

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous) Elayampalayam, Tiruchengode – 637205



B.E.-COMPUTER SCIENCE AND 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

• To impart quality education in the field of Computer Science and Technology and to produceglobally competent engineers with research experience to serve the society.

DEPARTMENT MISSION

- To impart knowledge in cutting edge technologies in par with current industrial standards
- To create a platform for strong communication skills and possess the ability to design computing systems individuals as well as part of a multidisciplinary terms
- To instill societal, safety and ethical responsibilities in professional activities
- To collaborate with industries to uplift innovative research and development

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) :

- **PEO 1:** Able to perform in technical/managerial roles ranging from design, development, problem solving, support software industries and R&D sectors
- **PEO 2:** The ability to adapt, contribute and innovative new technologies and systems in the key domains of Computer Science and Technology
- **PEO 3:** To Societal responsible solution provider and entrepreneur in Computer Science and Technology

PROGRAMME SPECIFIC OUTCOMES (PSOS):

PSO1	Ideal Solutions: Demonstrate basic knowledge of computer real applications and applystandard practices in software project development.
PSO2	Research Capability: Students at the time of graduation will be able to apply domain knowledge and expertise for enhancing research capability to transform innovative ideasinto reality.

PROGRAMME OUTCOMES (POs):

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

- 1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 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 activities with 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, and as 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 andleader 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	PO 1	PO 2	РО 3	PO 4	РО 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
Ι		\checkmark	\checkmark					\checkmark				
II		\checkmark		\checkmark			\checkmark	\checkmark	\checkmark			
III		\checkmark	\checkmark				\checkmark		\checkmark		\checkmark	\checkmark

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.

	CURRICULUM BREAKDOWN STRUCTURE											
	Summary of Credit Distribution											
0.4				Ser	nester				Total			
Category	SEM	SEM	SEM	SEM	SEM	SEM	SEM	SEM	No.of Credits			
	1	2	3	4	5	6	7	8				
HS	3	4							7			
BS	9	9	4	4	4				30			
ES	8	11							19			
PC			17	16	13	16	8		70			
PE					3	3	6	6	18			
OE					3	3	3		9			
EC						1	4	8	13			
Semester wise total	20	24	21	20	23	23	21	14	166			

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 (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205										
Programme	B.E.	B.E. Programme Code 107 Regulation 2019									
Department	COMPUTER SCIEN	NCE ANDTH	ECHNOLOG	GΥ			Semes	ter		Ι	
	(Applicable to the		CURRICU dmitted from onwards	m tl		ademic	year 20	19 - 20	020		
Course	Course Nam	e	Category	Р	eriods	/ Week	Credit	N	Aaximu	m Marks	
Code				L	Т	Р	С	CA	ESE	Total	
THEORY											
U19MA101	Calculus*		BSC	3	1	0	4	40	60	100	
U19EN101	English For Commun	ication- I *	HSC	3	0	0	3	50	50	100	
U19PH105	Engineering Physics [@]	ğ	BSC	3	0	0	3	50	50	100	
U19CS101	Programming for Pro Solving*	blem	ESC	3	0	0	3	50	50	100	
U19GE101	Engineering Graphics	*	ESC	2	0	3	3	50	50	100	
	1		PRACTIC	CAL					11		
U19PH106	Physics Laboratory [@] .		BSC	0	0	4	2	50	50	100	
U19CS102	Computer Practices I	Laboratory*	ESC	0	0	4	2	50	50	100	
	1	MANE	DATORY (C O	URS	ES		1	<u> </u>		
	Mandatory course - I		МС	3	0	0	0	100	-	100	
	1		1	1	<u>.</u>	Total	20	450	350	800	

* Common for all branches

[@]common for CSE,CST,IT,BT

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205									
Programme	B.E.Programme Code107Regulation2019									
Department	COMPUTER SCIENCE AND TECHNOLOGY Semester I									
	(Applicable to the stude		RRICULU nitted from onwards)		cadem	nic year	· 2019 - 2	2020		
Course	Course Name		Category	Pe	riods /	Week	Credit	Max	ximum]	Marks
Code				L	Т	Р	С	CA	ESE	Total
		I	THEORY							
U19MA202	Linear Algebra and Ordina Differential Equations*	ary	BSC	3	1	0	4	50	50	100
U19EN202	English For Communicati	on- II *	HSC	3	0	0	3	50	50	100
U19CH207	Engineering Chemistry [@]		BSC	3	0	0	3	50	50	100
U19EE201	Basic Electrical and Electr Engineering	ronics	ESC	3	0	0	3	50	50	100
U19GE202	Basic Civil and Mechanics Engineering*	al	ESC	3	0	0	3	50	50	100
U19CS203	Python Programming		ESC	2	0	2	3	50	50	100
	I	P	RACTICAI	L						
U19CH208	Chemistry Laboratory @		BSC	0	0	4	2	50	50	100
U19GE203	Engineering Practices Laboratory*	ESC	0	0	4	2	50	50	100	
	I	MANDA	TORY CO	URS	ES					•
	Mandatory course - II		MC	3	0	0	0	100	-	100
					-	Total	23	500	400	1000

CA- Continuous Assessment, ESE - End Semester Examination.

* Common for all branches

@common for CSE,CST,IT,BT

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205									
Programme	B.E.	P	rogramme C	ode	107		Regulati	on 2	2019	
Department	COMPUTER SCIEN	ICE AND TE	Y			Semest	er	III		
~	CURRICULUM (Applicable to the students admitted from the academic year 2020 - 2021 onwards)									
Course	Course Course Name		Category	Pe	riods /	Week	Credit	Max	kimum 🛛	Marks
Code				L	Т	Р	С	CA	ESE	Total
			THEORY	7						
U19MA304	Discrete Mathematic	s#	BSC	4	1	0	4	50	50	100
U19CT301	Data Structures and Algorithms		PCC	3	0	0	3	50	50	100
U19CT302	Data Base Manageme Systems	ent	PCC	3	0	0	3	50	50	100
U19IT304	Computer Organizati Architecture^	on &	PCC	3	0	0	3	50	50	100
U19CS307	Object Oriented Programming ¹		PCC	3	0	2	4	50	50	100
]	PRACTICA	L						
U19CT303	Data Structures Labo	ratory	PCC	0	0	4	2	50	50	100
U19CT304	DBMS Laboratory		PCC	0	0	4	2	50	50	100
		MAND	ATORY CO	OUR	SES					
	Mandatory course - I	II	MC	3	0	0	0	100	-	100
			·	·	·	Total	21	450	350	800

