE	
Welding: 5. Preparation of arc welding of butt joints, lap joints and tee joints.	CO1
6. Gas welding practice	CO1
Basic Machining: **7.** Turning and Facing.	CO1
8.Drilling Practice	CO1
Sheet Metal Work: 9. Forming & Bending	CO1
10. Model making – Tray and Basket.	CO1
Demonstration on: (a) Foundry operations like mould preparation for gear and step cone pulley. (b) Fitting – Exercises – Preparation of square fitting and vee – fitting models. **Study of Air Conditioner & Centrifugal Pump.**	
GROUP B (ELECTRICAL & ELECTRONICS ENGINEERING) **III. ELECTRICAL ENGINEERING PRACTICE**	
1. Residential house wiring and stair case wiring using switches, fuse, indicator & lamp.	CO3
2. Fluorescent lamp wiring.	CO3
3. Measurement of voltage, current, power & power factor using R-Load.	CO3
4. Measurement of energy using single phase meter.	CO3
5. Measurement of resistance to earth of electrical equipment.	CO3
6. Measurement of illumination to earth of electrical equipment.	CO3
7. Study of batteries.	CO3
IV. ELECTRONICS ENGINEERING PRACTICE	
1. Study of Electronic components and equipments – Resistor, colour coding.	CO4
2. Study of logic gates AND, OR, NOR, NAND and NOT.	CO4
3. Generation of Clock Signal.	CO4

4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.	CO5
Total Periods	**45**

Reference Books :	
R1.	Dr.P.Kannan, Mr.T.Satheeskumar & Mr.K.Rajasekar, "Engineering Practices Laboratory" Manual. First Edition, 2017.
R2.	Mr.T.Jeyapoovan, Mr.M.Saravana Pandian, "Engineering Practices Lab" Manual, Vikas Publishing House Pvt Ltd, 2017.

<table>
<tr><td rowspan="3"></td><td colspan="2">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN</td></tr>
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	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205	

Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**II**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19MCFY2	**Indian Constitution and Universal Human Values**	3	0	0	0	100	NA	100

Course Objective	The main objective of this course is : • To know about Indian constitution. • To know about central and state government functionalities in India • To know about Indian society.

Outcome Course	At the end of the course, the student should be able to,	Knowledge level
	• Understand the functions of the Indian government	K1
	• Understand and abide the rules of the Indian constitution	K1
	• Understand and appreciate different culture among the people	K1
	• Understanding human being as a co-existence of the sentient „I‟ and the material	K1,K2
	• „Body‟ and the needs of Self („I‟) and „Body‟ and Ability to utilize the professional competence for augmenting universal human order and Ability to identify the scope and characteristics of people- friendly and ecofriendly Production systems.	K2

Pre-requisites	---

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO 1						3		3	2					2
CO 2						3		3	3					1
CO 3						3		3	2					2
CO 4						3		3	3					2
CO 5						3		3	3					1

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & III 2. Assignment			
Indirect			
1. Course - end survey			
Content of the syllabus			
Unit – I	**INTRODUCTION**	Periods	**9**
Historical Background – Constituent Assembly of India – Fundamental Rights – Citizenship – Constitutional Remedies for citizens			
Unit - II	**STRUCTURE AND FUNCTION OF CENTRAL**	Periods	**9**
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India			
Unit – III	**STRUCTURE AND FUNCTION OF STATE**	Periods	**9**
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts			
Unit - IV	**Universal Human Values**	Periods	**9**
Course Introduction - Need, Basic Guidelines, Content and Process for Value Education			
Unit – V	**OPTOEL Universal Human Values – Professional Ethics ECTRONICS**	Periods	**9**
Understanding Harmony in the Human Being - Harmony in Myself and society.			
		Total Periods	**45**
Text Books:			
1.	Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.		
2.	Tanu shukla,Human Values and professional Ethics, Cengage publications.		
References:			
1.	R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi		
2.	Indian polity, M.Laksmikanth,Tatamchrawhill publications		
3.	R R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2		
E-Resources:			
1.	https://mhrd.gov.in/		
2.	https://niti.gov.in/content/niti-aayog-library		
3.	www.drishtiias.com/		

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Elayampalayam, Tiruchengode – 637 205

Programme	**B.E/B.TECH**	Programme Code		Regulation	**2019**
Department	**CSE/IT/CST**			Semester	**III**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19MA304	**Discrete Mathematics**	3	1	0	4	40	60	100

Course Objective	The Main Objective of the course is to • Introduce basic tools and techniques in Discrete Mathematical Structure • Provide information about the concepts needed to test the logic of a program and theory of inference • Recognize the connection between set, operations and logic • Identify the domain and range of a relation • Recognize the concepts of groups

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Demonstrate the mathematical reasoning and logics	K1,K2
	CO2: Reformulate statements from common language to formal language	K2,K5
	CO3: Relate logic with sets	K2,K3
	CO4: Analyze the connection between functions and relations.	K3,K5
	CO5: Demonstrate Algebraic facility with Groups, Subgroups and Normal subgroups	K1,K3

Pre-requisites | -

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO 1	3	3											2		
CO 2	3	3											2		
CO 3	3	3											2		
CO 4	3	3											2		
CO 5	3	3											2		

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**PROPOSITIONAL CALCULUS**	Periods	**12**
Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables – Tautologies and contradictions – Contrapositive – Logical equivalences and implications – DeMorgan"s Laws – Normal forms – Principal conjunctive normal form and Principal disjunctive normal form – Rules of inference – Arguments – Validity of arguments.			
Unit - II	**PREDICATE CALCULUS**	Periods	**12**
Predicates – Statement function – Variables – Free and bound variables – Quantifiers – Universe of discourse – Logical equivalences and implications for quantified statements – Theory of inference – Rules of universal specification and generalization – Validity of arguments.			
Unit – III	**SET THEORY**	Periods	**12**
Set Theory: Cartesian product of sets – Relations on sets – Types of relations and their properties – Matrix representation of a relation - Graph of a relation – Equivalence relations – Partial ordering – Poset – Hasse diagram – Lattices – Properties of lattices			
Unit - IV	**FUNCTIONS**	Periods	**12**
Definition – Classification of functions – Composition of functions – Inverse functions – Characteristic function of a set – Recurrence relations – Solution of recurrence relations – Generating Functions – Solving recurrence relation by generating functions.			
Unit – V	**GROUP THEORY**	Periods	**12**
Algebraic systems – Definitions – Examples – Properties – Semi groups – Monoids – Sub semi groups and Sub monoids - Groups and Subgroups – Homomorphism – Cosets – Lagrange"s theorem – Normal subgroups – Normal algebraic system with two binary operations.			
		Total Periods	**60**

Text Books

1	Tremblay J P and Manohar R., Discrete Mathematical Structures with Applications to Computer Science, TMH, New Delhi – 2004.
2	Rosen K H, "Discrete Mathematics and its Applications", Sixth Edition, Tata McGraw-Hill Pub.co. Ltd., Delhi, 2006.

References

1	Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Publishing Company, 2012
2	Singh S.B., Jai Kishore and Ekata, "Discrete Structures", 3rd Edition, Khanna Book Publishing, Delhi, 2017
3	Seymour Lipschutz, Marclars Lipson, "Discrete Mathematics", Tata McGraw Hill.,New Delhi.
4	Bernard Kolman, Robert Busby, Sharon C.Ross," Discrete Mathematical Structures", Pearson Education, Delhi, 6th Edition, 2015.
5	D.S.Malik, "Discrete Mathematical Structures Theory and Applications", Thomson Publishers, 2004.

E-Resources

1	https://en.wikipedia.org › wiki › Discrete mathematics
2	www.learnerstv.com/Free-engineering-Video-lectures
3	www.nptel.ac.in

Programme	**B. TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**III**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19EC308	**Electronic Devices and Circuits**	3	0	0	3	40	60	100

Course Objective	The Main Objective of the course is to - Expose fundamental knowledge in Semiconductor Devices. - Empower students to understand the design and working of BJT. - Empower students to understand the design and working of FET. - Understand behavior of Special semiconductor devices. - Describe the function and design of power supply.

Course Outcome	At the end of the course, the student would be able to,	Knowledge Level
	CO1: Understand the current voltage characteristics of semiconductor devices	K2
	CO2: Understand the construction and characteristics of BJT	K2
	CO3: Explain the construction, operating principle and various configurations of FET.	K5
	CO4: Understand the construction, working and characteristics of special semiconductor devices and their applications.	K2
	CO5: Discuss the functioning of internal circuits of power supply.	K2

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														**CO/PSO Mapping**	
COs	Programme Outcomes (POs)													PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	3			1			1		2	2	1
CO 2	3	2	3	2								2	2	
CO 3	3	2	2	2		1					1	2	2	2
CO 4	3	2	3	2									1	
CO 5	3		2										2	2

Course Assessment Methods			
Direct			
	1. Continuous Assessment Test I, II & III		
	2. Assignment		
	3. End-Semester examinations		
Indirect			
	1. Course - end survey		

Content of the syllabus			
Unit – I	**SEMICONDUCTOR DIODE**	Periods	**9**
Theory of PN junction diode –VI characteristics - Switching characteristics – Temperature effects– Breakdown in PN Junction Diodes– Ideal Versus Practical diode-Resistance levels– Diode equivalent circuits – Transition and diffusion capacitances– Diode specifications–Zener diode and its characteristics.			
Unit - II	**BIPOLAR JUNCTION TRANSISTOR**	Periods	**9**
Introduction to three terminal devices- BJT-construction - Types and different regions of operations-Transistor (BJT) as an amplifier-- Input and Output characteristics of transistor in Common Base,Common Emitter and Common Collector configuration,Comparison of CE,CC and CB.			
Unit – III	**FIELD EFFECT TRANSISTOR**	Periods	**9**
Construction and characteristics of JFET– Transfer characteristics – FET Parameters and specifications– Depletion type MOSFET – Enhancement type MOSFET –FET in CS, CD and CG Configurations –FET applications,Comparison of MOSFET with JFET.			
Unit - IV	**SPECIAL SEMICONDUCTOR DEVICES**	Periods	**9**
Tunnel diodes – PIN diode – SCR characteristics and two transistor equivalent model – UJT – Diac and Triac – Laser- CCD- Photodiode-Phototransistor- Photoconductive and Photovoltaic cells – LED-LCD.			
Unit – V	**POWER SUPPLIES**	Periods	**9**
Half wave Rectification – Full wave Rectification – Filters(LPF) – Zener diode as voltage regulator –Discrete Transistor Voltage Regulation - IC Voltage Regulator - SMPS.			
	Total Periods	**45**	

Text Books	
1.	Robert L. Boylestad; Louis Nashelsky,"Electronic Devices and Circuit Theory",11thEdition, Pearson Education, 2013.
2.	Anil K. Maini, VarshaAgrawal, „Electronics Devices and Circuits‟, Wiley India Pvt.Ltd, 2012.
References	
1.	Jacob .Millman&Halkias, ―Electronic Devices &Circuits,Tata McGraw Hill,3rd Edition, 2010
2.	Salivahanan. S, Suresh Kumar. N, Vallavaraj.A, ―Electronic Devices and circuits, Third Edition, Tata McGraw- Hill, 2008.
3.	R.S.Sedha, ― A Text Book of Applied Electronics S.Chand Publications, 2006.
E-Resources	
1.	https://www.electronicsforu.com/resources/electronic-devices-and-circuit-theory
2.	https://www.electronics-tutorials.ws/
3.	https://www.sciencedirect.com/topics/engineering/electronic-device

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN				
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Programme	**B. TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**III**

Course Code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT302	**Data Communications**	3	0	0	3	40	60	100

Course Objective	The main objective of this course is to: • Understand the evolution of data communication and transmission medium • Analyze analog and digital signal transmission encoding techniques. • Understand the operation of physical and` data link layer protocols • Understand flow control, frequency and time division multiplexing techniques toshare network bandwidth among multiple users. • Understand basic concepts of packet switching and circuit switching techniques.

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Describe the model of data communication and the protocols used inOSI layers	K2
	CO2: Communicate with digital devices by using signal encoding techniques.	K3
	CO3: Make devices to Communicate through wireless by using sampling techniques	K3
	CO4: Use Error detection and switching techniques for designing efficienttransmission system with accurate data	K3
	CO5: Describe about the devices used in networking	K2

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**P O9**	**PO 10**	**PO 11**	**PO12**	**PSO 1**	**PSO 2**
CO 1	-	-	3	3	3	2	2	-	-	-	-	-	1	2
CO 2	3	3	2	2	3	2	2	-	-	-	2	2	3	3
CO 3	3	3	2	2	3	2	2	-	-	-	2	2	3	3
CO 4	3	3	2	2	3	2	2	-	-	-	2	2	3	3
CO 5	-	-	3	3	3	2	2	-	-	-	-	-	1	2

Course Assessment Methods

Direct	
	1. Continuous Assessment Test I, II & III
	2. Assignment
	3. End-Semester examinations
Indirect	
	1. Course - end survey

Content of the syllabus

Unit – I	DATA COMMUNICATIONS AND NETWORKING OVERVIEW	Periods	10

A Communications Model, Introduction to Data Communications, types of Networks, Protocol Architecture: Need, A Simple Protocol Architecture, OSI. Analog and Digital Data Transmission - Transmission Impairments, Channel Capacity. Transmission Media: Guided Transmission Media, Wireless Transmission media.

Unit - II	DIGITAL SIGNAL TRANSMISSION	Periods	9

Digital Transmission: Introduction, Digital to digital conversion: Line Encoding - Types of Line Coding Unipolar scheme, Polar schemes, Biphase: Manchester and differential Manchester Bipolar schemes, Scrambling. Analog to Digital Conversion: Pulse code modulation (PCM), Delta modulation (DM).

Unit – III	ANALOG SIGNAL TRANSMISSION	Periods	9

Analog Transmission: Introduction, Digital to analog conversion: Amplitude shift keying, Frequency shift keying, Phase shift keying, Quadrature amplitude modulation. Analog to analog conversion: Amplitude modulation, Frequency modulation, Phase modulation

Unit – IV	DATA LINK CONTROL & SWITCHING NETWORKS	Periods	10

Asynchronous and Synchronous Transmission, Types of Errors, Error Detection, Error Correction. Introduction, Circuit Switching Networks, Circuit Switching Concepts, Packet Switching Principles, X.25, Frame Relay

Unit – V	INTRODUCTION TO NETWORKING DEVICES	Periods	7

Hub, Switches, Bridges , Routers, Gateways, Channel Service Unit/Data Service Unit, Network Interface Card, ISDN adapters, Wireless Access Point, Modems, Transceivers, Firewalls.

		Total periods	45

Text Books

1	W. Stallings, "Data and Computer Communications", 10th Edn., Pearson Edn./ PHI, New Delhi, 2014
2	B. A. Forouzan, "Data Communications and Networking", 5th Edn. TMH, New Delhi 2013.

References

1	P.C. Gupta, "Data Communications and Computer Networks", 2nd Edn PHI, New Delhi 2014.
2	Computer Networks, Andrew S Tanenbaum, 5th Edition, 2013, Pearson Education, PHI.
3	Drew Bird, Mike Harwood, "Network Plus", First edition, Pearson Education.

E-Resources

1	https://nptel.ac.in/courses/106/105/106105082/
2	https://cse.iitkgp.ac.in/~ksrao/cou-iti-1.html
3	https://memberfiles.freewebs.com/00/88/103568800/documents/Data.And.Computer.Communications.8e.WilliamStallings.pdf

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<tr><td rowspan="3"></td><td colspan="3">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN</td><td rowspan="3"></td></tr>
<tr><td colspan="3">(Autonomous Institution, Affiliated to Anna University, Chennai)</td></tr>
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Programme	**B. TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**III**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT303	**Data Structures**	3	0	0	3	40	60	100

Course Objective	The main objective of this course is to: • Understand the significance of Data structures and List ADTs. • Learn the concepts and applications of Stacks, Queues and Deque. • Learn the different types of Sorting and Searching Techniques and Hashing • Understand the Tree ADT and types of balancing the tree • Learn the fundamentals of Graph ADT, various Traversal algorithms, Types and findingthe Minimum spanning Tree	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Implement List ADT and its types.	K3
	CO2: Implement Stack ADT, Queue ADT, Priority Queue and Parsing the Arithmetic Expression in C	K3
	CO3: Implement various sorting and searching algorithms in C	K3
	CO4: Implement Tree ADT, Binary search tree, AVL and Splay tree in C	K3
	CO5: Develop C Programs to Implement the concept of Topological ordering and Minimum spanning Tree of a Graph ADT	K3

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	3	3	3	3	2	1				2	2	3	3
CO 2	3	3	3	3	3	2	1				2	2	3	3
CO 3	3	3	3	3	3	2	1				2	2	3	3
CO 4	3	3	3	3	3	2	1				2	2	3	3
CO 5	3	3	3	3	3	2	1				2	2	3	3

Course Assessment Methods
Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION**	**Periods**	**9**
Fundamental ADTs — Singly Linked List – Simple Array based Implementation - Circular Linked List – DoublyLinked List – Applications of Linked Lists			
Unit - II	**STACKS, QUEUES AND DEQUES**	**Periods**	**9**
Stack ADT – Array based Implementation - List based Implementation – Queue ADT – Array based Implementation- List based Implementation - Parsing Arithmetic Expressions. Deque ADT – Implementation.			
Unit – III	**SORTING, SEARCHING AND HASHING**	**Periods**	**9**
Types of Sorting - Bubble Sort – Selection Sort – Insertion Sort – Shell Sort – Quick Sort – Radix Sort – Merge Sort. Linear Search – Binary Search. Hashing – Open Addressing – Separate Chaining – Hash Functions.			
Unit - IV	**TREES**	**Periods**	**9**
Tree ADT – Binary Trees – Terminologies- Array based Implementation - List based Implementation – TraversalAlgorithms. Search Trees – Binary Search Tree – Balancing Trees – AVL Tree – Splay Tree.			
Unit – V	**GRAPHS**	**Periods**	**9**
Graph ADT – Data Structures for Graphs – Types of Graphs – Graph Traversals – Topological Ordering – Weighted Graphs – Dijkstra"s Algorithm – Minimum Spanning Tree – Prim-Jarnik Algorithm – Kruskal"s Algorithm.			
		Total Periods	**45**

Text Book:	
1	Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson India.
References:	
1	Michael T. Goodrich, Roberto Tamassia and Michael H. Goldwasser, "Data Structures and Algorithms in Java" 6th Edition, Wiley India. ISBN: 9788126551903
2	Robert Lafore, "Data Structures and Algorithms in Java" 2nd Edition, Pearson India. ISBN: 9788131718124
3	Kruse and Leung, "Data Structures and Program Design in C", 1/e, Pearson India.
4	Robert Sedgewick and Kevin Wayne, "Algorithms",4th Edition, Addison-Wesley.
5	Peter Brass, "Advanced Data Structures", 1 Edition, Cambridge.
6	Aho, Hopcroft and Ullman, ―Data Structures and Algorithms‖, Pearson Education,1983.
E-Resources:	
1	https://www.javatpoint.com/data-structure-tutorial
2	https://www.geeksforgeeks.org/data-structures
3	https://www.udemy.com/course/data-structures-and-algorithms-deep-dive-using-java

Programme	**B.TECH**	Programme Code	**104**		Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		**III**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT304	**Computer Organization & Architecture**	3	0	0	3	40	60	100

Course Objective	The main objective of this course is to: • Understanding of the basic structure and operation of a digital computer. • Recognize in the operation of the hardwire control and micro programmed control. • Illustrate in detail the different types of control and the concept of pipelining. • Classify the hierarchical memory system including cache memories and virtual memory. • Clarify the different ways of communicating with I/O devices and standard I/O interfaces.

Course Outcome	At the end of the course, the student should be able to,	KL
	CO1: Design the concepts in modern computer architecture.	K3
	CO2: Interpret the operations and instruction sequences in a basic computer.	K3
	CO3: Illustrate the data hazards and instruction hazards using pipelining	K3
	CO4: Examine the hierarchical memory system including cache memory and virtual memory	K3
	CO5: Inspect the different ways of communicating with I/O devices and standard I/O also demonstrate the memory functioning and DMA Controller.	K3

Pre-requisite -

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	1	2											2
CO 2	2	2	3											2
CO 3	1	3	3											2
CO 4	1	2	2											2
CO 5	1	3	2	1										2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**BASIC STRUCTURE OF COMPUTERS**	**Periods**	**9**
Functional units –Basic operational concepts –Bus structures –Software Performance and metrics –Multiprocessors and Multicomputer –Memory Locations and Addresses–Instructions andinstruction sequencing –Addressing modes –Fixed point and Floating point representations.			
Unit - II	**BASIC PROCESSING UNIT**	**Periods**	**9**
Fundamental concepts –Execution of a complete instruction –Multiple bus organization –Hardwired Control –Micro programmed control: Micro Instructions-Micro Instructions with next address field.			
Unit – III	**PIPELINING**	**Periods**	**9**
Basic concepts –Data hazards –Instruction hazards –Influence on instruction sets –Data path and control considerations –Super scalar operation–Performance considerations.			
Unit - IV	**MEMORY SYSTEM**	**Periods**	**9**
Basic concepts –Semiconductor RAM –ROM –Speed Size and cost –Cache memories – performance consideration –Virtual memory –Memory management requirements – Associative memories –Secondary storage devices.			
Unit – V	**I/O ORGANIZATION**	**Periods**	**9**
I/O devices -Accessing I/O devices –Programmed Input/output –Interrupts –Direct Memory Access – Buses –Interface circuits –Standard I/O Interfaces (PCI, SCSI, and USB)–processor Families.			
		Total Periods	**45**
Case Studies: Case study - Instruction sets of some common CPUs, A Recent Intel Processor,Acase study on ALU- Arithmetic and Logic Unit of the computer and IBM5 SYSTEM/360-370 Architecture.			

Text Books:	
1	Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 5th Edition "Computer Organization", McGraw-Hill, November 4, 2011.
2	William Stallings, "Computer Organization and Architecture – Designing for Performance", 9th Edition, Pearson Education, March 2012.
References:	
1	M. Morris Mano, "Computer System Architecture", Third Edition, Prentice Hall of India, 2000.
2	David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Third Edition, Elsevier, 2005.
3	John P.Hayes, "Computer Architecture and Organization", 3rd Edition, McGraw-Hill, 1998
E-Resources:	
1	https://www.javatpoint.com/computer-organization-and-architecture-tutorial
2	https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/
3	https://tutorialspoint.dev/computer-science/computer-organization-and-architecture

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Programme	**B. TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**III**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT305	**Professional Ethics and Human Values**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Stimulate critical and responsible reflections on moral issues surrounding engineering practices • Provide conceptual tools necessary for pursuing those issues. • Understand the moral values that ought to guide the engineering profession. • Justify the moral judgment concerning the profession. • Aware of the different ethical issues, codes for conduct for engineers in society and moralities in an organization.

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Can describe and explain historical, legal, professional, and personal reasons why legal and professional definitions of ethics exist.	K1
	CO2: Can describe the benefits that are expected to arise from acting ethically.	K2
	CO3: Stimulate critical and responsible reflections on moral issues surroundingengineering Practices	K3
	CO4: Provide Conceptual tools necessary for pursuing those issues.	K3
	CO5: Aware of the different ethical issues, codes for conduct for engineers insociety and Moralities in an Organization.	K3

Pre-requisites	Human Excellence Global Values

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO 1	3	2			1	1	2	2			1	2	2	1
CO 2	2				2			1				2	2	
CO 3	3	3	2		1		2	2		1		2		2
CO 4	2	2	2		3			2			1	2	3	
CO 5	2							2				2	2	

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & III   2. Assignment   3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	HUMAN VALUES	Periods	9
Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time –Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and Meditation for professional excellence and stress management.			
Unit – II	ENGINEERING ETHICS	Periods	9
Introduction to engineering ethics-Senses of „Engineering Ethics" – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg"s theory – Gilligan"s theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories			
Unit – III	ENGINEERING AS SOCIAL EXPERIMENTATION	Periods	9
Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger of IT industry Case Study			
Unit – IV	SAFETY, RESPONSIBILITY AND RIGHTS	Periods	9
Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk - Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR)-Chernobyl Case Studies and Bhopal-Eight and nine Mile Island case study.			
Unit – V	GLOBAL ISSUES	Periods	9
Globalization and MNCs –Cross Culture Issues-Computer Ethics-computers as the instrument of Unethical behavior-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analyzing Ethical Problems in Research-Food and Drug Adulteration			
		Total Periods	45

Text Books

1	Mike Martin and Roland Schinzinger, "Ethics in Engineering", 3rd edition, McGraw Hill, New York, 2017.
2	Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.

References

1	Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004
2	David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)
3	Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey,2004
4	Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009

E-Resources

1	https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/110105097/lec1.pdf
2	https://www.tutorialspoint.com/engineering_ethics/engineering_ethics_responsibility_for_safety.htm
3	http://clermontdd.org/wp-content/uploads/2017/02/Rights-and-Responsibilities.pdf
4	www.onlineethics.org
5	www.nspe.org
6	www.globalethics.org

	VIVEKANANDHACOLLEGE OF ENGINEERING FOR WOMEN				
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Programme	B.TECH	Programme code		Regulation	2019
Department			Semester		

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19TA302	தமிழரும் தொழில் நுட்பமும்/ TAMILS AND TECHNOLOGY	2	0	0	1	40	60	100

Content of the Syllabus

அலகு 1	நெசவு மற்றும் பானைத்தொழில்நுட்பம்	Periods	3

சங்ககாலத்தில் நெசவுத்தொழில்– பானைத்தொழில்நுட்பம் – கருப்புசிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு 2	வடிவமைப்பு மற்றும் கட்டிடத்தொழில்நுட்பம்	Periods	3

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு – சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள்–மாமல்லபுரச்சிற்பங்களும் கோவில்களும் – சோழர்காலத்துப் பெருங்கோயில்கள் மற்றும் பிறவழிபாட்டுத்தலங்கள் – நாயக்கர்காலக்கோயில்கள்-மாதிரிகட்டமைப்புகள் பற்றி அறிதல் மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக்கட்டிடக்கலை.

அலகு 3	உற்பத்தித் தொழில்நுட்பம்	Periods	3

கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத்தொழிற்சாலை – இரும்பை உருக்குதல் எஃகு – வரலாற்றுச்சான்றுகளாக - செம்பு மற்றும் தங்கநாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடிமணிகள் – சுடுமண்மணிகள் – சங்குமணிகள் – எலும்புத்துண்டுகள் – தொல்லியல்சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு 4	வேளாண்மை மற்றும் நீர்ப்பாசனத்தொழில்நுட்பம்	Periods	3

அணை, ஏரி, குளங்கள் ,மதகு – சோழர்காலக்குமுழித்தூம் பின் முக்கியத்துவம் – கால்நடைபராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச்சார்ந்த செயல்பாடுகள் – கடல்சார்அறிவு – மீன்வளம் – முத்துமற்றும்முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார்சமூகம்.

அலகு 5	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்	Periods	3

அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி – தமிழ்நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மின் பொருட்கள் உருவாக்கம் – தமிழ் இணையக்கல்விக்கழகம் – தமிழ் மின்னூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத்திட்டம்.

		Total Periods	15

<table>
<tr><td colspan="2" rowspan="3"></td><td colspan="4" rowspan="3" align="center">VIVEKANANDHA
COLLEGE OF ENGINEERING FOR WOMEN
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Elayampalayam, Tiruchengode – 637 205</td><td colspan="3" rowspan="3"></td></tr>
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Programme	B.TECH		Programme code		104	Regulation		2019
Department	**INFORMATION TECHNOLOGY**					Semester		II

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
	TAMILS AND TECHNOLOGY	1	0	0	1	40	60	100

Content of the syllabus

UNIT I	**WEAVING AND CERAMIC TECHNOLOGY**	**Periods**	**3**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) –Graffiti on Potteries

UNIT II	**DESIGN AND CONSTRUCTION TECHNOLOGY**	**Periods**	**3**

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)-Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III	**MANUFACTURING TECHNOLOGY**	**Periods**	**3**

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel - Copper and gold- Coins as source of history - Minting of Coins – Beads making - industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV	**AGRICULTURE AND IRRIGATION TECHNOLOGY**	**Periods**	**3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V	**SCIENTIFIC TAMIL & TAMIL COMPUTING**	**Periods**	**3**

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

		Total Periods	**15**

TEXT-CUM-REFERENCE BOOKS:

1	தமிழக வரலாறும் – மக்களும்பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2	கணினித்தமிழ் – முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
3	கீழடி – வைகைநதிக்கரையில்சங்கநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)
4	பொருநை - ஆற்றங்கரைநாகரிகம். (தொல்லியல்வெளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies
7	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205				
Programme	**B. TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**III**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	TOTAL
U19EC309	**Circuits and Devices Laboratory**	0	0	4	2	40	60	100

Course Objective	The Main Objective of the course is to - Learn the characteristics of basic electronic devices such as Diode, BJT, FET,SCR - Study and analyze BJT configurations. - Evaluate the characteristic(s) JFET, MOSFET, Photodiode, Phototransistor,UJT and SCR. - Design and analyze rectifiers. - Simulate various electronic circuits using P-SPICE software.
Course Outcome	At the end of the course, the student should be able to,
	CO1: Demonstrate V-I characteristics of PN junction diode & Zener diode
	CO2: Compare Input & Output characteristics of CB & CE configuration
	CO3: Compare Characteristics of diode, transistors & photo diode
	CO4: Compare Characteristics of rectifiers
	CO5: Apply P-spice & Develop a working model of an electronic circuit

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO 1	3	3	3	2										
CO 2		3	2	3										
CO 3		3	3	3									2	
CO 4	3	2	2	2										
CO 5	3	2	2		3				2			2		2

Course Assessment Methods

Direct

1. Prelab and post lab test
2. Record mark
3. End-Semester examinations

Indirect

1. Course - end survey

LIST OF EXPERIMENTS

SI. No	List of Experiments	Course Outcome
1.	Study the V-I characteristics of PN junction diode & Calculate Static & Dynamic Resistance	CO1
2.	Study the V-I characteristics of Zener diode & Calculate the Zener break down voltage.	CO1
3.	Study and plot the Input & Output characteristics of CB configuration in BJT.	CO2
4.	Study and plot the Input & Output characteristics of CE configuration in BJT.	CO2
5.	Study and plot the Intensity Vs photo current Characteristics of Photodiode and Phototransistor.	CO3
6.	Study and plot the Characteristics of UJT and calculate the intrinsic standoff ratio (η).	CO3
7.	Study and plot the Characteristics of SCR and calculate the V_{BO}, I_L & I_H.	CO3
8.	Study and plot the drain and transfer Characteristics of JFET and MOSFET.	CO2
9.	Verify the working of a Half wave rectifier, Full wave rectifier and full wave bridge rectifier and to measure the ripple factor.	CO4
10.	Introduction of P-spice Simulation software and characteristics of CB/CE configuration in BJT to be performed on P-spice.	CO5
11.	Analyze the drain characteristics and transfer characteristics of MOSFET using P-spice.	CO5
	Total Periods	**45**

<table>
<tr><td rowspan="3"></td><td colspan="4" style="text-align:center">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205</td><td></td></tr>
</table>

Programme	**B.TECH**			Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**					Semester	**III**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT306	**Data Structures Laboratory**	0	0	4	2	60	40	100

Course Objective	The Main Objective of the course is to • Familiarize the operations on Linear Data Structures and Nonlinear Data Structures • Understand the basic operations on Search Trees • Known to the basics of various graph Traversal methods • Understand the concepts of various Searching and Sorting Techniques	
Course Outcome	At the end of the course, the student should be able to,	KL
	CO1: Implement List based and Array based Linear and Nonlinear Data Structures	K3
	CO2: Suggest appropriate Search Tree for solving a given problem	K3
	CO3: Appropriately use the various graph Traversal for a given problem	K3
	CO4: Adopt an appropriate Searching and Sorting method to solve a problem	K3
	CO5: Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval	K3

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													**CO/PSO Mapping**	
	Programme Outcomes (POs)												PSOs	
COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PSO 2**
CO 1	3	2	1	1				1	1	1	1	1	1	1
CO 2	3	2	1	1				1	1	1	1	1	1	1
CO 3	3	2	1	1				1	1	1	1	1	1	1
CO 4	3	2	1	1				1	1	1	1	1	1	1
CO 5	3	2	1	1				1	1	1	1	1	1	1

Course Assessment Methods

Direct
1. Prelab and post lab test
2. Record mark
3. End-Semester examinations
Indirect
1. Course - end survey

LIST OF EXPERIMENTS

EX.NO	EXPERIMENT DESCRIPTION	COs
1.	Array implementation of Stack and Queue ADTs	CO1
2.	Array implementation of List ADT	CO1
3.	Linked list implementation of List, Stack and Queue ADTs	CO1
4.	Applications of List, Stack and Queue ADTs	CO1
5.	Implementation of Binary Trees and operations of Binary Trees	CO2
6.	Implementation of Binary Search Trees	CO2
7.	Implementation of AVL Trees	CO2
8.	Graph representation and Traversal algorithms	CO3
9.	Applications of Graphs	CO4
10.	Implementation of searching and sorting algorithms	CO4
11.	Hashing – any two collision techniques	CO5
		Total Periods | **45**

E - Resources	
1	https://www.programiz.com/c-programming
2	https://www.cprogramming.com/
3	https://beginnersbook.com/2015/02/simple-c-programs/

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Programme	**B. TECH**	Programme Code	**104**	Regulation	**2019**
Department	**CSE, EEE, ECE, IT & BT**			Semester	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	**T**	**P**	**C**	**CA**	**ESE**	**Total**
U19MCSY3	**NUMERICAL ABILITY**	**3**	**0**	**0**	**0**	**100**	**-**	**100**

Course Objective	The main objective of the course is to: develop skill to meet the competitive examinations for better job opportunity accommodate fundamental, mathematical aspects to instill confidence among students expand their knowledge and to develop their logical reasoning thinking ability

Course Outcome	**At the end of the course, the student will be able to:**	KL
	CO1: Develop a proper understanding of the number system	K3
	CO2: Explain the meaning of ratio, proportion and percentage	K2
	CO3: Solve complex problems involving speed, distance and time.	K3
	CO4: Understand the relationship between compound interest and its influencing factors	K2
	CO5: Solve surface area and volume of rectangular-prism problems with real objects	K3

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														CO/PSO Mapping	
COs	Programme Outcomes (POs)													PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3	3											2	
CO 2	3	3											2	
CO 3	3	3											2	
CO 4	3	3											2	
CO 5	3	3											2	

Content of the syllabus			
Unit – I	**NUMBER SYSTEMS**	Periods	**6**
Number Properties – HCF – LCM - Square root – Cube root – Simplification – Averages.			
Unit - II	**DIRECT PROPORTIONAL PROBLEMS**	Periods	**8**
Percentage - Profit & Loss –. Ratio & Proportions – Mixture & Allegations - Problem on Ages			
Unit – III	**INDIRECT PROPORTIONAL PROBLEMS**	Periods	**8**
Time & Work – Pipes & Cisterns - Time, Speed & Distance – Boats & Streams – Races & Games of Skills.			
Unit - IV	**BANKER'S PROBLEMS**	Periods	**4**
Simple Interest – Compound Interest – Logarithms – Partnership - Discounts.			
Unit – V	**MISCELLANEOUS PROBLEMS**	Periods	**4**
Mensuration: Area & perimeter – Volume & Surface Area – Geometry-Trigonometry.			
		Total Periods	**30**
Text Books			
1.	Dinesh Khattar- The Pearson guide to Quantitative Aptitude for Competitive Examinations 3rd edition.		
References			
1.	R.S. Aggarwal - Quantitative Aptitude for Competitive Examinations		

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Programme	**B.E/B.TECH**	Programme Code	104	Regulation	**2019**
Department	**CSE/IT/CST**			Semester	**IV**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Tot
U19MA405	**Statistics and Numerical Methods***	3	1	0	4	40	60	100

Course Objective	The main objective of the course is to • provide the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology. • Acquaint the knowledge of testing of hypothesis for small and large samples whichplays an important role in real life problems. • Introduce the basic concepts of solving algebraic and transcendental equations. • Introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines. • Introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.

Course Outcome	At the end of the course, the student should be able to	Knowledge level
	CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.	K1,K3
	CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.	K2,K3
	CO3: Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	K3,K5
	CO4: Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations	K2,K5
	CO5: Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications	K3,K4

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**	**PSO 3**
CO 1	3	3											2		
CO 2	3	3											2		
CO 3	3	3											2		
CO 4	3	3											2		
CO 5	3	3											2		

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III

2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit – I	**TESTING OF HYPOTHESIS**	Periods	**12**

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

Unit - II	**DESIGN OF EXPERIMENTS**	Periods	**12**

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial design.

Unit– III	**SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS**	Periods	**12**

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by Power method and Jacobi's method for symmetric matrices.

Unit - IV	**INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION**	Periods	**12**

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

Unit – V	**NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS**	Periods	**12**

Single step methods : Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods : Milne's and Adams - Bash forth predictor corrector methods for solving first order equations.

		Total Periods	**60**

Text Books:

1.	Grewal. B.S. and Grewal. J.S., "Numerical Methods in Engineering and Science ", 10th Edition, Khanna Publishers, New Delhi, 2015
2.	Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

References:

1.	Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2.	Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3.	Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi,2006.
4.	S.C.Gupta & V.K.Kapoor," Fundamentals of Mathematical Statistics", Sultan chand & sons Education Publishers, Newdelhi, 10th Edition.
5.	William Navidi,"Statistics for Engineers and Scientists", TMH Publishers, New Delhi, 3rd Edition, 2013.

E-Resources:

1.	https://www.maths.unsw.edu.au › courses › math2089-numerical-methods.
2.	www.learnerstv.com/Free-engineering-Video-lectures
3.	www.nptel.ac.in

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Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**IV**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT407	**Linear Integrated Circuits**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Introduce the basic building blocks of linear integrated circuits. • Learn the linear and non-linear applications of operational amplifiers. • Introduce the theory and applications of analog multipliers and PLL. • Learn the theory of ADC and DAC. • Introduce the concepts of waveform generation and introduce some special function ICs.