#common for CSE, CST, IT ^common for CST,IT ! common for CSE, CST

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai)Elayampalayam, Tiruchengode – 637 205									
Programme	B.E.	P	Programme Code 107 Regulation 2							
Department	COMPUTER SCIEN	ICE AND TE	CHNOLOGY	Y			Semest	ter	IV	
	(Applicable to the s		RRICULU nitted from (onwards)		cadem	nic year	2020 - 2	2021		
Course	Course Na	me	Category	Pe	riods /	Week	Credit	Max	ximum]	Marks
Code	Course Maine			L	Т	Р	С	CA	ESE	Total
			THEORY							
U19MA405	Statistics and Numerical Methods [#]		BSC	4	0	0	4	50	50	100
U19CS411	Design and Analysi Algorithm [!]	s of	PCC	3	0	0	3	50	50	100
U19CT405	Computer Networks	5	PCC	3	0	0	3	50	50	100
U19IT408	Operating Systems [^]		PCC	3	0	0	3	50	50	100
U19CT406	Foundation of Artif	cial	PCC	3	0	0	3	50	50	100
		Р	RACTICAI							
U19CT407	Computer Networks	Lab	PCC	0	0	4	2	50	50	100
U19IT411	Operating Systems Laboratory^	PCC	0	0	4	2	50	50	100	
		MANDA	ATORY CO	URS	ES					
	Mandatory course – I	V	MC	3	0	0	0	100	-	100
						Total	20	450	350	800

Common to CSE, IT and CST

^ Common to IT and CST

! Common to CSE and CST

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai)Elayampalayam, Tiruchengode – 637 205										
Programme	B.E.	Programme Code 107 Regulation									
Department	COMPUTER SCIENCE AND TECHNOLOGY Semester								V		
	CURRICULUM (Applicable to the students admitted from the academic year 2020 - 2021 onwards)										
Course Course Name Category Pe				riods /	Week	Credit	May	kimum 1	Marks		
Code	Course i te		L	Т	Р	С	CA	ESE	Total		
			THEORY								
U19MA509	Probability, Queuein & Game theory	ng Theory	BSC	4	0	0	3	50	50	100	
U19EC528	Embedded Systems	Design	PCC	3	0	0	3	50	50	100	
U19CT508	Artificial Intelligence Applications	e and its	PCC	3	0	0	3	50	50	100	
U19CT509	Internet Programmin	ıg	PCC	3	0	0	3	50	50	100	
	Professional Electiv	e – I	PEC	3	0	0	3	50	50	100	
	Open Elective – I		OEC	3	0	0	3	50	50	100	
		P	RACTICAI								
U19CT510	Internet Programmin Laboratory	ng	PCC	0	0	4	2	50	50	100	
U19EC526	Embedded System's Design LaboratoryPCC004250							50	50	100	
		MANDA	ATORY CO	URS	ES						
	Mandatory Course -	V	MC	3	0	0	0	100	-	100	
						Total	23	500	400	900	

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai)Elayampalayam, Tiruchengode – 637 205										
Programme	B.E.	P	rogramme C	ode	107		Regulation	on 2	2019		
Department	COMPUTER SCIEN	Y		•	Semest	ter	VI				
	CURRICULUM (Applicable to the students admitted from the academic year 2020 - 2021 onwards)										
Course	Course Course Name Category Po			Pe	riods /	Week	Credit	May	imum]	Marks	
Code	Course Manie			L	Т	Р	С	CA	ESE	Total	
	THEORY										
U19CT611	Foundations of Data	Foundations of Data Science			0	0	3	50	50	100	
U19CT612	Machine Learning T	echniques	PCC	3	0	0	3	50	50	100	
U19CT613	Cloud Computing		PCC	3	0	0	3	50	50	100	
U19IT620	Software Engineerin	lg^	PCC	3	0	0	3	50	50	100	
	Professional Elective	e – II	PEC	3	0	0	3	50	50	100	
	Open Elective – II		OEC	3	0	0	3	50	50	100	
		Р	RACTICAI								
U19CT614	Data Science Labora	atory	PCC	0	0	4	2	50	50	100	
U19CT615	Machine Learning L	aboratory	PCC	0	0	4	2	50	50	100	
U19EN603	Communication Ski Laboratory	lls	EEC	0	0	3	1	100	-	100	
	•	MANDA	TORY CO	URS	ES	•	•	·			
	Mandatory Course -	VI	MC	3	0	0	0	100	-	100	
						Total	23	450	350	800	

^ Common to IT and CST

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai)Elayampalayam, Tiruchengode – 637 205									
Programme	B.E.	Pı	rogramme C	ode	107		Regulatio	on	2019	
Department	COMPUTER SCIEN	NCE AND TE	CHNOLOG	Y			Semest	er	VI	[
	CURRICULUM (Applicable to the students admitted from the academic year 2020 - 2021 onwards)									
Course	Course Name				riods /	Week	Credit	Max	ximum]	Marks
Code			L	Т	Р	С	CA	ESE	Total	
			THEORY							
U19CT716	Internet of Things		PCC	3	0	0	3	50	50	100
U19CT717	Block Chain Techno	ology	PCC	3	0	0	3	50	50	100
	Professional Elective	e – III	PEC	3	0	0	3	50	50	100
	Professional Elective	e – IV	PEC	3	0	0	3	50	50	100
	Open Elective-III		OEC	3	0	0	3	50	50	100
PRACTICAL										
U19CT718	Internet of things La	boratory	PCC	0	0	4	2	50	50	100
U19IT719	Internship Training / Project	EEC	0	0	8	4	50	50	100	
						Total	21	450	350	800

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Programme	B.E.	Pı	rogramme C	ode	107		Regulati	on 2	2019		
Department	COMPUTER SCIEN	COMPUTER SCIENCE AND TECHNOLOGY Semester VIII									
1	CURRICULUM (Applicable to the students admitted from the academic year 2020 - 2021 onwards)										
Course	Course Na	me	Category	Pe	riods /	Week	Credit	Maximum Marks		n	
Code				L	Т	Р	С	CA	ESE	Total	
		Т	HEORY								
	Professional Elective	-V	PEC	3	0	0	3	50	50	100	
	Professional Elective	– VI	PEC	3	0	0	3	50	50	100	
PRACTICAL											
U19CT820	Project Work		EEC	0	0	16	8	50	50	100	
				-	·	Total	14	150	150	300	

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

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Prog	ramme		B.E.	Programme C	ode	107		Regu	lation	2019	
Depa	rtment	COM	PUTER SCIENCE AN	D TECHNOLOGY				Ser	nester		V
				CURRICULU							
			Prof	essional Elective	– I	_					
S.NO	S.NO COURSE COURSE N CODE			CATEGORY	L	T	Р	С		aximun arks	1
	CODE								CA	ESE	Total
1.	U19C	ГЕ01	Cryptography and Network Security	PEC	3	0	0	3	50	50	100
2.	U19C	ГЕ02	Pattern Recognition Techniques	PEC	3	0	0	3	50	50	100
3.	3. U19CTE03		Fundamentals of Virtualization	PEC	3	0	0	3	50	50	100
4.	U19C	ГЕ04	Mobile Computing	PEC	3	0	0	3	50	50	100
5.	U19C	TE05	Socket Programming	PEC	3	0	0	3	50	50	100

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Prog	ramme		B.E.		Programme C	ode	107		Re	gulation	2019	
Depa	artment	COM	PUTER SCIEN	CE AND	TECHNOLOGY			•	S	Semester	VI	
				(CURRICULUM	[
				Profes	ssional Elective	-II			-	-		
S.NO	O COURSE COURSE NAME			AME	CATEGORY	L	Т	Р	С	Max	imum I	Marks
5.10	CO	DE	DE COURSE NAME		CHILGORI	L	-	•	C	CA	ESE	Total
1.	U19C1	ГЕ06	Open Source Systems		PEC	3	0	0	3	50	50	100
2.	U19C1	ГЕ07	Network Programming Protocol	and	PEC	3	0	0	3	50	50	100
3.	U19C1	ГЕ08	Wireless S Networks	Sensor	PEC	3	0	0	3	50	50	100
4.	U19CTE09 Systems			PEC	3	0	0	3	50	50	100	
5.	U19C1	U19CTE10 Computer Graphics and Multimedia			PEC	3	0	0	3	50	50	100

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Progra	amme		B.E.		Programme Co	de	107]	Regula	ation	201	9
Depar	tment	COMP	UTER SCIENC	E AND	TECHNOLOGY	7	ł		Sem	ester	VI	[
				CURRICUL essional Elective		II&IV	1					
S.NO		URSE	COURSE NA	AME	CATEGORY	L	Т	Р	С		imum M	
				Deep Learning				-		CA	ESE	Total
1.	1		1	ng	PEC	3	0	0	3	50	50	100
2.	U190	J19CTE12 Software Performan Testing			PEC	3	0	0	3	50	50	100
3.	U190	CTE13	Information Storage Management		PEC	3	0	0	3	50	50	100
4.	U190	CTE14	High Performance Computing		PEC	3	0	0	3	50	50	100
5.	U190	CTE15	Big Data and Techniqu		PEC	3	0	0	3	50	50	100
6.	Inspired U19CTE16 Computing		Inspired Computing Techniques		PEC	3	0	0	3	50	50	100
7.	U19CTE17 Database Securit and Privacy		curity	PEC	3	0	0	3	50	50	100	
8.	Business			PEC	3	0	0	3	50	50	100	

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Prog	ramme		B.E.		Programme Co	ode	107		Re	gulation	2019	
Depa	artment	COM	PUTER SCIEN	CE AND	TECHNOLOGY				S	Semester	· VIII	
					CURRICULUM							
			Pro	fessiona	l Elective – V&	VI				[
S.NO	COU		COURSE N	JAME	CATEGORY	L	Т	Р	С		ximum]	
5	CO	DE	COURSET		CITZGONI	1	-	-	0	CA	ESE	Total
1.	U19C	TE19	Data Visuali	ization	PEC	3	0	0	3	50	50	100
2.	U19C	TE20	Network		PEC	3	0	0	3	50	50	100
3.	U19C	TE21	Biometrics Systems		PEC	3	0	0	3	50	50	100
4.	U19C	TE22	Natural Lan Processing	guage	PEC	3	0	0	3	50	50	100
5.	U19C	TE23	Forensic Incident Res	and sponse	PEC	3	0	0	3	50	50	100
6.	U19C	TE24	Geographica Information Systems		PEC	3	0	0	3	50	50	100
7.	U19C	TE25	Neuro Fuzz Genetic Programmin	•	PEC	3	0	0	3	50	50	100
8.	U19C	TE26	Knowledge Decision Su Systems		PEC	3	0	0	3	50	50	100

LIST OF OPEN ELECTIVES

Course Code	Course Name	Perio	ods / V	Veek	Credit	Max	imum I	Marks
		L	Т	P	С	CA	ESE	Total
U19CTOE1	Fundamentals of Artificial Intelligence	3	0	0	3	50	50	100
U19CTOE2	Fundamentals of Information Security	3	0	0	3	50	50	100
U19CTOE3	Fundamentals of Data Science	3	0	0	3	50	50	100
U19CTOE4	Fundamentals of Machine Learning	3	0	0	3	50	50	100
U19CTOE5	Fundamentals of Data Visualization	3	0	0	3	50	50	100
U19CTOE6	Computer Forensics	3	0	0	3	50	50	100

Course Code	Course Name	Period	ls / W	Veek	Credit	Max	imum I	Marks
		L	Т	Р	С	CA	ESE	Total
U19MCFY1	Environmental Science andEngineering	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
U19MCFY7	Comprehension on Electricity- Theoryand Practice-I	3	0	0	0	100	-	100
U19MCFY8	Comprehension on Electricity- Theoryand Practice-II	3	0	0	0	100	-	100

MANDATORY COURSE

BSC - Basic Science Courses, ESC- Engineering Science Courses, MC - Mandatory courses, HSC-Humanities and Social Sciences, CA- Continuous Assessment, ESE - End Semester Examination.