		Knowledge Level
Course Outcome	At the end of the course, the student should be able to,	
	CO1: Design linear and non linear applications of op – amps	K3
	CO2: Design applications using analog multiplier and PLL	K3
	CO3: Design ADC and DAC using op – amps	K3
	CO4: Generate waveforms using op – amp circuits	K3
	CO5: Analyze special function ICs	K3

Pre-requisites	--

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO 1	3	3	1		1							2	2	
CO 2	3		3	1	3							2	2	
CO 3	3		3	3	3							2	2	
CO 4	3	2	3	2	3							2	2	
CO 5	3		3	2	3							2	2	

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**BASICS OF OPERATIONAL AMPLIFIERS**	**Periods**	**9**
Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, Basic information about op-amps – Ideal Operational Amplifier – General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations.			
Unit – II	**APPLICATIONS OF OPERATIONAL AMPLIFIERS**	**Periods**	**9**
Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.			
Unit – III	**ANALOG MULTIPLIER AND PLL**	**Periods**	**9**
Analog Multiplier using Emitter Coupled Transistor Pair – Gilbert Multiplier cell – Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection			
Unit – IV	**ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS**	**Periods**	**9**
Analog and Digital Data Conversions, D/A converter – specifications – weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R 2R Ladder types – switches for D/A converters, high speed sample-and-hold circuits, A/D Converters – specifications – Flash type – Successive Approximation type – Single Slope type – Dual Slope type – A/D Converter using Voltage-to-Time Conversion – Over-sampling A/D Converters.			
Unit – V	**WAVEFORM GENERATORS AND SPECIAL FUNCTION**	**Periods**	**9**
Sine-wave generators, Multi vibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, Timer IC 555, IC Voltage regulators – Three terminal fixed and adjustable voltage regulators – IC 723 general purpose regulator – Monolithic switching regulator			
		Total Periods	**45**

Text Books:

1	Roy Choudhury and Shail Jain "Linear Integrated Circuits", Wiley Eastern, New Delhi, 2014.
2	Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", 3rd Edition, Tata Mc Graw-Hill, 2007.

References:

1	Ramakant A. Gayakwad, "OP-AMP and Linear ICs", 4th Edition, Prentice Hall / Pearson Education, 2001.
2	B.S.Sonde, "System design using Integrated Circuits" , 2nd Edition, New Age Pub, 2001.
3	Robert F Coughlin and Fedrick F Driscoll ―Operational amplifiers and linear Integrated Circuits‖, Fifth edition, Prentice Hall of India, New Delhi, 2001.

E-Resources:

1	http://kavediasir.yolasite.com/resources/Linear%20Integrated%20Circuit%202nd%20Edition%20-%20D.%20Roy%20Choudhary.pdf
2	http://fmcet.in/ECE/EC2254_uw.pdf

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Programme	B.TECH		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**IV**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT408	**Operating Systems**	3	0	0	3	40	60	100

Course Objective	The student should be made , • To understand the basic concepts and functions of operating systems. • To understand Processes and Threads • To analyze Scheduling algorithms. • To understand the concept of Deadlocks. • To analyze various memory management schemes. • To understand I/O management and File systems.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Illustrate the operating system concepts and its functionalities	K2
	CO2: Compare various CPU scheduling algorithms	K3
	CO3: Explain the need for process synchronization	K3
	CO4: Identify the issues in memory management	K3
	CO5: Compare file and disk management strategies	K2
Pre-Requisites	Nil	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO 1	2				3								2	
CO 2	2	2	1		2							2	2	1
CO 3	2	1		2		1							2	1
CO 4	2	1		1								2	2	1
CO 5	2	1				1							2	

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION**	**Periods**	**9**
Introduction-History of Operating Systems-Operating System Structure – Operating System Operations –Process Management – Memory Management – Storage Management – Protection and Security –Distributed Systems – Computing Environments – System Structures: Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs.			
Unit - II	**PROCESS MANAGEMENT AND COORDINATION**	**Periods**	**9**
Process Concept: Process Scheduling – Operations on Processes – Inter-process Communication. **Multithreaded Programming:** Overview – Multithreading Models – Threading Issues – **CPU Scheduling**: Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Synchronization – The Critical-Section Problem – Peterson‚s Solution – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Monitors.			
Unit – III	**DEADLOCKS AND MEMORY MANAGEMENT**	**Periods**	**9**
Deadlocks: System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock **Memory Management Strategies**: Swapping – Contiguous Memory Allocation – Paging – Structure of the Page Table – Segmentation			
Unit - IV	**VIRTUAL MEMORY MANAGEMENT**	**Periods**	**9**
Virtual Memory Management: Demand Paging – Copy on Write – Page Replacement – Allocation of Frames – Thrashing. **File System:** File Concept – Access Methods – Directory Structure – File Sharing –Protection			
Unit – V	**STORAGE MANAGEMENT**	**Periods**	**9**
Implementing File Systems: File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management **Secondary Storage Structure:** Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management. Devices – Device controllers- Device drivers. Case Study: (Only for Assignment Studies not for End-Semester-Examinations) 1. Kernel data structures for various open source operating systems 2. Linux Scheduling 3. Linux File system , Windows 7 4. RTOS , Mobile OS			
		Total Periods	**45**
Text Books			
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Principles",John Wiley & Sons (Asia) Pvt. Ltd, Ninth Edition, 2018		
References			
1.	Andrew S. Tanenbaum, ― Modern Operating Systems, 4th edition Prentice Hall of India Pvt.Ltd, 2016.		
2.	Gary Nutt, "Operating Systems- A Modern Perspective‖", Pearson Education Pvt. Ltd,5th Edition, 2012		
3.	William Stallings, "Operating System", Pearson Education, Sixth edition, 2012.		
E-Resources			
1.	www.webopedia.com/TERM/O/operating_system.html		
2.	https://www.tutorialspoint.com/operatingsystem/os_overview.htm		
3.	www.dictionary.com/browse/operating--system		

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Programme	**B.TECH**	Programme Code	**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**		Semester			**IV**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT409	**Design and Analysis of Algorithms**	3	1	0	4	40	60	100

Course Objective	The student should be made to, • Analyze the asymptotic performance of algorithms. • Apply important algorithmic design paradigms and methods of analysis. • Acquire knowledge run time analysis of algorithms. • Understanding the computational problems.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Analyze the running time complexities for the given recursive and non-recursive problems.	K3
	CO2: Analyze the execution time for the given problems in divide and conquer and greedy techniques.	K3
	CO3: Apply the Dynamic programming and iterative improvement problem solving technique to solve the given problems.	K3
	CO4: Apply the Branch and Bound and Backtracking problem solving technique to solve the given problems.	K3
	CO5: Analyze the P, NP-Hard and NP-Complete problem.	K3

Pre-requisite -

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO 1	3	1	2										2	2
CO 2	2	2	3										2	2
CO 3	1	3	3										2	2
CO 4	1	2	2										2	2
CO 5	1	3	2	1									2	2

Course Assessment Methods		
Direct		
1. Continuous Assessment Test I, II & III		
2. Assignment		
3. End-Semester examinations		
Indirect		
1. Course - end survey		

Content of the syllabus

Unit – I	INTRODUCTION TO ALGORITHM ANALYSIS	Periods	12

Algorithm and its properties-Asymptotic notations and its properties-Mathematical Analysis for recursive Algorithms (Binary search, Tower of Hanoi) and Non-Recursive Algorithms (Matrix multiplication, Bubble sort)Recurrence relations: Methods for solving recurrence relations.

Unit - II	DIVIDE AND CONQUER AND GREEDY TECHNIQUE	Periods	12

Divide and Conquer-Quick sort-Finding Maximum and Minimum-Strassen's Matrix Multiplication-Greedy Technique-Fractional Knapsack Problem-Huffman Trees.

Unit – III	DYANIMIC PROGRAMMING AND ITERATIVE IMPROVEMENT	Periods	12

Dynamic Programming-All pair shortest Path: Floyd's Algorithm-Optimal Binary search Tree -0/1 Knapsack Problem- Iterative Improvement-Maximum Matching in BiPartite Graphs-Stable Marriage Problem.

Unit - IV	BRANCH AND BOUND AND BACKTRACKING	Periods	12

Branch and Bound-Assignment Problem-8 Puzzle Problem-Back Tracking-8 Queens problem-Subset-sum problems-Hamiltonian Circuit Problem.

Unit – V	OTHER TECHNIQUES AND COMPUTATIONAL COMPLEXITY	Periods	12

Decrease and conquer-Insertion sort-Topological sorting-Transform and conquer-Horner's Rule for Polynomial-Introduction to P, NP-Hard and NP-Complete problems- Deterministic and Non Deterministic Algorithms-Approximation for NP-Hard problems.

	Total Periods	**60**

Text Books

1.	Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2011

References

1.	E Horowitz, S Sahni, and S Rajsekaran, Fundamentals of Computer Algorithms, Galgotia Publication, 2008.
2.	T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, Introduction to Algorithms, PHI Pvt. Ltd., 2009.
3.	Sridhar S, "Design and Analysis of Algorithms", Oxford Higher Education, First edition.
4.	Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, Third Edition, PHI Learning Private Limited, 2012.

E-Resources

1.	https://www.ics.uci.edu/~goodrich/teach/cs161/notes/
2.	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3.	https://nptel.ac.in/courses/106/106/106106131/

Programme	**B.TECH**	Programme Code		**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**IV**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT410	**Database Management System**	3	0	0	3	40	60	100

Course Objective	The student shall be accustomed with • To infer the essentials of data models to intellectualize and illustrate a database system using ER diagram. • To conceptualize the relational database implementation using SQL with effective relational database design concepts. • To elaborate the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure • To demonstrate Query evaluation and optimization techniques. • To signify the concepts of Database Security, Object Oriented, Data Warehousing and Data Mining

		KL
Course Outcome	At the end of the course, the student should be able to,	
	CO1: Distinguish database systems from file systems and describe data models and DBMS architecture.	K2
	CO2: Identify the basic issues of transaction processing and concurrency control.	K2
	CO3: Demonstrate with understanding of SQL Programming language and normalization theory.	K2
	CO4: Practice the basic query evaluation techniques, query optimization and familiar with basic database storage structures and access techniques.	K3
	CO5: Analyze and derive an information model expressed in the form of an entity relation diagram and transform into a relational database schema.	K3
Pre-requisites	--

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO 1	2	-	-	1	1	-	-	1	-	1	1	-		
CO 2	-	2	2	-	-	1	1	-	2	1	1	1		
CO 3	1	1	-	1	2	-	1	-	-	-	-	1		
CO 4	3	-	-	-	2	-	1	1	-	-	1	2		
CO 5	1	-	2	2	-	3	-	-	-	1	-	-		

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations	
Indirect	
1. Course - end survey	

Content of the syllabus

Unit – I	Introduction	Periods	10

Introduction: Introduction to Database. Hierarchical, Network and Relational Models. Three-Schema Architecture and Data Independence– The Database System Environment– **Data models**: Entity-relationship model, network model, relational and object oriented data models- Embedded SQL.

Unit – II	Relational query languages and Database design	Periods	9

Relational algebra, Relational Calculus, SQL Fundamentals -DDL and DML constructs.
Relational Database Design: Domain and data dependency, Armstrong's axioms, Functional Dependencies, Normal forms-1NF, 2NF , 3NF, BCNF.

Unit – III	Query processing & optimization	Periods	8

Query Processing Overview - Evaluation of relational algebra expressions- Algorithms for SELECT and JOIN operations-Nested-Loop join-Block Nested loop join-Indexed Nested loop join- Query equivalence types, Query optimization- Transformation of Relational expression, Heuristic optimization-Statistics of Cost Estimation.

Unit – IV	Transaction Processing and Database Recovery	Periods	8

Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, optimistic Concurrency Control schemes, Database recovery-Failure classification-Recovery Algorithm-Remote backup systems- Aries Algorithm.

Unit – V	Database Storage strategies & Security	Periods	10

RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – Static Hashing – Dynamic Hashing   **Database Security**: Authentication, Authorization and access control.

	Total Periods	**45**

Text Books

1	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 7 th Edition, Tata McGraw Hill, March 2019.
2	R. Elmasri and S. Navathe ,"Fundamentals of Database Systems", Pearson 7th Edition,2016.
3	Peter rob, Carlos Coronel, "Database Systems – Design, Implementation and Management", 9th Edition, Thomson Learning, 2009.

References

1	Gupta G K, "Database Management Systems", Tata McGraw Hill Education Private Limited, New Delhi, 2011.
2	J. D. Ullman,"Principles of Database and Knowledge – Base Systems", Vol 1,Computer Science Press ,Inc. New York, 1998.
3	Serge Abiteboul, Richard Hull, VictorVianu ,"Foundations of Databases", Addison-Wesley Publishing Company, 1995.

E-Resources	
1.	www.tutorialspoint.com/dbms/
2.	https://alison.com/courses/IT-Management-Software-and-Databases
3.	https://mva.microsoft.com/en-us/training-courses/database-fundamentals-8243?l= TEBiexJy_5904984
4.	http://www.sqlcourse.com/
5.	https://university.mongodb.com/
6.	http://www.edureka.co/mongodb
7.	https://www.lynda.com/NoSQL-training-tutorials/1473-0.html
8.	http://nptel.ac.in/video.php?subjectId=106106093
9.	https://www.udemy.com/database-management-system/
10.	http://www.nptelvideos.in/2012/11/database-management-system.html
11.	https://www.coursera.org/learn/database-management

Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**

<table>
<tr><td colspan="6" align="center">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University ,Chennai)
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</table>

Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**IV**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT411	**Operating Systems Laboratory**	0	0	4	2	60	40	100

Course Objective	The student should be made to, • Learn Unix commands and shell programming • Implement Deadlock Avoidance and Deadlock Detection Algorithms • Implement Page Replacement Algorithms • Implement File Organization and File Allocation Strategies	

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Simulate the basic UNIX Commands using system calls and simulate the utility code using shell programming.	K3
	CO2: Compare the performance of various CPU Scheduling Algorithms and Implement Deadlock avoidance and Detection Algorithms	K2
	CO3:Create processes and implement IPC	K3
	CO4: Analyze the performance of the various Page Replacement Algorithms	K3
	CO5: Implement File Organization and File Allocation Strategies	K3

Pre-requisites -

<table>
<tr><td colspan="14" align="center">CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak</td><td colspan="2" align="center">CO/PSO Mapping</td></tr>
<tr><td rowspan="2">Cos</td><td colspan="12" align="center">Programme Outcomes (POs)</td><td colspan="2" align="center">PSOs</td></tr>
<tr><td>PO 1</td><td>PO 2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO 2</td></tr>
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</table>

Course Assessment Methods

Direct
1. Prelab Post Lab
2. End-Semester examinations

Indirect
1.Course - end survey

EX.NO	EXPERIMENT DESCRIPTION	COs
1.	Study of LINUX - Basic Commands	CO1
2.	Shell programming (Using looping, control constructs etc.,)	CO1
3.	Write programs using the following system calls of UNIX operating system: fork, exec, getpid	CO1
4.	Write programs using the I/O system calls of UNIX operating system (open, read, write, etc).	CO1
5.	Implementation of CPU scheduling algorithms: FCFS & SJF	CO2
6.	Implementation of CPU scheduling algorithms: Round Robin & Priority Scheduling	CO2
7.	Implement the Producer – Consumer problem using semaphores.	CO3
8.	Implementation of Banker`s algorithm	CO2
9.	Implement some memory management schemes (First fit, Best fit & Worst fit)	CO4
10.	Implement some page replacement algorithms (FIFO & LRU)	CO5
	TOTAL PERIODS	**45**

E-Resources	
1.	https://www.hostinger.in/tutorials/linux-commands
2.	https://maker.pro/linux/tutorial/basic-linux-commands-for-beginners
3.	https://ubuntu.com/tutorials/command-line-for-beginners#3-opening-a-terminal
4.	https://www.tutorialspoint.com/unix/unix-useful-commands.htm

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205		

Programme	**B.TECH**	Programme Code	**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**		Semester			**IV**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT412	**DatabaseManagement System Laboratory**	0	0	4	2	60	40	100

Course Objective	• Learn to create and use a database • Be familiarized with a query language • Have hands on experience on DDL Commands • Have a good understanding of DML Commands and DCL commands • Familiarize advanced SQL queries. • Be Exposed to different applications

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Design and implement a database schema for a given problem-domain	K3
	CO2: Populate and query a database	K3
	CO3: Create and maintain tables using PL/SQL.	K3
	CO4: Prepare reports	K3
	CO5: Prepare databases	K3

Pre-requisites	NIL

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO 1	2	1	-	1	2	-	-	-	1	-	1	2	2	1
CO 2	-	2	-	1	-	-	1	-	1	2	-	1	2	1
CO 3	2	-	-	-	2	-	1	1	-	-	3	-	2	1
CO 4	2	1	-	-	1	1	1	-	-	-	-	1	2	1
CO 5	1	-	1	1	-	2	-	-	1	1	-	1	2	1

Course Assessment Methods
Direct
1. Pre Lab & Post Lab 2. Record 3. End-Semester examinations
Indirect
1. Course - end survey

EX.NO	EXPERIMENT DESCRIPTION	COs
1.	Creation of a database and writing SQL queries to retrieve information from the database.	CO2
2.	Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based onconditions.	CO2

3.	Mini project (Application Development using Oracle/ Mysql)
	    a) Inventory Control System.
	    b) Material Requirement Processing.
	    c) Hospital Management System.
	    d) Railway Reservation System.
	    e) Personal Information System.
	    f) Web Based User Identification System.
	    g) Timetable Management System.
	    h) Hotel Management System
		CO4 & CO5

4.	Creation of Views, Synonyms, Sequence, Indexes, Save point.	CO2
5.	Creating an Employee database to set various constraints.	CO2
6.	Creating relationship between the databases.	CO1
7.	Study of PL/SQL block.	CO3
8.	Write a PL/SQL block to satisfy some conditions by accepting input from the user.	CO3
9.	Write a PL/SQL block that handles all types of exceptions.	CO3
10.	Creation of Procedures.	CO3
11.	Creation of database triggers and functions	CO3
	TOTAL PERIODS	**45**

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205	

Programme	**B.E./ B.TECH**	Programme Code	104		Regulation	**2019**
Department	**CSE, EEE, ECE, IT & BT**				Semester	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19MCSY4	**VERBAL ABILITY**	3	0	0	-	100	-	100

Course Objective	The main objective of the course is to: • Help the student understand the importance of having his language skills kept ready for effective use • Provide a host of varied opportunities for the student to hone his acquired language skills basic components, namely, Grammar, Vocabulary, Spelling and Comprehension.	
Course Outcome	At the end of the course, the student will be able to,	KL
	CO1:, Identify the verb and tense in a sentence by circling and labeling	K1
	CO2: State the definition of an article	K1
	CO3: Develop their awareness of correct usage of English grammar in writing and speaking ·	K3
	CO4: Tests a vocabulary power and skill to follow the logic of sentences	K4
	CO5: Discuss how word root based extends vocabulary	K2
Pre-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1						2			3	3		3		2
CO 2						2			3	3		3		2
CO 3						2			3	3		3		2
CO 4						2			3	3		3		2
CO 5						2			3	3		3		2

Content of the syllabus

Unit – I	**TENSES**	Periods	**6**

Purpose and rules of tenses and its keywords (focus should be given to present continuous, future continuous, present perfect, future perfect, present perfect continuous, past perfect continuous, future perfect continuous with more examples) - Direct and Indirect Speech – Voices.

| **Unit - II** | **ARTICLES** | Periods | **6** |

Purpose of Articles: Indefinite Article: If you want to say about ANY item, you should use the articles A / An. **A :** A European, A One Eyed beggar, A University, A Useful Website. Name of professions, Expressionof quantity, To make a Proper noun a Common noun, With certain numbers, used before the word 'Half' when it follows a whole number. **Exceptions: Choosing A or An** There are a few exceptions to the general rule of using a before words that start with consonants and an before words that begin with vowels. The first letter of the word honor, for example, is a consonant, but it"s unpronounced. In spite of its spelling, the word honor begins with a vowel sound. Therefore, we use an. **Example.**

The Definite Article:

Where to use the Definite Article -A specific item, a particular person or thing, Before superlative forms, Before double comparatives, Before musical instruments, Before rank or title, Before name of the political parties, armed forces, physical positions, Before a Proper noun when used as a Common noun, Before some adjectives to make them nouns, Before Ordinal numbers, Before the names of Oceans, Seas, Rivers, Canals, Deserts, Groups of Mountains and Groups of Islands, Before the names of the Things, which are unique in nature, Before the names of Planets and Satellites, Before Holy Books, Before the names of News Papers, Before the names of some countries, measuring expressionsbeginning with by. **Omission of articles**:

Before Plural countable noun, Before proper noun, Before languages, a single item of uncountable noun, Before name of the meals except adjective usage, Double expressions – with wife and fork, withhat and folk, from top to bottom, With the names of meals such as Breakfast, Before predicative nounsdenoting a unique position, After type of / kind of / sort of / post of / title of / rank of / articles are not used. Ex. He is not that sortof man, Articles are not used with material nouns, After di-transitive verb articles should not be used except when it is used as mono transitive verb, Before the names of meals no article should be used in a general way except in particular causes.

Repetition of the articles

    1. When two or more adjectives qualify the same noun, the article is used before the first adjective only; but when they qualify different nouns, expressed or understood, the article is used before each adjective.

PREPOSITIONS

a. Prepositions Of Time-On, In, At, Since, For, Ago, During, Before, After, Until, Till, To/Past, From/To, By

b. Prepositions Of Place- In, At, On, Off, By, Beside, Under, Over, Below, Above, Up And Down, Ago

c. Prepositions Of Directions/ Movements Across, Through, To, Into, Out Of, Onto, Towards, From

d. Other Prepositions- Of, By , About, For, With

e. Prepositions Usage with Its Context

| **Unit – III** | **SENTENCE CORRECTION** | Periods | **6** |

SENTENCE CORRECTION

a) In each of the following sentences, four options are given. You are required to identify the best way of writing the sentence in the context of the correct usage of standard written English. While doing so, you haveto ensure the message being conveyed remains the same in all the cases.

b) For each of the following questions, a part or the whole of the original sentence has been underlined. You have to find the best way of writing the underlined part of the sentence.

c) In the following questions, you have to identify the correct sentence/s. For each of the following questions, find the sentence/s that are correct.

d) In each of the following questions, one or more of the sentences is/are incorrect. You have to

identify the incorrect sentence/s.

SENTENCE IMPROVEMENT
- a. Subject-Verb Agreement
- b. Parallelism
- c. Redundancy: The error of repeating the same thing.
- d. Modifier
- e. Comparisons

RULE: (a) When comparative degree is used with than, make sure that we exclude the thing comparedfrom the rest of class of things by using the
- f. Confusing words
  - i) Few and Less
  - ii) Few and A few
  - iii) Little and A Little

  A little tact would have saved the situation (some tact).Lay and Lie Lay, laid

Unit - IV	SENTENCE COMPLETION	Periods	6

SENTENCE COMPLETION: Purpose and usage of proper words. **SPOTTING ERRORS:**
- a. Errors on conjunctions
- b. Errors on „if" clauses
- c. Errors on adverbs
- d. Errors on adjectives
- e. Errors on prepositions
- f. Errors on determiners
- g. Errors on verbs
- h. Errors on nouns
- i. Errors on modifiers
- j. Errors on degrees of comparison
- k. Errors on subject-verb agreement
- l. Errors on infinitives
- m. Errors on pronouns
- n. Errors on tenses
- o. Redundancy errors
- p. Errors on articles
- q. Error on complex sentences

Unit – V	VOCABULARY	Periods	6

Synonyms: Root Based Word, Suffix Based Word. Antonyms - Contextual Vocabulary - Verbal Analogy

	Total Periods	30

Text Book:	
1.	Objective General English by SP Bakshi – Arihant Publication

References:	
1.	A modern Approach to verbal and non-verbal reasoning by R.S. Agarwal
2.	Word power made easy by Norman Lewis

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Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**IINFORMATION TECHNOLOGY**		Semester		**V**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT513	**Data Warehousing and Data Mining**	3	0	0	3	40	60	100

Course Objective	The main objective of the course is to: • Introduce the basic concepts of data mining • Familiarize the data mining functionalities • Assess the strengths and weaknesses of various data mining techniques	
Course Outcome	At the end of the course, the student will be able to:	KL
	CO1: Familiar with the data warehouse architecture	K1
	CO2: Understand the functionalities of data mining	K2
	CO3: Know the different data preprocessing techniques	K3
	CO4: Identify the association rules using frequent itemset mining algorithms	K2
	CO5: Describe the classification and clustering technique	K2
Pre-requisites	Database Management Systems	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3			2	3								2	
CO 2	2	2			2								2	
CO 3	3				2								2	
CO 4	2	2		2	2								2	
CO 5	3	2			3								2	

Course Assessment Methods

Direct
1.Prelab Post Lab   2.Record   3.End-Semester examinations
Indirect
1.Course - end survey

Content of the syllabus				
Unit – I	**Data Warehousing**		Periods	**9**
Introduction- Data Warehouse - Multidimensional data model - Data warehouse architecture - Steps for the design and construction of data warehouses, Three-tier data warehouse architecture, Data warehouse back-end tools and utilities, Metadata Repository - Types of OLAP Servers - Data warehouse implementation				
Unit - II	**Introduction to Data Mining**		Periods	**9**
Introduction - The evolution of database system technology – Steps in knowledge discovery from database process - Architecture of a data mining systems - Data mining on different kinds of data – Different kinds of pattern – Technologies used – Applications – Major issues in data mining - Classification of data mining systems– Data mining task primitives - Integration of a data mining system with a database or data warehouse system				
Unit – III	**Data Preprocessing**		Periods	**9**
Data Objects and attribute types – Basic statistical description of data –Measuring data similarity and dissimilarity - Data cleaning – Integration - Data reduction – Data transformation and data discretization.				
Unit - IV	**Association Rule Mining**		Periods	**9**
Basic concepts – Frequent item set mining methods – Apriori algorithm, A pattern growth approach , Vertical data format, Closed and max patterns - Pattern mining in multilevel and multidimensional space – Constraint based frequent pattern mining				
Unit – V	**Classification and Clustering**		Periods	**9**
General approach to classification - Decision tree induction - Bayes classification methods-Rule Based Classification- Metrics for evaluating classifier performance – Prediction - Cluster Analysis – Partitioning methods – Hierarchical methods- Applications of data mining-Social impacts of data mining-Tools				
			Total Periods	**45**
Text Books:				
1	Jiawei Han, Micheline Kamber and Jian Pai , Data Mining: Concepts and Techniques, MorganKauffman, 2013			
2	Alex Berson and Stephen J Smith, Data Warehousing, Data Mining, and OLAP, Mcgraw-Hill, 1997			
References:				
1	David Hand, Heikki Manila, Padhraic Symth, Principles of Data Mining, MIT Press, 2001			
2	Margaret H.Dunham, Data Mining: Introductory and Advanced Topics, Pearson Education 2003			
E-Resources :				
1	https://en.wikipedia.org/wiki/Data_mining			
2	https://en.wikipedia.org/wiki/Association_rule_Learning			
3	http://blog.bismart.com/en/Clustering_a_practical_explanation			

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Programme	**B.TECH**	Programme Code		**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**				Semester		**V**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT514	**Microprocessor and Microcontroller**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the Architecture of 8086 Microprocessor • Learn about general-purpose interfaces. • Understand the basics of 8051 and embedded system	
Course Outcome	At the end of the course, the student should be able to,	KL
	CO1: Identify the functions of 8086 microprocessors	K2
	CO2: Programming the 8086 to connect general-purpose interfaces	K3
	CO3: Understand the basics of 8051	K2
	CO4: Develop skills to write programs using 8051 ALP	K3
	CO5: Understand the basics of embedded systems	K2
Pre-requisites	Computer Organization	

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Course Assessment Methods
Direct

1. Continuous Assessment Test I, II & III
   2. Assignment
   3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**8086 Microprocessor**	Periods	**9**
Intel 8086 microprocessor - Architecture -Basic 8086/8088 Configurations: Minimum Mode and Maximum Mode. Instruction set - Addressing modes – Assembly language programming			
Unit – II	**General Purpose Interfacing Devices**	Periods	**9**
8255A Programmable Peripheral Interface - IC 8251A Serial Communication Interface – 8253 Programmable Interval Timer IC - IC 8279 Programmable Keyboard /Display Interface – 8259A Programmable Interrupt Controller.			
Unit – III	**8051 Microcontroller**	Periods	**9**
Introduction to 8051 - Microprocessor architecture and its operations – Example of a 8051 based Microcomputer - Instruction set- Addressing modes- Timing diagram of 8051 (Opcode fetch, Memory Read/Write, I/O Read/Write).			
Unit – IV	**Programming the 8051**	Periods	**9**
Counters – Time Delays – Stack and Subroutines – Code conversion – Interrupts- Memory mapped I/O andI/O mapped I/O for 8051.			
Unit – V	**Principles of Embedded Systems**	Periods	**9**
Introduction -Embedded systems description, definition, design considerations and requirements - Overviewof Embedded system Architecture (CISC and RISC) -Categories of Embedded Systems - Embedded processor selection and tradeoffs.			
		Total Periods	**45**

Text Books:		
1.	Yn-cheng Liu,Glenn A.Gibson, "Microcomputer systems: The 8086 / 8088 Family architecture,Programming and Design", Second Edition, Prentice Hall of India , 2006.
2.	Muhammad Ali Mazidi, Janice Gillispie Mazidi,RolinD.MC Kinlay ,"The 8051 Microcontroller and Embedded Systems",Pearson Education,Second Edition,2008.
References:	
1.	Kenneth J.Ayala, "The 8051 microcontroller Architecture, Programming and Applications", Third Edition, Penram international 2004.
2.	Douglas V.Hall, "Microprocessors and Interfacing: Programming and Hardware", TMH,Revised Second Edition, 2006.
3.	Krishna Kant, "Microprocessors and Microcontrollers: Architecture, Programming and SystemDesign 8085, 8086, 8051, 8096", Prentice Hall of India Pvt. Ltd., 2012.
4.	Lyla B. Das, "Embedded Systems: An Integrated Approach", Pearson, 2013.
E-Resources :	
1.	http://gbcramgarh.in/e-learning-study-materials/BCA/computer/THE%208086%20MICROPROCESSOR/9780198079064.pdf
2.	http://www.gpcet.ac.in/wp-content/uploads/2018/03/UNIT-5-MPI-LECTURE-NOTES.pdf
3.	http://oms.bdu.ac.in/ec/admin/contents/9_P16PYE1_2020051208244932.pdf

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN						
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Programme	**B.TECH**		Programme Code	**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**				Semester		**V**
Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT515	**Web Technology**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Learn the basics of web and XHTML • Apply scripting in XHTML for designing interactive web page • Apply the concepts of Full Stack Development • Develop a application in AngularJS	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Understand the internet related technologies and Implement the objects in XHTML and CSS	K2
	CO2: Design dynamic and interactive web pages by embedding Java Script code in XHTML	K3
	CO3: Apply server side programming and build web application using ASP.NET	K3
	CO4: Implement the full stack development using AngularJS and Spring boot	K3
	CO5: Develop a Single page application in AngularJS	K3
Pre-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	2	1	1	2	-	-	-	3	2	1	-	2	2
CO 2	3	2	1	1	3	-	-	-	3	2	1	-	3	3
CO 3	3	2	1	1	3	-	-	-	3	2	1	-	3	3
CO 4	2	2	1	1	3	-	-	-	3	2	1	-	3	3
CO 5	3	2	1	1	3	-	-	-	3	2	1	-	3	3

Course Assessment Methods

DIRECT

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

INDIRECT

1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION TO WEB AND XHTML**	Periods	**8**
Internet - Basic Protocols - Webpages. Introduction to XHTML and Editing XHTML – Headings – Linking - Images - Special characters and Horizon rules - Lists – Tables - Forms – Internal Linking- Meta Elements –Cascading Style Sheets.			
Unit - II	**CLIENT SIDE SCRIPTING - JAVA SCRIPT**	Periods	**9**
Introduction to scripting – Control statements I, II – Functions: Definition – Random Number Generation – Global function – Recursion – Arrays: Declaring and allocating arrays – Multidimensional arrays – Objects : Math object – String object – Date object – Boolean, Number object – Document object –Window object - Events			
Unit – III	**SERVER SIDE SCRIPTING - ASP . NET**	Periods	**9**
Database : My SQL - Create Table - Insert, Update and Delete operation. Server side scripting - ASP.NET - Introduction - Basics - Installing Visual Studio - Creating forms - HTTP Request/ Response - Connecting Database. Web services			
Unit - IV	**FULL STACK DEVELOPMENT**	Periods	**10**
Introduction - Architecture of Modern Web Applications - Front End Vs Back End - Angular JS as Front End Framework - Spring Boot as Back End Framework - Installing Spring Boot - Sample Maven Project. Creating Restful Layer : REST - HTTP Methods - CRUD Operations - Building Restful Service for User Registration Form			
Unit – V	**ANGULARJS**	Periods	**9**
Basic Components - Life Cycle - MVC Architecture - Setting up AngularJs - Adding Bootstrap - A Single Page Application in AngularJS			
		Total Periods	**45**

Text Books:	
1	P.J. Deitel and H.M. Deitel, Internet and World Wide Web – How to Program, Pearson Education, Fifth Edition, 2012.
2	Full Stack AngularJS for Java Developers: Build a Full-Featured Web Application from Scratch Using AngularJS with Spring RESTful - Ravi kant Soni - APress - 2017

References:	
1	UttamK.Roy, Web Technologies, University Press, 2011.Oxford.
2	Rajkamal, Web Technology, Tata McGraw-Hill, 2009.

E-Resources:	
1.	https://learning.oreilly.com/library/view/full-stack-angularjs/9781484231982/
2.	https://www.freecodecamp.org/learn/responsive-web-design/

<table>
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</table>

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**V**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT516	**Python Programming**	2	1	0	3	40	60	100

Course Objective	The student should be made to, • Understand the fundamentals of Python programming • Handle list, tuples, sets and Dictionaries data types • Learn function prototypes and string functions • Use files and modules for data processing • Understand packages in Python and data visualization

		Knowledge Level
Course Outcome	At the end of the course, the student should be able to,	
	CO1: Develop basic Python programs using conditional and control statements	K1
	CO2: Perform operations on list, tuples, sets and Dictionaries	K2
	CO3: Implement function prototypes and string functions	K2
	CO4: Apply files and modules and perform operations on CSV files	K2
	CO5: Perform data visualization and apply Python packages	K2
Pre-requisites	Basics of Algorithmic and C	

														CO/PSO Mapping

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak

COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	1	2	2	1	1						1	1	2	3
CO 2	2	3	3	2	1						1	1	2	3
CO 3	2	3	3	2	2						1	1	2	3
CO 4	2	3	3	3	2						1	1	2	3
CO 5	2	3	3	3	3						1	1	2	3

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION TO PYTHON**	Periods	**9**
Introduction to Python, features, installing Python, writing and executing Python program — native data types, comments, constants, variables, operators, expression, conditional statements, control statements, continue, pass,break.			
Unit - II	**LISTS, TUPLES, SETS AND DICTIONARIES**	Periods	**9**
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Sets: methods and operators, Dictionaries: operations and methods.			
Unit – III	**FUNCTIONS AND STRINGS**	Periods	**9**
Function definition, declaration, arguments, parameters – formal and local, parameter passing methods - functionprototypes, recursion; Strings: string slices, immutability, string functions and methods, string module, regular expressions.			
Unit - IV	**FILES AND MODULES**	Periods	**9**
Files and exception: Text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, accessing CSV file.			
Unit – V	**PACKAGES AND DATA VISUALIZATION**	Periods	**9**
Text processing, Numerical processing: NumPy package – mean, medium and mode, Pandas package – vector,data frame, data visualization: matplotlib, Time operations.			
		Total Periods	**45**

Text Books:

1.	Anurag Gupta,G.P BISWAS, "Python Programming – Problem solving, packages and Libraries",Edition 1, Tata McGraw Hill, 2018
2.	Mark Lutz, ―Learning Python: Powerful Object-Oriented Programming, Fifth Edition, O „Reilly,Shroff Publishers and Distributors, 2013
3.	David Beazley and Brian K. Jones, "Python Cookbook", Third Edition, O „Reilly, 2013

References:

1.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 3, Shroff/ O Reilly Publishers, 2016.
2.	Mark Pilgrim, ―Dive into Python 3, Apress, 2009.
3.	John V. Guttag, Introduction to Computation and Programming using Python, PHI, 2014.
4.	Paul Barry, "Head First - Python", Second Edition, O „Reilly, 2017
5.	E Balagurusamy, "Problem Solving and Python Programming", Tata McGraw Hill, 2018

E-Resources:

1.	https://nptel.ac.in/courses/106/106/106106182/
2.	https://www.w3schools.com/python/
3.	BeginnersGuide - Python Wiki
4.	Free Books - PythonBooks - Python Wiki

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Programme	**B.E. / B.TECH**	Programme Code	**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**		Semester		**V**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT517	**Web Technology Laboratory**	0	0	3	2	60	40	100

Course Objective	The main objective of the course is to: • Be familiar with Web page design using HTML / XHTML and stylesheets • Learn to create dynamic web pages using server side scripting. • Explore the connectivity of back end with front end. • Learn about web services • Implement the web application using Angular JS Tool	
Course Outcome	At the end of the course, the student will be able to	
	CO1: Design Web pages using markup languages and style sheets	K3
	CO2: Design and Implement database applications.	K3
	CO3: Create dynamic web pages using server side scripting	K3
	CO4: Build a web form for display	K3
	CO5: Create a student profile in AJS	K3

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														**CO/PSO Mapping**	
COs	Programme Outcomes (POs)													PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	2	1	1							1	-		
CO 2	3	2	1	1							1	-		
CO 3	3	2	1	1							1	-	2	
CO 4	2	2	1	1							1	-		2
CO 5	3	2	1	1							1	-		2

Course Assessment Methods

Direct
1. Prelab Post Lab 2. Record 3. End-Semester examinations
Indirect
1.Course - end survey

EX.NO	EXPERIMENT DESCRIPTION	COs
1.	Develop the html program for Creation of web site with forms, frames, links, tables Etc	CO1
2.	Create an XHTML document that has a form with text box, Radio Button, Selection box,Checkbox, Submit and reset buttons along with CSS.	CO2
3.	Creating simple application to access data base using JDBC Formatting HTML with CSS.	CO2
4.	Generate JavaScript for arrays and functions.	CO3
5.	Create a web page with real time clock using Java script event handling mechanism.	CO3
6.	Program with ASP .net by connecting with SQL	CO3
7.	Create login form to enter into website	CO4
8.	Building web form that displays data from a database	CO4
9.	Process XHTML Forms using PHP program by GET and POST methods.	CO4
10.	Write a program to implement web service for calculator application	CO4
11.	Create a form in AngularJS & validate the form and also print the user data given in the form once the form is submitted.	CO5
12.	Create a Student Profile in AngularJS using event handling mechanism.	CO5
	TOTAL PERIODS	**45**

Programme	**B.E. / B.TECH**	Programme Code	**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**		Semester		**V**	

CourseCode	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT518	**Python Programming Laboratory**	0	0	4	2	60	40	100

Course Objective	The main objective of this course is • To write, test, and debug simple Python programs • To implement Python programs with conditionals and loops • Use functions for structuring Python programs • Represent compound data using Python lists, tuples, dictionaries • Read and write data from/to files in Python.

Course Outcome	At the end of the course, the student should be able to,	
	CO1 :Write, test, and debug simple Python programs	K3
	CO2: Implement Python programs with conditionals and loops	K3
	CO3: Develop Python programs step-wise by defining functions and calling them	K3
	CO4: Use Python lists, tuples, dictionaries for representing compound data	K3
	CO5: Read and write data from/to files in Python	K3

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3	2	1		1							1		
CO 2	3	2	1		1							1		
CO 3	3	2	1		1							1	2	
CO 4	3	2	1		1							1		2
CO 5	3	2	1		1							1		2

Course Assessment Methods

  1. Prelab Post Lab
  2. Record
  3. End-Semester examinations

  1. Course - end survey

List of Experiments

EX.NO	EXPERIMENT DESCRIPTION	COs
1.	a. Odd or Even b. Simple Calculator c. Leap year d. Finding the exponentiation of the given number	CO1
2.	a. Finding Factorial of given number b. Armstrong Number c. Finding Fibonacci Series d. Finding the maximum of the list e. Finding n Prime numbers	CO2
3.	a. Circulating N values of an array b. Summation of n numbers c. Swapping of two values d. Distance between two points	CO2,CO3
4.	a. Linear Search b. Binary Search	CO3,CO4
5.	a. Selection Sort b. Insertion Sort	CO3,CO4
6.	Merge Sort	CO3,CO4
7.	Multiply Matrices	CO3,CO4
8.	Program to take command line arguments (word count)	CO5
9.	Find the most frequent words in a text read from a file	CO5
10.	a. Simulate Elliptical Orbits using PyGame b. Simulate Bouncing Ball using PyGame	CO5
	TOTAL PERIODS	**45**

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Programme	**B. TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19MCTY5	**Logical Reasoning**	2	0	0	-	100	-	100

Content of the syllabus

Unit – I	**VERBAL REASONING**	Periods	6

Coding – Decoding(Letter Coding, Direct Letter Coding, Number/Symbol Coding, Deciphering Message – Word coding and Numeral coding, Substitution Coding, Crypt coding – crypt addition, subtraction, Information Arrangement Coding) , **Analogy** (Direct and Simple Analogy, Completing the Analogues pair, Choosing the Analogues pair, Choosing the similar word, Number Analogy, Alphabet Analogy), **Classification**(Choosing the odd words, Choosing the odd pair of words, Choosing the odd letter group, Choosing the odd number and odd pair of numbers), **Alphabet** Test(Arrangement according to dictionary, Alpha-Numeric sequence, Letter word problems, Rule detection), Word
Formation (Using letters from a given word, By unscrambling words)

Unit - II	**SITTING ARRANGEMENT & SENSE TEST**	Periods	6

Sitting Arrangement (Arrangement in a line, Arrangement around of a circle, square and rectangle, Arrangement around pentagonal and hexagonal, **Direction Sense Test**[(Main, Cardinal and Shortest Direction)Final Detection, Displacement, Direction and Displacement], Nu**mber, Ranking, Time sequence Test** (Number Test, Ranking Test,
Time Sequence Test), Puzzles (Based on classification, Based on placing and comparison, Family Based problems)

Unit – III	**NUMBER AND LETTER SERIES**	Periods	6

Number and Letter Series[(<u>**Number Series**</u>: To find a missing term, Find the number that does not follow the pattern, Miscellaneous pattern of the series (Based on addition / subtraction of consecutive odd / even no's, Based on addition / subtraction of prime numbers, Multiplication and Division, Based on addition / subtraction of squares of natural numbers, Based on addition / subtraction of cubes of natural numbers) , <u>**Letter Series**</u> (Alphabet Series, Continuous pattern of series)], **Inserting the missing character**, **Age, Blood** (Jumbled up descriptions, Relation puzzles, Coded Relations), **Clock and calendar (**Mathematical operations and Notations- Problem of solving by substitution, Interchanging signs and numbers, Deriving the appropriate conclusions), **Logical order of words, Clerical aptitude**
(Question based on address, Question based on issues)

Unit – IV	**LOGICAL AND ANALYTICAL REASONING**	Periods	6

Logical venn diagrams (Universal positive, Universal Negative, Universal Affirmative or Negative, Miscellaneous, Geometrical Figures on Venn Diagrams), **Eligibility test, Syllogisms, Statement and Assumptions, Statement and Conclusions, Statement and Arguments, Statement and Course of Action, Verification of Truth of the Statement,**
Data Sufficiency.

Unit – V	DATA INTERPRETATION & FLOW CHART	Periods	6
Input – Output (Shifting, Arranging),**Data Interpretation** (Table chart, Bar chart, Pie chart, Miscellaneous chart, Mixed chart), **Cube**(no of sided painted, Full cube, cutting cube), **Flow chart** (Description flow chart, Value updating flow chart), **Quantitative reasoning, Logical deduction, Deductive reasoning, Binary logic**			
		Total Periods	**30**

Text Book:

1.	How to crack Test of Reasoning - Jai kishan and Prem kishan -arihant publication

Reference:

1.	How to prepare logical reasoning for CAT – Arun Sharma – Mc Graw Hill Publication

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Programme	**B.E. / B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**CSE & IT**				Semester	**VI**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CS626	**Compiler Design**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Enrich the knowledge in various phases of compiler • Define the role of lexical analyzer, use of regular expression and transition diagrams • Extend the knowledge of parser by parsing LL parser and LR parser. • Construct dynamic run-time stack • Enrich the knowledge in code optimization techniques, machine code generation, and use of symbol table.

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Explain the various phases of compiler	K2
	CO2: Apply the knowledge of tools to develop a scanner	K3
	CO3: Construct the syntax analyzer for various languages.	K3
	CO4: Design the Intermediate Code Generator in compiler.	K4
	CO5: Apply the code optimization techniques to improve the performance of a program.	K4

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	3	3	2	2	2	2	-	2	2	1	2	1	2
CO 2	3	3	3	3	2	2	2	-	2	1	2	2	3	3
CO 3	3	3	3	3	3	3	2	-	3	2	2	3	3	3
CO 4	3	3	3	3	2	2	2	2	2	2	1	1	2	3
CO 5	3	3	3	2	2	3	2	-	2	3	2	3	3	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment/Quiz/Seminar
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION TO COMPILERS**	Periods	**10**
Translators-Compilation and Interpretation-Language processors -The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools - Programming Language basics			
Unit - II	**LEXICAL ANALYSIS**	Periods	**9**
Need and Role of Lexical Analyzer-Lexical Errors-Expressing Tokens by Regular Expressions-Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analyzers-LEX.			
Unit – III	**SYNTAX ANALYSIS**	Periods	**8**
Need and Role of the Parser-Context Free Grammars -Top Down Parsing -General Strategies-Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item-Construction of SLR Parsing Table -Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC.			
Unit - IV	**SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT**	Periods	**9**
Intermediate Languages -Syntax directed Definitions-Construction of Syntax Tree-Bottom-up Evaluation of S-Attribute Definitions. RUN-TIME ENVIRONMENT: Source Language Issues-Storage Organization-Storage Allocation-Parameter Passing-Symbol Tables-Dynamic Storage Allocation.			
Unit – V	**CODE OPTIMIZATION AND CODE GENERATION**	Periods	**9**
Principle Sources of Optimization-DAG- Optimization of Basic Blocks-Global Data Flow Analysis-Efficient Data Flow Algorithms-Issues in Design of a Code Generator - A Simple Code Generator Algorithm.			
		Total Periods	**45**

Text Books:

1.	Alfred V Aho, Monica S Lam, Ravi Sethi &Jeffrey D. Ullman, "Compilers: Principles, Techniques and Tools", 2nd Edition, Pearson Education, India, 2014.

References:

1.	O.G. Kakde, "Compiler Design", 5th Edition, An Imprint of Laxmi Publications Pvt. Ltd., 2015.
2.	V Raghavan , "Principles Of Compiler Design", Tata Mcgraw Hill Publishing Co Ltd, 2016.
3.	Randy Allen, Ken Kennedy,―Optimizing Compilers for Modern Architectures: A Dependence-based Approach‖, Morgan Kaufmann Publishers, 2009
4.	Steven S. Muchnick, ―Advanced Compiler Design and Implementation, ―Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2007
5.	Charles N. Fischer, Richard. J. LeBlanc ―Crafting a Compiler with C‖, Pearson Education, 2008

E-Resources:

1.	https://nptel.ac.in/courses/106/105/106105190/
2.	https://www.geeksforgeeks.org/compiler-design-tutorials/
3.	https://nptel.ac.in/courses/106/108/106108113/
4.	gatecse.in/category/compiler-design/
5.	www.tutorialspoint.com/compiler_design

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Programme	**B.E / B.TECH**	Programme Code		**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		**VI**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT619	**Introduction to Machine Learning**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • The course focuses on the methodology of how to translate a data driven business/societal problem into an effective solution by using the powerful Machine Learning paradigm.

Course Outcome	On Completion of the course, the student should be able to,	Knowledge Level
	CO1: Define AI-based problems, and identify its key competitive advantages and issues.	K2
	CO2: Emphasize machine learning basics and the importance of mathematics towards machine learning methods.	K2
	CO3: Apply and evaluate the classification models of machine learning	K3
	CO4: Implement and evaluate the regression models of machine Learning	K3
	CO5: Examine and evaluate the unsupervised methods of machine Learning	K3

Pre-requisites	-

CO / PO Mapping														**CO/PSO Mapping**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														**Mapping**	
COs	Programme Outcomes (POs)													PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	1	1	-	-	-	-	-	-	-	-	-	3	1
CO 2	2	1	1	-	-	-	-	-	-	-	-	-	3	1
CO 3	3	2	1	1	-	-	-	-	-	-	-	-	3	1
CO 4	3	2	1	1	-	-	-	-	-	-	-	-	3	1
CO 5	3	2	1	1	-	-	-	-	-	-	-	-	3	1

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment/Quiz/Seminar
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	Introduction to AI & ML	Periods	9
Introduction– Definition, Symbolic and Non-Symbolic Representation, Research Focus of Artificial Intelligence. **Artificial Intelligence**: History, Applications, Objectives, Artificial Intelligence Programming and future of AI. **Machine Learning-** Introduction- Types of Machine Learning-Applications			
Unit – II	Modelling & Concepts of Probability	Periods	9
Selecting a Model- Training a Model- Model Representation and Interpretability- Evaluating Performance of a Model-Concepts of Probability-Random variables-Discrete Distributions-Continuous Distribution-Multiple Random Variables			
Unit – III	Classification	Periods	9
Baye‟s Theorem-Brute Force Bayesian algorithm-Naïve Bayes classifier- Applications of Naïve Bayes - Examples of Supervised Learning -Classification Model-Classification Learning Steps, k-Nearest Neighbour (kNN), Random forest model, Support vector machines			
Unit – IV	Regression	Periods	9
Example of Regression-Common Regression Algorithms-Simple linear regression, Multiple linear regression, Assumptions in Regression Analysis, Main Problems in Regression Analysis, Improving Accuracy of the Linear Regression Model, Polynomial Regression Model, Logistic Regression			
Unit – V	Unsupervised Learning	Periods	9
Application of Unsupervised Learning-Clustering- Clustering as a machine learning task, Different types of clustering techniques, Partitioning methods, k-Medoids: a representative object-based technique-Finding Pattern using Association Rule-Definitions of common terms, Association rule, The apriori algorithm for association rule learning			
		Total Periods	45

Text Books:

1.	Rajendra Akerkar, "Introduction to Artificial Intelligence", PHI Learning Pvt Ltd, Second Edition August,2014.
2	Siakut Dutt, S.Chandramouli, Amit Kumar Das, "Machine Learning" Pearson Education, 2018

Reference Books:

1	Subhrajit Bhattacharyya, Sujit Bhattacharyya,"Practical Handbook of Machine Learning", GKP publishers, 2021
2	Gopinath Rebala, Ajay Ravi, Sanjay Churiwala, "An Introduction to Machine Learning", Springer Nature, Switzerland, 1st edition, 2019.
3	Tom M. Mitchell, "Machine Learning", McGraw Hill Education, First edition (1 July 2017).

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Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**	
Department	**IT**				Semester	**VI**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT620	**Software Engineering**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Defined as a simplified representation of a software process. Each model represents a process from a specific perspective • Explain the students the importance of Requirements Engineering. • Know about the role of UML and Testing in Software Development. • Know about the essentials design of software architectural design and design. • Explain about the fundamentals of software testing.	

Course Outcome	At the end of the course, the student should be able to,	KL
	CO1: Identify various software development models.	K3
	CO2: understand the requirement engineering tasks to identify the requirements for a given scenario.	K3
	CO3: Implement the design problem in UMI Modeling	K3
	CO4: Predict the design concepts and models	K3
	CO5: Describe different types of software testing in the software product.	K3

Pre-requisites	Nil

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3	2	1										3	3
CO 2	2	1											3	3
CO 3	3	2	1										3	3
CO 4	3	2	1										3	3
CO 5	3	2	1										3	3

Course Assessment Methods

DIRECT
1.   Continuous Assessment Test I, II & III
2.   Assignment
3.   End-Semester examinations
INDIRECT
1.   Course - end survey

Content of the Syllabus			
Unit – I	**PROCESS MODELS**	Periods	9
Software process structure – Process models - Waterfall model, Incremental process models, Evolutionary process models, Specialized process models – Unified Process - Agile development: Agile process - Extreme programming – Other Agile process model: Scrum.			
Unit – II	**REQUIREMENT GATHERING AND ANALYSIS**	Periods	9
Requirements engineering – Eliciting requirements, Developing use cases – Building the analysis model – Negotiating requirements – Requirements monitoring – Validating requirements – Requirements analysis.			
Unit – III	**UML MODELING**	Periods	9
Introduction – Unified Modeling Language – Static model – Dynamic model – UML diagrams UML class diagram– Use case diagram – UML dynamic modeling – UML interaction diagrams –UML state chart diagram – UML activity diagram – Implementation Diagrams –Componentdiagram – Deployment diagram.			
Unit – IV	**SOFTWARE DESIGN**	Periods	9
Design concepts and model – Architectural design: Software architecture, Architectural styles – Architectural design – Component level design: Designing class-based components, Conducting component level design – User interface design: User interface analysis and design – Interface analysis –Interface design steps – Design patterns.			
Unit – V	**SOFTWARE TESTING FUNDAMENTALS**	Periods	9
Software testing strategies: Strategic approach – Issues – Test strategies for conventional and Object Oriented software –Validation and System testing – Debugging – Testing conventional applications: White box testing – Basis path testing – Control structure testing – Black box testing – Software configuration management – SCM repository – SCM process.			
		Total Periods	**45**

CASE STUDY:

Only for Assignment not for end semester examination.

1. Simple Chat Instant Messaging System

2. GPS Based Automobile Navigation System

3. Waste Management Inspection Tracking System (WMITS)

4. Geographical Information System

Text Book:	
1.	Roger S. Pressman, Bruce R. Maxim, "Software Engineering: A Practitioner‚s Approach", 8 Edition, McGraw-Hill Education, India, 2019.

References:	
1.	Ali Bahrami, "Object Oriented Systems Development", 1 Edition, Tata McGraw-Hill, New Delhi, 2008.
2.	JalotePankaj, "An Integrated Approach to Software Engineering", 3 Edition, Narosa Publishing House, New Delhi, 2000.
3.	Andrew Stellman and Jennifer Greene, "Learning Agile: Understanding Scrum, XP, Lean and Kanban", 1st Edition, O'Reilly Media, 2005

E-Resources:	
1.	https://www.javatpoint.com/software-engineering-tutorial
2.	https://www.tutorialspoint.com/uml/uml_building_blocks.
3.	https://www.geeksforgeeks.org/software-testing-basics/

Programme	**B.E./B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**VI**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT621	**Computer Communication Networks**	3	0	0	3	40	60	100

Course Objective	The student should be able to , • Understand the concept of computer networking basics. • Understand the different components of computer networks, various protocols, and working Principles of Layers	
Course Outcome	At the end of the course ,the student should be able to,	KL
	CO1:.Summarize the basic fundamentals of networks for data communication and apply the different line coding schemes for digital-to-digital conversion	K3
	CO2: Demonstrate the knowledge of error detection and correction methods and protocols at data link layer	K3
	CO3: Interpret the different addressing schemes and apply various routing protocols at network layer	K3
	CO4: Illustrate the different transport layer protocols and the beneficial effects of adopting suitable flow control and QoS techniques	K2
	CO5 : Explore the various protocols and its working principles at application layer with basic cloud networking .	K2
Pre-requisites	Data Communications	

CO / PO Mapping														**CO/PSO Mapping**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak															
COs	Programme Outcomes (POs)													PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**		**PSO1**	**PSO2**
CO 1	3	2	1											3	2
CO 2	3	2	1											3	2
CO 3	3	2	1											3	2
CO 4	2	1	1											3	2
CO 5	2	1	1											3	2

Course Assessment Methods :

Direct
1. Continuous Assessment Test I,II&III
2. Assignment
3. End-Semester examinations

Indirect
1. Course- end survey

Content of the syllabus			
Unit– I	**Network Models and Physical Layer**	Periods	**9**
Layers in OSI Model- TCP/IP Protocol suite- Addressing -Transmission Modes –Multiplexing: FDM-WDM-STDM-Spread Spectrum :FHSS-DSSS-Virtual Circuit Networks.			
Unit- II	**Data Link Layer**	Periods	**9**
Introduction –Framing– Flow Control and Error Control -HDLC - Point-to-point protocol. Media Access Control Protocols: Random Access Protocols – Channelization: FDMA-TDMA-CDMA - Wired LAN: Standard Ethernet –Fast Ethernet –Giga Ethernet.			
Unit–III	**Network Layer**	Periods	**9**
Network Layer Services- Network layer performance - IPV4 addresses – Internet Protocol (IP) - ICMPv4. Unicast Routing Algorithms: Distance Vector and Link-state routing – Routing Protocols: RIP and OSPF - IPV6 addressing- IPV6 protocol.			
Unit- IV	**Transport Layer**	Periods	**9**
Introduction – Transport layer protocols – TCP :Simple – Stop-and-wait - Go-back-N – Selective Repeat - Piggybacking – Quality of Service: Data Flow Characteristics -Techniques to improve QoS.- – UDP.			
Unit– V	**Application Layer and Cloud Networking**	Periods	**9**
WWW - HTTP- FTP - Electronic mail -Telnet-SSH-DNS-Network Management: Introduction – SNMP- Software Defined Networking (SDN).			
		Total Periods	**45**
TextBook:			
1.	Behrouz A. Forouzan, "Data Communications and Networking with TCP/IP Protocol Suite", McGraw-Hill, 6th Edition, 2021		
References:			
1.	Kurose James F. and Ross Keith W., "Computer Networking: A Top-Down Approach", 6th Edition, Pearson Education, New Delhi, 2017.		
2.	Stallings, "Data and Computer Communications", PHI, 10th Edition, 2015.		
E-Resources:			
1.	https://nptel.ac.in/courses/106/105/106105183/		
2.	https://onlinecourses.nptel.ac.in/noc22_cs19		
3.	https://www.oreilly.com/library/view/sdn-software defined/9781449342425/ch04.html#introduction-id3 (SDN)		

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Programme	**B.TECH**	Programme Code		**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		**VI**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT622	**Machine Learning Laboratory**	**0**	**0**	**2**	**1**	**60**	**40**	**100**

Course Objective	The student should be made to, • Provide hands-on experience in implementing Machine Learning Algorithms for providing solutions to the real world problems.	
Course Outcome	On Completion of the course, the student should be able to,	**Knowledge Level**
	CO1: Apply information theoretic approach for data manipulation and data visualization and to explore different datasets	K3
	CO2: Implement supervised and unsupervised learning algorithms in modern tools	K3
	CO3: Model the machine learning solutions for any data set and analyze the results	K3
	CO4: Apply the algorithm for linear regression in modern tools	K3
	CO5: Apply the K-Means, Apriori algorithm for classification in modern tools with different datasets	K3
Pre-requisites	Python Programming	

CO / PO Mapping														**CO/PSO Mapping**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														**PSOs**	
COs	Programme Outcomes (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1		1							1		
CO 2	3	2	1		1							1		
CO 3	3	2	1		1							1	2	
CO 4	3	2	1		1							1		2
CO 5	3	2	1		1							1		2

Course Assessment Methods
Direct
1. Prelab & Post Lab 2. Record 3. End-Semester examinations
Indirect
1. Course - end survey

EX.NO	EXPERIMENT DESCRIPTION	COs
1.	Exploration of UCI repository datasets and tools like WEKA, Rapid Miner, etc.,	CO1
2.	Perform data manipulation using NumPy and pandas and data visualization using matplotlib.	CO1
Supervised Learning		
3.	Implement Naïve Bayesian classification and predict the class label for the given data	CO2
4.	Implement k-NN algorithm for the specified data.	CO2
5.	Implement SVM algorithm for the specified data.	CO4
6.	Implement linear regression models to approximate the given data	CO4
Unsupervised Learning		
7.	Implement k-means clustering algorithm for the given data and visualize and interpret the result.	CO5
8.	Implement apriori algorithm for association rule to predict the result of given dataset.	CO5
Case Study		
9.	With your own dataset, apply any three algorithms for the same dataset. Calculate and compare the accuracy using Confusion matrix and graph.	CO3
10.	Predict the Grocery Store sales using Machine learning with the help of kaggle.	CO3
	TOTAL PERIODS	**45**

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Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**VI**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT623	**Case Tools Laboratory**	0	0	4	2	60	40	100

Course Objective	The student should be made to, • Learn the software engineering process • Know and apply appropriate methods, techniques and tools to elicit, document and manage requirements. • Learn the role of requirements analysis in system and software development. • Be able to define a system that satisfies the requirements. • Be able o know about the project requirements, project description and project implementation using UML.

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: design and implement projects using OO concepts	K3
	CO2: use UML analysis and design diagrams in various applications	K3
	CO3: apply appropriate design patterns for the given scenarios	K3
	CO4: Apply suitable design patterns in system design 3.	K3
	CO5: Critique Object Oriented analysis and system design using Object Oriented Principles	K3

Pre-requisites	Nil

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3	2	1	1									3	2
CO 2	3	2	1	1									3	2
CO 3	3	2	1	1									3	2
CO 4	3	2	1	1									3	2
CO 5	3	2	1	1									3	2

Course Assessment Methods

Direct

1. Prelab & Post Lab
2. Record
3. End-Semester examinations

Indirect

1. Course - end survey

LIST OF EXPERIMENTS

EX.NO	EXPERIMENT DESCRIPTION	COs
1.	Define problem statement, develop business and domain models with UML diagrams, implement the interfaces and do testing for the Passport Automation system	CO1
2.	Define problem statement, develop business and domain models with UML diagrams, implement the interface and do testing for the Library Management system	CO1
3.	Define problem statement, develop business and domain models with UML diagrams, implement the interface and do testing for the Exam Registration System	CO2
4.	Define problem statement, develop business and domain models with UML diagrams, implement the interface and do testing for the Stock Maintenance system	CO2
5.	Define problem statement, develop business and domain models with UML diagrams, implement the interface and do testing for the Online Course Registration system	CO3
6.	Define problem statement, develop business and domain models with UML diagrams, implement the interface and do testing for the E-ticketing system	CO3
7.	Define problem statement, develop business and domain models with UML diagrams, implement the interface and do testing for the Insurance management system	CO4
8.	Define problem statement, develop business and domain models with UML diagrams, implement the interface and do testing for the Credit card processing system	CO4
9.	Define problem statement, develop business and domain models with UML diagrams, implement the interface and do testing for the Employee Recruitment system	CO5
10.	Define problem statement, develop business and domain models with UML diagrams, implement the interface and do testing for the Bank Management system	CO5
	TOTAL PERIODS	**45**

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<tr><td colspan="4" align="center">(Autonomous Institution Affiliated to Anna University Chennai)</td><td></td></tr>
<tr><td colspan="4" align="center">Elayampalayam, Tiruchengode – 637 205</td><td></td></tr>
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Programme	**B.E/B.TECH**		Programme code	104		Regulation		2019
Department	**INFORMATION TECHNOLOGY**					Semester		VI

Course code	Course Name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19EN603	**Communication Skills Laboratory**	0	0	3	1	100	-	100

Objective	• Equip with effective Soft skills in English. • Enhance them with intrapersonal skills. • Effective management of time and stress.

Outcomes	The students who complete this course successfully are expected to:	Knowledge Level
	CO1: Able to communicate, present, describe and discuss fluently in English.	K1
	CO2: Equipped for an easy transition from studying to working atmosphere.	K1
	CO3: Accomplished with planning and corporate Managerial skills.	K2
	CO4: attain professional correspondence and execute the same in professional manner.	K4
	CO5: employ the professional needs and accomplishments at global standards.	K4

Pre-requisites	Nil	

<table>
<tr><td colspan="14" align="center">CO / PO Mapping</td><td colspan="2" align="center">CO/PSO</td></tr>
<tr><td colspan="14" align="center">(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak</td><td colspan="2" align="center">Mapping</td></tr>
<tr><td>COs</td><td colspan="12" align="center">Programme Outcomes (POs)</td><td colspan="2" align="center">PSOs</td></tr>
<tr><td></td><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td></tr>
<tr><td>CO 1</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>-</td><td>3</td><td>3</td><td>-</td><td>3</td><td>-</td><td>2</td></tr>
<tr><td>CO 2</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>-</td><td>2</td><td>3</td><td>-</td><td>3</td><td>-</td><td>2</td></tr>
<tr><td>CO 3</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>-</td><td>2</td><td>2</td><td>-</td><td>3</td><td>-</td><td>2</td></tr>
<tr><td>CO 4</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>-</td><td>3</td><td>3</td><td>-</td><td>3</td><td>-</td><td>2</td></tr>
<tr><td>CO 5</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>2</td><td>-</td><td>-</td><td>3</td><td>3</td><td>-</td><td>3</td><td>-</td><td>2</td></tr>
</table>

English Language Proficiency: Listening Comprehension, Reading Comprehension, Common Errors in English, Diction and its usage, Framing sentences – Idiomatic Expressions.
Resume – Structuring and Drafting the resume – Cover letter- Writing Professional Letters
Group Discussion: Introduction – Topic Analysis – Thematic Expressions-Objective and content of discussion – Persuasion – Discussion – Controlling Emotions - Presentation of the group – Offering support – Use of functional Language - Summary and conclusion
Presentation skills: Making Self Introduction effectively-Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Accents analysis – Stylistics.
Soft Skills: Introduction - Change in Today's Workplace: Soft Skills as a Competitive Weapon - Antiquity of Soft Skills - Classification of Soft skills - Ability to work as a team - Innovation, Creativity and Lateral thinking – Flexibility - Personality Traits and Soft Skills for future Career Advancement-Personality and Soft Skills for career growth- Time management.

	Total Periods	**45**

Lab Manuals suggested:	
1.	Anderson, P.V, Technical Communication, Thomson Wadsworth, Sixth Edition, New Delhi, 2007.
2.	John Seely, The Oxford Guide to Writing and Speaking, Oxford University Press, New Delhi, 2004.

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Elayampalayam, Tiruchengode – 637 205

Programme	**B.TECH**		Programme Code	**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**				Semester		**VI**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19MCTY6	**PERSONALITY DEVELOPMENT**	3	0	0	-	100	-	100

Content of the syllabus

Unit – I	**NUMERICAL ABILITY**	Periods	**8**

Number Properties – Time & Work – Pipes & Cisterns - Time, Speed & Distance – Ratios & Proportions – Mixtures & Alligations – Averages – Percentages – Profit & Loss – Simple & Compound Interest – Problems on Ages – Partnership – Mensuration – Geometry - Miscellaneous

Unit - II	**LOGICAL REASONING**	Periods	**8**

Coding Decoding – Blood Relations –Direction Sense Test – Seating Arrangement – Number Series – Syllogisms – Venn Diagrams – Statements – Data Interpretation – Data Sufficiency – Clocks & Calendars - Miscellaneous

Unit – III	**SOFT SKILLS & VERBAL ABILITY**	Periods	**8**

Resume Preparation – Mock GD – Interview Etiquette – Mock Interview – Reading Comprehension – Essay Writing

Unit - IV	**TECHNICAL SKILLS I**	Periods	**8**

Recap of C – Variables & Datatypes – Console IO Operations – Operators & Expressions – Control Flow Statements – Working with Functions – Working with Arrays

Unit – V	**TECHNICAL SKILLS II**	Periods	**8**

Pointers – String Handling – Structures & Unions – File Handling – Pre Processor Directives – Command Line Arguments & Variables – Searching & Sorting – Stack – Queue – Linked List - Trees

		Total Periods	**40**

REFERENCES:

1. Quantum CAT by Sarvesh Verma – Arihant Publications
2. Quantitative aptitude by R.S. Aggarwal
3. A Modern Approach to Verbal & Non-Verbal Reasoning by R.S. Aggarwal
4. Word Power Made Easy by Norman Lewis
5. Let us C By Yashavant P Kanetkar
6. Programming in ANSI C By E. Balaguruswamy

<table>
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</table>

| | **VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN** (Autonomous Institution- Affiliated to Anna University -Chennai) Elayampalayam- Tiruchengode – 637 205 | |

Programme	**B. TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**VII**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT724	**Big Data Analytics**	3	0	0	3	40	60	100

Course Objective	The student should be made to • Understand the competitive advantages of big data analytics. • Understand the big data frameworks. • Learn data analysis methods. • Learn stream computing.	
Course Outcome	At the end of the course- the student will be able to:	KL
	CO1: Describe the concepts- characteristics of big data and apply for real applications.	K3
	CO2: Implement Map Reduce programs in Hadoop framework.	K3
	CO3: Utilize MongoDB and Cassandra to solve real world problems.	K3
	CO4: Develop solutions for big data problems using MR and Hive, Apach spark and Apache kafka.	K3
	CO5: Recognize the need for architecture and apply it in real case scenarios.	K3
Pre-requisites	Data warehousing	

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	2	1	-								3	3
CO 2	3	2	2	2	2								3	3
CO 3	3	2	2	2	2								3	3
CO 4	3	2	2	2	-								3	3
CO 5	3	2	2	2	-								3	3

Course Assessment Methods

Direct
1. Continuous Assessment Test I- II & III
2. Assignment
3. End-Semester examinations
Indirect
1. Course - end survey

Content of the Syllabus

Unit – I	**INTRODUCTION TO BIG DATA AND ANALYTICS**	Periods	9
BIG DATA: Introduction - Types of Digital Data – Characteristics – Evolution – Definition – Challenges –Need for Big Data -Traditional BI versus Big data – Typical Data warehouse environment. ANALYTICS: Greatest Challenges that prevent Business from Capitalizing on Big data –Top Challenges Facing Big data –Importance of Big data analytics – Data science – Terminologies used in Big Data environments– Analytics Tools.		
Unit - II	**BIG DATA AND HADOOP FRAMEWORK**	Periods	9
	BIG DATA LANDSCAPE TECHNOLOGY: NoSQL –Types of NOSQL Databases – Need for NOSQL –Use of NoSQl in Industry-SQL VS NoSQL-New SQL .HADOOP: Hadoop Introduction - RDBMS Vs Hadoop – History of Hadoop-Use case of Hadoop –Hadoop Overview – Managing resources and application with Hadoop YARN -Interacting with Hadoop Ecosystem.		
Unit – III	**MONGO DB AND CASSANDRA**	Periods	9
	MONGO DB: Introduction to MongoDB – Terms used in MongoDB– Data types in MongoDB – MongoDB Query Language. CASSANDRA: Introduction to Cassandra – Features of Cassandra – CQL Data types – CQLSH– CRUD operations – Collections – Alter commands – Import and Export – Querying System tables.		
Unit - IV	**MAP REDUCE and HIVE, APACHE**	Periods	9
	INTRODUCTION TO MAP REDUCE PROGRAMMING : Introduction –Map task – Searching –Sorting – Compression .HIVE: Introduction to Hive – Hive Architecture – Data types – File format – Hive Query Language – RCFile implementation. Apache spark and Apache kafka, Messaging Queues on Asynchronous Event driven development.		
Unit – V	**RECENT TRENDS IN PIG AND CASE STUDY**	Periods	9
	PIG: Introduction to Pig –- Pig on Hadoop – Pig Philosophy -Use case of Pig - Data types – Running Pig – Execution modes of Pig – HDFS commands–Eval function . CASE STUDY: Word count in File-Retail log processing.		
		Total Periods	**45**

Text Books

1.	Seema Acharya and Subhashini Chellappan,"Big Data and Analytics",2nd Edition,Wiley,2019.
2.	Dr.Anil Maheshwari,"Big Data",1st Edition, McGraw Hill Education, 2017

References

1.	EMC Education Services, "Data science and Big data Analytics: Discovering-Analyzing- Visualizing and Presenting Data", John Wiley and Sons,2015.

E-Resources

1.	https://www.xenonstack.com/blog/big-data-platform/
2.	https://www.tutorialspoint.com/managerial_economics/regression_technique.htm
3.	https://www.geeksforgeeks.org/frequent-item-set-in-data-set-association-rule-mining/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205			

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		**VII**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT725	**Building of Internet of Things**	3	0	0	3	40	60	100

Course Objective	The student should be able to, • Understand Smart Objects and IoT Architectures and configurations • Build simple IoT Systems using Arduino and Raspberry Pi.	

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved.	K2
	CO2: Understand IoT transactions and configurations	K2
	CO3: Program the sensors and controllers as part of IoT.	K3
	CO4: Understand the IoT protocols	K2
	CO5: Implement basic IoT applications on embedded platform	K3

Pre-requisites	

CO / PO Mapping													**CO/PSO Mapping**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	1	1	1	1	1							2	
CO 2	2	1	2	1	1	1							2	
CO 3	3	2	3	2	3	2						2	3	1
CO 4	2	1	2	1	1	1							2	
CO 5	3	2	3	2	3	2						2	2	1

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION TO IoT**	Periods	**9**
Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs, Challenges in designing an Embedded System.			
Unit - II	**IoT CONFIGURATION**	Periods	**9**
Introduction, M2M, Difference between IoT and M2M, difference between SDN and NFV for IoT, Software defined networks, network function virtualization, Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER			
Unit – III	**IoT PHYSICAL DEVICES AND ENDPOINTS**	Periods	**9**
Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – C program with Arduino with focus on interfacing external gadgets, controlling output, reading input from pins			
Unit - IV	**IoT PROTOCOLS**	Periods	**9**
IoT Access Technologies- Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks,6LoWPAN, Application Transport Methods: SCADA, Application Layer Protocols: CoAP and MQTT.			
Unit – V	**CASE STUDIES AND APPLICATION DEVELOPMENT FOR IoT USING EMBEDDED SYSTEMS**	Periods	**9**
Home Automation- Smart Lighting-Smart Appliance-Theft Detection, Smart cities - Smart parking-Smart Road, Smart Environment-Air pollution monitoring-weather monitoring, Health fitness monitoring, Techniques for writing Embedded code - Examples for Application development cloud services for IoT.			
		Total Periods	**45**

Text Books:

1.	Arshdeep Bahga and Vijay Madisetti, "Internet of Things -A Hands-on Approach", Universities Press Pvt. Ltd., 2015.
2.	Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things – Key applications and Protocols‖, Wiley, 2012.

References:

1.	Charalampos Doukas , "Building Internet of Things with the Arduino", CreateSpace Independent Publishing Platform, April 2012.
2.	Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley Publications, 2012.
3.	Matt Richardson & Shawn Wallace, "Getting Started with Raspberry Pi", O'Reilly (SPD), 2014.
4.	Peter Friess,'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014.
5.	Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015.