 α Common for all branches

* Common for CSE, CST, IT, BT & Common for CSE, CST & EEE

\$ Common for BME, CSE, CST, IT, ECE, BT

			utonomous Ins	titution,	LEGE OF ENG Affiliated to Ann m, Tiruchengode	a Uni	iversit	y, Ch			TÜVPherand (CETTFED)	001.2015
Prog	gramme		B.E.		Programme C	ode	101		Re	gulation	2019	
Depa	artment	СОМ	PUTER SCIEN	CE AND	ENGINEERIN	G		•	S	Semester	-	
	(App	olicable		its admit	CURRICULUN tted from the acc PEN ELECTIV	adem	nic ye	ar 20	19- 20)20 onw	ards)	
S.NO	COU		COURSE N	AME	CATEGORY	L	Т	Р	С		imum 1	r
	CO	CODE								CA	ESE	Total
1.	U19CSC	DE1	Introduction to) IOT	OEC	3	0	0	3	50	50	100
2.	U19CSC	DE2	Ethical Hackir	ng	OEC	3	0	0	3	50	50	100
3.	U19CSC	DE3	Smart Sensor Technologies		OEC	3	0	0	3	50	50	100
4.	U19CSC	DE4	Web Designin	g	OEC	3	0	0	3	50	50	100
5.	U19CSC	CSOE5 Data Analyti		S	OEC	3	0	0	3	50	50	100
6.	U19CSC	CSOE6 Enterprise Java		a	OEC	3	0	0	3	50	50	100
7.	U19CSOE7 Open Source Softw		Software	OEC	3	0	0	3	50	50	100	
8.	3. U19CSOE8 Python Programmin		mming	OEC	3	0	0	3	50	50	100	

			utonomous Ins	titution,	LEGE OF ENG Affiliated to Ann m, Tiruchengode	a Univ	versity.	-			TWRheinard CESTFED WHEN 0 110	001.2015 0.1410 0.14
Prog	ramme		B.E.		Programme C	ode	102		R	egulatio	n 2019	
Depa	artment	ELECTF	RICAL AND ELE	CTRONIC	S ENGINEERING					Semeste	er -	
	(App	olicable		its admit	CURRICULUN tted from the act PEN ELECTI	ademi	c year	20	19- 20)20 onw	vards)	
S.NO	COURSE				CATEGORY	L	Т	Р	С	Max CA	timum I ESE	Marks Total
1.	U19EE	OE1	Electron Devices		OEC	3	0	0	3	50	50	100
2.	U19EE		Electrical Saf	fety	OEC	3	0	0	3	50	50	100
3.	U19EE	OE3	Energy Audit	ting	OEC	3	0	0	3	50	50	100
4.	U19EE	OE4	Energy Stora Technologies	-	OEC	3	0	0	3	50	50	100
5.	U19EE	OE5	Biomass Ene Systems	rgy	OEC	3	0	0	3	50	50	100
6.	U19EE	OE6	Energy Effici Lighting Syst		OEC	3	0	0	3	50	50	100
7.	U19EE	COE7	Soft Computitechniques	ing	OEC	3	0	0	3	50	50	100
8.	A		stems	OEC	3	0	0	3	50	50	100	

A A A A A A A A A A A A A A A A A A A		• -	IVEKANANDHA (Autonomous Instituti Elayampa	ion, 4		a Uni	versity		· ·	· · · · · · ·	TÜVRiehand CERTIFED	0 9001 2015
Prog	gramme		B.E.		Programme C	ode	103	Reg	ulatio	n	2019)
Dep	artment		TRONICS AND CON NEERING	MMU	UNICATION					Semeste	er -	
	(App	olicabl	e to the students ac	dmit		adem	ic yea	r 201	19-20	020 onv	vards)	
	COU	DSE		FO	PEN ELECTI	VES				Ma	vimum	Marks
S.NO			COURSE NAM	E	CATEGORY	L	Т	Р	С	CA	ESE	Total
				OPE	EN ELECTIVE	E-I						
1.	U19EC	DE1	Speech Processing		OE	3	0	0	3	50	50	100
2.	U19EC	DE2	E2 Biomedical Instrumentation		OE	3	0	0	3	50	50	100
3.	U19EC	DE3	Automotive Electronics		OE	3	0	0	3	50	50	100
				OPI	EN ELECTIVI	E-II						
1.	U19EC	DE4	Satellite Communication		OE	3	0	0	3	50	50	100
2.	U19EC	DE5	VLSI Design and Applications	Its	OE	3	0	0	3	50	50	100
3.	U19EC	DE6	Digital Image Processing		OE	3	0	0	3	50	50	100
				OPE	N ELECTIVE	2-III						
1.	U19EC	DE7	Basics of Communication Systems		OE	3	0	0	3	50	50	100
2.	U19EC	DE8	Wireless Sensor Networks		OE	3	0	0	3	50	50	100
3.	U19EC	DE9	PCB Design and Fabrication		OE	3	0	0	3	50	50	100

	VIVEK	KANANDHA COLLEGE (Autonomous Institution Elayampa	Affiliat	ed to A	Anna U		Chennai)	TÜVRheinind CERTIFED	S0 M01205	
Programme	B.Tech.	Programme Code	104			Regulatior	1	2	2019	
Department	INFORM	IATION TECHNOLOGY	Y			Semester	r		-	
	(Applicat	CUR ble to the students admit	RICUL ted from		acader	nic year 2	2019- 202	20 onw	vards)	
LIST OF OPEN ELECTIVES										
Course	Cou	urse Name	Hou	rs /We	eek	Credit	Maxi	imum	Marks	
Code	Cou		L	Т	Р	С	CA	ESE	Total	
U19ITOE1	Mobile app	blication development	3	0	0	3	50	50	100	
U19ITOE2	Robotics		3	0	0	3	50	50	100	
U19ITOE3	Basics of C	Cloud Computing	3	0	0	3	50	50	100	
U19ITOE4	Introductio	on to Data Structures	3	0	0	3	50	50	100	
U19ITOE5	Cyber Secu	ırity	3	0	0	3	50	50	100	
U19ITOE6	Information	n Technology Essentials	3	0	0	3	50	50	100	
U19ITOE7	Business in Application	ntelligence and its	3	0	0	3	50	50	100	
U19ITOE8	Internet of	Things	3	0	0	3	50	50	100	
U19ITOE9	Introductio	n to Java Programming	3	0	0	3	50	50	100	
U19ITOE10	Introductio	ntroduction to R Programming			0	3	50	50	100	
U19ITOE11	Ethical Had	cking	3	0	0	3	50	50	100	
U19ITOE12	Cyber Fore	ensics	3	0	0	3	50	50	100	
U19ITOE13	E Learning	Techniques	3	0	0	3	50	50	100	