	E-Resources:
1.	file:///C:/Users/ITLAB/Downloads/Internet%20of%20Things%20A%20Hands-On%20Approach%20by%20Arshdeep%20Bahga,%20Vijay%20Madisetti%20(z-lib.org).pdf
2.	https://nasrinword.files.wordpress.com/2018/05/olivier-hersent-david-boswarthick-omar-elloumi-e28095the-internet-of-things-e28093-key-applications-and-protocols-ref-5.pdf
3.	https://madsg.com/wp-content/uploads/2015/12/Designing_the_Internet_of_Things.pdf
4.	https://ptgmedia.pearsoncmg.com/images/9781587144561/samplepages/9781587144561_CH08.pdf
5.	https://dhananjaypawar.files.wordpress.com/2019/05/unit-1.pdf
6.	https://www2.deloitte.com/content/dam/insights/us/articles/iot-primer-iot-technologies-applications/DUP_1102_InsideTheInternetOfThings.pdf
7.	https://mrcet.com/downloads/digital_notes/EEE/IoT%20&%20Applications%20Digital%20Notes.pdf
8.	https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf

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<tr><td colspan="3" align="center">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN</td><td></td></tr>
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	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205	

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**VII**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT726	**IoT and Data Analytics Laboratory**	0	0	2	1	60	40	100

Course Objectives	The main objective of the course is to: • Learn to process the big data using Hadoop framework and MapReduce • Analyze big data using classification and clustering techniques. • Realize storage of big data using MongoDB and Hbase. • Familiarize the usage of distributed frameworks for handling voluminous data.

Course Outcomes

At the end of the course- the student will be able to:	Knowledge Level
CO1: To Demonstrate the Raspberry Pi /Arduino installation.	K2
CO2: To Interface the LED with Raspberry Pi/Arduino for sensing the data based on inputs.	K3
CO3: To Perform data analysis using classification and clustering techniques	K3
CO4: To Implement Map Reduce framework for processing big data..	K2
CO5: To Perform graphical data analysis	K3

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO** **Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	1											2	2
CO 2	3	2	1	1									3	3
CO 3	2	2	1	1									3	3
CO 4	2	1											2	2
CO 5	3	2	1	1									3	3

Course Assessment Methods

Direct
1. Prelab & Post Lab 2. Record 3. End-Semester examinations
Indirect
1. Course - end survey

LIST OF EXPERIMENTS

EX NO	EXPERIMENT DESCRIPTION	COs
1.	Create a simple LED bargraph using Arduino	CO1
2.	Design a system to find the obstacle distance using Arduino	CO1
3.	Design a project to count the number of visitors using Arduino	CO2
4.	Interface a gas sensor and find the Gas level using NODEMCU	CO2
5.	Control an LED via a webpage with the help of NODEMCU	CO2
Hadoop		
6.	Install, configure and run Hadoop	CO3
7.	To implement the following file management tasks in Hadoop System (HDFS): Adding files and directories, Retrieving files, Deleting files.	CO3
8.	To run a basic Word Count Map Reduce program to understand Map Reduce Paradigm: To count words in a given file, To view the output file, and To calculate execution time.	CO4
9.	To study and implement basic functions and commands in R Programming.	CO5
	TOTAL PERIODS	**45**

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<tr><td colspan="2" rowspan="3"></td><td colspan="4">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
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Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**VII**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT727	**Internship Training and Summer Project**	0	0	8	4	100	-	100

Course Objectives	The main objective of the course is to: • Advance from an intellectual student to a creator and an industry professional. • Apply communication skills to explain technical problem solving techniques and solutions. • Collaborate within and across disciplinary boundaries to solve problems. • Exercise computational thinking over the entire software life cycle.

Course Outcomes

At the end of the course, the student should be able to,	Knowledge Level
CO1: Gain industrial experience and to apply them in practical form	K2
CO2: Identification of modern tools used in the field of IT engineering for development	K3
CO3: Ability to find effective solutions for real life problems	K3
CO4: Apply engineering and management values to accomplish project ambitions	K2
CO5: Evaluate the performance of Internship & Summer Project	K3

<table>
<tr><td colspan="13">CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak</td><td colspan="2">CO/PSO Mapping</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12">Programme Outcomes (POs)</td><td colspan="2">PSOs</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td></tr>
<tr><td>CO 1</td><td>3</td><td>2</td><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td></td><td></td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td></tr>
<tr><td>CO 2</td><td>3</td><td>3</td><td>3</td><td>2</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>3</td></tr>
<tr><td>CO 3</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td></td><td></td><td>1</td><td>3</td><td>2</td><td>2</td><td></td><td>3</td><td>3</td></tr>
<tr><td>CO 4</td><td>3</td><td>1</td><td>2</td><td>2</td><td>2</td><td>2</td><td>1</td><td>1</td><td>3</td><td></td><td></td><td>1</td><td>3</td><td>3</td></tr>
<tr><td>CO 5</td><td>3</td><td>3</td><td>2</td><td>2</td><td>1</td><td>3</td><td>1</td><td>2</td><td>2</td><td>1</td><td>3</td><td>2</td><td>3</td><td>3</td></tr>
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Course Assessment Methods

Direct
1. Internship Training & Certification 2. Summer Project Development & Viva

Indirect
1. Course - end survey

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN						
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	Elayampalayam, Tiruchengode – 637 205						

Programme	**B.TECH**		Programme Code	**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**				Semester		**VIII**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19IT828	**PROJECT WORK**	0	0	16	8	60	40	100

Course Objectives	The main objective of the course is to: • Explore their field of knowledge, which includes a critical awareness of current problems and/or new insights at the forefront of that field. • Understand of techniques applicable to their own area of professional practice. • Demonstrate originality in the application of knowledge, together with a practical understanding. • Demonstrate self-direction and originality in tackling and solving problems.

Course Outcomes

At the end of the course, the student should be able to,	Knowledge Level
CO1: Demonstrate a sound technical knowledge of their selected project topic.	K2
CO2: Apply engineering Knowledge, Skills and management principles to achieve project goal.	K3
CO3: Implement hardware and/or software tools with Test Solutions	K3
CO4: Test/verify the modules of implemented project.	K2
CO5: Express the engineering activities with effective presentation, report and Evaluation metrics.	K3

CO / PO Mapping													**CO/PSO Mapping**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	2	3	2	2	3			2	2	2	3	3	3	3
CO 2	1	3	3	3	3	2	2	2	2	2	2	3	3	3
CO 3	1	3	3	2	3			2	2	2	2	3	2	2
CO 4				3	3			2	2	2	3	3	2	2
CO 5				1	3	3	3	2	2		2	3	2	3

Course Assessment Methods

Direct
1. Project Reviews 2. End Semester Examinations

Indirect
1. Course - end survey

PROFESSIONAL ELECTIVE COURSES (PEC)

VERTICAL I – NETWORKS

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205						
Programme	**B.E. / B.Tech.**		Programme code		Regulation		**2019**
Department	**CSE, IT & CST**			Semester			**-**
Course Code	Course name		Periods per week		Credit	Maximum Marks	

		L	T	P	C	CA	ESE	Total
U19CSV11	**Mobile Adhoc Networks**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Study the basic and emerging technologies in the context of ad-hoc networks • Understand the functioning of different Medium Access Protocols and routing protocols that can be used for ad-hoc networks. • Learn the concepts of Security issues for designing a routing protocol • understand the role of cross layer design in enhancing the network performance	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Remember and understand the principles on how mobility is dealt with in today''s Internet and Mobile ad-hoc Networks	K2
	CO2: Discuss various MAC routing protocols function	K2
	CO3: Apply different routing technologies for designing a routing protocol.	K3
	CO4: Illustrate the security issues in adhoc networks	K2
	CO5: exposed to the advances in adhoc network design concepts	K3
Pre-requisites	-	

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak												**CO/PSO Mapping**	
	Programme Outcomes (POs)												PSOs	
COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	3	3	2	3			2			2	3	3	3
CO 2	3	2	3	3	3			1			2	3	3	3
CO 3	3	3	2	3	3						3	3	3	3
CO 4	3	3	3	2	2	2	2				2	3	3	3
CO 5	3	1	2	1	2						3	3	3	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignments / Quiz / Seminar
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION**	Periods	**9**
Introduction to ad-hoc networks – definition, characteristics features, applications. Characteristics of wireless channel, ad-hoc mobility models: indoor and outdoor models.			
Unit - II	**MEDIUM ACCESS PROTOCOLS**	Periods	**9**
MAC Protocols: Design issues, goals and classification. Contention based protocols – with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN			
Unit – III	**NETWORK PROTOCOLS**	Periods	**9**
Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, energy aware routing algorithm, hierarchical routing, QoS aware routing.			
Unit – IV	**END – END DELIVERY AND SECURITY**	Periods	**9**
Transport Layer: Issues in designing – Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols.			
Unit – V	**CROSS LAYER DESIGN**	Periods	**9**
Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, cross layer cautionary perspective. Integration of adhoc with Mobile IP networks.			
		Total Periods	**45**
Textbooks:			
1.	C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocollsll, 2nd edition, Pearson Education. 2011 (For units1,2 and 3)		
2.	Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000 (For units 4 and 5)		
References:			
1.	Mohammad Ilyas, The handbook of adhoc wireless networks 1st Edition, CRC press, 2002.		
2.	Erdal Qayirci and Chunming Rong c, Security in Wireless Ad Hoc and Sensor Networks 2009, John Wiley and Sons, Ltd.		
3.	Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad-hoc networking, Wiley-IEEE press, 2004		
4.	Xiuzhen Cheng, Xiao Hung, Ding-Zhu Du: Ad-hoc Wireless Networking, Kluwer Academic Publishers, 2004.		
E-Resources:			
1.	Research, "Wireless Communication and Mobile Comp.Special Issue on Mobile Ad-hoc Networking Research, Trends and Applications, Vol.2, no. 5, 2002, pp. 483 – 502.		
2.	A survey of integrating IP mobility protocols and Mobile Ad-hoc networks, Fekri M. bduljalil and Shrikant K. Bodhe, IEEE communication Survey and tutorials, no: 12007		

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	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN	
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	Elayampalayam, Tiruchengode – 637 205	

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV11	**WIRELESS SENSOR NETWORKS**	3	0	0	3	40	60	100

Course Objective	To the course aims to understand the fundamental concepts of wireless sensor networks and functionalities of different layers. It also helps to devise appropriate node and network management strategies and provides knowledge on sensor networks security.	
Course Outcome	At the end of the course, the student should be able to,	KL
	CO1: Apply the basic concepts of wireless sensor networks	K3
	CO2: Identify the basic architectural framework using physical and MAC layer Protocols	K3
	CO3: Develop various network layer protocols for inter and intra communication Pattern	K3
	CO4: Sketch the different synchronization algorithms for managing node and network level functions	K3
	CO5: Discover the challenges in Security and Sensor Network Programming	K3
Pre-requisites	Computer Networks	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3	2	1	1									3	3
CO 2	3	2	1	1									3	3
CO 3	3	2	1	1									3	3
CO 4	3	2	1	1									3	3
CO 5	3	2	1	1									3	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations

Indirect

   1.Course - end survey

Content of the syllabus			
Unit – I	**Introduction**	**Periods**	**9**
Introduction-Motivation and Wireless Sensor Nodes: Definitions and Background, Challenges and Constraints - Applications: Structural Health Monitoring, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture, Active Volcano, Underground Mining - Node Architecture: The Sensing Subsystem, The Processor Subsystem, Communication Interfaces, Prototypes.			
Unit - II	**Basic Architectural Framework and Medium Access Control**	**Periods**	**9**
Physical Layer: Basic Components, Source Encoding, Channel Encoding, Modulation, Signal Propagation. Medium Access Control: Overview, Wireless MAC Protocols, Characteristics of MACProtocols in Sensor Networks, Contention-Free MAC Protocols, Contention-Based MAC Protocols,Hybrid MAC Protocols.			
Unit – III	**Routing Protocols**	**Periods**	**9**
Network Layer: Overview, Routing Metrics, Flooding and Gossiping, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, QoS-Based Routing Protocols.			
Unit - IV	**Power Management and Time Synchronization**	**Periods**	**9**
Power Management: Local Power Management Aspects-Dynamic Power Management-Conceptual Architecture-Time Synchronization: Clocks and the Synchronization Problem, Time Synchronization in Wireless Sensor Networks, Basics of Time Synchronization, Time Synchronization Protocols.			
Unit – V	**Security and Sensor Network Programming**	**Periods**	**9**
Security: Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks, Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, IEEE 802.15.4 and ZigBee Security. Sensor Network Programming: Challenges in Sensor Network Programming.			
		Total Periods	**45**
Text Book:			
1.	Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", 1st Edition, John Wiley & Sons , 2011.		
References:			
1.	Mohammad S. Obaidat, Sudip Misra, "Principles of Wireless Sensor Networks", 1st Edition, Cambridge University Press, 2014.		
2.	Feng Zhao, Leonidas Guibas, "Wireless Sensor Networks", 1st Edition, Elsevier, 2004.		
E-Resources:			
1.	https://www3.nd.edu/~cpoellab/teaching/cse40815/Chapter3.pdf		
2.	https://www.cse.wustl.edu/~jain/cse574-06/ftp/energy_mgmt/index.html		
3.	https://www.intechopen.com/chapters/71586		

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Programme	**B.TECH**	Programme Code		**104**	Regulation	**2019**	
Department	**INFORMATION TECHNOLOGY**				Semester	**-**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV12	**DISTRIBUTED SYSTEMS**	3	0	0	3	40	60	100

Course Objective	The students should made to: • Understand foundations of Distributed Systems • Understand the idea of peer-to-peer services and file system • Understand in detail the system level and support required for distributed system • Understand the issues involved in studying process and resource management	
Course Outcome	At the end of the course, the students should be able to,	KL
	CO1: Understand the various trends and models in distributed systems	K2
	CO2: Illustrate the role of communication in distributed systems.	K2
	CO3: Make use of the peer-to-peer system and file system concepts that are intended to implement in distributed system	K3
	CO4: Demonstrate how the time and global states and fault tolerant services are involved in distributed systems	K2
	CO5: Summarize the management of process and resources in distributed Systems	K2
Pre-requisites	Data structures and Algorithms	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1											2	2
CO 2	2	1											2	2
CO 3	3	2	1										3	3
CO 4	2	1											2	2
CO 5	2	1											2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus			
Unit– I	**INTRODUCTION**	Periods	**9**
Introduction to Distributed systems, Characterization of DS- Examples of distributed systems- resource sharing and the web- challenges, System model-Physicalmodel-Architectural models- Fundamental models,client server communication-group communication, Operating system supports-Processes and threads-communication and invocation.			
Unit–II	**COMMUNICATION IN DISTRIBUTED SYSTEM**	Periods	**9**
Inter process Communication – The API for internet protocols – External data representation and Multicast communication- Network visualization: Overlay networks-Case study: MPI - Remote Invocation: Request-reply protocols – Remote procedure call – Remote method invocation. Case study: Java RMI – Group communication – Message queues – Shared memory approaches.			
Unit– III	**PEER TO PEER SYSTEM AND FILE SYSTEM**	Periods	**9**
Introduction - Napster and its legacy - Peer-to-peer – Middleware - Routing overlays- Overlay case studies: Pastry, Tapestry-Distributed File Systems: Introduction - File service architecture –Case study: Andrew File system, Name service and domain name system-Directory services.			
Unit-IV	**SYNCHRONIZATION AND REPLICATION**	Periods	**10**
Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks - Global states – Distributed debugging-Transactions and Concurrency Control: Transactions - Nested transactions – Locks – Optimistic concurrency control - Timestamp ordering – Atomic Commit protocols -Distributed deadlocks – Replication –fault tolerant services- Case study :Coda.			
Unit– V	**DISTRIBUTED MULTIMEDIA SYSTEMS**	Periods	**8**
Distributed multimedia system-Characteristic of multimedia data-Quality of service management-Resource management-stream adaption-Sensing and context awareness-Security and privacy-Case study: Tiger, Big torrent.			
		Total Periods	**45**

Text Book:	
1.	George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", Fifth Edition, Pearson Education, 2012.

References:	
1.	Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
2.	Tanenbaum A.S., Van Steen M., "Distributed Systems: Principles and Paradigms", Pearson Education, 2007.

E-Resources:	
1.	https://www.slideshare.net/sunitasahu101/introduction-to-distributed-system-127420140
2.	https://www.slideshare.net/mjagadeeshmtech/peer-to-peer-services-and-file-systems
3.	https://www.slideshare.net/SHATHAN/synchronization-34088991
4.	https://www.slideshare.net/sandpoonia/10-resource-management
5.	https://nptel.ac.in/courses/106/106/106106168/

Programme	**B.E. / B.Tech.**	Programme Code		Regulation	**2019**
Department	**CSE, IT & CST**			Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CSV14	**Green Computing**	3	0	0	3	40	60	100

Course Objective	The Main Objective of the course is to • acquire knowledge to adopt green computing practices • minimize negative impacts on the environment • learn about energy saving practices • understand the impact of e-waste and carbon waste. • describe green IT in relation to technology	
Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Explain the necessity of green IT.	K2
	CO2: Outline methodologies for creating green assets & their management.	K2
	CO3: Associate the use of grid in green IT.	K3
	CO4: Outline the protocols, standards & audits available for green IT.	K2
	CO5: Apply the Environmentally responsible business strategies	K3
Pre-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	3	3	3										3	2
CO 2	3	3	3										2	3
CO 3	3	3	2										3	3
CO 4	3	3	3										3	2
CO 5	3	3	3										3	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III   2. Assignment / Quiz / Seminar   3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**FUNDAMENTALS**	Periods	**9**
Green IT Fundamentals: Business, IT, and the Environment – Benefits of a Green Data Centre - Green Computing: Carbon Foot Print, Scoop on Power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.			
Unit - II	**GREEN ASSETS AND MODELING**	Periods	**9**
Green Assets: Buildings, Data Centers, Networks, Devices, Computer and Earth Friendly peripherals, Greening Mobile devices – Green Business Process Management: Modeling, Optimization, and Collaboration			

– Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains .			
Unit – III	**GRID FRAMEWORK**	Periods	**9**
Virtualizing of IT Systems – Role of Electric Utilities, Telecommuting, Teleconferencing and Teleporting – Materials Recycling – Best Ways for Green PC – Green Data Center – Green Grid Framework. Optimizing Computer Power Management, Seamless Sharing Across Systems. Collaborating and Cloud Computing, Virtual Presence.			
Unit - IV	**GREEN COMPLIANCE**	Periods	**9**
Socio-Cultural Aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, And Audits – Emergent Carbon Issues: Technologies and Future. Best Ways to Make Computer Greener.			
Unit – V	**GREEN INITIATIVES**	Periods	**9**
Green Initiative Drivers and Benefits with IT - Resources and Offerings to Assist Green Initiatives. - Green Initiative Strategy with IT - Green Initiative Planning with IT - Green Initiative Implementation with IT - Green Initiative Assessment with IT. The Environmentally Responsible Business Strategies (ERBS)			
		Total Periods	**45**

Text Books:

1.	Bhuvan Unhelkar, Green IT Strategies and Applications-Using Environmental Intelligence, CRC Press, June 2011.
2.	Carl Speshocky, Empowering Green Initiatives with IT, John Wiley and Sons, 2010.
3.	Alin Gales, Michael Schaefer, Mike Ebbers, Green Data Center: Steps for the Journey, Shoff/IBM rebook, 2011.

References:

1.	John Lamb, The Greening of IT, Pearson Education, 2009.
2.	Jason Harris green Computing and Green IT- Best Practices on Regulations and Industry, Lulu.com, 2008.
3.	Woody Leonhard, Katherrine Murray, Green Home computing for dummies, August 2009.

E-Resources:

1.	http://dte.karnataka.gov.in/Institutes/gptbellary/FileHandler/4-db424c3c-c2e7-4a3f-9337-ba1618da73e8
2.	https://shareok.org/bitstream/handle/11244/11105/Letcher_okstate_0664M_12544.pdf?sequence=1

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution, Affiliated to Anna University ,Chennai)

Elayampalayam, Tiruchengode – 637 205

Programme	**B.TECH.**		Programme Code		**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**				Semester			-

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV13	**Java Programming**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Impart the fundamental concepts of core JAVA. • Enable the students to gain programming skills in JAVA. • Be able to use the Java SDK environment to create, run and execute the simple java programs.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Understand the syntax, semantics and classes in Java language.	K2
	CO2: Develop programs using OOPS concepts.	K3
	CO3: Use the concept of Input and Output in Java.	K3
	CO4: Develop programs using strings.	K3
	CO5: Understand Applet, AWT and Event handlers in Java.	K2
Pre-requisites	U19IT201 - Object oriented Programming.	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	3	3	3		3							2	2	
CO 2	3				2							2	2	
CO 3	3		2									2	2	
CO 4	3	2										2	2	
CO 5	3											2	2	

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**Basics of Java**	**Periods**	**9**
The Genesis of Java - Overview of Java - Data Types, Variables, and Arrays - Operators - Control Statements - Introducing Classes - Methods and Classes. Inheritance: Basics - Using Super – Creating a MultilevelHierarchy - Method overriding – Using Abstract Classes.			
Unit - II	**Errors and Exception Handling**	**Periods**	**9**
Packages and Interfaces: Packages - Access Protection - Importing Packages- Interfaces Definitions and Implementations - Compile time errors –Run time errors – Exception Handling: Types - Try and Catch -Throw - Finally – User defined exceptions.			
Unit – III	**Streams and Threads**	**Periods**	**9**
File - The Byte Streams - The Character Streams - Using Stream I/ O - Serialization. Java threads – Priorities – Synchronization – Thread class and Runnable interfaces – Creating threads – Multiple threads – Inter thread communication.			
Unit - IV	**String Handling**	**Periods**	**9**
String Handling: Special String operations and Methods - String Buffer - Exploring java.lang: Simple type Wrappers - System - Math - Collections Framework: Collections Interfaces and Classes - Utility Classes:String Tokenizer - Date and Time.			
Unit – V	**Applets, Event Handling and AWT**	**Periods**	**9**
Applet Basics - Applet Architecture - Applet Display Methods - Parameter Passing - Event Handling Mechanisms - Event Classes and Listener – Graphics , Colors and Fonts - AWT Controls - Layout Managers and Menus.			
		Total Periods	**45**

Text Books:

1	Herbert Scheldt, Java The Complete Reference, Tata Mc Graw Hill, 2019. (UNIT I,II,III & IV)
2	Deitel & Deitel, Java How to Program, Prentice Hall of India, 2017. (UNIT V)

References:

1	D.T. Editorial Services, Java 8 Programming Black Book, Dreamtech Press, 2015.
2	Pierre-Yves Saumont, Functional Programming in Java: How Functional Techniques ImproveYour Java Programs, Dreamtech Press, 2017.
3	Raoul-Gabriel Urma & Mario Fusco & Alan Mycroft, Java 8 in Action, Dreamtech Press, 2014.
4	Anita Seth & B.L. Juneja, Java: One Step Ahead, Oxford University Press, 2017.

E-Resources:

1	https://www.geeksforgeeks.org/java/
2	https://www.w3schools.com/java/
3	https://www.codecademy.com/learn/learn-java

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Programme	**B.TECH**	Programme Code	104	Regulation	2019
Department	**INFORMATION TECHNOLOGY**			Semester	-

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV14	**Network Programming**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Study the basics of TCP/IP protocols and sockets. • Develop the applications of TCP echo client and server, I/O model. Enhance the socket methods options and elementary UDP socket options. • To know about the difference between IPV4 and IPV6 protocols, functions of raw socket.Study the basic simple network management system.

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Demonstrate advanced knowledge of networking understand the keyprotocols which support the Internet	K3
	CO2: Be familiar with several common programming interfaces fornetwork communication.	K2
	CO3: Demonstrate advanced knowledge of programming fornetwork communications.	K3
	CO4: Make use of different types of I/O such as non-blocking I/O and event driven I/O, have a detailed knowledge of the TCP/UDP Sockets.	K2
	CO5: Be familiar with the simple network management information system.	K2

Pre-requisites	Computer Networks

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	3		3							2	2	
CO 2					2								2	
CO 3			2											1
CO 4		2			2								2	1
CO 5													2	

Course Assessment Methods
Direct

1. Continuous Assessment Test I, II & III
   2. Assignment
   3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**ELEMENTARY TCP SOCKETS**	**Periods**	**9**
Introduction to socket programming – Overview of TCP / IP protocols – Introduction to sockets – Socket address structures – Byte ordering functions – Address conversion functions – Elementary TCP sockets – Socket – Connect – Bind – Listen – Accept – Read – Write – Close functions – Iterative server – Concurrent server.			
Unit – II	**APPLICATION DEVELOPMENT**	**Periods**	**9**
TCP echo server – TCP echo client – POSIX signal handling – Server with multiple clients – Boundary conditions– Server process crashes– Server host crashes – Server crashes and reboots – Server shutdown – I/O multiplexing – I/O models – Select function – Shutdown function – TCP echo server (with multiplexing) – Poll function – TCP echo client (with multiplexing)			
Unit – III	**SOCKET OPTIONS, ELEMENTARY UDP SOCKETS**	**Periods**	**9**
Socket options – Getsocket and set socket functions – Generic socket options – IP socket options – ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo server – UDP echo client – Multiplexing TCP and UDP sockets – Domain Name System – Gethostbyname function – IPV6 support in DNS – Gethostbyadr function – Getservbyname and getservbyport functions.			
Unit –IV	**ADVANCED SOCKETS**	**Periods**	**9**
IPV4 and IPV6 interoperability – Threaded servers – Thread creation and termination– TCP echo server using threads – Mutexes – Condition variables – Raw sockets – Raw socket creation – Raw socket output – Rawsocket input – Ping program – Trace route program.			
Unit – V	**SIMPLE NETWORK MANAGEMENT**	**Periods**	**9**
SNMP network management concepts – SNMP management information – Standard MIB,,s – SNMP V1protocol and practical issues – Introduction to RMON, SNMP V2 and SNMP V3.			
		Total Periods	**45**

Text Books:

1. W. Richard Stevens, ―Unix Network Programming Vol – I, 3r^d Edition, Prentice Hall of India / Pearson Education, 2003.

2. William Stallings, ―SNMP, SNMPV2, SNMPV3 and RMON 1 and 2‖, 3rd Edition, Addison Wesley, 1999.

3. D. E. Comer, ―Internetworking with TCP/IP Vol – III‖, (BSD Sockets Version), 2nd Edition, Prentice Hall of India, 2003.

References:

1. D. E. Comer, ―Internetworking with TCP/IP Vol - III‖, (BSD Sockets Version), 2nd Edition, Prentice Hall of India, 2003

E-Resources:

1, https://notes.shichao.io/unp/ch4/

2. https://www.masterraghu.com/subjects/np/introduction/unix_network_programming_v1.3/ch08.html

3. https://docs.oracle.com/cd/E26502_01/html/E35299/sockets-22932.html

4. https://www.geeksforgeeks.org/simple-network-management-protocol-snmp/

<table>
<tr><td rowspan="3">Programme</td><td colspan="2">B.TECH</td><td colspan="2">Programme Code</td><td>104</td><td>Regulation</td><td colspan="2">2019</td></tr>
</table>

Programme	**B.TECH**		Programme Code		**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**					Semester		**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV15	**SERVICE ORIENTED ARCHITECTURE**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Study the importance of Service Oriented Architecture. • Learn to implement SOA in the J2EE and .Net environment • Study the advanced features of SOA and web services for SOA	

Course Outcome	At the end of the course, the student should be able to,	KL
	CO1: Relate how the components are interrelated in SOA.	K1
	CO2: Classify simple web services using SOA principles.	K2
	CO3: Apply various activity management and a series of composition techniques for SOA	K3
	CO4: Experiment the various services using Metadata.	K3
	CO5: Select the advanced features of web services security.	K3

Pre-requisites	Web Technology

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO Mapping	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	1												1	1
CO 2	2	1											2	2
CO 3	3	2	1	1									3	3
CO 4	3	2	1	1									3	3
CO 5	3	2	1	1									3	3

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION TO SOA WITH WEB SERVICES**	Periods	**9**
Service Oriented Enterprise – Service Oriented Architecture (SOA) – SOA and Web Services – Multi-Channel Access – Business Process management – Extended Web Services Specifications.			
Unit - II	**SOA AND WEB SERVICES**	Periods	**9**
Web Services Platform – Service Contracts – Service-Level Data Model – Service Discovery – Service-Level Security – Service-Level Interaction patterns – Atomic Services and Composite Services – Proxies and Skeletons-Introduction to REST –Designing a REST Service –Introduction to Micro services.			
Unit – III	**SOA AND MULTICHANNEL ACCESS**	Periods	**9**
Multi-Channel Access – Business Benefits – SOA for Multi Channel Access – Tiers – Business Process Management – Concepts – BPM - SOA and Web Services – WS- BPEL – Web Services Composition			
Unit - IV	**EXTENDED WEB SERVICES SPECIFICATION**	Periods	**9**
Metadata Management - Metadata Specification – XML-WSDL 2.0-UDDI-Addressing-Policy-WS policy-WSPL-WSDL 2.0 features and properties-comparing the policy specifications-WS Metadata Exchange.			
Unit – V	**WEB SERVICES SECURITY**	Periods	**9**
Overarching concern, Core Concepts, Summary of Challenges, Threats and Remedies, Securing the Communications Layer, Message Level Security-Data Level Security.			
		Total Periods	**45**
Text Books:			
1.	Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", First Edition, Pearson Education,2005		
References:			
1.	James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, "Java Web Services Architecture", Elsevier, 2003		
2.	Thomas Erl, "Service Oriented Architecture", Pearson Education, 2005.		
3.	Eric Pulier, Hugh Taylor, "Understanding Enterprise SOA", Dreamtech Press, 2007.		
E- Resourses:			
1.	https://www.tutorialspoint.com/soa/soa_business_processes.htm		
2.	https://www.informit.com/articles/article.aspx?p=357691&seqNum=6		
3.	https://docs.oracle.com/cd/E13209_01/wlcp/wlng22/devext/wespa_using.html		
4.	https://www.coursera.org/learn/service-oriented-architecture		

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Programme	**B.E./ B.TECH.**		Programme Code		Regulation	**2019**
Department	**CSE,IT & CST**				Semester	**-**

Course Code	**Course Name**	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CTV12	**Socket Programming**	3	0	0	0	40	60	100

Course Objective	The main objective of this course is to: • To learn different socket function and implement client server applications using sockets • To conduct experiments to know how different internet protocols like TCP/IP works • To analyze various application program like TELNET, DNS, DHCP • Build different application like Routing, Load balancing & Security • To apply protocols get adapted to emerging technologies	

Course Outcome	The students who complete this course successfully are expected to:	Knowledge level
	CO1: Become familiar with elementary socket functions.	K1
	CO2: Design and implement client –server applications using Sockets	K2
	CO3: Learn about functions that convert between names and numeric values and protocols	K2
	CO4: Analyze network protocol functions	K3
	CO5: Learn about the advanced socket functions	K3

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Programme Outcomes (POs)													PSOs	
COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	3	3	3	2	1				2	2	3	3
CO2	3	3	3	3	3	2	1				2	2	2	2
CO3	3	3	3	3	3	2	1				2	2	3	3
CO4	3	3	3	3	3	2	1				2	2	2	2
CO5	3	3	3	3	3	2	1				2	2	3	3

Course Assessment Methods

Direct

    4. Continuous Assessment Test I, II & III
    5. Assignment.
    6. End-Semester examinations

Indirect
    1.Course - end survey

Content of the syllabus			
Unit – I	**Introduction to Network Security**	**Periods**	**9**
Introduction, simple daytime client, protocol independence, Error handling, simple daytime server, Roadmap to client/server, Overview of TCP/IP protocol- TCP connection establishment and termination, TCP state transition diagram – Time-wait state, SCTP association establishment and termination, TCP port numbers and concurrent servers, Buffer size and limitations, standard internet services, protocol usage by common, Internet applications.			
Unit – II	**Socket Functions**	**Periods**	**9**
Socket function, connect function, bind function, listen function, accept function, Fork function, exec function, concurrent servers, close function-get sock name and get peer name, TCP Echo server, TCPEcho client, normal startup and termination, POSIX signal handling, Wait and Waitpid functions, Termination of server process, Crashing and rebooting of server host.			
Unit - III	**Protocol Functions**	**Periods**	**9**
Get sock opt function, set sock opt function, IPV4, ICMP, TCP socket options, UDP Echo server and client, recvfrom function, send to function, Connect function with UDP, dg_cli function, lack of flowcontrol with UDP			
Unit – IV	**DNS Socket Functions**	**Periods**	**9**
DNS, resolvers and name servers, gethostbyname function, gethostbyaddr function, getservbyname, getservbyport function, tcp_connect function- tcp_listen function, udp_client, udp_connect, udp_server function, BOOTP, DHCP.			
Unit – V	**Advanced Socket Functions**	**Periods**	**9**
Internet Protocol, IPV4, IPV6 interoperability, Daemon processes, Daemon processes and the inetdsuperserver, Advanced I/O functions			
		Total Periods	**45**
Text Books:			
1.	Douglas.E.Comer " Internetworking with TCP/IP " principles, protocols and architecture, 6th Edition,Volume 1, Pearson Education,2013		
2.	Behrouz A.Forouzan , " TCP/IP protocol suite", 4th edition, Mc Graw Hill education privatelimited,2010.		
3.	Adam Woodbeck, Network Programming with Go, Code Secure and Reliable Network Services from Scratch, No Starch Press, ISBN-10 : 1718500882, 2021		
4.	Douglas.E.Comer " Internetworking with TCP/IP " principles, protocols and architecture, 6th Edition,Volume 1, Pearson Education,2013		
References:			
1.	W.Richard Stevens, Bill Fenner, Andrew M. Rudoff " Unix Network programming " 3rd edition, Volume – 1, Pearson Education , 2015 R.F.Gilberg, B.A.Forouzan, Data Structures,2nd ed., Thomson India, 2005		
2.	Wendell Odom , " IP networking ", 1st edition, Pearson Education 2012		
3.	NPTEL Course Notes		
E-Resources:			
1.	https://dev.to/sanjayrv/a-beginners-guide-to-socket-programming-in-c-5an5		
2.	https://www.cs.rpi.edu/~moorthy/Courses/os98/Pgms/socket.html		
3.	https://www.tutorialspoint.com/unix_sockets/index.htm		

VERTICAL II – CYBER SECURITY

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN				
	(Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam,Tiruchengode– 637 205				

Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**		Semester		**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV21	**INFORMATION SECURITY**	3	0	0	3	40	60	100

Course Objective	The students should made to: • Understand the basics of Information Security • Know the legal, ethical and professional issues in Information Security. • Know the aspects of risk management. • Become aware of various standards in this area • Know the technological aspects of Information Security

Course Outcomes	At the end of the course, the students should be able to,	Knowledge Level
	CO1: Understand the basics of information security	K2
	CO2: Illustrate the legal, ethical and professional issues in information security	K2
	CO3: Demonstrate knowledge of security objectives and policy development.	K2
	CO4:Understand the various standards in the Application Security	K2
	CO5: Understand and implementation of Security Techniques.	K2

Pre-Requisites	Nil

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1											2	2
CO 2	2	1											2	2
CO 3	2	2	1										2	2
CO 4	2	1											2	2
CO 5	2	1											2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus

Unit–I	INTRODUCTION	Periods	9

History-Information Security- Information Security Overview-Risk Analysis-Compliance with Standards, Regulations, and Laws - Secure Design Principles - Security Policies, Standards, Procedures, and Guidelines Security Organization -Authentication and Authorization

Unit–II	DATA SECURITY AND NETWORK SECURITY	Periods	9

Securing Unstructured Data-Information Rights Management – Encryption-Storage Security – DatabaseSecurity-storage security, Network Security:Secure Network Design-Network Device Security - Firewalls-Virtual Private Networks - Wireless Network Security - Intrusion Detection and Prevention Systems -Voice over IP (VoIP) and PBX Security.

Unit–III	COMPUTER SECURITY	Periods	9

Operating System Security Models -Unix Security - Windows Security -Securing Infrastructure Services - Virtual Machines and Cloud Computing -Securing Mobile Devices.

Unit–IV	APPLICATION SECURITY	Periods	9

Secure Application Design-Writing Secure Software-J2EE Security-Windows .NET Security-Controlling Application Behavior Security Operations -Security Operations Management-Disaster Recovery, Business Continuity, Backups, and High Availability -Incident Response and Forensic Analysis.

Unit–V	DATABASE SECURITY AND SECURITY OPERATIONS	Periods	9

Database security: Security requirements, Reliability and integrity, Sensitive data, Inference, Multilevel database, Proposal for Multi level security.

Security Operations: Security operation Management - Disaster recovery, Business community, Backups and High Availability - Forensic Analysis.