		ANDHA COLLEGE OF onomous Institution Affili Elayampalayam,Tir	ated to A	nna U	nivers			TUVheinard GETTPED	
Programme	B.Tech.	Programme Code	105			Regulati	on	2019	
Department	BIOTECHNOI	LOGY				Semest	ter		-
(Ar	plicable to the stu	CURRICU Idents admitted from the a		year2	2019-2	2020onw	ards)		
		LISTOFOPENE	ELECTI	VES					
Course Code	Credit	N	<i>l</i> aximur	n Marks					
Course Code	Court	se Name	L	Т	Р	C	CA	ESE	Total
		OPEN ELE	CTIVE-I	[
U19BTOE1	Biology for En	gineers	3	0	0	3	50	50	100
U19BTOE2	Biofuels and B	ioenergy	3	0	0	3	50	50	100
U19BTOE3	Bio-Business		3	0	0	3	50	50	100
		OPEN ELEC	TIVE-I	I					
U19BTOE4	Basics of Bioin	formatics	3	0	0	3	50	50	100
U19BTOE5	Human Health	and Nutritional Disorders	3	0	0	3	50	50	100
U19BTOE6	Waste Manage	ment	3	0	0	3	50	50	100
		TIVE-I	II						
U19BTOE7	Food Processin Technology	g and Preservation	3	0	0	3	50	50	100
U19BTOE8	Forensic Techr	ology	3	0	0	3	50	50	100
U19BTOE9	Biodiversity an	d Bio proprespecting	3	0	0	3	50	50	100

		ANDHA COLLEGE O mous Institution Affiliat Elayampalayam	ed to An	na Uni	versity	, Chenna		TÜVReinle	ISO 5001.2015	
Programme	B.E.	Programme Code	106			Regulat	ion	2019		
Department	BIOMEDICAL	ENGINEERING				Semes	ster	-		
	(Applicab	CURRIC le to the students admitte 2020on	ed from t	he aca	demic	year 2019)_			
		LIST OF OPEN	ELECI	IVES						
Course Code	Course Code Course Name Hours /Week Credit Maximum Marks									
			L	Т	Р	С	CA	ESE	Tot al	
		OPEN ELF	ECTIVE	-I						
U19BMOE1	Biotelemetry		3	0	0	3	50	50	100	
U19BMOE2	Virtual Instrume	ntation	3	0	0	3	50	50	100	
U19BMOE3	Hospital Waste	Management	3	0	0	3	50	50	100	
		OPEN ELE	CTIVE-	-II						
U19BMOE4	Medical Robot	ics	3	0	0	3	50	50	100	
U19BMOE5	Healthcare Mar	nagement Systems	3	0	0	3	50	50	100	
U19BMOE6	Biometric Systems and Their				0	3	50	50	100	
		OPEN ELEC	CTIVE-I	I						
U19BMOE7	Basics of Biom	edical Instrumentation								
U19BMOE8	Medical Inform	natics								
U19BMOE9	ICU and Operati	on Theatre Equipments								

		ŀ			nomous	Institu	ution, Af	filiated	l to Anr		FOR WOM rsity ,Chenna 205		INFreehand INFreehand
Pro	ogrami	ne	B.E	. Pro	gramm		<u> </u>		U		Regulation	20	19
De	partme	ent	Comp	outer S	Science	& Te	chnolog	y			Semester		Ι
C	C	л.	C.		T			ds Per		Credi	-		um Marks
	Irse Co		Co	urse N			L	Т	Р	C	CA	ESE	Total
U	19MA1	01		Calc	ulus		3	1	0	4	50	50	100
Cour	se Obj	ective	The Ma	Provi Unde Demo Ident	de the i rstand i onstrate ify the j	nform naxim Integr proble	a and mi al calcul ms based	out Rev inima c lus. l on are	of functi ea, surfa	ions of tw ace and w	ontinuity and vo variables. olume. equations	differe	entiability.
						-	e student					Know	ledge leve
a	C		-				heorem :	and Ta	ylor's t	heorem.			K1,K3 K2,K4
Course Outcome	CO2: CO3:	K2,K4 K3,K5											
			CO3: CO4:	K3,K5 K2,K5									
							riation o						K2,K5 K3,K5
Pre-r	equisit	es	-	<u> </u>	metho			i puiu					110,110
	(3/2/1 in	dicates s		n of corre	elation	apping 3-Strong omes (PC		ledium,	1 - Weak		Ma	O/PSO apping PSOs
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO PO 11 12	PSO 1	PSO 2
CO1	3	3	5	7	5	U	/	0	,	10	11 12	2	
CO2	3	3										2	
CO3	3	3										2	
CO4 CO5	3	3										$\frac{2}{2}$	
Course	Direc 1. 2.	t Cont Assi End-	Iethods inuous gnment. Semest	Assess			I & III						
			- end su	irvev									
	1.	Course	- enu si	urvey									

Content of the sylla	abus		
Unit – I	DIFFERENTIAL CALCULUS	Periods	12
	ifferentiability, rules of differentiation, differentiation		
	roof), Mean value theorem(excluding proof), Taylor's theo		
	l Applications (Newton's law of cooling – Heat flow proble		
naterials – Chemical	reactions and solutions, Ohm's law, Kirchoff's law- Simpl	e electric circ	uit problems)
Unit – II	FUNCTIONS OF SEVERAL VARIABLES	Periods	12
Partial differentiation	n - Homogeneous functions and Euler's theorem(exclude	ing proof) –	Total derivative
Change of variables	– Jacobians – Partial differentiation of implicit functions –	Taylor's seri	es for functions o
two variables(exclud	ing proof) – Maxima and minima of functions of two varial	oles	
Unit – III	MUTIPLE INTEGRALS	Periods	12
Riemann integral- Fi	indamental theorem of calculus(excluding proof) - method	s of integration	on (Integration by
parts, Trigonometric	integrals, Trigonometric substitutions, Integration of ration	al functions b	y partial fraction,
	<u>π</u> <u>π</u>		
Into anotion of imat	pol functions) Reduction formula on $\int_{-\infty}^{2} e^{-n} dn = \int_{-\infty}^{2} e^{-n} dn$		
integration of irration	hal functions) -Reduction formula on $\int_{\Omega} \cos^n x dx$, $\int_{\Omega} \sin^n x dx$	Χ.	
	0 0		
Unit – IV	ORDINARY DIFFERENTIAL EQUATIONS	Periods	12
Double integrals – C	hange of order of integration – Double integrals in polar	coordinates -	Area enclosed by
plane curves – Triple	integrals - Volume of solids - Change of variables in doub	ole and triple	integrals.
Unit – V	ORDINARY DIFFERENTIAL EQUATIONS	Periods	12
Second order Line	ar ordinary differential equations with constant co	efficients ('auchy's - Fule
	proof)- Legendre's Linear differential equations(excluding		•
parameters.		5 [
		Total Period	ls 60
Text Books			
1. Stewart, J.	Calculus: Early Transcendentals (8th Edition), Cengage Lea	arning, 2015.	
Grewal B.	S., "Higher Engineering Mathematics", Khanna Publishers,	New Delhi, 4	3rd Edition, 2014
2. Reference	es		
1. Kreyszig E	, Advanced Engineering Mathematics (10th Edition), John	Wiley (2015).	
2. Boyce W I	E and DiPrima R, Elementary Differential Equations (9th Ed	lition), John V	Viley (2005).
3. Nishant Sh	ukla, Elementary Integral Calculus		
	Calculus: Early Transcendentals, 10th Edition, Wiley (201	•	
	ana, Higher Engineering Mathematics, Tata McGraw Hill E	Education Pvt	Ltd., New Delhi
(2012)			
E-Resources			
1. https://freevic	eolectures.com > All Courses > Calculus > UCLA		
2. www.learnerstv	.com/Free-engineering-Video-lectures		
3. www.nptel.ac.i	1		
•			

4			VIVE		nomous Ir	nstitutio		ted to A	nna Univ	ersity ,Che	R WOMEN ennai)		No KRI 2015
Pro	gramm	e	B.E.	Prog	gramme	Code				107	Regulation	202	19
Dep	oartmen	nt	Comp	uter S	cience &	& Tec	hnology	7			Semester		I
Com			Car	urse N				ds Per	-	Credi			um Marks
Cou	rse Cod	le			ame		L	Т	Р	C	CA	ESE	Total
Ul	19EN10	1	English Commu		on- I		3	0	0	3	50	50	100
Cours	se Obje	ctive	• • •	To ma To ma To ma Assist cultura Identi	ake learr ake learr ake learr studen al literac	ners lis ners re ners de ts in cy so t pegin t	aten to a ad wide evelop v the dev hat they to apply	udio fi ly in o ocabul elopme may e	rder to j ary and ent of ngage i	practice strength intellect n life-lo	e it in speakin writing hen grammati ual flexibilit ng learning. of academic	ical und y, crea	lerstanding tivity, and
Cours	se Outc	ome	CO1: S CO2: V reading CO3: U knowlec CO4: L	peak a Vrite a of a va Jse lar lge ab isten t	dequate appropri ariety of aguage to out usir he accer	ly fror ately mater throug ng righ	n the in based tials h their t word a l tones o	puts th on the gramm at the r	ey gain knowle hatical a ight con	ed throu edge gai acquisitiontext. e properl	pected to: gh listening. ned through on and their y. nderstanding		edge Level K2 K3 K3 K2 K4
Pre-re	equisite	s	-										
	(3	/2/1 in	dicates st		CO / F of correl ogramme	ation)	3-Strong		edium, 1	l - Weak		Ma	O/PSO apping PSOs
COs	РО	РО		PO	PO	PO	PO	PO		PO	PO PO	PSO	PSO
CO1	1	2	3	4	5	<u>6</u> 2	7	8	9 3	10 3	<u>11 12</u> 3	1	2
CO1			<u> </u>			2			3	3	3		2
CO3						2			3	3	3		2
CO4						2			3	3	3		2
CO5						2			3	3	3		2

Course Assessment M	lethods Direct		
Direct			
1.Contin	uous Assessment Test I, II & III		
2.Assign			
	mester examinations		
Indirect			
1.Course	- end survey		
Content of the sylla	bus		
Unit – I		Periods	9
Listening-Introduction	on to Different Types of Listening, Listening to Casi	ual Conversa	tions, Speaking-
Introduction to devel	op the Art of Speaking, Giving Self Introduction, Readin	g –Understand	ling the Basics of
	ng Instructions and Technical Manuals, Writing- Introducti		
	LanguageTechnical terms (Jargon), Word Formation w		
Active Voice and Pas	sive Voice, Basic sentence patterns, Tenses (past, present, p	berfect and co	ntinuous tenses).
Unit – II		Periods	9
Listening- Listening	to lectures, listening to description of equipment, Speak	ting- Strategi	es for Developing
	, Short Conversations through Role Play Activities, Read		
	ading Headlines, Predicting the Content, Writing- Note		-
•	Collocations, Functional Use of Tenses, Subject - verb agree	•	
Unit – III		Periods	9
Speaking- Describing Reading passages fo	to different kinds of interviews (Face - to - face, radio, T an Object, Asking Questions, Participating in Discussions or gist. Writing - Informal writing -short e-mails with e tion), Focus on Language –Sequential Connectives, Impers	s Reading – I mphasis on	ntensive reading,
Unit – IV		Periods	9
	ng, Speaking- Improving Fluency through Narration. R		-
-	Phone messages, Reading and Transferring Informatio	-	• • •
-	riting, Writing a Memo, Focus on Language– Pronunciat	-	-
-	and Diphthongs), Cause and Effect, Conditional Statements		
of Modal Verbs.	and Dipinition25), Cause and Effect, Conditional Statement.	, in clauses	und types), Osuge
Unit – V		Periods	9
Listening_ Listening	to understand Modulation, Listening to Welcome Sp	eeches Snea	king. Delivering
0 0	Understanding Segmental and Suprasegmental Features	· •	0
	- Reading for a purpose, Reading Business Documents, In	-	
-	isiness e-mails, Describing a Process. Focus on Langua	- -	-
Common Errors in E	•	ge -Synonym	s and Antonyms,
	ignish.		
		Total Period	s
Text Books			•
1.	, Pereira Joyce, Shameem.M, Selvarajan.R-English Comr vt.Ltd, 2015.	munication S	kills,Vijay Nicole