		Total Periods	45

Text Books

1.	*Mark Rhodes-Ousley,Information Security- The Complete Refence eBook Second Edition, 2015.*

References

1.	Micki Krause, Harold F. Tipton, ― Handbook of Information Security Management‖, Vol 1-3 CRCPress LLC, 2004.
2.	Stuart McClure, Joel Scrambray, George Kurtz, ―Hacking Exposed‖, Tata McGraw- Hill, 2003

E-Resources

1.	https://nptel.ac.in/courses/106/ 06/106106129/
2.	https://nptel.ac.in/noc/courses/noc16/SEM1/noc16-cs01/
3.	https://slideplayer.com/slide/5127731/

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode–637 205					
Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**	
Department	**INFORMATION TECHNOLOGY**			Semester	**-**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV22	**CYBER SECURITY**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Provides the skills in cyber security in view of cybercrime. • Provides the skills in cyber offences. • To detect frauds in mobile and wireless devices. • Provide techniques for handling cybercrime, organizational implications and cyber terrorism

	At the end of the course, the student should be able to,	Knowledge Level
Course Outcome	**CO1**:Outline the threats and risks in cybercrime and cyber offences.	K2
	CO2:Identify the frauds, attacks and security issues in mobile and wireless devices..	K2
	CO3:Know the methods used in cyber crime	K2
	CO4:.Apply the phishing techniques and organizational implications.	K3
	CO5:.Describe about Social, Political, Ethical and Psychological Dimensions of Cybercrime.	K2
Pre-requisites	Computer Networks	

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	3	2	2	3			2	2			3	3	2
CO 2	3	3	2	2	3			2	2			3	3	2
CO 3	3	3	2	2	3			2	2			3	3	2
CO 4	3	3	2	2	3			2	2			3	3	2
CO 5	3	3	2	2	3			2	2			3	3	2

Course Assessment Methods Direct

Direct
1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations

Indirect
    1.Course - end survey

Content of the syllabus			
Unit– I	**INTRODUCTION**	Periods	**9**
Introduction: Definition and Origins of the Word - Classifications of Cybercrimes- Installing and Configuring Kali Linux-Pre-penetration Testing Checklist, Information Gathering-External Pen-testing,Website Penetration Testing-Internal Network Penetration Testing and Wi-Fi Penetration Testing-Network Sniffing, Exploitation- Social Engineering.			
Unit-II	**CYBERCRIME: MOBILE AND WIRELESS DEVICES**	Periods	**9**
Trends in Mobility: Credit Card Frauds in Mobile and Wireless Computing Era- Authentication Service Security-Attackson Mobile/CellPhone. **Mobile Devices**:Security Implications for Organizations-Organizational Measures for Handling Mobile Devices -Laptops: Physical Security Counter measures.			
Unit – III	**TOOLS AND METHODS USED IN CYBERCRIME**	Periods	**9**
Introduction: Password Cracking: Online Attacks, Offline Attacks - Strong, Weak and Random Passwords. **Keyloggers and Spywares:** Software Keyloggers - Hardware Keyloggers – Antikeylogger - Spywares. **Virus and Worms:**Trojan Horses and Backdoors-Buffer Overflow-Attacks on Wireless Networks.			
Unit-IV	**PHISHING AND ORGANIZATIONAL IMPLICATIONS**	Periods	**9**
Phishing and Identity Theft: Phishing - Spear Phishing - Types of Phishing Scams - Phishing Toolkits and Spy Phishing- Phishing Counter measures. **Social Media Marketing:**Security Risks and Perils for Organizations, Social Computing and the Protecting People's Privacy in the Organization.			
Unit– V	**CYBER TERRORISM**	Periods	**9**
Introduction: Intellectual Property in the Cyberspace - Copyright, Patent, Trademarks - Trade Secret – Trade Name Domain Name. Ethical Hackers: The Psychology Mindset and Skills of Hackers and Other Cyber criminals –Sociology of Cyber criminals- Information Warfare.			
		Total Periods	**45**

Text Books:	
1.	Abhinav Ojha,"Beginners Guide To Ethical Hacking and Cyber Security", FirstEdition ,2020.
2.	RogerGrimes,"HackingtheHacker',WileyIndia, 2017.

References:	
1	Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed 7 :Network Security" Secrets &amp Solutions", Tata Mcgrawhill Publishers, Seventh Edition, 2012.
2	Donaldson,S.,Siegel,S.,Williams,C.K.,Aslam,A.,,EnterpriseCybersecurity- How to Build a Successful Cyber defence Program against AdvancedThreats',A-press, 2015.

E-Resources :	
1.	Udemy.com,,TheCompleteCyberSecurityCourse:HackersExposed',2018.[online].Available:https://www.udemy.com/the-complete-internet-security-privacy-course-olume1/,[Accessed:May2019]

Programme	**B.E. / B.Tech.**		Programme Code		Regulation	**2019**
Department	**CSE & IT**			Semester		**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CSV23	**Cryptography and Network Security**	3	0	0	3	40	60	100

Course Objective	The student should be made to • Understand the fundamentals of networks security, security architecture, threats and vulnerabilities • Learn various cryptographic algorithms. • Understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Classify the Encryption techniques	K2
	CO2: Apply the different cryptographic operations of symmetric and public cryptographic algorithms.	K3
	CO3: Evaluate the authentication and hash algorithms.	K3
	CO4: Differentiate Computer security and network security and develop a system for remote user authentication	K3
	CO5: Identify how to secure their systems	K4

Pre-requisites	Computer Networks

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO 1	3	2	2	2	2			2					2	3
CO 2	3	3	2	2	2			2					2	2
CO 3	2	3	3	2	2			2					3	2
CO 4	2	3	2	3	2			2					2	3
CO 5	3	3	2	2	2			2					2	2

Course Assessment Methods

DIRECT
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

INDIRECT
1. Course - end survey

Content of the syllabus

Unit – I	**COMPUTER SECURITY BASICS**	Periods	**9**

Computer Security Concepts, OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, Model for Network Security, Classical Encryption techniques- Substitution and Transposition

methods, Block Cipher Principles			
Unit - II	**ENCRYPTION STANDARDS**	Periods	**9**
Data Encryption Standard- DES Encryption- Key Generation- DES Decryption, Advanced Encryption Standard (AES)- AES Transformation Functions, Multiple Encryption and Triple DES- Triple DES with Two Keys- Triple DES with Three Keys.			
Unit – III	**AUTHENTICATION AND HASH FUNCTION**	Periods	**9**
Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA –Digital signature and authentication protocols - Entity Authentication: Biometrics, Passwords, Challenge Response protocols- Authentication applications – Kerberos, X.509			
Unit - IV	**NETWORK SECURITY**	Periods	**9**
Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution using Asymmetric Encryption, Public Key Distribution , Public Announcement of Public Keys ,Publicly available Directory , Public-Key Authority, Public-Key Certificates, Remote User Authentication principles- Remote user Authentication Using Symmetric Encryption, Kerberos, Remote user Authentication using Asymmetric Encryption.			
Unit – V	**SYSTEM SECURITY**	Periods	**9**
Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction, Intruders, Intrusion Detection, Password Management, Malicious Software, Firewalls, Trusted Systems.			
		Total Periods	**45**

Text Books	
1.	Behrouz A. Forouzan, ”Cryptography and Network Security” 3rd Edition, McGraw Hill Publications, 2016.
2.	William Stallings, ”Cryptography and Network Security - Principles and Practice Paperback” – PEARSON, 8th Edition, 2023.
References	
1.	Mohammad Amjad, "Cryptography and Network Security",Wiley,2019
2.	Bruce Schneier, "Applied Cryptography, Second Edition", John Wiley & Sons Inc, 2007.
3.	AtulKahate, "Cryptography and Network Security", Tata McGraw-Hill, 2003
4.	Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Third Edition, Pearson Education, 2003.
Resources	
1.	http://nptel.ac.in/courses/106105031/1
2.	http://nptel.ac.in/courses/106102064/23
3.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-033-computer-system-engineering-spring-2009/video-lectures/ lecture by Prof. Robert Morris and Prof. Samuel Madden MIT
4.	https://www.brainkart.com/article/Remote-User-Authentication-Using-Asymmetric-Encryption_8476/
5.	http://nptel.ac.in/courses/106105031/lecture by Dr. DebdeepMukhopadhyayIITKharagpur

Programme	**B.E. / B.Tech.**		Programme code		Regulation		**2019**
Department	**CSE, IT & CST**			Semester			**-**

| Course Code | Course name | Periods per week | | | Credit | Maximum Marks | | |

U19CSV24	**Cyber Law and Ethical Hacking**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Course Objective	The student should be made to, ➤ understand the concepts of cyber crime and legal systems of information technology. ➤ gain knowledge on impacts and effects of cyber laws and acts in India ➤ Understand the basics of Ethical Hacking ➤ Learn Tools available for Pen testing

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Define Cyber Crime and explain types of Cyber Crime	K2
	CO2: Recite laws and Acts in India for cyber Crime	K2
	CO3: Explain the basics and phases of Ethical hacking	K3
	CO4: Identify Types of Attacks and their counter measures	K2
	CO5: Work with pen testing tools	K3

Pre-requisites	-

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak												**CO/PSO Mapping**	
	Programme Outcomes (POs)												PSOs	
COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	2					2	2						2	2
CO 2	2					2	2					2	2	2
CO 3	2					2	3					2		2
CO 4	2					2	3							2
CO 5	2				3	2	3					2		2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Quiz / Seminar 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**CYBER CRIME**	Periods	**9**

Introduction to Cyber Crimes –Nature and Scope of Cyber Crime- Types of Cyber Crime: Internet, Hacking, Cracking, Viruses, Virus Attacks, Pornography, Software Piracy, Intellectual property, Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits, and Cyber Security etc.

Unit - II	**LAWS AND ACTS**	Periods	**9**

Laws and Ethics - Digital Evidence Controls - Evidence Handling Procedures - Basics of Indian Evidence ACT IPC and CrPC - Electronic Communication Privacy ACT - Legal Policies.

Unit – III	ETHICAL HACKING BASICS	Periods	9

Introduction to Ethical Hacking – Types of hacking – Phases of Ethical hacking.**Reconnaissance And Scanning:**Footprinting with DNS – Determining Network Range – Google Hacking. Scanning for targets: Identify Active machines – Port Scanning. Enumeration: Windows Security basics – Enumeration Techniques.

Unit – IV	SYSTEM ATTACK & WEB ATTACKS	Periods	9

Sniffing: Communications basics –Sniffing techniques and tools –Network Roadblocks: Intrusion Detection – Session hijacking, System Attack: Windows system hacking – Password Cracking – Exploiting   privileges. Social Engineering: Human Based attack – Computer based attack. Web Server Hacking: Web service architecture

Unit – V	MALWARES AND PENETRATION TESTING	Periods	9

Web attacks. Web Applications: Web applications attack – Web resources protection. Wireless Attacks – Bluetooth attacks. Malware Attacks: Trojans, viruses and worms.   Penetration Testing: Types of Penetration testing – Penetration testing methodologies – Penetration test tools.

		Total Periods	45

Textbooks

1.	Bernadette H Schell, Clemens Martin, "Cybercrime", ABC – CLIO Inc, California, 2004.
2.	R K Jha, .Digital Forensic and Cyber Crime Hardcover – 2016,
3.	Matt Walker, "CEH- Certified Ethical Hackers Guide ", 4th Edition, McGraHill Education, 2019
4.	Michael Gregg," Certified Ethical Hacker (CEH) Version 9 Cert Guide", 2nd Edition, Pearson Education, 2018

References

1.	Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", 2nd Edition, Syngress , Elseveir, 2013.
2.	Parteek Sharma," Hacking Revealed", 1st Edition, White Falcon Publishing, 2018.
3.	Reginald Wong, "Mastering Reverse Engineering: Re-engineer your ethical hacking skills", Packt Publishing, 2018.
4.	DafyddStuttard, Marcus Pinto, "The Web Application Hacker"s Handbook: Finding and Exploiting Security Flaws", 2nd Edition, John Weily& Sons, 2011
5.	Monnappa K A,"Learning Malware Analysis: Explore the concepts, tools, and techniques to analyze and investigate Windows malware",1st Edition, Packt Publishing, 2018.

E-Resources

1.	https://doc.lagout.org/security/ceh-official-certified-ethical-hacker-review-guide-exam-312-50.9780782144376.27422.pdf
2.	https://www.mediafire.com/file/dyewn6f3r3olnuw/A_Beginners_Guide_To_Hacking_Computer_Systems.zip/file
3.	https://www.pdfdrive.com/hacking-beginner-to-expert-guide-to-computer-hacking-basic-security-and-penetration-testing-computer-science-series-e175287729.html

Programme	**B.E. / B.Tech.**		Programme code		Regulation		**2019**

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam,
Tiruchengode – 637 205

Programme	**B.E. / B.Tech.**		Programme code		Regulation		**2019**
Department	**CSE, IT & CST**			Semester			**-**

Course Code	Course name	Periods per week			Credit	Maximum Marks		
U19CSV25	**Social Network Analysis**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the concept of semantic web and related applications. • Learn knowledge representation using ontology. • Learn the Extraction and Mining Communities in Web Social Networks • Understand human behavior in social web and related communities. • Learn visualization of social networks.	

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Distinguish WWW from semantic web	K2
	CO2: Discover the knowledge using ontology.	K2
	CO3: Identify the communities in social networks.	K3
	CO4: Predict human behavior in social web and related communities.	K2
	CO5: Apply representation techniques for visualizing social networks.	K3

Pre-requisites	-

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak												**CO/PSO Mapping**	
	Programme Outcomes (POs)												PSOs	
COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	2	1	2	2	2	1	1		1		1	2	1
CO 2	3	2		2	2							1	2	1
CO 3	3	2		2	2	2	1	1		1		1	2	1
CO 4	3	2		2	2							1	2	1
CO 5	3	2	2	2	2	2	1	1		1		1	2	1

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignments / Quiz / Seminar 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**INTRODUCTION**	Periods	**9**

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks- Web-based networks - Applications of Social Network Analysis.

Unit - II	MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION	Periods	9

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modeling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Aggregating and reasoning with social network.

Unit – III	EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS	Periods	9

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities

Unit – IV	PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES	Periods	9

Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

Unit – V	VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS	Periods	9

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare.

	Total Periods	45

Textbooks:

1.	Peter Mika, "Social Networks and the Semantic Web", First Edition, Springer 2007.
2.	BorkoFurht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.
3.	GuandongXu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
4.	Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.

References:

1.	Max Chevalier, Christine Julien and Chantal Soule-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modeling", IGI Global Snippet, 2009.
2.	John G. Breslin, Alexander Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.
3.	Stanley Wasserman, "Social Network Analysis Methods and Applications", Cambridge University Press, June 2012.

E-Resources:

1.	Social Network Analysis and Mining	Home (springer.com)
2.	Social network analysis - Wikipedia
3.	Social network analysis: An approach and technique for the study of information exchange - ScienceDirect
4.	SNA-Toolkit.pdf (digitalpromise.org)
5.	Online Social Network Analysis (degruyter.com)

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205					
Programme	**B.E. / B.Tech.**	Programme code		Regulation		**2019**
Department	**CSE, IT & CST**			Semester		**-**

Course Code	Course name	Periods per week			Credit	Maximum Marks		
U19CSV26	**Semantic Web**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Course Objective	The student should be made to, • Extrapolate the basic concepts, tasks, methods, and techniques insemantic web • Interpret the concept of RDF andits schemas • Comprehend the ontology and semanticweb architecture • Construct logic inference and rule markupin XML. • Recognize and infer the semantic web processand issues

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Describe the features and uses in Semantic Web and its Technologies	K2
	CO2: Construct the RDF data model and defining the vocabularies used in RDF data model	K2
	CO3: Identify the requirements of Ontology and know the sublanguages	K3
	CO4: Write the Monotonic and Non monotonic Rules	K2
	CO5: Relate methodologies and techniques to a range of practical applications in Semantic web technologies.	K3

Pre-requisites | -

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak												**CO/PSO Mapping**	
	Programme Outcomes (POs)												PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	2	2										2	1
CO 2	2	3	3										2	2
CO 3	2	3	3										2	2
CO 4	2	3	3										2	2
CO 5	2	2	2										2	-

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignments / Quiz / Seminar
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**INTRODUCTION**	Periods	**9**

History–SemanticWebLayers– SemanticWebtechnologies–SemanticsinSemanticWeb–XML:Structuring–Namespaces – Addressing–Querying–Processing

184

Unit - II	RESOURCE DESCRIPTION FRAMEWORK	Periods	9

RDFandSemanticWeb–BasicIdeas-RDFSpecification–RDFSyntax:XMLandNon-XML-RDF elements– RDF relation RDFandSemanticWeb–BasicIdeas-RDFSpecification–RDFSyntax:XMLandNon-XML-RDF elements– RDF relationship: Reification, Container, Collaboration – RDF Schema –Editing, Parsing , Browsing , RDF/XML-RQL-RDQL

Unit – III	ONTOLOGY	Periods	9

Why Ontology–Ontology movement–OWL–OWLSpecification-OWLElements– OWL constructs: Simple and Complex – Ontology Engineering : Introduction –Constructing Ontologies – Reusing Ontologies – On-To KnowledgeSemantic Webarchitecture

Unit – IV	LOGIC AND INFERENCE	Periods	9

Logic – Description Logics - Rules – Monotonic Rules: Syntax, Semantics and Examples – Non monotonic Rules – Motivation, Syntax and Examples – Rule Markup in XML: MonotonicRules and Non-Monotonic Rules

Unit – V	APPLICATIONS OF SEMANTIC WEBTECHNOLOGIES	Periods	9

RDF Uses: Commercial and Non-Commercial use – Sample Ontology – E-Learning –Web Services – Web mining – Horizontal information – Data Integration – Future of SemanticWeb

		Total Periods	45

Textbooks:

1.	Grigoris Antoniou, Frank van Harmelen,” A Semantic Web Primer ” MIT, 2ndEdition, Press,2020
2.	Spinning the Semantic Web: Bringing the world wide web to its full potential – The MIT Press – 2005
3.	Shelley Powers – "Practical RDF" – O‟reilly publishers – First Indian Reprint : 2003

References:

1.	Markus Kroetzsch, Pascal Hitzler, and Sebastian Rudolph,” Foundations of Semantic Web Technologies”, CRC press, 2009
2.	Michael C. Daconta, Leo J. Obrst, and Kevin T. Smith, "The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management", Fourth Edition, Wiley Publishing, 2003.
3.	John Davies, Rudi Studer, and Paul Warren John, "Semantic Web Technologies: Trends and Research in Ontology-based Systems", Wiley and Son‟s, 2006.

E-Resources:

1.	https://www.w3.org/standards/semanticweb/
2.	https://www.w3.org/RDF/
3.	https://cse.iitkgp.ac.in/~tkmishra/files/SEMANTIC%20WEB%20report.pdf
4.	https://obitko.com/tutorials/ontologies-semantic-web/
5.	https://www.geektonight.com/web-technologies-notes-pdf/

Programme	**B.TECH**			Programme Code	**104**	Regulation	**2019**	
Department	**INFORMATION TECHNOLOGY**					Semester	**-**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV23	**CYBER FORENSICS**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Learn about computer investigation • Understanding and determining data acquisition methods and tools. • Familiar about identifying the crime scenes and digital evidence. • Learn about computer forensics tools and Analyze and Validation. • Know about Email investigation and recovering the graph files	
Course Outcome	At the end of the course, the student should be able to,	KL
	CO1:apply digital forensic investigation with a systematic approach	K3
	CO2:make use of various tools for data acquisition	K3
	CO3 :identify the digital evidence in a crime scene	K3
	CO4: apply forensic tools in forensic examination	K3
	CO5:build the recovery of graph files and investigating E-mail crimes	K3
Pre-requisites	Nil	

CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak

Cos	Programme Outcomes (POs)												CO/PSO Mapping PSOs	
	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	PSO 1	PSO 2
CO 1	3	2	1	1									3	3
CO 2	3	2	1	1									3	3
CO 3	3	2	1	1									3	3
CO 4	3	2	1	1									3	3
CO 5	3	2	1	1									3	3

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examination
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	Computer Investigations	Periods	9
Computer Investigations: Preparing a Computer investigation – Taking a systematic approach – Assessing the case – Planning Investigation – Securing evidence. Procedures for Corporate High: Tech investigations – Conducting an Investigation – Completing the case.			
Unit – II	Data Acquisition	Periods	9
Understanding storage formats for digital evidence – Determining the best acquisition method - Contingency planning for image acquisitions – Using Acquisition tools: Windows XP Write- protection with USB Devices – Validating Data Acquisitions: Windows Validation Methods – Performing RAID Data Acquisitions – Using Remote Network Acquisition tools – Using other Forensics Acquisition tools.			
Unit – III	Processing Crime and Incident Scenes	Periods	9
Identifying Digital Evidence – Collecting Evidence in Private Sector Incident Scenes – Processing Law Enforcement Crime Scenes – Preparing for a Search –Securing a Computer Incident or Crime Scene – Seizing Digital Evidence at the Scene –Storing Digital Evidence –Obtaining a Digital Hash – Reviewing a Case.			
Unit – IV	Computer Forensic Tools, Analysis and Validation	Periods	9
Evaluating Computer Forensics Tool Needs -Computer Forensics Software Tools – Computer Forensics Hardware Tools –Validating and Testing Forensic Software - Computer Forensics Analysis and Validation: Determining Data Collection and Analysis –Validating Forensic Data –Addressing Data-Hiding Techniques –Performing Remote Acquisitions.			
Unit – V	Recovering Graph Files, Email Investigations	Periods	9
Recognizing Graph File- Understanding Data Compression- Locating And Recovering Graphic Files- Identifying Un known File Formats- Understanding Copyright Issues- Investigating Email Crimes And Violations- Understanding Email Servers- Using Specialized Email Forensic Tools.			
		Total Periods	45

CASE STUDY:
Only for Assignment not for end sem examination.
1. Illegal money transfer 2. **Network data reveals theft of trade secrets** 3. **Data from vehicle infotainment, telematics and black box systems** 4. Intellectual property theft

Text Books	
1.	Nelson Bill, Phillips Amelia and Steuart Christopher, "Guide to Computer Forensics and Investigations", 4th Edition, Cengage Learning, 2020.

References	
1.	Marie-Helen Mara, "Computer Forensics", 2nd Edition, Jones and Bartlett Learning, 2015.
2.	Albert Marcella Jr, "Cyber Forensics", 2nd Edition, Auerbach Publications , 2007.

E-Resources	
1	https://www.slideshare.net/sumeetpatel21/data-acquisition-system-40835631
2	https://samsclass.info/121/ppt/ch05.ppt
3	https://resources.infosecinstitute.com/topic/7-best-computer-forensics-tools/
4	https://www.guru99.com/computer-forensics-tools.html
5	https://www.tutorialspoint.com/python_digital_forensics/python_digital_forensics_investigation_using_emails.htm

Programme	**B.E./B. TECH.**	Programme Code		Regulation	**2019**
Department	**CSE, IT & CST**			Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CTV23	**Biometrics Systems#**	3	0	0	3	40	60	100

Course Objective	• Understand the basic concept of biometrics systems. • To Describe the principles of the core biometric modalities. • To identify the privacy and security concerns surrounding biometric systems. • To discuss about Deal with poor image qualities and its effect in biometrics. • To Organize and conduct biometric data collections, and apply biometric databases in system evaluation.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Understand biometrics systems operation from sensor to decision.	K2
	CO2: Describe the principles of the core biometric modalities (face, fingerprint, retina and iris), and to deploy them in authentication scenarios.	K3
	CO3: Identify the privacy and security concerns surrounding biometric systems.	K2
	CO4: Deal with poor image qualities and its effect in biometrics.	K3
	CO5: Enumerate the most up-to-date examples of real biometric applications in human authentication.	K4
Pre-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Programme Outcomes (POs)													PSOs	
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	2	2	2	2								1	2
CO2	2	1	1	2	2								2	2
CO3	1	2	1	2	1								1	1
CO4	1	2	1	1	1								1	1
CO5	1	2	1	1	1								2	1

Course Assessment Methods

   Direct

1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations

   Indirect

1.Course - end survey

Content of the syllabus				
Unit – I	**INTRODUCTION TO BIOMETRICS**		**Periods**	9
History of Biometrics ,Types of Biometric Traits, General Architecture of Biometric System, Biometric Characteristics- Basic working of Biometric Matching , Biometric System Error and Performance Measures- Design of Biometric Systems , Identification and Verification Concepts-Applications of Biometrics, Benefits of Biometrics versus Traditional Authentication Methods.				
Unit - II	**FACE, FINGERPRINT, RETINA AND IRIS BIOMETRICS**		**Periods**	**9**
Introduction to Face, Finger Print Retina and Iris biometrics-Design of Face Recognition System, Neural Network for Face Recognition-Face Detection in video sequences, Challenges in Face Biometrics, Face Recognition Methods, Advantages and Disadvantages8.-Fingerprint Biometrics, Fingerprint Recognition System, Minutiae Extraction.-Design of Retina and Iris Recognition System, Iris Segmentation Method.- Determination of Iris Region, Experimental Results of Iris Location, Applications of Iris Biometrics, Advantages and Disadvantages.				
Unit - III	**PRIVACY ENHANCEMENT AND CRYPTOGRAPHY FOR BIOMETRICS**		**Periods**	**9**
Introduction to privacy enhancement and biometric cryptography.-Privacy concerns associated with deployment, identity and privacy, privacy concerns, biometrics with privacy enhancement.- Comparison of biometrics in terms of privacy, soft biometrics.-General purpose crypto system, Model cryptography and attacks.- Symmetric key ciphers, cryptographic algorithms-Introduction to Multimodal biometrics, Basic architecture of multimodal biometrics-Multimodal biometrics using face and ear, Characteristic and advantages of multimodal biometrics.				
Unit - IV	**IMAGE ENHANCEMENT TECHNIQUES**		**Periods**	**9**
Introduction to Image Enhancement Techniques, Current Research in Image Enhancement Techniques- Image Enhancement, Frequency Domain Filters, Databases and Implementation.- Experimental results of Image Enhancement Techniques.				
Unit - V	**BIOMETRICS: SCOPE AND FUTURE, REPOSITORIES FOR DATABASE AND BIOMETRICSTANDARDS**		**Periods**	**9**
Scope and future market of biometrics-Applications of biometrics, Biometrics and information technology infrastructure, Role of biometrics in enterprise security, Role of biometrics in border security-Smart card technology and biometrics, Radio frequency identification biometrics, DNA biometrics, Comparative study of various biometric techniques. Biometric Databases and BiometricStandards.				
			Total Periods	**45**

Text Books:	
1.	G.R.Sinha, Sandeep B Patil,"Biometrics:Concepts and Applications",Wiley publications, New Delhi,2013.
2.	Robert Newman" Security and Access control using Biometric Technologies", CengageLearning,,2010.

References:	
1.	Jain, A.K., Flynn, P. and Ross, A. Handbook of Biometrics. 2008.
2.	Ruud M.Bolle, Sharath Pankanti, Nalini K. Ratha, Andrew W. Senior, Jonathan H. Connell, "Guideto Biometrics ",Springer ,2009.
3.	Rafael C. Gonzalez, Richard Eugene Woods," Digital Image Processing using MATLAB", 2nd Edition,Tata McGraw-Hill Education ,2010.

E-Resources:	
1.	https://archive.nptel.ac.in/

VERTICAL III : ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN							
	(Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205							

Programme	**B.E. / B.Tech.**		Programme Code			Regulation	**2019**	
Department	**CSE & IT**					Semester	**-**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CSV34	**Advanced Database Systems**	3	0	0	3	40	60	100

Course Objective	The student should be made to, - Understand the basics of Query processing. - Apply indexing and hashing techniques in the design of relational database. - Learn the concepts of Object Oriented database. - Listening the concept of Database security. - Enrich the knowledge of NoSQL, MongoDB.	

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Outline the features of Query processing and relational algebra operations	K2
	CO2: Apply indexing and hashing techniques in the design of relational database	K3
	CO3: Explain the concepts of Object Oriented and Extended Relational Database Technologies	K2
	CO4: Analyze & tune the Database security	K4
	CO5: Apply the principles & techniques of Advanced Databases.	K3

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO 1	2	3	3	3	2							2	2	3
CO 2	1	3	3	2	2							3	2	2
CO 3	2	2	3	3	2							2	2	3
CO 4	2	2	3	2	2							2	2	3
CO 5	2	2	3	3	2							3	2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignment/Quiz/Seminar
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus				
Unit – I	**QUERY PROCESSING**		Periods	**9**
Basic concepts of query processing - converting SQL queries into Relational Algebra - Basic Algorithms for executing query operations - Query tree and query graph - Heuristic optimization of query tree.				
Unit – II	**INDEXING, HASHING AND CURRENT ISSUES**		Periods	**9**
Ordered indices – B tree index files – B+ Tree index files – Multiple key access – Static and Dynamic Hashing – Bitmap indices- Active Database Concepts – Introduction to Deductive Databases – Clausal Form and Horn Clauses – Interpretation of Rules – Use of Relational Operations – Multimedia Databases				
Unit - III	**OBJECT ORIENTED AND EXTENDED RELATIONAL DATABASE TECHNOLOGIES**		Periods	**9**
Overview of Object oriented database - OO Concepts - Encapsulation of Operations and methods – Inheritance - Object Model - Object definition language - Object Query Language - Object Relational Concepts.				
Unit – IV	**DATABASE SECURITY**		Periods	**9**
Introduction to Database Security Issues- Discretionary Access Control Based on Granting and Revoking Privileges- Mandatory Access Control and Role-Based Access Control for Multilevel Security- Introduction to Statistical Database Security- Encryption and Public Key Infrastructures- Challenges to Maintaining Database Security- Oracle Label-Based Security				
Unit - V	**ADVANCED DATABASE TECHNIQUES**		Periods	**9**
NoSQL (Not Only SQL)) - Introduction to MongoDB – Term Used in RDBMS and MongoDB – Data Types in MongoDB – MongoDB Query Language- MongoDB Atlas – Introduction to Apache Cassandra – CQL Data Types – CQLSH – CRUD operations –Collections – Using a counter – Time to Live – Alter Commands – Import and Export – Querying System Tables.				
			Total Periods	**45**

Text Books:

1.	Elmasri & Navathe Fundamentals of Database Systems, Pearson Education, 7th Edition,2016
2.	Rini Chakrabarti, Shilbhadra Dasgupta Advanced Database Management System (MISL-DT), Dreamtech press,2014
3.	Silberschatz Abraham, Korth Henry F. and Sudarshan S., ―Database System Concepts‖, 7th Edition, McGraw Hill, New York, 2019.

References:

1.	Database Illuminated, Catherine Ricarso, Second Edition, Jones & Bartleft Learning.2013
2.	Database Management System , S K Sinha, Second Edition, Pearson Publication 2011
3.	Data Base Management System, Leon & Leon, Vikas Publications ,2010
4.	Introduction to Database Systems, Bipin C Desai, Galgotia, 2012

Resources:

1.	https://www.tutorialspoint.com/distributed_dbms/distributed_dbms_relational_algebra_query_optimization.htm
2.	https://phoenixnap.com/kb/object-oriented-database
3.	https://www.analyticsvidhya.com/blog/2020/09/different-nosql-databases-every-data-scientist-must-know/

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	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN	
	(Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205	

Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**		Semester		**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV31	**Data Science**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Building the fundamentals of data science. • Imparting design thinking capability to build big-data • Developing design skills of models for big data problems • Gaining practical experience in programming tools for data sciences • Empowering students with tools and techniques used in data science	
Course Outcome	At the end of the course, the student should be able to,	**Knowledge Level**
	CO1: Make use of data science principles when developing applications	K2
	CO2: Apply machine learning methods to solve problems with large data	K2
	CO3: Experiment with Hadoop and Spark platform for data science applications	K2
	CO4: Apply the data science process to solve real world problem using NoSQL database and Graph database	K3
	CO5: Make use of text analytics techniques for building solutions for text mining problem	K3
Pre-requisites	-	

CO / PO Mapping													**CO/PSO Mapping**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO 2	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO 3	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO 4	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO 5	3	2	1	-	-	-	-	-	-	-	-	-	3	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations.

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**Introduction to data science**	**Periods**	**9**
Benefits of Data Science – Facets of Data – Data Science Process –Big Data Ecosystem and Data Science–Example using Hadoop. The Data Science Process: Overview – Defining Research Goals – Retrieving Data – Data Preparation – Exploratory Data Analysis – Building Models – Building Applications.			
Unit – II	**Machine learning and handling big data**	**Periods**	**9**
Applications for Machine Learning in Data Science – Machine Learning in Data Science Process – The Modeling Process. Handling Large Data: Problems in Handling Large Data – General Techniques – Programming Tips – Case Studies.			
Unit – III	**Distributed data storage and processing**	**Periods**	**9**
Distributing Data Storage and Processing with Frameworks: Hadoop – Spark – Case Study: Assessing Risk with Loaning Money – OWASP Introduction.			
Unit – IV	**Data and Storage API Service**	**Periods**	**9**
NoSQL and graph database: Introduction: ACID– CAP Theorem – The BASE Principles of NoSQL Databases – NoSQL Database Types – Case Study: What disease is that?– Graph Database: Introducing Connected Data and Graph Databases – Connected Data Example.			
Unit – V	**Text Mining and Text Analytics**	**Periods**	**9**
Test Mining in Real World – Text Mining Techniques: Bag of Words – Stemming and Lemmatization – Decision Tree Classifier –Case Study: Classifying Reddit Posts.			
		Total Periods	**45**
Text Book:			
1.	Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science – Big Data, Machine Learning and more, Using Python Tools", First edition, Manning Publications, 2016		
References:			
1.	"Data Science and Big data Analytics: Discovering, Analyzing, Visualizing and Presenting Data"- http://education.EMC.com/academicalliance. Kindle,EMC Education Services,2015.		
2.	Joel Grus, "Data Science from the Scratch", Second edition, O"Reilly,2019		
E-Resources:			
1.	https://www.datacamp.com/		
2.	https://www.udacity.com/		
3.	https://nathancarter.github.io/MA346-course-notes/_build/html/chapter-1-intro-to-data-science.html		
4.	https://owasp.org/		

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</td><td colspan="5">VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205</td><td colspan="2">ISO 9001:2015
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Programme	**B.TECH**			Programme Code	**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**					Semester		**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV32	**DEEP LEARNING**	3	0	0	3	40	60	100

Course Objective	- To understand the concepts of machine learning algorithms and neural network and regularization - To understand the convolutional networks and case studies of deep learning techniques	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Understand basics of machine learning and neural network	K2
	CO2: Understand the mathematical, statistical and computational challenges of deep learning algorithms	K2
	CO3: Design basic deep learning models	K3
	CO4: Optimize deep networks and understand the convolutional networks	K3
	CO5: Explore the knowledge in deep learning applications like computer vision, speech recognition and natural language processing	K2
Pre-requisites	-	

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	1	1	1	1							2	
CO 2	2	1	1	1	1	1							2	
CO 3	3	2	2	2	3	2						2	3	1
CO 4	3	2	2	1	3	2							3	
CO 5	2	2	1	2	3	1						2	2	1

Course Assessment Methods

DIRECT
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

INDIRECT
1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION**	Periods	**9**
Introduction- Historical Trends in Deep Learning, Applied Math and Machine Learning Basics, Learning Algorithms, Capacity, Overfitting and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics.			
Unit – II	**LEARNING ALGORITHMS**	Periods	**9**
Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning			
Unit – III	**DEEP NETWORKS**	Periods	**9**
Deep Feed forward Networks, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms.			
Unit - IV	**REGULARIZATION AND OPTIMIZATION**	Periods	**9**
Parameter Norm Penalties - Norm Penalties as Constrained Optimization - Regularization and Under-Constrained Problems - Dataset Augmentation -Noise Robustness - Semi-Supervised Learning - Multitask Learning, Pure Optimization - Challenges in Neural Network Optimization.			
Unit – V	**CONVOLUTIONAL NETWORKS AND APPLICATIONS**	Periods	**9**
Convolutional Networks: Convolution Operation –Pooling – Functions - Random or Unsupervised Feature, Application: Large-Scale Deep Learning - Computer Vision - Speech Recognition - Natural Language Processing.			
		Total Periods	**45**

Text Books :	
1.	Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning, MIT Press, 2016.
2.	Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
References :	
1.	Simon Haykin, Neural Networks and Learning Machines, 3rd ed, Pearson Prentice Hall, 2009
2.	Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.
E-Resources :	
1.	http://www.deeplearningbook.org/
2.	https://www.microsoft.com/en-us/research/wp-content/uploads/2016/02/DeepLearning-NowPublishing-Vol7-SIG-039.pdf
3.	https://www.math.univ-toulouse.fr/~besse/Wikistat/pdf/st-m-hdstat-rnn-deep-learning.pdf
4.	http://faculty.neu.edu.cn/yury/AAI/Textbook/Deep%20Learning%20with%20Python.pdf
5.	http://deeplearning.net/tutorial/deeplearning.pdf
6.	http://dai.fmph.uniba.sk/courses/NN/haykin.neural-networks.3ed.2009.pdf

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai)Elayampalayam, Tiruchengode – 637 205		

Programme	**B.E./B.TECH.**	Programme Code		Regulation	**2019**
Department	**CSE, IT & CST**			Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CTV35	**Natural Language Processing**	3	0	0	3	40	60	100

Course Objective	The Main Objective of the course is to • Provide the student with knowledge of various levels of analysis involved in NLP. • Understand the applications of NLP. • Gain knowledge in automated Natural Language Generation and Machine Translation.	

	At the end of the course, the student should be able to,	Knowledge Level
Course Outcome	**CO1:** Extract information from text automatically using concepts and methods from natural language processing (NLP) including stemming, n-grams, POS tagging, and parsing.	K2
	CO2 : Develop speech-based applications that use speech analysis (phonetics, speech recognition, and synthesis).	K3
	CO3 : Analyze the syntax, semantics, and pragmatics of a statement written in a natural language.	K2
	CO4 : Apply machine learning algorithms to natural language processing.	K3
	CO5 : Evaluate the performance of NLP tools and systems.	K4

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
Programme Outcomes (POs)													PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	2	2	1									2	1
CO2	1	2	2	1						2			2	2
CO3	1	2	2	1						1			2	1
CO4	1	1	2	1									2	1
CO5	1	1	2	1									2	1

Course Assessment Methods Direct

Direct
1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations

Indirect
1.Course - end survey

Content of the syllabus			
Unit – I	OVERVIEW AND MORPHOLOGY	Periods	9
Introduction – Models -and Algorithms - -Regular Expressions Basic Regular Expression Patterns –Finite State Automata-Morphology -Inflectional Morphology - Derivational Morphology --Finite-State Morphological Parsing --Porter Stemmer.			
Unit - II	WORD LEVEL AND SYNTACTIC ANALYSIS	Periods	9
-N-grams Models of Syntax - Counting Words - Unsmoothed N-grams-Smoothing- Back off Deleted Interpolation – Entropy - English Word Classes - Tagsets for English-Part of Speech Tagging-Rule Based Part of Speech Tagging - Stochastic Part of Speech Tagging - Transformation-Based Tagging.			
Unit - III	CONTEXT FREE GRAMMARS	Periods	9
Context Free Grammars for English Syntax- Context- Free Rules and Trees --Sentence- Level Constructions–Agreement – Sub Categorization-Parsing – Top-down – Earley Parsing -feature Structures – Probabilistic Context-Free Grammars.			
Unit - IV	SEMANTIC ANALYSIS	Periods	9
Representing Meaning - Meaning Structure of Language - First Order Predicate Calculus- Representing Linguistically Relevant Concepts -Syntax- Driven Semantic Analysis - Semantic Attachments -Syntax- Driven Analyzer-- Robust Analysis - Lexemes and Their Senses - Internal Structure - Word Sense Disambiguation -Information Retrieval.			
Unit - V	LANGUAGE GENERATION AND DISCOURSE ANALYSIS	Periods	9
Discourse -Reference Resolution - Text Coherence - Discourse Structure – Coherence-Dialogand Conversational Agents - Dialog Acts – Interpretation - Conversational Agents-Language Generation – Architecture -Surface Realization- Discourse Planning .-Machine Translation -Transfer Metaphor–Interlingua – Statistical Approaches.			
		Total Periods	45

Text Books:

1.	Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", PrenticeHall, 2nd Edition, 2008.
2.	C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing",MIT Press. Cambridge, MA:,1999.

References:

1.	James Allen, Bejamin/cummingsx, "Natural Language Understanding", 2nd edition, 1995.

E-Resources:

1.	https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP.
2.	https://www.sas.com/en_us/insights/analytics/what-is-natural-language-processing-nlp.html
3.	https://towardsdatascience.com/your-guide-to-natural-language-processing-nlp-48ea2511f6e1
4.	https://github.com/oxford-cs-deepnlp-2017/lectures/blob/master/README.md
5.	https://www.analyticsvidhya.com/blog/2022/01/master-natural-language-processing-in-2022- with-best-resources/

Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV33	**SOFT COMPUTING**	3	0	0	3	40	60	100

Course Objective	The main objective of the course is to: • Study an overview of soft computing techniques • Understand the neural networks • Introduce the applications of soft computing

	At the end of the course, the student will be able to:	Knowledge Level
Course Outcome	**CO1 :** Demonstrate different types of artificial neural networks	K3
	CO2 : Understand the concept of fuzzy systems	K2
	CO3 : Summarize the various special networks	K2
	CO4 : Use genetic algorithms to develop the solutions	K3
	CO5 : Analyze the soft computing applications	K3
Pre-requisites	-

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												CO/PSO Mapping	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	1									2	2
CO 2	2	1											2	2
CO 3	2	1											2	2
CO 4	3	2	1	1									2	2
CO 5	3	2	1	1									2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus

Unit – I	Artificial Neural Networks	Periods	9

Fundamental Concept – Basic Model of ANN – Terminologies of ANN - Supervised Learning Neural Networks: Perception Networks - Adaptive Linear Neuron – Multiple Adaptive Linear Neurons – Back Propagation Network-Unsupervised Learning Neural Networks:Kohenenself-organizing Feature Maps-Learning vector Quantization.

Unit - II	Fuzzy Systems	Periods	9

Classical sets – Fuzzy sets - Classical relation – Fuzzy relations - Defuzzification – Fuzzy rule base and approximate reasoning: Fuzzy reasoning – Fuzzy Inference Systems - Fuzzy decision making – Fuzzy logic control systems.

Unit – III	Special Networks	Periods	9

Counter propagation Networks – Adaptive Resonance Theory Network – Simulated Annealing Network – Boltzmann Machine – Gaussian Machine – Cauchy Machine – Probabilistic Neural Net – Cascade Correlation Network.

Unit - IV	Genetic Algorithms	Periods	9

Introduction - Basic operators and terminologies in GA - Traditional Vs Genetic Algorithm - Simple GA – General Genetic Algorithm - Classification of Genetic Algorithm - Holland classifier systems – Genetic Programming.

Unit – V	Applications of Soft Computing	Periods	9

Image Fusion - Neural network classification - Traveling salesman problem using Genetic algorithm - Genetic algorithm based Internet searching technique – Soft Computing Based Hybrid Fuzzy Controllers – Soft Computing Based Rocket Engine Control.

		Total Periods	45

TEXT BOOKS :

1.	S.N.Sivanandam and S.N.Deepa, Principles of Soft Computing, Wiley India (P) Ltd, 2011.

REFERENCES:

1.	Timothy J.Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill, 2000.
2.	Davis E.Goldberg, Genetic Algorithms: Search, Optimization and Machine Learning, Addison Wesley, N.Y., 1989.
3.	Jang.J.S.R.Sun.C.T.andMizutami.E, Neuro fuzzy and Soft computing, Prentice Hall, New Jersey-2010.

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution , Affiliated to Anna University, Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV34	**BUSINESS INTELLIGENCE AND ITS APPLICATIONS**	3	0	0	3	40	60	100

Course Objective	The student should be able to, • Understand and critically apply the concepts and methods of business analytics • Identify, model and solve decision problems in different settings • Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity

Course Outcome	At the end of the course ,the student should be able to,	Knowledge Level
	CO1: Know about enterprise view of IT applications and identify the different types of digital data	K2
	CO2: Understand BI concepts and techniques to experiment ETL process	K2
	CO3: Compare and Contrast OLTP with OLAP systems and design dimensional model	K3
	CO4: Experiment an model of Dashboard Creation for Performance Management	K3
	CO5: Apply BI to mobile, cloud, ERP and social CRM systems	K3
Pre-requisites	Database Management System	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1											2	2
CO 2	2	1											2	2
CO 3	3	2	1	1									3	3
CO 4	3	2	1	1									3	3
CO 5	3	2	1	1									3	3

Course Assessment Methods

Direct
1. Continuous Assessment Test   I, II&III 2. Assignment 3. End-Semester examinations
Indirect
1. Course-end survey

Content of the syllabus			
Unit –I	**Business View of IT Applications**	Periods	**9**
Introduction to Business View of Information -Core Business Processes – Baldrige Business Excellence Framework – Purpose of using IT in Business – Characteristics of Internet-ready IT Applications – Enterprise Applications – Information users and their requirements.- Types of Digital Data: Introduction – Structured Data – Unstructured Data – Semi-Structured Data – Difference between semi-structured and structured data.			
Unit - II	**Business Intelligence and Data Integration**	Periods	**9**
Business Intelligence: Definition – Evolution – Need for BI – BI Value Chain – Business Analytics – BI Framework – BI Users – BI Applications – BI Roles and Responsibilities – Data Integration : Need for Data Warehouse – Definition of Data Warehouse – Data mart – Ralph Kimball's Approach vs. W.H.Inmon's Approach – Goals of Data Warehouse – ETL Process – Data Integration Technologies –Data Quality – Data Profiling.			
Unit –III	**OLTP, OLAP and Multidimensional Data Modeling**	Periods	**9**
OLTP – OLAP – OLAP Architectures – Data Models – Role of OLAP Tools in BI – OLAP Operations – Basics of Data Modeling – Types of Data Model – Data Modeling Techniques – Fact Table – Dimension Table – Dimensional Models – Dimensional Modeling Life Cycle – Designing the Dimensional Model.			
Unit - IV	**Performance Management and Enterprise Reporting**	Periods	**9**
Measures, Metrics, KPIs and Performance Management: Understanding Measures and Performance – Measurement System – Role of metrics – KPIs – Enterprise Reporting: Reporting Perspectives – Report Standardization and Presentation Practices – Enterprise Reporting Characteristics – Balanced Scorecard – Dashboards – Creating Dashboards – Scorecards vs. Dashboards – Analysis.			
Unit –V	**BI Applications**	Periods	**9**
Understanding Business Intelligence and Mobility– the need for business intelligence on the move – BI Mobility time line – Data Security Concerns for Mobile BI – Business Intelligence and Cloud Computing – Business Intelligence for ERP systems – Social CRM and Business Intelligence			
Text Books:			
1.	Prasad R.N. and Seema Acharya, "Fundamentals of Business Analytics", 2nd Edition, Wiley, 2016.		
References:			
1.	Ramesh Sharda, Dursun Delen, Efraim Turban, "Business Intelligence, Analytics, and DataScience: A Managerial Perspective", 4th Edition, Pearson Education, 2017.		
2.	David Loshin, "Business Intelligence: The Savvy Manager's Guide", 2nd Edition, Morgan Kaufmann , 2012.		
E-Resources:			
1.	https://www.coursera.org/learn/business-intelligence-tools		

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Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		-

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV35	**Digital Image Processing**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Learn digital image fundamentals. • Be exposed to simple image processing techniques. • Be familiar with image compression and segmentation techniques. • Learn Wavelets and image compression techniques • Learn to represent image in form of features	

Course Outcome	At the end of the course, the student should be able to,	KL
	CO1: Analyze general terminology of digital image processing	K3
	CO2: Examine various types of images, intensity transformations and spatial filtering and develop for image processing in frequency domain.	K2
	CO3: Evaluate the methodologies for image segmentation and restoration etc.	K3
	CO4: Implement image process and analysis and algorithms	K2
	CO5: Apply image processing algorithms in practical applications	K3

Pre-requisites	Linear signals, Fourier transforms, Probability theory

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2											2	
CO 2	1	1	1											2
CO 3		1	1		2	1								2
CO 4			1	1		1			2					
CO 5		1						1					2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**DIGITAL IMAGE FUNDAMENTALS**	Periods	**8**
Introduction – Origin – Steps in Digital Image Processing – Components – Elements of VisualPerception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models.			
Unit – II	**IMAGE ENHANCEMENT**	Periods	**10**
Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering – **Frequency Domain:** Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.			
Unit – III	**IMAGE RESTORATION AND SEGMENTATION**	Periods	**9**
Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering **Segmentation:** Detection of Discontinuities– Edge Linking and Boundary detection – Region based segmentation Morphological processing-erosion and dilation.			
Unit – IV	**WAVELETS AND IMAGE COMPRESSION**	Periods	**9**
Wavelets – Subband coding - Multiresolution expansions - **Compression:** Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.			
Unit – V	**IMAGE REPRESENTATION AND RECOGNITION**	Periods	**9**
Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.			
		Total Periods	**45**

Text Books:	
1	Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", Third Edition,Pearson Education, 2010.
2	Deitel and Deitel and Nieto, "Internet and World Wide Web - How to Program", Prentice Hall,5th Edition, 2011.
3	Herbert Schildt, "Java-The Complete Reference", Eighth Edition, Mc Graw Hill Professional, 2011.

References:	
1	Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.
2	Anil Jain K. "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd. 2011.
3	Willliam K Pratt, "Digital Image Processing", John Willey, 2002.
4	Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", First Edition, PHI Learning Pvt. Ltd., 2011.

E-Resources:	
1	http://eeweb.poly.edu/~onur/lectures/lectures.html.
2	https://www.caen.uiowa.edu/~dip/LECTURE/lecture.html

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Programme	**B.E. /B.TECH.**	Programme code		Regulation	**2019**
Department	**CSE, IT**		Semester		**-**

Course Code	Course name	Periods per week			Credit	Maximum Marks		
U19CSV36	**Knowledge Management**	L	T	P	C	CA	ESE	Total
		3	0	0	3	40	60	100

Course Objective	The student should be made to, • Study the basic concepts of knowledge management. • Learn the life cycle evolution of knowledge management. • Study the basic concepts of Expert Knowledge. • Be familiar with tools. • Learn the Knowledge Transfer and Sharing of Knowledge Management.

Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Implement knowledge management concepts, in all aspect.	K2
	CO2: Demonstrate the knowledge management life cycle.	K2
	CO3: Compute the fuzzy logic in designing expert system.	K3
	CO4: Analyze the knowledge management system using tools & testing techniques.	K2
	CO5: Infer the knowledge transfer & shearing in knowledge management application.	K3

Pre-requisites | -

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak												**CO/PSO Mapping**	
	Programme Outcomes (POs)												PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	**PSO 1**	**PSO 2**
CO 1	3	2	1						3		2		3	2
CO 2	3	3	2	1	1				2				3	1
CO 3	2	3	3		2						2		2	2
CO 4	3	3	2		3				2		2		3	3
CO 5	3	2	2						1	1	2		2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignments / Quiz / Seminar
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**KNOWLEDGE MANAGEMENT**	Periods	**9**

KM Myths – KM Life Cycle – Understanding Knowledge – Knowledge, intelligence –Experience – Common Sense – Cognition and KM – Types of Knowledge – Expert Knowledge – Human Thinking and Learning.

Unit - II	**KNOWLEDGE MANAGEMENT SYSTEM LIFE CYCLE**	Periods	**9**

Challenges in Building KM Systems – Conventional vs KM System Life Cycle (KMSLS) – Knowledge Creation and Knowledge Architecture – Nonaka's Model of Knowledge Creation and Transformation. Knowledge Architecture.

Unit – III	KNOWLEDGE CAPTURING	Periods	9
Evaluating the Expert – Developing a Relationship with Experts – Fuzzy Reasoning and the Quality of Knowledge – Knowledge Capturing Techniques, Brain Storming – Protocol Analysis – Consensus Decision Making – Repertory Grid- Concept Mapping – Blackboarding.			
Unit – IV	KNOWLEDGE CONVERSION AND TESTING	Periods	9
Modes of Knowledge Conversion – Codification Tools and Procedures – Knowledge Developer‟s Skill Sets – System Testing and Deployment – Knowledge Testing – Approaches to Logical Testing, User Acceptance Testing – KM System Deployment Issues – User Training – Post implementation.			
Unit – V	KNOWLEDGE TRANSFER AND SHARING	Periods	9
Transfer Methods – Role of the Internet – Knowledge Transfer in e-world – KM System Tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Decision Making Architecture – Data Management – Knowledge Management Protocols – Managing Knowledge Workers.			
		Total Periods	**45**

Textbooks:

1.	Elias. M. Award & Hassan M. Ghaziri "Knowledge Management" Pearson, Education 2003.
2.	Guus Schreiber, Hans Akkermans, Anjo Anjewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde and Bob Wielinga, "Knowledge Engineering and Management", Universities Press, 2001.

References:

1.	Holsapple, "Handbooks on Knowledge Management", International Handbooks on Information Systems, Vol 1 and 2, 2004
2.	Ronald maiser "Information and Communication Technologies for Knowledge Management" 3rd Edition,2007

E-Resources:

1.	Knowledge Management - Course (nptel.ac.in)
2.	www.cs.unibo.it/~gaspari/www/teaching/slides_KM2.pdf
3.	What is Knowledge Management? The 2022 Guide	Guru (getguru.com)

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Programme	**B.E. / B.Tech.**		Programme Code		Regulation	**2019**
Department	**CSE, IT & CST**				Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CSV41	**Embedded Systems**	3	0	0	3	40	60	100

Course Objective	The Main Objective of the course is to • Learn the architecture and programming of ARM processor. • Be familiar with the embedded computing platform design and analysis. • Learn the system design techniques and networks for embedded systems • Discuss the major components that constitute an embedded system. • Implement small programs to solve well-defined problems on an embedded platform.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Describe the architecture & programming of ARM processor.	K1
	CO2: Discuss different memory management schemes.	K2
	CO3: Analyze embedded core based design & real time OS	K3
	CO4: Use the system design techniques to develop software for embedded system	K4
	CO5: Formulate real time examples using embedded system	K2
Pre-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													**CO/PSO Mapping**		
COs	Programme Outcomes (POs)												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**	
CO 1	3	3	2		2								2	2	
CO 2	2	1	2		1								3	2	
CO 3	3	2	2		1								2	1	
CO 4	2	3	3		2								2	2	
CO 5	2	2	2		1								3	2	

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment / Quiz / Seminar
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit – I	**EMBEDDED COMPUTING**	Periods	**9**

Introduction to Embedded Systems –Structural units in embedded processor, selection of processor & memory management methods devices- Embedded system design process. Embedded processors – 8051

Microcontroller, ARM processor – Architecture, Instruction sets and programming.				
Unit - II	**MEMORY AND INPUT / OUTPUT MANAGEMENT**		Periods	**9**
Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupts handling.				
Unit – III	**PROCESSES AND OPERATING SYSTEMS**		Periods	**9**
Multiple tasks and processes – Context switching – Scheduling policies – Inter process communication mechanisms – Performance issues.				
Unit - IV	**EMBEDDED SOFTWARE**		Periods	**9**
Embedded Product Development Life Cycle- objectives, different phases of EDLC, Modeling of EDLC, issues in Hardware-software Co-design, Data Flow Graph, state machine model, Sequential Program Model, concurrent Model, object oriented Model.				
Unit – V	**EMBEDDED SYSTEM APPLICATION AND DEVELOPMENT**		Periods	**9**
Case Study of Washing Machine- Automotive Application- Smart card System Application-ATM machine - surveillance camera				
		Total Periods		**45**

Text Books:

1.	Wayne Wolf, "Computers as Components - Principles of Embedded Computing System Design", Third Edition "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012
2.	Michael J. Pont, "Embedded C", Pearson Education, 2007

REFERENCE BOOKS:

1.	Steve Heath, "Embedded System Design", Elsevier, 2005.
2.	Muhammed Ali Mazidi, Janice GillispieMazidi and Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second edition, 2008

E-Resource:

1.	https://www.digimat.in/nptel/courses/video/108102045/L01.html

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Programme	**B.E. / B.Tech.**		Programme Code		Regulation	**2019**
Department	**CSE,IT & CST**				Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CSV42	**Smart Sensor Technologies**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Select the right sensor for a given application. • Design basic circuit building blocks. • Simulate, synthesize, and layout a complete sensor or sensor system.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Analyze the sensors available in IoT based on application requirement and the Sensing methods	K2
	CO2: Analyze the sensors available in IoT based on application requirement and the Sensing methods	K3
	CO3: Interfacing different types of Sensors with MCU	K3
	CO4: Infer Wireless Sensing, RF Sensing and RF MEMS	K4
	CO5: Design a real-time application for landslide monitoring and hazard mitigation	K3
-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak														**CO/PSO Mapping**	
COs	Programme Outcomes (POs)													PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	2	2	2						3			2	2
CO 2	1	3	2	2						3			2	2
CO 3	1	3	2	2						2			2	2
CO 4	3	2	2	2						3			2	2
CO 5	2	3	2	2						2			2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignment/Seminar
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus

Unit – I	**BASICS OF SENSORS**	Periods	**9**

Introduction- Sensor Vs Transducer, Nature of Sensors, Sensor Output Characteristics, Sensing Technologies, Digital Output Sensors.

Unit – II	APPLICATION SPECIFIC SENSORS	Periods	9

Occupancy and motion detectors: ultrasonic – microwave – capacitive detectors- optical presence sensor, Light Detectors: Photo diodes – photo transistor – photo resistor- CCD and CMOS image sensors, Temperature Sensors: thermos-resistive sensors – thermoelectric contact sensor

Unit - III	SENSOR WITH MICROCONTROLLER	Periods	9

Introductions, Amplification and Signal Conditioning, Integrated Signal Conditioning, Digital Conversion, MCU Control, MCUs for Sensor Interface, Techniques and Systems Considerations, Sensor Integration

Unit – IV	WIRELESS SENSING	Periods	9

Wireless Data and Communications, Wireless Sensing Networks, Industrial Wireless Sensing Networks, RF Sensing, Telemetry, RF MEMS, Complete System Consideration.

Unit – V	SMART APPLICATIONS AND SYSTEM REQUIREMENTS	Periods	9

Automotive Applications, Industrial (Robotic) Applications, Consumer Applications, Future Sensor Plus Semiconductor Capabilities, Future System Requirements.

		Total Periods	45

Text Book:

1.	Frank, Randy, "Understanding smart sensors", Artech House integrated microsystems series, 3rd Edition, 2013.

References:

1.	Jacob Fraden, "Handbook of Modern Sensors: Physics, Designs, and Applications", 5th Edition, Springer, 2016
2.	VlasiosTsiatsis, Stamatis Karnouskos, Jan Holler, David Boyle, Catherine Mulligan, "Internet of Things: Technologies and Applications for a New Age of Intelligence", Academic Press, 16-Nov-2018.
3.	Henry Leung, Subhas Chandra Mukhopadhyay, "Intelligent Environmental Sensing", Springer, 22-Jan-2015.

E-Resources:

1.	https://www.techbriefs.com/component/content/article/tb/pub/features/articles/33212
2.	https://www.azosensors.com/article.aspx?ArticleID=1289
3.	https://360digitmg.com/iot-smart-sensors

Programme	**B.E./B.Tech.**		Programme Code		Regulation	**2019**
Department	**CSE, IT & CST**				Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CSV43	**Security in Computing**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand security design principles and secure programming techniques. • Understand the mathematics behind cryptography. • Know the standard algorithms used to provide confidentiality, integrity and authenticity. • Understand the security requirements in operating systems and databases.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Illustrate the various threats and design principles in security.	K2
	CO2: Discuss on various types of attacks and their characteristics	K3
	CO3: Apply symmetric encryption algorithms for providing security	K3
	CO4: Implement asymmetric encryption techniques.	K4
	CO5: Design a secure OS.	K3
-requisites	-	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO 1	1	2	2	2	3	2							2	2
CO 2	1	3	2	2	3	2							2	2
CO 3	2	2	2	2	2	2							2	2
CO 4	2	3	2	3	2	2							2	2
CO 5	2	2	2	3	2	2							2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations

Indirect

1.Course - end survey

Content of the syllabus

Unit – I	**SECURITY DESIGN PRINCIPLES**	Periods	**9**

Security Goals – Secure System Design – Understanding Threats – Designing-In Security – Convenience and Security – Security in Software Requirements – Security by Obscurity – Secure Design Principles – Defense in Depth – Diversity in Defense – Securing the Weakest Link – Fail-Safe Stance.

Unit – II	SECURE PROGRAMMING TECHNIQUES	Periods	9

Worms and Other Malware – Buffer Overflows – Client State Manipulation – SQL Injection – Password Security – Cross Domain Security in Web Applications – Attack Patterns – Preventing XSRF – Preventing XSSI - Preventing XSS.

Unit - III	SYMMETRIC CIPHERS & INTRODUCTION TO NUMBER THEORY	Periods	9

Overview - Classical Encryption Techniques – Block Ciphers and the Data Encryption Standard – Basic Concepts in Number Theory and Finite Fields – Advanced Encryption Standard – Block Cipher Operation – Fermat's and Euler's Theory – CRT – Discrete Logarithms.

Unit – IV	PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS	Periods	9

Public Key Cryptography and RSA – Diffie-Hellman Key Exchange – Elgamal Cryptographic System – Elliptic Curve Cryptography – Cryptographic Hash Functions – Message Authentication Code - Digital Signature - Certificates.

Unit - V	SECURITY APPLICATIONS	Periods	9

Security in Operating Systems - Security in the Design of OS – Rootkit- Open Web Application Security – Wireless Network Security – Introduction to Mobile Security.

	Total Periods	**45**

Text Books:

1.	Neil Daswani, Christoph Kern, and Anita Kesavan, Foundations of Security: What Every Programmer Needs to Know, First Edition, Apress, 2008.
2.	William Stallings, Cryptography and Network Security: Principles and Practices‖, 8th Edition, Pearson Education, 2023.

References:

1.	Charles P. Pfleeger, Shari Lawrence Pfleeger and Jonathan Margulies, Security in Computing, Fifth Edition, Pearson Education, 2015.
2.	AtulKahate, Cryptography and Network Security, Tata McGraw Hill, 2003.
3.	Reshetova, Ahmad-Reza Sadeghi, Mobile Platform Security, First Edition, Morgan and Claypool Publishers Series, 2014.

Resources:

1.	http://index-of.co.uk/Hacking-Coleccion/Foundations%20of%20Security%20- %20What %20 Every %20Programmer%20Needs%20to%20Know.pdf
2.	https://www.tutorialspoint.com/computer_security/index.htm
3.	https://www.javatpoint.com/cyber-security-tutorial
4.	https://www.brainkart.com/subject/Security-in-Computing_156/

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Programme	**B.TECH**		Programme Code	**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**			Semester			**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV41	**SOFTWARE DEFINED NETWORKS**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the concepts of software defined networks • Explore modern approaches like openflow, openstack • Learn the interface between networking devices and the software controlling them • Know about SDN in data centers. • Study about the various applications of SDN.

Course Outcome	At the end of the course, the student should be able to,	**Knowledge Level**
	CO1: Differentiate between traditional networks and software defined networks.	K2
	CO2: Understand advanced and emerging networking technologies.	K2
	CO3: Learn how to use SDN controllers to perform complex networking tasks.	K2
	CO4: Demonstrate the skills to do advanced networking research and programming.	K3
	CO5: Apply the knowledge on SDN and measures to solve real world problems	K3
Pre-requisites	Computer Networks	

CO / PO Mapping													**CO/PSO Mapping**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	-	-									-	2	2
CO 2	2	1	-									-	2	2
CO 3	2	1	-									-	2	2
CO 4	3	2	2									1	2	3
CO 5	3	3	2									1	2	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations.

Indirect
1. Course - end survey

Content of the syllabus

Unit – I	Introduction to SDN	Periods	9

Introduction to SDN: Basic packet switching terminology – The modern data center – Traditional switch architecture – Autonomous and dynamic forwarding table. Why SDN?: Evolution of switches and control planes – Cost-Data center innovation – Data center needs. The Genesis of SDN: The evolution of networking technology – Forerunners of SDN

Unit – II	SDN and OpenFlow	Periods	9

How SDN works: Fundamental characteristics of SDN – SDN operation – SDN devices – SDN controllers – Alternate SDN methods. The OpenFlow specification: OpenFlow overview – OpenFlow 1.0 and OpenFlow basics – OpenFlow 1.1 Additions – OpenFlow 1.2 Additions – OpenFlow 1.3 Additions – OpenFlow Limitations.

Unit – III	SDN Interfaces	Periods	9

SDN Interfaces: Alternative definitions of SDN: Potential drawbacks of open SDN – SDN via APIs – SDN via hypervisor based overlays – SDN via opening up the device – Network Functions virtualization – Alternatives overlap and ranking. SDN open source: Open source licensing issues – OpenFlow source code – Switch implementation – Controller implementations – Orchestration and Network virtualization – Simulation, Testing and Tools – OpenStack – Applying SDN open source

Unit – IV	SDN in Data Center	Periods	9

Data center definition – Data center demands – Tunneling technologies for the data center- Path technologies in the data center – SDN and shortest path complexity – Ethernet fabrics in the data center – SDN use cases in the data center – Open SDN versus Overlays in the data center – Real-world data center implementation.

Unit – V	SDN Environments and Applications	Periods	9

SDN in other environment: Wide area networks – Service provider and carrier networks – Campus networks – Hospitality networks – Mobile networks – In-Line network functions – Optical networks. SDN Applications: Reactive versus Proactive applications – A simple reactive Java application – Creating network virtualization tunnels – offloading flows in the data center – Access control for the campus – Traffic engineering for the service providers.

		Total Periods	45

Text Book:

1.	Paul Goransson and Chuck Black, "Software Defined Networks: A Comprehensive Approach",2nd Edition, Morgan Kaufmann, 2016.

References:

1.	Siamak Azodolmolky, "Software Defined Networking with OpenFlow", 2nd Edition, Packet Publishing, 2017.
2.	Thomas D. Nadeau, Ken Gray, "SDN: Software Defined Networks", 1st Edition, O'Reilly Media, 2013.

E-Resources:

1.	https://www.cs.tau.ac.il/~msagiv/courses/rsdn/SDN-TAU.pdf
2.	https://www.cse.wustl.edu/~jain/tutorials/ftp/sd_hs14.pdf
3.	https://networklessons.com/cisco/ccna-routing-switching-icnd2-200-105/introduction-to-sdn-software-defined-networking

<table>
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</table>

Programme	**B.E./B.TECH.**		Programme Code		Regulation	**2019**
Department	**CSE, IT & CST**				Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CTV41	**Fundamentals of Virtualization**	3	0	0	3	40	60	100

Course Objective	The main objective of this course is to: • Understand about Computing Virtualization tools, applications and techniques • Understand CPU virtualization, memory virtualization • How to configure VM CPU and memory options • Understand storage and network virtualization • Acquire knowledge about virtualization security • Learn about many case studies	
Course Outcome	The students who complete this course successfully are expected to:	Knowledge Level
	CO1:Able to define, distinguish Computing Virtualization tools, applications and techniques	K1
	CO2: Able to configure virtual machine CPU and memory options	K2
	CO3: Able to configure VM storage	K3
	CO4: Able to understand network options in Virtualization	K3
	CO5: Identify threats and able to secure virtualized environment	K3
Pre-requisites	-	

<table>
<tr><td colspan="13" align="center">CO / PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak</td><td colspan="2" align="center">CO/PSO Mapping</td></tr>
<tr><td colspan="13" align="center">Programme Outcomes (POs)</td><td colspan="2" align="center">PSOs</td></tr>
<tr><td>COs</td><td>PO 1</td><td>PO 2</td><td>PO 3</td><td>PO 4</td><td>PO 5</td><td>PO 6</td><td>PO 7</td><td>PO 8</td><td>PO 9</td><td>PO 10</td><td>PO 11</td><td>PO 12</td><td>PSO 1</td><td>PSO 2</td></tr>
<tr><td>CO1</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>3</td></tr>
<tr><td>CO2</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>CO3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>3</td></tr>
<tr><td>CO4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>CO5</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td>1</td><td></td><td></td><td></td><td>2</td><td>2</td><td>3</td><td>3</td></tr>
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Course Assessment Methods Direct

Direct

1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations

Indirect
1.Course - end survey

Content of the syllabus			
Unit – I	**Introduction**	Periods	**9**
Overview Of Virtualization -Basics of Virtualization - Virtualization Types – Desktop Virtualization, Storage Virtualization – System-level Operating Virtualization – Application Virtualization- Virtualization Advantages, Understanding Hypervisors, Understanding Virtual Machines, Assignment- Installing, windows, Linux on virtual machine.			
Unit – II	**Concepts in Creating Virtual Machines**	Periods	**9**
Creating a Virtual machine- Performing P2V Conversions, Loading your Environment, Building a new Virtual machine, Managing CPUs for a virtual machine-Understanding CPU Virtualization, Configuring VM CPU options, Tuning practices for VM CPUs, Managing Memory for a virtual Machine-Understanding memory virtualization, Configuring VM memory options, Tuning practices for VM memory			
Unit - III	**Storage Management in Virtual Machine**	Periods	**9**
Managing Storage for a virtual machine-Understanding storage virtualization, Configuring VM Storage , options, Tuning practices for VM storage, SCSI- Speaking SCSI- Using SCSI buses – Fiber Channel – Fiber Channel Cables – Fiber Channel Hardware Devices – iSCSI Architecture – Securing iSCSI, Server virtualization concepts, Introduction to server virtualization, Types of server virtualization technologies, Limitations of server virtualization, Managing Networking for a virtual machine- understanding network virtualization, Configuring VM network options, Tuning practices for Virtual networks.			
Unit – IV	**Network Device Virtualization s**	Periods	**9**
Theory Network Device Virtualization - VLANs , VRF Instances- VFIs -Virtual Firewall Contexts Network Device Virtualization, Fundamentals of Virtualization security-Virtualization architecture, Threats to a virtualized environment.			
Unit – V	**Security Virtualization**	Periods	**9**
How security must adapt to virtualization, Securing hypervisors-Hypervisor configuration and security, Designing virtual networks for security-comparing virtual and physical networks, Virtual network security considerations, Configuring virtual switches for security			
Total Periods		**45**	

Text Books	
1.	Virtualization Security: Protecting Virtualized Environments, Dave shackleford, sybex publications,2013
2.	Matthew Portnoy, Virtualization Essentials, WILEY INDIA, 2nd Edition, 2016

References	
1.	William von Hagen, Professional Xen Virtualization, Wrox Publications, January, 2008
2.	David Marshall, Wade A. Reynolds, Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center, Auerbach Publications, 2006
3.	NPTEL Course Notes

E-Resources	
1.	https://www.youtube.com/watch?v=ZogZwbyPO_4
2.	https://www.oreilly.com/library/view/vmware-vsphere virtualization/9780133442090/Lesson_5_2.html
3.	https://www.redhat.com/en/topics/virtualization

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV42	**INFORMATION STORAGE AND MANAGEMENT**	3	0	0	3	40	60	100

Course Objective	The student should be made • To understand the basic components of Storage System Environment. • To examine emerging technologies including IP-SAN. • To describe the different backup and recovery topologies and their role in providing disaster recovery and business continuity capabilities.

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Understand the storage system architecture and RAID techniques.	K2
	CO2: Understand storage components and its access.	K2
	CO3: Infer the different backup and recovery	K2
	CO4: Demonstrate information and storage networking security	K3
	CO5: Identify parameters for managing and monitoring storage infrastructure	K2

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1											2	2
CO 2	2	1											2	2
CO 3	2	1											2	2
CO 4	3	2	1	1									2	2
CO 5	2	1											2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	INTRODUCTION TO STORAGE SYSTEM	Periods	9
Introduction to evolution of storage architecture - key data center elements - virtualization, and cloud computing – Host (or compute), connectivity, storage. RAID implementations, techniques and levels along with the impact of RAID on application performance- Components of intelligent storage systems- Front end - Cache - Back end - Physical disk.			
Unit - II	STORAGE NETWORKING TECHNOLOGIES	Periods	9
Fibre channel SAN components, connectivity options - FC protocol stack - FC addressing operations - Zoning - SAN-based virtualization - iSCSI and FCIP protocols for storage access over IP network, Converged protocol FCoE and its components			
Unit – III	BACKUP, ARCHIEVE AND REPLICATION	Periods	9
Business continuity terminologies - BC planning life cycle - Failure analysis - Business impact analysis - BC Technology solutions- Backup and recovery – methods, targets and topologies, Data Deduplication for backup - backup in virtualized environment - Data archive - Local replication in classic virtual environments, Remote replication and migration in a virtualized environments.			
Unit - IV	SECURING STORAGE INFRASTRUCTURE	Periods	9
Information security Framework – Risk Triad – Security Implementations in Storage Networking: FC SAN – NAS – IP SAN – Securing storage infrastructure in Virtualized and Cloud environments.			
Unit – V	MANAGING STORAGE INFRASTRUCTURE	Periods	9
Monitoring storage infrastructure – Storage Infrastructure Management Activities –Storage infrastructure management challenges – Developing Idea solutions - Information lifecycle management - Storage tiering			
		Total Periods	45
Text Book:			
1.	EMC Education Services, "Information Storage and Management: Storing Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments", 2nd Edition, Wiley, 2015.		
References:			
1.	Anthony T Velte, "Cloud Computing: A practical Approach", 1st Edition, Tata McGraw-Hill, 2009.		
2.	Mark Lippitt and Erik Smith, "Networked Storage Concepts and Protocols Tech book", V2.3 Edition, EMC Tech books, 2014.		
3.	Soren Lauesen , "Software Requirements: Styles & Techniques", First edition, Addison Wesley Professional publications, 2002		
E-Resources:			
1.	https://vdocument.in/cccloud-computing-a-practical-approach.html?page=46		
2.	https://www.slideshare.net/SudarshanDhondale/storage-area-networks-unit-1-notes		

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</table>

Programme	**B.E./B.TECH.**	Programme Code		Regulation	**2019**
Department	**CSE, IT & CST**			Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CTV43	**Big Data Tools and Techniques**	3	0	0	3	40	60	100

Course Objective	The Main Objective of the course is to • Gain knowledge about the various tools and techniques used in big data analytics • Learn the fundamentals of Hadoop and the related technologies • Understand the basics of development of applications using MapReduce, HDFS,YARN • Learn the basics of Pig, Hive and Sqoop • Learn the basics of Apache Spark, Flink and understand the importance of NoSQL databases

Course Outcome	At the end of the course, the student should be able to,	Knowledge level
	CO1: Use the various tools and techniques in big data analytics	K1
	CO2: Apply Hadoop and related technologies to big data analytics	K3
	CO3: Apply MapReduce, HDFS and YARN develop big data applications	K3
	CO4: Develop applications using Pig, Hive and Sqoop	K3
	CO5: Apply Apache Spark and Flink to applications and understand the importance of NoSQL databases	K3

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO Mapping	
Programme Outcomes (POs)													PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	3	3	2									1	2
CO2	2	2	2	3									2	2
CO3	2	2	3	2									3	2
CO4	2	3	2	3									2	3
CO5	2	3	2	3									3	3

Course Assessment Methods Direct

Direct

1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations

Indirect

1.Course - end survey

Content of the syllabus			
Unit – I	**OVERVIEW OF BIG DATA ANALYTICS**	Periods	**9**
Introduction to data analytics and big data, Big data mining, Technical elements of the Big Data platform, Analytics Toolkit, Components of the analytics toolkit. Introduction to Hadoop, Fundamentals of Hadoop, Hadoop Ecosystem, The core modules of Hadoop, MapReduce,.
Unit – II	**INTRODUCTION TO HADOOP YARN**	Periods	**9**
Analyzing data with Unix tools and Hadoop, Scaling Out – Data Flow, Combiner Functions, Hadoop Streaming, HDFS, Hadoop file systems, Java Interface to Hadoop, YARN, Job Scheduling, Hadoop I/O, Data Integrity, Compression, Serialization, File based Data Structures, Developing a MapReduce Application
Unit – III	**INTRODUCTION TO TOOLS**	Periods	**9**
Installing and running pig, Basics of Pig, Introduction to Hive, Installing and running Hive, Introduction to HiveQL, Introduction to Zookeeper, Installing and running Zookeeper, TheZookeeper Service.
Unit – IV	**BIG DATA DATABASE TOOLS**	Periods	**9**
Introducing Oozie, Apache Spark, Limitations of Hadoop and overcoming the limitations, Core components and architecture of Spark, Introduction to Apache Flink, Batch analytics using Flink, Big Data Mining with NoSQL, Why NoSQL?, NoSQL databases, Introduction to MongoDB
Unit – V	**ENTERPRISE DATA SCIENCE OVERVIEW**	Periods	**9**
Data Science Solutions in the enterprise, Enterprise data science – Machine Learning and AI, Enterprise Infrastructure solutions, Visualizing Big Data, Using Python and R for visualization, Big Data Visualization Tools..

	Total Periods	**45**

Text Books:

1	Nataraj Dasgupta, Practical Big Data Analytics, Packt, 2018.
2	Tom White, Hadoop:The Definitive Guide,3rd Edition, O"Reilly, 2012
3	Sridhar Alla,Big Data Analytics with Hadoop 3,Packt, 2018.