	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-Re	esou	rces
1.	http	://www.sparknotes.com/lit/the-alchemist/summary.html
2.	http	s://www.stephencovey.com/7habits/7habits.php
3.	<u>http</u>	://en.wikipedia.org/wiki/The_Seven_Habits_of_Highly_Effective_People

	VIVEK	ANANDHA COL (Autonomous Institu Elayamp		d to An	na Unive	rsity ,Cher		-	Winname Correction a reserved
Programme	B.E.	Programme Coc	le			107	Regulation	20	19
Department	Compu	iter Science & Te	echnology				Semester		I
Comme Code	C	rse Name	Period			Credit			um Marks
Course Code			L	Т	Р	C	CA	ESE	Total
U19PH105	Engi	neering Physics	3	0	0	3	50	50	100
Course Objective	• 1 • 2 • 1 5 • 0 t	lent should be ma- understand the bas gain knowledge al dentify the differ Study the product correlate better u emperature in a naterials and its u categorize the type	sic concept bout the corrent types ion and app nderstandin semicondu	nduction of cry plication ng the uctor.	on prop stal str ons of u carrier Study	perties of ructures ltrasonic r concer the pro	metals and crystal s. ntration and	its va	riations with
		nd of the course, th							vledge Level
		nderstand the elas	<u> </u>				. 1		K2
	CO2: ga	in knowledge abo	out the cond	duction	i prope	rties of n	netals		К3
Course Outcome	different	etermine packing types of crystal applications.							K1
		uss the basic idea of modern engine			ng mat	erials an	d realize the		K1
	CO5:lea	rn the optical prop	perties of n	nateria	ls and i	ts uses			К3
Pre-requisites	-		_						

	(.	3/2/1 in	dicates		of corr				ledium,	1 - Weal	ζ		CO/PSO Mapping PSOs		
COs	РО	РО	РО	PO	PO	РО	PO	PO	РО	PO	РО	PO	PSO	PSO	
CO1	1 3	2 2	3	4	5 2	6	7	8	9	10	11	12	1	2	
CO1	3	2	3	3	1									2	
CO3	3	3		3	1									2	
CO4	3		2	1	1								3	2	
CO5	3			1	2	2								2	
Course	Assess	ment N	lethods	Direct											
[Direct	t													
	1.		inuous	Assess	ment 7	Fest I, II	1 & III								
	2.		gnment		inent i	1051 1, 11	a m								
	3.			ter exar	ninatic	ons									
	Indire														
	1.0	Course	- end s	survey											
Cart	4 -641		- 1												
	ent of th nit – I	ie syna	adus		σρωρ	FDTL	S OF N		FD		D	eriods		0	
U	nii – 1				PROP		29 OF N		LK		P	erious		9	
Elastic	city:	Types	of m	oduli	of ela	sticity	- Stres	ss - S	train]	Diagran	n – us	ses. Yo	ung's 1	nodulus:	
														olication:	
	nal per			•				U		0					
Viscos	ity: Co	o-effic	ient of	viscos	sity - F	Poiseuil	lles' for	mula -	- Expe	rimenta	l deter	minatio	on – use	s.	
		T			EL	ECTRO	DNS IN	SOLI	D		D			0	
	J nit – I		<u> </u>	1.0	1.	.1	6	. 1	-	•		eriods	1	9	
														tivity and	
			•										failures		
		-		-				-		-			-	dent wave	
-		lalitat	ive) - F	article	in a or	le-dime	nsional	box - F	ermı –	Dirac S	tatistic	s - Dens	ity of en	ergy states	
(Qualit	auve).														
Un	it – III			CRYS	TAL P	HYSIC	S AND	ULTE	RASO	VICS]	Periods		9	
Crystal	lograph	ıy - Uı	nit cell	- Cryst	tal syst	tems - l	Bravais	lattices	s- Latti	ice plan	es - M	iller ind	ices - I	nter-plana	
spacing	g in cub	ic latti	ice- Ca	lculatio	on of n	umber (of atoms	s per u	nit cel	l- Atom	ic radiu	us – Coo	ordinatic	n number	
	g Factor														
													plicatior	ns: Sound	
Naviga	tion and	d Rang	ing (SC	JNAR)	, Non -	– Destru	ictive T	esting	(NDT)	and Sor	nogram	•			
Un	it – IV			S	SEMI	COND	UCTIN	NG &	MOD	ERN]	Periods		9	
							EERI								
Intrinsi	c semic	onduc	tor: (Qu	ualitativ	ve only) – Carr	ier conc	entrati	ion – Fe	ermi lev	el – Ele	ectrical o	conducti	vity - Band	
									ration	in n – t	ype an	d p - t	ype sem	iconductor	
						-	perature								
Metalli	-	-	-	on, proj	perties	and ap	plicatio	ns - Sh	nape m	emory a	lloys (SMA):	Characte	ristics and	
applica	tions of	NiTi a	alloy						.1						

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
Text	Boo	ks
1	Ι.	R.K. Gaur and Gupta. S.L, Engineering Physics, Dhanpat Rai Publishers, 2017.
2	2.	Pillai., Solid state physics, New Age International Private Limited.
3	8.	Dr.P.Mani, "Engineering Physics", Shri Dhanam publisher, Chennai – 600 042
		References
	1.	B.K. Pandey, S. Chaturvedi. "Engineering Physics", 1 st 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, 6 th 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-Re	sour	ces
1.	WV	vw.e-booksdirectory.com
2.	Ho	ome.iitk.ac.in
3.	ph	ysics.cu.ac.bd/