References:

1.	G. Sudha Sadasivam, R. Thirumahal, BIG DATA ANALYTICS, Oxford Press, 2020
2	DT Editorial Services, Big Data: Black Book,2016.

E-Resources:

1	https://www.researchgate.net/publication/339363557_Big_Data_Tools_and_Techniques_A_roadmap_for_Predictive_Analytics
2	https://nptel.ac.in/courses/106104189
3	https://www.simplilearn.com/what-is-big-data-analytics-article

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Programme	**B.TECH**		Programme Code	**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**				Semester		-

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV43	**Cloud Computing**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Introduce the broad perceptive of cloud architecture and model • Understand the concept of Virtualization and features of cloud simulator • Familiar with the lead players in cloud. • Apply different cloud programming model as per need	
Course Outcome	At the end of the course, the student should be able to,	KL
	CO1: Enumerate the broad perspective of cloud architecture & model.	K1
	CO2: Analyze the tools and mechanisms for implementing virtualization.	K2
	CO3: Design the cloud storage architecture along with resource management	K3
	CO4: Choose the appropriate programming models and apply	K3
	CO5: Identify the core issues of cloud computing	K3

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	2	1		1								2	2
CO 2	3	2	2		2								1	1
CO 3	3	2	2		2								2	2
CO 4	3	2	2		2								2	2
CO 5	3	2	2										2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III   2. Assignment   3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit- I	**CLOUD COMPUTING BASICS**	**Periods**	**9**
Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:-Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS)–Public vs Private Cloud–Cloud Solutions-Cloud ecosystem–Service management–Computing on demand.			
Unit - II	**VIRTUALIZATION**	**Periods**	**9**
Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation.			
Unit – III	**CLOUD ARCHITECTURE**	**Periods**	**9**
Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.			
Unit - IV	**SECURITY IN CLOUD**	**Periods**	**9**
Security Overview–Cloud Security Challenges and Risks–Software-as-a-Service Security–Security Governance– Risk Management–Security Monitoring–Security Architecture Design–Data Security–Application Security– Virtual Machine Security-Identity Management and Access Control–Autonomic Security.			
Unit – V	**APPLICATIONS OF CLOUD**	**Periods**	**9**
Scientific Applications – Healthcare –Biology – Geo science – Business and Consumer Applications - Cloud Computing Collaboration - Multimedia – Storage – Corporate – Communication.			
		Total Periods	**45**

TEXT BOOK:	
1	Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.

REFERENCES:	
1	DAVID E.Y. SARNA, "Implementing and Developing Cloud Computing Applications", CRC Press, 2010.
2	Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India, 2010.
3	Rajkumar Buyya, Christian Vecchiola, S.Tamarai Selvi, „Mastering Cloud Computing", TMGH, 2013.
4	Michael Miller, Cloud Computing, Que Publishing,2008

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Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**ELECTIVE**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV51	**Design Thinking**	3	0	0	3	40	60	100

Course Objective	The student should be able to, • Knowledge in Design Thinking and Brief explanation of activity systems • Effective Learning in Mind Mapping with an Team Building activity • Analyzing an Brain storming activity with redefining sessions • Learn about Engaging Phase and bring the ideas into Reality • May consider the real time feedback at evolve phases.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Apply the basic concepts of design thinking.	K3
	CO2: Make use of Mind Mapping Process for Designing any systems.	K3
	CO3: Develop many creative ideas through structured brainstorming sessions.	K3
	CO4:.Develop rapid prototypes to bring the ideas into reality	K3
	CO5:.Implement the Evolve Phase considering the real time feedback	K3
Pre-requisites	Problem Solving and Programming	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	1	2				2	2		3	3	2
CO 2	3	2	1	1	2				2	2		3	3	2
CO 3	3	2	1	1					2	2		3	3	2
CO 4	3	2	1	1					2	2		3	3	2
CO 5	3	2	1	1					2	2		3	3	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I,II&III   2. Assignment   3. End-Semester examinations
Indirect
1. Course- end survey

Content of the syllabus			
Unit– I	**Introduction and Explore Phase**	Periods	**9**
Introduction – Need for design thinking – Design and Business –The Design Process – Design Brief – Visualization – Four Questions, Ten Tools – Explore – STEEP Analysis – Strategic Priorities – Activity System – Stakeholder Mapping – Opportunity Framing			
Unit- II	**Empathize Phase**	Periods	**9**
Visualization –Journey Mapping –Value Chain Analysis –Mind Mapping–Empathize– Methods and tools -Observations–Deep user Interview- Need Finding–User Personas –Team building activity			
Unit–III	**Experiment Phase**	Periods	**9**
Brainstorming–reasons for brainstorming- Zen of brainstorming –Brainstorming Activity-Concept Development–Experiment–Ideation–different ways of ideation-Prototyping –Idea Refinement.			
Unit- IV	**Engage Phase**	Periods	**9**
Assumption Testing – Need for assumption testing- steps - Rapid Prototyping – forms of prototyping-Engage – Storyboarding.-purpose and case study			
Unit– V	**Evolve Phase**	Periods	**9**
Customer Co-Creation Learning Launch– Leading Growth and Innovation– Evolve–Concept Synthesis – Strategic Requirements – Evolved Activity Systems – Quick Wins.			
		Total Periods	**45**

Text Book:

1.	Jeanne Liedtka and Tim Ogilvie, "Designing for Growth: A Design Thinking Tool Kit for Managers", Columbia University Press, 2011.

References:

1.	Lee Chong Hwa "Design Thinking The Guidebook", Design Thinking Master Trainers of Bhutan, 2017.
2.	Jeanne Liedtka, Tim Ogilvie, and Rachel Brozenske, "The Designing for Growth Field Book: A Step-by-Step Project Guide", Columbia University Press, 2014
3.	Tim Brown, "Change by Design: How design thinking transforms organizations and inspires innovation", HarperCollins Publishers, 2009.

E-Resources:

1.	https://www.interaction-design.org/literature/article/design-thinking-a-quick-overview
2.	https://nptel.ac.in/courses/110/106/110106124/

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Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV52	**Agile Methodologies**	3	0	0	3	40	60	100

Course Objective	The student should be made , • To provide students with a basic knowledge on Agile • To provide a good use of managing the project • To do test with Scrum tools • To understand the benefit of implementing different methodologies	

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Understand the core values and principles of Agile	K2
	CO2: Use of Scrum frameworks on Project management and self Organization	K3
	CO3: Test the projects using different tools used in scrum	K3
	CO4: Model software design and architecture with XP practices like pair programming	K3
	CO5: Make use of Lean thinking and Kanban's practices with Agile Coach helps in deliver good software	K3

Pre-requisites	Software Engineering

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong- 2 – Medium- 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO7**	**PO8**	**PO 9**	**PO 10**	**PO 11**	**PO12**	**PSO1**	**PSO 2**
CO 1	2	1	-		-		-		-		-		2	2
CO 2	3	2	2		2		-		1		-		3	3
CO 3	3	2	2		2		1		1		-		3	3
CO 4	3	2	2		2		1		1		-		3	3
CO 5	3	2	2		2		1		1		1		3	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus				
Unit – I	**UNDERSTANDING AGILE VALUES AND PRINCIPLES**		Periods	**9**
Preface to Agile, Understanding Agile Values – No Silver Bullet – Agile to Rescue – A fractured perspective – Agile Manifesto – Understanding the Elephant – Starting with New Methodology, Agile Principles –The principles – Delivering the project – Communicating and working together – Project Execution – Constantly improving the project and the team – Agile Project				
Unit – II	**SCRUM AND SELF-ORGANISING TEAMS**		Periods	**9**
Understanding Scrum, Rules of Scrum , Scrum Team owns the project, Daily Scrum , Sprint, Planning and Retrospective –Iterative or Incremental – Makes or Breaks of Sprint by product owner – Visibility and Value - Plan and run effective Scrum Sprint.				
Unit – III	**SCRUM PLANNING AND COLLECTIVE COMMITMENT**		Periods	**9**
User Stories – Make software useful – Build features –Condition of satisfaction, Story point and velocity – Burn-down chart – Planning and Running a Sprint –Generally Accepted Scrum Practices, Scrum Value Revisited				
Unit – IV	**XP, SIMPLICITY AND INCREMENTAL DESIGN**		Periods	**9**
Primary Practices of XP, An effective Mindsets starts with XP, Understanding XP principles, Code an Design, Make Code and Design decisions at the last responsible moment , Incremental Design and the Holistic XP practices				
Unit – V	**LEAN, KANBAN AND AGILE COACH**		Periods	**9**
Lean thinking – Lean values – Commitment, Option thinking and Set based development, Creating Heroes and Magical thinking – Eliminate Waste –Gain a deeper understanding - Deliver as fast as possible, Principles of Kanban, Improving process with Kanban, Emergent behavior with Kanban, Overview of Agile coach- Principles of Coaching.				
			Total Periods	**45**

Text Book:

1.	Andrew Stellman and Jennifer Greene, "Learning Agile: Understanding Scrum, XP, Lean and Kanban", 1st Edition, O'Reilly Media, 2014

References:

1.	Eric Brechner, "Agile Project Management with Kanban", Microsoft Press, 1st Edition, 2015
2.	Ken Schwaber,"Agile Project Management with Scrum", 1st Edition,Microsoft Press,2004

E-Resources:

1.	https://www.agileleanhouse.com/lib/lib/People/KenSchwaber/AgileProjectManagementWith Scrum/www.itworkss.com.pdf
2.	https://www.scrum.org/
3.	https://www.atlassian.com/agile

Programme	**B.TECH**	Programme Code		**104**	Regulation		**2019**
Department	**INFORMATION TECHNOLOGY**			Semester			**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV53	**Software Project Management**	**3**	**0**	**0**	**3**	**40**	**60**	**100**

Course Objective	The student should be made to, • Learn project management activities • Learn cost benefit analysis for project evaluation • Learn risk management techniques • Organize the people and complete the task by team basis	
	On Completion of the course, the student should be able to,	**Knowledge Level**
Course Outcome	**CO1:** Learn the basis of project management and understand some problems and concerns of software project managers.	K2
	CO2: Describe the project portfolio management and carry out an evaluation and selection of projects against strategic, technical and economic criteria.	K3
	CO3: Identify the factors putting a project at risk and categorize and prioritize actions for risk elimination or containment.	K3
	CO4: Monitor the progress of projects, visualize and assess the state of a project, revise targets to correct or counteract drift.	K3
	CO5: Comprehend the best methods for organizational behavior and management.	K3
Pre-requisites	**-**	

CO / PO Mapping														**CO/PSO Mapping**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak															
COs	Programme Outcomes (POs)													PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO 1	2	1	1	-	-	-	-	-	-	-	-	-	3	2	
CO 2	3	2	1	-	-	-	-	-	-	-	-	-	3	2	
CO 3	3	2	1	-	-	-	-	-	-	-	-	-	3	2	
CO 4	3	2	1	-	-	-	-	-	-	-	-	-	3	2	
CO 5	3	3	2	-	-	-	-	-	-	-	-	-	3	2	

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment/Quiz/Seminar
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**Introduction To Software Project Management**	**Periods**	**9**
Project Definition – Contract Management – Activities covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning.			
Unit – II	**Project Evaluation and Estimation**	**Periods**	**9**
Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation. Basis for software estimating – Software effort estimation techniques – Estimating by analogy – Albercht function point analysis – A Procedural code-oriented approach - COCOMO: a parametric Model			
Unit – III	**Activity Planning and Risk Management**	**Periods**	**9**
Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks. Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control- Evaluation Risk to the schedule.			
Unit – IV	**Monitoring and Control**	**Periods**	**9**
Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target. Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.			
Unit – V	**Managing People and Organizing Teams**	**Periods**	**9**
Introduction – Understanding Behavior – Organizational Behavior: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldham – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies.			
		Total Periods	**45**
Text Book:			
1.	Bob Hughes, Mike Cotterell, Rajib Mall, Software Project Management, Sixth Edition, McGraw Hill, 2017		
Reference Books:			
1	Greg Horine-Project Management Absolute Beginner's Guide, 3/E-Que Publishing ,2012		
2	Richard H. Thayer, "Software Engineering Project Management", Second Edition, John Wiley & Sons, 2001		
E-Resources:			
1.	http://bls.buu.ac.th/~se888321/2556/00BaseInfo/software-project-management-bob-hughes-and-mike-cotterell-tata-mcgraw-hill-edition.pdf		
2.	https://fit.instructure.com/courses/523154/files/38788449/download?verifier=e0fjj1346csQB7J4QCmvsQxb17Rx21YPNNufpZfk&wrap=1		

Programme	B.TECH	Programme Code	104	Regulation	2019

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
(Autonomous Institution, Affiliated to Anna University ,Chennai)
Elayampalayam, Tiruchengode – 637 205

Programme	B.TECH	Programme Code	104	Regulation	2019
Department	INFORMATION TECHNOLOGY			Semester	-

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV54	**Block Chain Technology**	3	0	0	3	40	60	100

Course Objective	The student should be made , • To acquire the basic knowledge and understandings of Bitcoin • To understand the mechanisms of Bitcoin. • To understand the current trends of Block chain • To familiarize about the networking basics behind bitcoin • To illustrate mining concepts of bit coin	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Comprehend the foundations of Blockchain	K2
	CO2: Discover the secure and efficient transactions with Bitcoin	K2
	CO3: Confer the core concepts of Key, address and transaction	K2
	CO4: Expertise about the networking concepts deployed in Bitcoin	K2
	CO5: Experiment with Bitcoin mining	K3
Pre-requisites	Cryptography and Network Security	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	1											2	3
CO 2	2	1											2	3
CO 3	2	1											2	3
CO 4	2	1											2	3
CO 5	3	2	1										3	3

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III   2. Assignment   3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**Block Chain**	Periods	**9**
Blockchain - Features and challenges - Decentralization - Tamper-resistant – Transparency - Security - Smart contracts - blockchain implementation: Bitcoin – Wallets - Hashing - Mining – Consensus – Blockchain Ecosystem.			
Unit - II	**Bitcoin**	Periods	**8**
Introduction to Bitcoin - History – Uses - Sending and receiving bitcoins – Bitcoin Working - Bitcoin Transactions - Transaction Forms - Constructing a Transaction - Bitcoin Mining - Mining transactions in blocks - Spending the transaction			
Unit – III	**Key, Address and Transaction**	Periods	**9**
Key, Address: Public key cryptography and crypto-currency - Private and Public – Bitcoin Addresses - Implementing Keys and Addresses in Python/Java. **Transactions**: Introduction - Transaction Lifecycle – Structure – Outputs and Inputs – Chaining – Script Language – Standard Transaction.			
Unit - IV	**Network**	Periods	**9**
Peer-to-Peer Network Architecture - Nodes Types and Roles - Extended Bitcoin Network - Network Discovery - Full Nodes – Inventory - Simplified Payment Verification Nodes Bloom Filters and Inventory Updates - Transaction Pools - Alert Messages.			
Unit – V	**Mining**	Periods	**10**
Mining: Introduction - Bitcoin Economics and Currency Creation - Decentralized Consensus - Independent Verification of Transactions - Mining Nodes - Aggregating Transactions into Blocks - Constructing the Block Header - Mining the Block - Validating a New Block - Assembling and Selecting Chains of Blocks - Hashing Race - Consensus Attacks			
		Total Periods	**45**

Text Books:	
1.	Nascimento S, Pólvora A., Anderberg A., Andonova E., Bellia M., Calès L., Inamorato dos Santos A., Kounelis I., Nai Fovino I., Petracco Giudici M., Papanagiotou E., Sobolewski M., Rossetti F., Spirito L., "Blockchain Now And Tomorrow: Assessing Multidimensional Impacts of Distributed Ledger Technologies"European Union, 2019
2.	Andreas M Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O"Reilly Media,2018

References:	
1.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, "Bitcoin and cryptocurrency technologies: a comprehensive introduction", Princeton University Press, 2016.
2.	Imran Bashir, "Mastering Blockchain Distributed ledgers, decentralization and smart contracts Explained", 2 Edition, Packt Publishing, 2018.

E-Resources:	
1.	https://www.coursera.org/learn/blockchain-basics
2.	https://www.tutorialspoint.com/blockchain/index.html
3.	https://www.javatpoint.com/blockchain-tutorial

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	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN						
	(Autonomous Institution, Affiliated to Anna University ,Chennai)						
	Elayampalayam, Tiruchengode – 637 205						

Programme	**B.TECH**	Programme Code			**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester		**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV55	**Total Quality Management**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Understand the concept of the quality • Study principles and philosophies of quality management • Understand the different quality systems. • Learn the tools and techniques for management • Learn the quality system and implementation	
Course Outcome	On Completion of the course, the student should be able to,	**Knowledge Level**
	CO1: Learn the TQM framework and quality statements	K2
	CO2: Understand the philosophy and principles of Total Quality Management(TQM)	K2
	CO3: Interpret Statistical Process Control And Process Capability	K3
	CO4: Discover the tools and techniques to enhance Management process	K3
	CO5: Distinguish Quality systems and Implementation	K3
Pre-requisites	**-**	

CO / PO Mapping													**CO/PSO Mapping**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	-	-	-	-	-	-	-	-	-	-	3	2
CO 2	2	1	-	-	-	-	-	-	-	-	-	-	3	2
CO 3	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO 4	3	2	1	-	-	-	-	-	-	-	-	-	3	2
CO 5	3	2	1	-	-	-	-	-	-	-	-	-	3	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment/Quiz/Seminar
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**Introduction to Quality Management**	Periods	9
Definitions – TQM framework, benefits, awareness and obstacles. Quality – vision, mission and policy statements. Customer Focus – customer perception of quality, Translating needs into requirements, customer retention. Dimensions of product and service quality			
Unit – II	**Principles and Philosophies of Quality Management**	Periods	9
Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi techniques – introduction, loss function, parameter and tolerance design, signal to noise ratio. Concepts of Quality circle, Japanese 5S principles			
Unit – III	**Statistical Process Control and Process Capability**	Periods	9
Meaning and significance of statistical process control (SPC) – construction of control charts for variables and attributed. Process capability – meaning, significance and measurement – Six sigma concepts of process capability. Reliability concepts – definitions, reliability in series and parallel, product life characteristics curve. Total productive maintenance (TMP)			
Unit – IV	**Tools and Techniques for Quality Management**	Periods	9
Quality functions development (QFD) – Benefits, Voice of customer, information organization,House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) – requirements of reliability, failure rate, FMEA stages, design, process and documentation. Seven old (statistical) tools. Seven new management tools.			
Unit – V	**Quality Systems Organizing and Implementation**	Periods	9
Introduction to IS/ISO 9004:2000 – quality management systems – guidelines for performance improvements. Quality Audits. TQM culture, Leadership – quality council, employee involvement, motivation, empowerment, recognition and reward, Business process re-engineering (BPR) – principles, applications, reengineering process, benefits and limitations.			
		Total Periods	45

Text Books:

1.	Dale H. Besterfiled, et at., "Total Quality Management", Fifth Edition, Pearson 2019
2.	James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, South- Western (Thomson Learning), 2011.

Reference Books:

1.	Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, 3rdEdition, 2003.
2.	Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd.,2006.
3.	Janakiraman, B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

E Resources:

1.	http://www.uop.edu.pk/ocontents/Total%20Quality%20Management%20by%20Dale%20H.%20Besterfield,%20Carol%20BesterfieldMichna,%20Glen%20H.%20Besterfield,%20Mary%20BesterfieldSacre,%20Hemant%20Urdhwareshe,%20Rashmi%20Urdhwarshe%20(zlib.org).pdf
2.	https://books.google.co.in/books?id=n67M3XJB91IC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205				

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester		**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV56	**BUILDING ENTERPRISE APPLICATION**	3	0	0	3	40	60	100

Course Objective	• The student should be made to, • Introduces the concepts, architecture, different design modeling techniques of Enterprise applications and different issues related to their implementation • Understand the importance of application framework and designing other application components. • Introduce the different testing techniques for Enterprise application and methodologies used to roll out these applications.

Course Outcome	At the end of the course, the student should be able to,	KL
	CO1: Identify challenges in building an enterprise applications and build a model	K2
	CO2: understand a logical ,technical and data architecture of an application	K2
	CO3: understand application framework components and perform code review and analysis	K2
	CO4: describe various testing methods and rolling out an enterprise applications	K2
	CO5: apply different framework components to design enterprise applications	K3

Pre-requisites	Object Oriented Programming

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	1											2	2
CO 2	2	1											2	2
CO 3	2	1											2	2
CO 4	2	1											2	2
CO 5	3	2	1										2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III   2. Assignment   3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION**	Periods	**9**
Introduction to enterprise applications - Software engineering methodologies - Life cycle of raising an enterprise application - Key determinants of successful enterprise applications - Measuring the success of enterprise applications. Inception of enterprise applications: Enterprise analysis- business modeling-requirements elicitation and analysis-requirements validation- planning and estimation.		
Unit - II	**ARCHITECTURE AND DESIGNING**	Periods	**9**
Architecture, view and viewpoints-Enterprise application architecture perspective - Logical architecture - Technical architecture and Design- - Data architecture - Infrastructure architecture and design-infrastructure architecture and building blocks –Networking, internetworking and Communication Protocol – IT hardware and software – Middleware – Policies for infrastructure management – Deployment Strategy - Documentation: system architecture documentation - design documentation		
Unit – III	**CONSTRUCTING ENTERPRISE APPLICATION**	Periods	**9**
Construction readiness - code review – objective – Process - static code analysis – Coding style – Logical bugs – Security vulnerabilities – Code quality -build and testing-build process – unit testing - Dynamic code analysis – Code profiling – Code coverage		
Unit - IV	**TESTING AND ROLLING OUT ENTERPRISE APPLICATION**	Periods	**9**
Testing enterprise applications – enterprise application environments - integration testing - system testing – Performance, Penetration, Usability, Globalization, Interface Testing - user acceptance testing - rolling out enterprise application		
Unit – V	**APPLICATION IMPLEMENTATION**	Periods	**9**
Infrastructure services Layer Framework components – Presentation Layer Framework components – Business Layer Framework components – Data Access Layer Framework components		
		Total Periods	**45**

Text Book:

1.	AnubhavPradhan, Satheesha B. Nanjappa, Senthil K. Nallasamy, VeerakumarEsakimuthu, "Raising Enterprise Applications", 1st Edition, Wiley India Pvt. Ltd, 2010.

References:

1.	Brian Berenbach, Daniel J. Paulish, JuergenKazmeier, Arnold Rudorfer, "Software Systems Requirements and Engineering: In Practice", 1st Edition, McGraw-Hill Education, 2009.
2.	SrinivasanDesikan, Gopalaswamy Ramesh, "Software Testing Principles and Practices ", 1st Edition, Pearson Education, 2006.
3.	Soren Lauesen , "Software Requirements: Styles & Techniques", First edition, Addison Wesley Professional publications, 2002

E-Resources:

1.	https://slideplayer.com/slide/15865992/
2.	https://slideplayer.com/slide/14417244/

Programme	**B.TECH**	Programme Code	**104**		Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV57	**INTERNET MARKETING AND E-COMMERCE**	3	0	0	3	40	60	100

Course Objective	The main objective of the course is to: • Recognize how information technologies (IT) influence businesses and how they provide competitive advantages. • Gain knowledge about various electronic payment methods. • Identify desirable properties of secure communication and ways to achieve them. • Know about management's role in information security	
Course Outcome	At the end of the course, the student will be able to:	Knowledge Level
	CO1 : Demonstrate knowledge on recalling the Network and Internet concepts	K3
	CO2 : Understand the methodologies for online business dealings.	K2
	CO3 : Understand the role of Internet technology in E-Commerce.	K2
	CO4 : Understand various aspects of E-Commerce.	K2
	CO5: Identify desirable properties of secure communication and ways to achieve them.	K1
Pre-requisites		

CO / PO Mapping													**CO/PSO**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	1									2	2
CO 2	2	1											2	2
CO 3	2	1											2	2
CO 4	2	1											2	2
CO 5	1												2	2

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**Introduction to Electronic commerce**	Periods	**9**
Introduction to Electronic commerce Benefits of Electronic commerce Impact of Electronic commerce Classification of Electronic commerce Application of Electronic commerce			
Unit - II	**Electronic Commerce: Business Models**	Periods	**9**
Electronic Commerce: Business Models Electronic Data Interchange EDI, Layered Architecture, Benefits of EDI, Applications of EDI Electronic Commerce: Architectural Framework Network Infrastructure LAN, ELAN, WAN, TCP/IP Reference Model, Domain Name System Information Distribution and Messaging FTP, WWW server, HTTP, Web Server Information Publishing Technology Information publishing, Web Browsers, HTML, Common Gateway, VRML			
Unit – III	**Electronic Commerce: Securing the Business on Internet**	Periods	**9**
Electronic Commerce: Securing the Business on Internet Why information on internet is vulnerable, Site Security, Protecting the Network, HTTP services Electronic Commerce: Securing Network Transaction Transaction Security, Cryptology, Cryptographic Algorithms,Public Key Algorithms, Digital Signature, Email Security Influence on supply chain Management Electronic Payment System Online, Pre Paid, Post paid payment system			
Unit - IV	**Electronic Commerce: Influence on Marketing**	Periods	**9**
Electronic Commerce: Influence on Marketing Product, Physical Distribution Price Promotion Electronic Commerce: Search Engine and Directory Services Search engines, Search engines marketing, Internet Advertising Mobile Commerce: Introduction, Framework and Models			
Unit – V	**Agents in Electronic Commerce**	Periods	**9**
Agents in Electronic Commerce Need for Agents Types of Agents, Standards and Protocols, Application.			
		Total Periods	**45**
TEXT BOOK :			
1	Bharath Baskar ,"Electronic Commerce: Framework, Technologies and Applications ",Tata 4eMcGraw-Hill Education, 2013		
REFERENCES :			
1	"Kamesh K.Bajaj and Debjani Nag, E-Commerce the Cutting Edge of Business", Tata McGrawHill, 2005		
2	Ravi Kalakota and Andrew B.Whinston,"Frontiers of E-Commerce", Pearson Education Asia,2006		
3	Gary Schneider, "Electronic Commerce", 12th Edition, Cengage Learning, 2016		

Programme	**B.TECH**			Programme Code	**104**	Regulation	**2019**

Department	**INFORMATION TECHNOLOGY**		Semester	**-**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITV58	**GAME THEORY AND ITS APPLICATIONS**	3	0	0	3	40	60	100

Course Objective	• To explain and predict how individuals behave in a specific strategic situation and therefore help improve decision making • To familiarize with the process of game design and development	
Course Outcome	At the end of the course, the student should be able to,	**KL**
	CO1: Apply the strategies of games to the real world problems	K3
	CO2: Solve the problems of Non-cooperative static games and present its optimized solution	K3
	CO3: Apply the concept of Equilibria and dynamic games to identify the certainty of games.	K3
	CO4: Solve problems in cooperative games and relate to multi objective optimization	K3
	CO5: Solve real world problems using the principles of game theory	K3

Pre-requisites	-

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	1	-	-	-	-	-	-	-	-	3	3
CO 2	3	2	1	1	-	-	-	-	-	-	-	-	3	3
CO 3	3	2	1	1	-	-	-	-	-	-	-	-	3	3
CO 4	3	2	1	1	-	-	-	-	-	-	-	-	3	3
CO 5	3	2	1	1	-	-	-	-	-	-	-	-	3	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			

Unit – I	**Introduction to Game Theory**	Periods	**09**
Reasoning about Behavior in Game- Best responses and Dominant Strategies -Nash Equilibrium-Mixed Strategies-Pareto Optimality -Dominated strategies and dynamic games..			
Unit - II	**Non-cooperative Games**	Periods	**09**
Discrete static games- Continuous static games- Relation to other Mathematical Problems: Nonlinear optimization Fixed point-problems.			
Unit – III	**Equilibria and Dynamic Games**	Periods	**09**
Existence of Equilibria -Computation of Equilibria- Special matrix games- Uniqueness of Equilibria -Repeated and Dynamic games- Games under uncertainty			
Unit - IV	**Cooperative Games**	Periods	**09**
Solutions based on characteristic function -Conflict Resolution - Multi objective optimization- Social choice.			
Unit – V	**Case studies**	Periods	**09**
A salesman‟s Dilemma- Oligopoly in water management -A forestry management problem- International fishing Water-distribution problem			
		Total Periods	**45**

Text Book:	
1.	David Easley and jon Kleinberg, "Networks, Crowds and Markets: Reasoning about a highly Connected World", Cambridge University, 2010 (UNIT - I)
2.	Matsumoto A., Szidarovszky F, "Game Theory and Applications", Springer, 2016. (UNIT – II,III,IV,V)
References:	
1.	E.M.Barron, "Game Theory: An Introduction", Wiley, 2009.
2.	Leon Petrosjan, Vladimir.Mazalov, "Game Theory &Applications", Nova Science Publishers, Inc, 2015.
E Resources :	
1.	https://www.cs.cornell.edu/home/kleinber/networks-book/networks-book.pdf
2.	https://ocw.mit.edu/courses/economics/14-126-game-theory-spring-2016/lecture-notes/MIT14_126S16_gametheory.pdf

Programme	**B.E. / B.Tech.**		Programme code		Regulation	**2019**
Department	**CSE, IT & CST**				Semester	

Course code	Course name	Periods per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19CSV58	**Full Stack Development**	2	0	2	3	40	60	100

Course Objective	The student should be made to, • Understand the web development both front-end and back-end technologies. • equip with the skills necessary to build, deploy, and maintain web applications. • gain proficiency in key web development tools and frameworks • create responsive, dynamic, and robust web applications.

Course Outcome	At the end of the course, the students will be able to,	**KL**
	CO1: Create Web Pages Using HTML and CSS	K2
	CO2: Develop Interactive Web Applications Using JavaScript	K3
	CO3: Deploy Web Applications Using Cloud Services	K3
	CO4: Develop RESTful APIs and manage data flow between front-end and back-end.	K4
	CO5: Work on Comprehensive Full Stack Projects	K4

Pre-requisites	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	1	2								3	3
CO 2	3	2	1	1	2								3	3
CO 3	3	2	1	1	2								3	3
CO 4	3	2	1	1	2								3	3
CO 5	3	2	1	1	2								3	3

Course Assessment Methods

Direct
1. Continuous Assessments
2. End-Semester examination

Indirect
1. Course - end survey

Content of the syllabus

Unit - I	**Introduction to Full Stack Development**	Periods	**12**

Overview of web development - Understanding front-end, back-end, and full stack development -
Tools and technologies used in web development – Understanding the Framework structure - HTML & CSS
Basics -Structure of HTML documents - Common HTML tags - Introduction to CSS - Styling HTML elements
- JavaScript Basics - Introduction to JavaScript - Variables, data types, and operators - Basic syntax and control
structures - Introduction to Version Control with Git - Understanding version control systems - Basic Git

commands - Using GitHub for collaboration - Building Your First Webpage - Combining HTML, CSS, and JavaScript - Creating a simple static webpage - Introduction to responsive design			
Unit – II	**Self-Paced Learning**	Periods	**12**
Bundle 1: Front-End Focus: HTML and CSS(Bootstrap/Tailwind) - JavaScript – Git & GitHub - React.js/Angular/Vue.js/Next.js Bundle 2: Back-End Focus: Nodejs/Django or Flask– JavaScript/Python - Git & GitHub - MySQL/MongoDB Bundle 3: Comprehensive Full Stack: HTML and CSS - JavaScript - Git -React.js/Next.js - Firebase Bundle 4: MERN-Focused Full Stack Development: HTML, CSS(Bootstrap/Tailwind), JavaScript – Git &GitHub – React.js -Nodejs -MySQL/MongoDB			
Unit – III	**Advanced Front-End Development**	Periods	**12**
Advanced JavaScript (ES6+ features) Industry Expert - Introduction to frameworks (React or Angular, or Vue.js) - State management in front-end development - Building dynamic and interactive user interfaces.			
Unit – IV	**Back-End Development and Databases**	Periods	**12**
Server-side programming with Node.js (Express.js) or Python (Django/Flask) - RESTful API development - Database management (SQL and NoSQL) - Integrating front-end and back-end			
Unit - V	**Deployment and DevOps**	Periods	**12**
Introduction to cloud services (AWS, Azure, Google Cloud) -Deploying web applications - CI/CD pipelines - Monitoring and maintaining web applications.			
		Total Periods	**60**

Text Books

1.	JavaScript – The Definitive Guide – David Flanagan – 6 edition
2.	Mastering Nodejs – Sandro Pasquali
3.	The Complete Reference HTML & CSS – 5Th edition – Thomas A Powell
4.	The complete reference SQL - James R. Groff and Paul N. Weinberg -

E-Resources

1.	pepa.holla.cz/wp-content/uploads/2016/08/JavaScript-The-Definitive-Guide-6th-Edition.pdf
2.	dl.ebooksworld.ir/sooth3r/javascript/PP.Mastering.Node.js.Nov.2013.www.EBooksWorld.ir.pdf
3.	the-complete-reference-html-css-fifth-edition.pdf (dcpehvpm.org)
4.	Free Python Tutorial for Beginners from Basics to Advanced (guvi.in)
5.	Free JavaScript Tutorial for Beginners from Basics to Advanced (guvi.in)
6.	Welcome to AWS Documentation (amazon.com)
7.	MongoDB Documentation

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205						

Programme	**B.TECH**		Programme Code		**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**					Semester	**OPEN ELECTIVE**

Course Code	Course Name		Periods Per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
U19ITOE1	**MOBILE APPLICATION DEVELOPMENT**		3	0	0	3	40	60	100

Course Objective	The student should be made to, • Use the Objective-C and Java languages (and associated frameworks) for creating mobile apps on iOS and Android platforms, respectively • Learn new mobile app development tools independently • Learn new android management tools • Harness Internet service in support of mobile apps, create effective user interfaces for mobile apps and store/retrieve data in support of mobile apps • Take advantage of common mobile extras such as GPS, sensors (e.g., accelerometers), etc.

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: Articulate the differences between desktop and mobile applications.	K3
	CO2: Compare and contrast some popular mobile app development tools	K2
	CO3: Develop the GPS functionality	K3
	CO4: Demonstrate the iOS Programming	K2
	CO5: Practice the Storyboard Integration	K2

Pre-requisites	Computer Networks

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	3		3							2	2	
CO 2					2								2	
CO 3			2											1
CO 4		2			2								2	1
CO 5													2	

Couse Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
   2. Assignment
   3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus

Unit – I	Introduction	Periods	9

Introduction to Mobile Telephony – Mobile device – communication standards : GSM, CDMA, UMTS, Introduction to 1G/2G/3G/4G – LTE – Mobile applications – categories – Factors in Developing Mobile Applications - Mobile application development – software architecture – application models – Framework and tools - HTML 5 - Java script - AJAX

Unit – II	Android	Periods	9

Introduction to Android – Installation - Android Architecture - Application Fundamentals - SDK features – Development framework – Android Applications and Activities – creating user interfaces – layouts – views – resources – menu – graphics – animation – intents

Unit – III	Android File management tool	Periods	9

Android File management tool – database storage – working with SQLite – GPS functionality – location based API – creating map based activities - geocoding – location-based services – handling audio and video services - networking : using Bluetooth – managing connectivity – telephony – SMS.Andriod implementation tools: xcode, Android studio, Appcode.

Unit – IV	iOS programming	Periods	9

iOS programming – introduction to Objective C: class-objects-methods – interface – inheritance – Introduction to Foundation Framework Classes - File Handling - Property Lists, NSCopy, and Archiving - Selectors and Targets - Dynamic Typing and Dynamic Binding. Introduction to iPhone Architecture - Introduction to Development IDE - XCODE, Interface Builder - Creating and building simple applications -Handling Basic Interaction - Creating basic view controllers - Monitoring events and actions – Creating advanced view controllers

Unit – V	Storyboarding Integration	Periods	9

Storyboarding Integration - Programmatic Interface creation - Integrating with core services – Email, Contacts - Data actions – preferences - files and addresses - Camera, Web Kit - database with iPhone app - Core Data Integration - Advanced controllers – Navigation controller - Integrating with Core Services – Core Audio - Video - Even Handling - Gesture Recognition - Maps and location - Protocols and Categories - Communication with the Services - Using the Accelerometer - Bluetooth Programming

		Total Periods	45

Text Books :

1	Jeff McWherter, Scott Gowell , Professional Mobile Application Development, John Wiley & sons ,Inc, 2012
2	J. F. DiMarzio , Android – A programmer‟s Guide, Mc Graw Hill, 2010(UNIT II & III)
3	James A. Brannan, Blake Ward, iOS SDK Programming, Tata McGraw Hill, 2011(UNIT IV &V)

References

1	Jeff McWherter, Scott Gowell , Professional Mobile Application Development, John Wiley & sons , Inc, 2012

E-Resources

1	https://www.ibm.com/cloud/learn/mobile-application-development-explained
2	https://www.tutorialspoint.com/android/android_overview.htm
3	https://www.javatpoint.com/android-file-manager

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Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**OPEN ELECTIVE**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE2	**ROBOTICS**	3	0	0	3	40	60	100

Course Objective	• This course provides the knowledge about industrial robots and their control and design	

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: interpret the features of an industrial robots with end effector	K2
	CO2: perform kinematic and dynamic analyses with simulation	K3
	CO3:design control laws for a robot	K3
	CO4: integrate mechanical and electrical hardware for a real prototype of robotic device	K3
	CO5: select a robotic system for given application	K3

Pre-requisites	Nil

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	1	1									3	2
CO 2	3	2	1	1									3	2
CO 3	3	2	1	1									3	2
CO 4	3	2	1	1									3	2
CO 5	3	2	1	1									3	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus				
Unit – I	**Introduction to Robotics**		Periods	**9**
Types and components of a robot, Classification of robots, closed-loop and open-loop control systems. Kinematics systems; Definition of mechanisms and manipulators, Social issues and safety.				
Unit – II	**Robot Kinematics and Dynamics**		Periods	**9**
Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, DH parameters, Jacobian, Singularity, and Statics. Dynamic Modelling: Equations of motion: Euler-Lagrange formulation.				
Unit – III	**Sensors and Vision System**		Periods	**9**
Sensor: Contact and Proximity, Position, Velocity, Force, Tactile etc. Introduction to Cameras, Camera calibration, Geometry of Image formation, Euclidean/Similarity/Affine/Projective transformations. Vision applications in robotics.				
Unit – IV	**Robot Control and Actuation Systems**		Periods	**9**
Basics of control: Transfer functions, Control laws: P, PD, PID. Non-linear and advanced controls. Actuators: Electric, Hydraulic and Pneumatic, Transmission: Gears, Timing Belts and Bearings, Parameters for selection of actuators.				
Unit – V	**Control Hardware and Interfacing**		Periods	**9**
Embedded systems: Architecture and integration with sensors, actuators, components, Programming for Robot Applications.				
			Total Periods	**45**
Text Book:				
1	Saha S.K., "Introduction to Robotics", 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014.			
References:				
1	Niku Saeed B., "Introduction to Robotics: Analysis", PHI Learning, New Delhi, 2011.			
2	Ghosal A., "Robotics", Oxford, New Delhi, 2006.			

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Elayampalayam, Tiruchengode – 637 205							

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**	
Department	**INFORMATION TECHNOLOGY**				Semester	**OPEN ELECTIVE**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE3	**BASICS OF CLOUD COMPUTING**	3	0	0	3	40	60	100

Course Objective	The main objective of the course is to: • Acquire a basic understanding of cloud computing and services in order to design and develop a simple cloud service.	

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1: explain the concepts, characteristics, and benefits of Distributed System Models	K2
	CO2: Apply virtualization technology to virtual resource management	K2
	CO3: use and evaluate various cloud computing services	K3
	CO4: explore the elements of Cloud Programming and Software Environments	K3
	CO5: develop strategies for Ubiquitous Clouds and the Internet of Things.	K3

Pre-requisites	Operating Systems & Computer Networks

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														**CO/PSO Mapping**	
COs	Programme Outcomes (POs)													PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	1	1										2	2
CO 2	2	1	1										2	2
CO 3	3	2	1	1									3	3
CO 4	3	2	1	1									3	3
CO 5	3	2	1	1									3	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Unit – I	Distributed System Models	Periods	9
Scalable computing – Network Based Systems – System Models – Software Environment for Distributed and Cloud computing – Performance – Security – Energy Efficiency.			
Unit - II	Virtualization	Periods	9
Implementation levels of Virtualization – Virtualization Structures – Tools and Mechanisms – CPU, Memory, I/O devices Virtualization – Virtual Clusters and Resource Management – Virtualization forData-Center Automation.			
Unit – III	Cloud Platform Architecture over Virtualized Data Centers	Periods	9
Cloud computing Service models – Data-Center Design and Interconnection Networks – Architectural Design of Compute and Storage Clouds. Public Cloud Platforms : Google App Engine – AWS – Azure – Inter-cloud Resource Management – Cloud Security – Trust Management.			
Unit - IV	Cloud Programming and Software Environments	Periods	9
Cloud and Grid Platforms – Parallel and Distributed Programming Paradigms – Programming Support: Google App Engine – Amazon AWS – Microsoft Azure – Cloud Frameworks : Eucalyptus – Nimbus – OpenNebula – Sector – Sphere – OpenStack – Manjrasoft Aneka Cloud and Appliances.			
Unit – V	Ubiquitous Clouds and the Internet of Things	Periods	9
Cloud Trends in supporting Ubiquitous Computing Performance of Distributed Systems and the Cloud – Enabling technologies forthe Internet of Things – Innovative Applications of the Internet of Things – Online Social and Professional Networking			
		Total Periods	45

Text Books

1.	Kai Hwang, Geoffrey C Fox and Jack G Dongarra,"Distributed and Cloud Computing, From Parallel Processing to theInternet of Things" First –reprint ,Morgan Kauffmann Place -2017

References

1.	Thomas Erl, ZaighamMahood and Richard Puttini,"Cloud Computing, Concept, Technology and Architecture", First Prentice Hall, Place,2013.
2.	RajkumarBuyya, James Broberg and Andrzej M. Goscinski "Cloud Computing: Principles and Paradigms" First,John Wiley&sons,2013

E-Resources

1.	https://www.javatpoint.com/virtualization-in-cloud-computing
2.	https://slideplayer.com/slide/16594496/
3.	https://unearth.blog/2020/06/02/ubicomp/

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Programme	**B.TECH**			Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**OPEN ELECTIVE**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE4	**INTRODUCTION TO DATA STRUCTURES**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Implement abstract data types for linear data structure • Apply the different linear and non linear data structure to problem solutions. • Critically analyze the various sorting algorithms

Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1 : understand the concepts of ADTs	K2
	CO2 : outline linear data structures – stacks	K2
	CO3 : describe linear data structures – queues	K2
	CO4 : understand searching and sorting algorithms	K2
	CO5 : illustrate non linear data structures - trees	K2

Pre-requisites	-

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	1											2	2
CO 2	2	1											2	2
CO 3	2	1											2	2
CO 4	2	1											2	2
CO 5	2	1											2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus				
Unit – I	**INTRODUCTION TO DATA STRUCTURES**		Periods	**9**

Time and space complexity, Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linearlist. circular linked list implementation, Double linked list implementation, insertion, deletion and searching operations. Applications of linked lists

Unit – II	**LINEAR DATA STRUCTURES - STACK**		Periods	**9**

Stacks-Operations, array and linked representations of stacks, stack applications -infix to postfix conversion, postfix expression evaluation, recursion implementation.

Unit – III	**LINEAR DATA STRUCTURES - QUEUE**		Periods	**9**

Queues-operations, array and linked representations. Circular Queue operations, Dequeues, Applications of queues.

Unit - IV	**SEARCHING AND SORTING**		Periods	**9**

Searching and Sorting – Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort, shell sort, radix sort, Searching-linear and binary search methods, comparison of sorting and searching methods

Unit – V	**NON LINEAR DATA STRUCTURE TREES**		Periods	**9**

Trees – Definitions, tree representation, properties of trees, Binary tree, Binary tree representation, binary tree properties, binary tree traversals, binary tree implementation, applications of trees.

		Total Periods	**45**

Text Book:

1.	Data structures A Programming Approach with C, D.S.Kushwaha and A.K.Misra, PHI,2014

References Books :

1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, ―Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
2.	Aho, Hopcroft and Ullman, ―Data Structures and Algorithms‖, Pearson Education,1983.

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Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**OPEN ELECTIVE**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE5	**CYBER SECURITY**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Provides the skills in cyber security in view of cybercrime. • Provides the skills in cyber offences. • Detect frauds in mobile and wireless devices. • Provide techniques for handling cybercrime, organizational implications and cyber terrorism.	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1:Outline the threats and risks in cybercrime and cyber offences.	K2
	CO2: Identify the frauds, attacks and security issues in mobile and wireless devices.	K2
	CO3: Know the methods used in cybercrime	K2
	CO4:Apply the phishing techniques and organizational implications.	K3
	CO5:Describe about Social, Political, Ethical and Psychological Dimensions of Cybercrime.	K2
Pre-requisites	Computer Networks	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	1				1	1	1				1		1
CO 2	2	2				1	1	2				1		
CO 3	2	3				1	1	1				1	2	2
CO 4	2	3				1	1	1				1		2
CO 5	1	1				1	1							

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION**	Periods	**9**
Introduction: Definition and Origins of the Word - Classifications of Cybercrimes- Installing and Configuring Kali Linux - Pre-penetration Testing Checklist, Information Gathering - External Pen-testing, Website Penetration Testing - Internal Network Penetration Testing and Wi-Fi Penetration Testing - Network Sniffing ,Exploitation - Social Engineering.			
Unit - II	**CYBERCRIME: MOBILE AND WIRELESS DEVICES**	Periods	**9**
Trends in Mobility: Credit Card Frauds in Mobile and Wireless Computing Era- Authentication Service Security- Attacks on Mobile/Cell Phone. **Mobile Devices**: Security Implications for Organizations - Organizational Measures for Handling Mobile Devices - Laptops: Physical Security Countermeasures.			
Unit – III	**TOOLS AND METHODS USED IN CYBERCRIME**	Periods	**9**
Introduction: Password Cracking: Online Attacks, Offline Attacks - Strong, Weak and Random Passwords. **Keyloggers and Spywares:** Software Keyloggers - Hardware Keyloggers – Antikeylogger - Spywares. **Virus and Worms:** Trojan Horses and Backdoors - Buffer Overflow -Attacks on Wireless Networks.			
Unit - IV	**PHISHING AND ORGANIZATIONAL IMPLICATIONS**	Periods	**9**
Phishing and Identity Theft: Phishing - Spear Phishing - Types of Phishing Scams - Phishing Toolkits and Spy Phishing - Phishing Countermeasures. **Social Media Marketing:** Security Risks andPerils for Organizations, Social Computing and the Protecting People's Privacy in the Organization.			
Unit – V	**CYBER TERRORISM**	Periods	**9**
Introduction: Intellectual Property in the Cyberspace - Copyright, Patent, Trademarks - Trade Secret - Trade Name - Domain Name. **Ethical Hackers:** The Psychology - Mindset and Skills of Hackers and Other Cybercriminals - Sociology of Cybercriminals - Information Warfare.			
		Total Periods	**45**
Text Book:			
1	Abhinav Ojha,"Beginners Guide To Ethical Hacking and Cyber Security", First Edition , 2020.		
Reference:			
1	Roger Grimes, ‚Hacking the Hacker՚, Wiley India, 2017.		
2	Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., ‚Enterprise Cyber security - How to Build aSuccessful Cyber defence Program against Advanced Threats՚, A-press, 2015.		
E-Resource:			
1.	Udemy.com, ‚The Complete Cyber Security Course: Hackers Exposed՚, 2018. [online]. Availabe:https://www.udemy.com/the-complete-internet-security- privacy-course-volume-1/, [Accessed: May2019]		

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Programme	**B.TECH**	Programme Code	**104**		Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**OPEN ELECTIVE**	

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE6	**INFORMATION TECHNOLOGY ESSENTIALS**	**3**	**0**	**0**	**3**	**40**	**60**	**100**

Course Objective	The main objective of this course is to: • Introduce the principles required for building web applications • Know about scripting languages. • Understand the principles of database access and storage and various applications related to Information Technology.	
Course Outcome	At the end of the course, the student should be able to,	
	CO1: Understand the basics of web development.	K2
	CO2: Understand the basics of JavaScript and PHP.	K2
	CO3: Create simple database applications.	K3
	CO4: Describe the basics of networking.	K2
	CO5: Design simple and interactive applications.	K3
Pre-requisites	Basics of web technology , database management & networking concepts	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	1												2	1
CO 2	1		1	1									2	1
CO 3	3	2											3	3
CO 4	2	1											2	2
CO 5	3	2	1	1									3	3

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III   2. Assignment   3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus				
Unit - I	**WEB ESSENTIALS**		Periods	**9**
Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server – HTML basics – HTML tags and their use				
Unit - II	**SCRIPTING ESSENTIALS**		Periods	**9**
Need for Scripting languages - Types of scripting languages - Client side scripting - Server side scripting - Introduction to JavaScript - Arrays - Strings - Functions - PHP - Working principle of PHP - PHP Variables - Constants - Operators				
Unit – III	**DATABASE ESSENTIALS**		Periods	**9**
Database management - Database terms - MySQL - commands – Data types – Indexes – Functions – Accessing MySQL using PHP.				
Unit - IV	**NETWORKING ESSENTIALS**		Periods	**9**
Fundamental computer network concepts - Types of computer networks - - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching - Network components				
Unit – V	**APPLICATION ESSENTIALS**		Periods	**9**
Creation of simple interactive applications - Simple database applications – Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications				
			Total Periods	**45**
TEXT BOOKS :				
1.	Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Fifth Edition, O'REILLY,2019.			
2.	James F. Kurose, "Computer Networking: A Top-Down Approach", Seventh Edition, Pearson,2017.			
REFERENCES:				
1.	Gary Cornell and Cay S.Horstmann, Core Java Vol.1 and Vol.2, Sun Microsystems Press, 2008.			
E Resources:				
1.	https://oiipdf.com/learning-php-mysql-javascript-5th-edition			
2.	https://www.ucg.ac.me/skladiste/blog_44233/objava_64433/fajlovi/Computer%20Networking%20_%20A%20Top%20Down%20Approach,%207th,%20converted.pdf			

Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**OPEN ELECTIVE**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE7	**BUSINESS INTELLIGENCE AND ITS APPLICATIONS**	3	0	0	3	40	60	100

Course Objective	The student should be able to, • Understand and critically apply the concepts and methods of business analytics • Identify, model and solve decision problems in different settings • Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity

Course Outcome	At the end of the course ,the student should be able to,	Knowledge Level
	CO1: Know about enterprise view of IT applications and identify the different types of digital data	K2
	CO2: Understand BI concepts and techniques to experiment ETL process	K2
	CO3: Compare and Contrast OLTP with OLAP systems and design dimensional model	K3
	CO4: Experiment an model of Dashboard Creation for Performance Management	K3
	CO5: Apply BI to mobile, cloud, ERP and social CRM systems	K3
Pre-requisites	Database Management System	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2	1											2	2
CO 2	2	1											2	2
CO 3	3	2	1	1									3	3
CO 4	3	2	1	1									3	3
CO 5	3	2	1	1									3	3

Course Assessment Methods

Direct	
	1. Continuous Assessment Test I, II&III
	2. Assignment
	3. End-Semester examinations
Indirect	
	1. Course-end survey

Content of the syllabus

Unit –I	**Business View of IT Applications**	Periods	9

Introduction to Business View of Information -Core Business Processes – Baldrige Business Excellence Framework – Purpose of using IT in Business – Characteristics of Internet-ready IT Applications – Enterprise Applications – Information users and their requirements - Types of Digital Data: Introduction – Structured Data – Unstructured Data – Semi-Structured Data – Difference between semi-structured and structured data.

Unit - II	**Business Intelligence and Data Integration**	Periods	9

Business Intelligence: Definition – Evolution – Need for BI – BI Value Chain – Business Analytics – BI Framework – BI Users – BI Applications – BI Roles and Responsibilities – Data Integration : Need for Data Warehouse – Definition of Data Warehouse – Data mart – Ralph Kimball's Approach vs. W.H.Inmon's Approach – Goals of Data Warehouse – ETL Process – Data Integration Technologies – Data Quality – Data Profiling.

Unit –III	**OLTP, OLAP and Multidimensional Data Modeling**	Periods	9

OLTP – OLAP – OLAP Architectures – Data Models – Role of OLAP Tools in BI – OLAP Operations – Basics of Data Modeling – Types of Data Model – Data Modeling Techniques – Fact Table – Dimension Table – Dimensional Models – Dimensional Modeling Life Cycle – Designing the Dimensional Model.

Unit - IV	**Performance Management and Enterprise Reporting**	Periods	9

Measures, Metrics, KPIs and Performance Management: Understanding Measures and Performance – Measurement System – Role of metrics – KPIs – Enterprise Reporting: Reporting Perspectives – Report Standardization and Presentation Practices – Enterprise Reporting Characteristics – Balanced Scorecard – Dashboards – Creating Dashboards – Scorecards vs. Dashboards – Analysis.

Unit –V	**BI Applications**	Periods	9

Understanding Business Intelligence and Mobility– the need for business intelligence on the move –BI Mobility time line – Data Security Concerns for Mobile BI – Business Intelligence and Cloud
Computing – Business Intelligence for ERP systems – Social CRM and Business Intelligence

Text Books:	
1.	Prasad R.N. and Seema Acharya, "Fundamentals of Business Analytics", 2nd Edition,Wiley, 2016.

References:	
1.	Ramesh Sharda, DursunDelen, Efraim Turban, "Business Intelligence, Analytics, and DataScience: A Managerial Perspective", 4th Edition, Pearson Education, 2017.
2.	David Loshin, "Business Intelligence: The Savvy Manager‚s Guide", 2nd Edition, Morgan Kaufmann , 2012.

E-Resources:	
1.	https://www.coursera.org/learn/business-intelligence-tools
2.	https://www.udemy.com/courses/search/?src=ukw&q=business+intelligence+andits+applications

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**OPEN ELECTIVE**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE8	**INTERNET OF THINGS**	3	0	0	3	40	60	100

Course Objective	The student should be made: • To study the fundamentals about IoT. • To study about IoT Access technologies and networking. • To study the paradigms, challenges and future.

Course Outcome	At the end of the course, the students should be able to,	Knowledge Level
	CO1: Understand the basics of IoT.	K2
	CO2: Illustrate the Architecture of networking and IoT protocols in IoT.	K2
	CO3: Understand IoT technologies	K2
	CO4: Demonstrate the paradigms, challenges, and futures	K2
	CO5: Compare IOT Applications in Industrial & real world.	K2

Pre-requisites	Computer networks

CO / PO Mapping													**CO/PSO Mapping**	
(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														
COs	Programme Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1											2	2
CO 2	2	1											2	2
CO 3	2	1	1										2	2
CO 4	2	1											2	2
CO 5	2	1											2	2

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations
Indirect
1. Course - end survey

Content of the syllabus			
Unit– I	FUNDAMENTALS OF IoT	Periods	9
Introduction- Evolution of IoT-Networking Components-Addressing Strategies in IoT-Sensing and Actuation: IoT Sensing and Actuation-Sensors-Sensor Characteristics-Types -Scalar sensing- Virtual sensing- IoT Connectivity Technologies: Bluetooth-wifi.			
Unit-II	NETWORKING AND IoT PROTOCOLS	Periods	9
Network types-Connection Type-Network reachability-Physical topology-Security-Symmetric key cryptography-asymmetric key cryptography-M2M communication-Architecture components of M2M-Communication technologies: Infrastructure protocols-Multicast DNS-Data protocol-COAP-MQTT.			
Unit – III	IoT TECHNOLOGIES	Periods	9
Cloud computing-Virtualization- Advantages of virtualization-Types of virtualization-Cloud Models-Service- Fog computing applications: Fog nodes-Fog deployment model -Fog Computing Architecture-Fog Computing in IoT.			
Unit–IV	PARADIGMS, CHALLENGES, AND THE FUTURE	Periods	9
Evolution of New IoT- Paradigms Internet of battle eld things (IoBT)-Internet of vehicles (IoV)-Internet of drones (IoD) -Internet of space (IoSpace)-Internet of services (IoS) -Internet of people (IoP).			
Unit– V	CASE STUDIES/ INDUSTRIAL APPLICATIONS	Periods	9
Agricultural IoT-Smart irrigation management-Vehicular IoT-Crime assistance in a smart IoT transportation system Healthcare IoT.			
		Total Periods	45

Text Books	
1	Sudip Misra; Anandarup Mukherjee; Arijit Roy and published by Cambridge UniversityPress Introduction to IoT ,2021.

References	
1	Internet Of Things: A Hands-On Approach Arshdeep bahga,Vijay madisetti,2015.
2	Architecting the Internet of Things,DieterUckelmann, Mark Harrison, Michahelles and Florian (Eds), Springer,2011.
3	Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, MichaelMargolis, Arduino Cookbook and O"Reilly Media,2011.

E-Resources	
1	https://www.arduino.cc/
2	https://www.slideshare.net/jaswindersinghthind/a-basic-ppt-on-internet-of-thingsiot
3	https://www.ibm.com/smarterplanet/us/en/?ca=v_smarterplanet

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205			

Programme	**B.E. / B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**OPEN ELECTIVE**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE9	**INTRODUCTION TO JAVA PROGRAMMING**	3	0	0	3	40	60	100

Course Objective	The main objective of this course is to: • Impart the fundamental concepts of core JAVA. • Enable the students to gain programming skills in JAVA. • Be able to use the Java SDK environment to create, run and execute the simple java programs.	
Course Outcome	At the end of the course, the students should be able to,	KL
	CO1: Understand the syntax, semantics and classes in Java language.	K2
	CO2: Discuss the programs using OOPS concepts.	K2
	CO3: Use the concept of Input and Output in Java	K3
	CO4: Create the programs using strings.	K3
	CO5: Develop Applet, AWT and Event handlers in Java	K3
Pre-requisites	Object Oriented Programming	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong- 2 – Medium- 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO7**	**PO8**	**PO 9**	**PO 10**	**PO 11**	**PO12**	**PSO1**	**PSO 2**
CO 1	2	2	-		-				-				2	1
CO 2	2	2	-		-				-				2	2
CO 3	3	2	-		2				1				3	3
CO 4	3	3	3		2				1				3	3
CO 5	3	3	3		2				1				3	3

Course Assessment Methods

DIRECT
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

INDIRECT
1. Course - end survey

Content of the syllabus			
Unit -I	**Basics of Java**	Periods	**9**
The Genesis of Java - Overview of Java - Data Types, Variables, and Arrays - Operators - Control Statements - Introducing Classes - Methods and Classes. Inheritance: Basics - Using Super – Creating a Multilevel Hierarchy - Method overriding – Using Abstract Classes			
Unit - II	**Errors and Exception Handling**	Periods	**9**
Packages and Interfaces: Packages - Access Protection - Importing Packages- Interfaces Definitions and Implementations - Compile time errors –Run time errors – Exception Handling: Types - Try and Catch - Throw - Finally – User defined exceptions			
Unit – III	**Streams and Threads**	Periods	**9**
File - The Byte Streams - The Character Streams - Using Stream I/ O - Serialization. Java threads – Priorities – Synchronization – Thread class and Runnable interfaces – Creating threads – Multiple threads – Inter thread communication			
Unit - IV	**String Handling**	Periods	**9**
String Handling: Special String operations and Methods - String Buffer - Exploring java.lang: Simple type Wrappers - System - Math - Collections Framework: Collections Interfaces and Classes - Utility Classes: String Tokenizer - Date and Time			
Unit – V	**Introducing GUI Programming with JavaFX**	Periods	**9**
Introducing Java FX GUI Programming:Java FX Basic ConceptsA Java FX Application Skeleton-Compiling and Running a JavaFX Program-The Application Thread-A simple JavaFX Control:Label-Using buttons and Events-Exploaring JavaFX Controls:Using image and imageview-Toggle button-Radio button-Checkbox-list view-Combo Box-Text Field.			
		Total Periods	**45**
Text book :			
1.	Herbert Schildt, Java –The Complete Reference, Tata Mc Graw Hill, Tenth Edition,2018		
References:			
1.	Deitel & Deitel, Java How to Program, Prentice Hall of India, 2010		
2.	Gary Cornell and Cay S.Horstmann, Core Java Vol.1 and Vol.2, Sun Microsystems Press, 2008.		
E-Resources:			
1.	https://www.tutorialspoint.com/java/index.htm		
2.	https://www.programiz.com/java-programming		

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Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**		Semester		**OPEN ELECTIVE**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE10	**INTRODUCTION TO R PROGRAMMING**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Building the fundamentals of data science. • Imparting design thinking capability to build big-data • Developing design skills of models for big data problems • Gaining practical experience in programming tools for data sciences • Empowering students with tools and techniques used in data science	

Course Outcome	At the end of the course, the student should be able to,	**Knowledge Level**
	CO1: Create artful graphs to visualize complex data sets and functions	K3
	CO2: Write more efficient code using parallel R and vectorization	K3
	CO3: Interface R with C/C++ and Python for increased speed or functionality	K2
	CO4: Find new packages for text analysis, image manipulation, and perform statistical analysis of the same	K2
	CO5: Develop interfacing R to other Languages	K3

Pre-requisites	Basics of any programming language

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong- 2 – Medium- 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO7**	**PO8**	**PO 9**	**PO 10**	**PO 11**	**PO12**	**PSO1**	**PSO 2**
CO 1	3	3	2		-				2			2	3	3
CO 2	3	3	2		2				2			2	3	3
CO 3	2	2	2		2				1			-	3	3
CO 4	2	2	2		-				1			-	3	3
CO 5	3	3	3		-				2			2	3	3

Course Assessment Methods

1. Continuous Assessment Test I, II & III
2. Assignment.
3. End-Semester examinations.

1. Course - end survey

Content of the syllabus				
Unit- I	**Introducing to R**		Periods	**9**
Introducing to R – R Data Structures – Help functions in R – Vectors – Scalars – Declarations – recycling – Common Vector operations – Using all and any – Vectorized operations – NA and NULL values – Filtering –Vectorised if-then else – Vector Equality – Vector Element names				
Unit – II	**Matrices, Arrays And Lists**		Periods	**9**
Matrices, Arrays And Lists Creating matrices – Matrix operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction – Avoiding Dimension Reduction – Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists.				
Unit – III	**Data Frames**		Periods	**9**
Creating Data Frames – Matrix-like operations in frames – Merging Data Frames – Applying functions to Data frames – Factors and Tables – factors and levels – Common functions used with factors – Working with tables - Other factors and table related functions				
Unit – IV	**Control statements, Functions, R graphs**		Periods	**9**
Control statements – Arithmetic and Boolean operators and values – Default values for arguments - Returning Boolean values – functions are objects – Environment and Scope issues –Writing Upstairs - Recursion – Replacement functions – Tools for composing function code – Math and Simulations in R Creating Graphs – Customizing Graphs – Saving graphs to files – Creating three-dimensional plots				
Unit – V	**Interfacing**		Periods	**9**
Interfacing R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linear models – Non-linear models – Time Series and Auto-correlation – Clustering				
			Total Periods	**45**

Text Book:	
1.	Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design", No Starch Press, 1st Edition ,2011.

References:	
1.	Jared P. Lander, "R for Everyone: Advanced Analytics and Graphics", Addison-Wesley Data & Analytics Series,2nd Edition, 2017.
2.	Robert Knell, "Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R", Amazon Digital South Asia Services Inc, Kindle Edition , 2013.

E-Resources:	
1.	https://www.tutorialspoint.com/r/
2.	https://www.javatpoint.com/r-tutorial

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<tr><td colspan="2">(Autonomous Institution, Affiliated to Anna University ,Chennai)</td></tr>
<tr><td colspan="2">Elayampalayam, Tiruchengode – 637 205</td></tr>
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Programme	**B.TECH**		Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**				Semester	**OPEN ELECTIVE**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE11	**ETHICAL HACKING**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Explore the concepts of security testing and the knowledge required to protect against the hacker and attackers. • Understand the publicly available tools used to gather information on potential targets and identify network system vulnerabilities and confirm their exploitability. • Identify the techniques for wireless hacking.	
Course Outcome	At the end of the course, the student should be able to,	KL
	CO1: Define about penetration testing, vulnerabilities and risks available in a system	K1
	CO2: Explain the various types of Information gathering methods.	K2
	CO3: Determine the various vulnerabilities and employ suitable tools to carry out sniffing in the networks	K3
	CO4: Make use of the exploitation available in network protocols, servers, clients, services and USBs.	K3
	CO5: Identify the wireless hacking techniques.	K1
Pre-requisites	Networks, Operating Systems, Database and Web Technology	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													**CO/PSO Mapping**	
COs	Programme Outcomes (POs)												PSOs	
	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO 12	PSO1	PSO 2
CO 1	3												1	1
CO 2	3	2											2	2
CO 3	3	2	1	1									2	2
CO 4	3	2	1	1									3	3
CO 5	3												1	1

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	**Introduction to Hacking**	**Periods**	**9**
Important Terminologies – Penetration Test – Vulnerability Assessments versus Penetration Test – Pre-Engagement – Rules of Engagement – Penetration Testing Methodologies – OSSTMM – NIST – OWASP – Categories of Penetration Test – Types of Penetration Tests – Vulnerability Assessment Summary – Reports.			
Unit - II	**Information Gathering and Target Enumeration**	**Periods**	**10**
Active , Passive and Sources of information gathering - Copying Websites Locally –Traceroute - NeoTrace - Cheops-ng - Intercepting a Response –WhatWeb –Netcraft - Basic Parameters -Xcode Exploit Scanner - Interacting with DNS Servers –Nslookup – DIG - Fierce, Zone Transfer with Host Command and Automation - DNS Cache Snooping-Attack Scenario - Automating Attacks - SNMP –Problem - Sniffing Passwords - SolarWinds Toolset -Sweep, Brute Force and Dictionary – Tools - Attack – Enumeration - Intelligence Gathering Using Shodan.			
Unit – III	**Vulnerability Assessment & Network Sniffing**	**Periods**	**9**
Introduction to Vulnerability Assessment - Pros and Cons –Nmap -Updation of database - Testing SCADA Environments with Nmap – Nessus. Sniffing: Types - Hubs versus Switches - Promiscuous versus Nonpromiscuous Mode - MITM Attacks - ARP Protocol Basics – working – Attacks -DoS Attacks –Dsnifftool - Using ARP Spoof to Perform MITM Attacks - Sniffing the Traffic with Dsniff - Sniffing Pictures with Drifnet - Urlsnarf and Webspy - Sniffing with Wireshark.			
Unit - IV	**Basics of Exploitation**	**Periods**	**9**
Introduction to Remote Exploitation -Understanding Network Protocols – Server Protocols - Attacking Network Remote Services - Common Target Protocols -Tools for cracking network remote services - Attacking SMTP - Attacking SQL Servers - Client Side Exploitation Methods: E-Mails Leading to Malicious Attachments & Malicious Links - Compromising Client Side Update - Malware Loaded on USB Sticks .			
Unit – V	**Wireless Hacking**	**Periods**	**8**
Wireless Hacking – Introducing Aircrack– Cracking the WEP – Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng – Evil Twin Attack – Causing Denial of Service on the Original AP			
		Total Periods	**45**

Text Book:	
1.	Rafay Baloch, Ethical Hacking and Penetration Testing Guide –CRC Press, 1st Edition, 2015.

References:	
1.	Sean-Philip Oriyano, CEH v9: Certified Ethical Hacker Version 9, Wiley publication, 3rd Edition, 2016.
2.	Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed 7 : Network Security" Secrets & Solutions", Tata Mcgrawhill Publishers, Seventh Edition, 2012.
3.	EC- Council, Ethical Hacking and Countermeasures: Attack Phases, Cengage Learning, 2009.

E-Resources:	
1.	https://purplesec.us/types-penetration-testing/
2.	https://www.sciencedirect.com/topics/computer-science/vulnerability-assessment
3.	https://www.aircrack-ng.org/doku.php

Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**OPEN ELECTIVE**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
U19ITOE12	**CYBER FORENSICS**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Learn about computer investigation • Understanding and determining data acquisition methods and tools. • Familiar about identifying the crime scenes and digital evidence. • Learn about computer forensics tools and Analyze and Validation. • Know about Email investigation and recovering the graph files	
Course Outcome	At the end of the course, the student should be able to,	Knowledge Level
	CO1:apply digital forensic investigation with a systematic approach	K3
	CO2:make use of various tools for data acquisition	K3
	CO3 :identify the digital evidence in a crime scene	K3
	CO4: apply forensic tools in forensic examination	K3
	CO5:build the recovery of graph files and investigating E-mail crimes	K3
Pre-requisites	Nil	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	3	2	1	1									3	3
CO 2	3	2	1	1									3	3
CO 3	3	2	1	1									3	3
CO 4	3	2	1	1									3	3
CO 5	3	2	1	1									3	3

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examination

Indirect

1. Course - end survey

Content of the syllabus			
Unit – I	Computer Investigations	Periods	9
Computer Investigations: Preparing a Computer investigation – Taking a systematic approach – Assessing the case – Planning Investigation – Securing evidence. Procedures for Corporate High: Tech investigations – Conducting an Investigation – Completing the case.			
Unit – II	Data Acquisition	Periods	9
Understanding storage formats for digital evidence – Determining the best acquisition method - Contingency planning for image acquisitions – Using Acquisition tools: Windows XP Write- protection with USB Devices – Validating Data Acquisitions: Windows Validation Methods – Performing RAID Data Acquisitions – Using Remote Network Acquisition tools – Using other Forensics Acquisition tools.			
Unit – III	Processing Crime and Incident Scenes	Periods	9
Identifying Digital Evidence – Collecting Evidence in Private Sector Incident Scenes – Processing Law Enforcement Crime Scenes – Preparing for a Search –Securing a Computer Incident or Crime Scene – Seizing Digital Evidence at the Scene –Storing Digital Evidence –Obtaining a Digital Hash – Reviewing a Case.			
Unit – IV	Computer Forensic Tools, Analysis and Validation	Periods	9
Evaluating Computer Forensics Tool Needs -Computer Forensics Software Tools – Computer Forensics Hardware Tools –Validating and Testing Forensic Software - Computer Forensics Analysis and Validation: Determining Data Collection and Analysis –Validating Forensic Data –Addressing Data-Hiding Techniques –Performing Remote Acquisitions.			
Unit – V	Recovering Graph Files, Email Investigations	Periods	9
Recognizing Graph File- Understanding Data Compression- Locating And Recovering Graphic Files- Identifying Un known File Formats- Understanding Copyright Issues- Investigating Email Crimes And Violations- Understanding Email Servers- Using Specialized Email Forensic Tools.			
		Total Periods	45

CASE STUDY:

Only for Assignment not for end sem examination.

1. Illegal money transfer 2. Network data reveals theft of trade secrets 3. Data from vehicle infotainment, telematics and black box systems 4. Intellectual property theft

Text Book:	
1.	Nelson Bill, Phillips Amelia and Steuart Christopher, "Guide to Computer Forensics and Investigations", 4th Edition, Cengage Learning, 2020.
References:	
1.	Marie-Helen Mara, "Computer Forensics", 2nd Edition, Jones and Bartlett Learning, 2015.
2.	Albert Marcella Jr, "Cyber Forensics", 2nd Edition, Auerbach Publications , 2007.

E-Resources	
1	https://www.slideshare.net/sumeetpatel21/data-acquisition-system-40835631
2	https://samsclass.info/121/ppt/ch05.ppt
3	https://resources.infosecinstitute.com/topic/7-best-computer-forensics-tools/
4	https://www.guru99.com/computer-forensics-tools.html
5	https://www.tutorialspoint.com/python_digital_forensics/python_digital_forensics_investigation_using_emails.html
6	https://www.slideshare.net/edwardbel/email-investigation

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Programme	**B.TECH**	Programme Code	**104**	Regulation	**2019**
Department	**INFORMATION TECHNOLOGY**			Semester	**OPEN ELECTIVE**

Course Code	Course Name	Periods Per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Tot
U19ITOE13	**E LEARNING TECHNIQUES**	3	0	0	3	40	60	100

Course Objective	The student should be made to, • Analyze and compare different on-line E-Learning tools- design course content for a specific subject from different perspective- plan and design the instruction • Support needs of learners of various backgrounds- levels and situations based on different learning methodologies	
Course Outcome	At the end of the course- the student should be able to,	
	CO1: Understand the broad perspective of e-learning techniques.	K2
	CO2: Analyze the tools and mechanisms for implementing virtualization.	K3
	CO3: Illustrate the cloud storage architecture along with resource management.	K2
	CO4: Choose the appropriate programming models and apply.	K3
	CO5: Understand the collaborative e learning techniques.	K2
Pre-requisites	Nil	

CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													**CO/PSO Mapping**	
Cos	Programme Outcomes (POs)												PSOs	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO 9**	**PO10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1	2	1											2	2
CO 2	3	2	1										3	3
CO 3	2	1											2	2
CO 4	2	1											2	2
CO 5	2	1											2	2
1 – Slight, 2- Moderate, 3 – Substantial, BT- Bloom‟s Taxonomy														

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & III
2. Assignment
3. End-Semester examinations

Indirect
1. Course - end survey

Content of the syllabus			
Unit – I	**INTRODUCTION**	Periods	**9**
E-Learning – E-Learning cycle – E-Learning types – challenges and opportunities – cognitive presence – Approaches to design E-Learning – E-Learning framework – 6C framework –E-Learning Tools			
Unit - II	**E-LEARNING STRATEGY**	Periods	**9**
Role of tutor – E-Learning strategy – Blended E-Learning – M-Learning- problem based learning– Enterprise learning – Corporate Learning – Web based Learning – Pod casting – Learning Management systems – Content development process – E-Learning standards SCORM standard – managing e-learning quality – case studies			
Unit – III	**PRINCIPLES OF E-LEARNING**	Periods	**9**
Philosophy of E-Learning – theory of learning – Applying principles of multimedia – Applying principles of contiguity – Applying principles of modality – Applying principles of redundancy – Applying principles of coherency – Applying principles of personalization – web-based learning communities – knowledge sharing and Knowledge management in e-learning – social networks and social media in e-learning			
Unit - IV	**DESIGN**	Periods	**9**
On line E-Learning technologies – visual communication techniques – Computer-based technologies – Computer-mediated communication (CMC) – Assessment and evaluation Organizing and designing learning sequences- Characteristics of Interactive Online Learning Media			
Unit – V	**E LEARNING PLATFORMS**	Periods	**9**
Leverages example in E-Learning – collaborative E-Learning – Learner control in E-Learning guidelines to solve issues in E-Learning – Implementation of an E-Learning Course Content for a complete online course- Research in content retrieval and generation for E-Learning- Role of cloud and semantic Grid in E-Learning			
		Total Periods	**45**

Text Book:	
1	D.Randy Garrison "E-Learning in the 21st century a framework for research and practice"- 2nd edition- Taylor and Francis- 2016.

References:	
1	John Gardner- Bryn Holems- "E-Learning : Concepts and practice" SAGE Publications- 2006.
2	R.C.Clark and R.E.Mayer- "E-Learning and the science of instruction"- Pfeiffer Wiley- 2011.
3	Mark J Rosenberg- "E-Learning: strategies for delivering knowledge in the Digital Age"- McGraw-Hill- 2001.
4	Kjell E. (Erik) Rudestam - Judith Schoenholtz-Read- "Handbook of Online Learning"- Sage Publications Inc.- Second Edition- 2009.

E-Resources:	
1	https://engineering.futureuniversity.com/BOOKS%20FOR%20IT/E%20learning%20%20(2).pdf
2	http://www.fao.org/3/i2516e/i2516e.pdf