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Pro	gram	ne	B.E	. Pro	gramm			uenenge	<i>Jue</i> 037	107	Regulation	n 201	.9
Dep	partme	nt	Comp	outer S	cience	& Tec	chnology	7			Semester		Ι
C	C		C		т		Perio	ls Per	Week	Credit		Maximu	m Marks
Cou	rse Co	de		urse N			L	Т	Р	С	CA	ESE	Total
U190	CS101		Proble		ring		3	0	0	3	50	50	100
					U		s course						
								•		equire pro	oblem solvii	ng skills	
Cours	se Obje	ctive					mming c	-					
							sing arra	•	lstrings				
			• \	Write tl	ne prog	rams u	sing fun	ctions					
			• \	Write tl	ne prog	rams u	sing stru	ctures					
			At the	end of	the cou	rse, the	e student	should	be able	to,		Knowl	edge level
			CO1: proble		e the a	algoritl	hms and	l to d	lraw fl	owcharts	for solvin	g	K3
	С	ourse	CO2 :	Analy	ze the t	basics of	of C prog	rammi	ing lang	uage			K4
	Οι	itcome	CO3:	Imple	ment th	e C pro	ograms u	sing a	rrays an	d strings			K4
			CO4:	Devel	op C pr	ogram	s using th	ne func	ctions a	nd pointe	rs.		K3
			CO5:	Solve	the real	l time p	problems	using	Structu	res and u	nion		K3
Pre-r	equisit	es	-										
					CO /	PO Ma	apping					CO/PS	50
	(3/2/1 in	dicates s				3-Strong		edium,	l - Weak		Mappir	ng
COs	PO	PO	PO	Pr PO	ogramm PO	PO PO	omes (PC	os) PO	PO	PO	PO PO	PSOs PSO	PSO
COS	1	2	3	4	5	6	7	8	9	10	10 FO 11 12	1	2
CO1	3	3	3	-	2	-	-	3	3	3	3 2	3	-
CO2 CO3	3	3	3	-	2	-	-	3	3	3	3 2 3 2	3	-
CO3	3	3	3	2	2	-	-	3	3	3	$\frac{3}{3}$ 2	3	-
CO5	3	3	3	3	2	-	-	3	3	3	3 2	3	3
	e Assess	ment M	U		2			5	5	5	5 2	5	
	Direc												
	1.		nuous A	ssessm	ent Tes	st I, II &	z III						
	2.	Assig											
	3.		lemester	r exami	nations								
1	Indire	~ +											

Content of the	syllabus		
Unit – I	INTRODUCTION TO PROBLEM SOLVING	Periods	9
	ion of Computer - Programming Languages- Flowchart - Pse		
	ilding Blocks of Algorithm - Algorithmic Problem Solving-		
	ustrative Problems: Find Minimum value from list of eleme	nts, Guess an Integ	ger Number in a
	l of a given number		
Unit – II	C PROGRAMMING	Periods	9
	C - Features - Data Types - Constants - Variables - I/O Sta		s –Expressions -
	g and Branching - Looping Statements - Break, Goto, Contin		
Unit – III	ARRAYS AND POINTERS	Periods	9
	pts - Need - one dimensional array - array declaration - fe	atures – array initi	alization - Two
	rays- Multidimensional Arrays.		
	duction, pointer declaration-accessing variable through point		
	inters structures-pointer Arithmetic - Array of Pointers – dyna		
Unit – IV	FUNCTIONS AND STRINGS	Periods	9
	duction, function declaration, defining and accessing function prototypes-parameter passing methods-recursion. Strings:		-
	utput Functions- Strings standard functions -Arrays of Strings		s manipulation -
	STRUCTURES AND UNIONS	Periods	0
Unit – V			9
	duction- nested structures- Arrays of Structures - Structu	res and Function	is - Pointers to
Structures – Ur	ions- Type Definition – Bitfields- Enumerated Types.	Total Periods	45
		Total Periods	45
Text Books			
	han BW and Ritchie DM, "The C Programming Language",	2nd Edition, Prent	tice Hall ofIndia
2015.			
2. E. Ba	agurusamy, Computer Programming, First Edition, Mc Graw	Hill, 2016.	
References			
1. Herbe	rt Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edi	tion	
2. Dr.V.	Rameshbabu, Dr.R.Samyutha, M.Muni Rathnan, "Com	puter Programm	ing", VRB
² . Publis	hers Pvt.Ltd,		C /
3. E. Ba	agurusamy, Programming in ANSIC, Seventh Edition, McG	raw Hill, 2017.	
E-Resources			
1. https://	/www.geeksforgeeks.org/c-language-set-1-introduction/		
	/www.programiz.com/c-programming		
2	/www.cprogramming.com/		
nups:	www.cprogramming.com/		

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Pro	ogrami	ne	B.E	. Pro	gramme			luchenge	Jue – 037	107	Regulation	201	9
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U1	19GE1	01	Engin	eering	Grap	nics	2	0	3	3	50	50	100
Cour	se Obje	ective	• •P1 •	Develo and to roject th Sketch Draw Draw t	op skills draw th he draw h section the dev he isom	to er e poi ing o ned v elopr	nts kept i f various iews of s nent of su	eir abil n vario solids. olids. urfaces	lity to k ous posi	tions, line	concept of e es and planes any given o	5.	
		ourse	At the CO1: lines a	Const nd pla	f the co ruct pla ne surfa	ane c aces	curves a	nd dev	velop p	e able to projection ous conc	n of points		edge level K2 K4
		itcome	the sec CO4: CO5:	ction Design	n and d	evelo	op the di	fferent	solid s	surfaces.	e shape of	ıt	K3 K2 K1
Pre-r	equisit	es	solids. -										
	(3/2/1 in	dicates s		of corre	lation	apping) 3-Strong comes (PC		edium, 1	l - Weak		CO/PS Mappin PSOs	
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CO2	3	3	2	2	2	-	-	-	-	-		2	-
CO3 CO4	3	2	23	2	32	-	-	-	-	-		23	2 3
CO4	3	3	2	3	3	-	-	-	-	-		$\frac{3}{2}$	2
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	2.A 3.E Indire	Continu Assignm End-Ser	ous Asse nent nester ex - end su	kaminat		II & I	11						

Content of the sylla			
Concepts &	Importance of graphics in engineering applications –		
Conventions(Not	Use of drafting instruments – BIS conventions and	Periods	_
for Examination)	specifications – Size, layout and folding of drawing	1 chibus	1
· · · · ·	sheets – Lettering and dimensioning.		
Unit – I	PROJECTION OF POINTS, LINES AND PLANE SURFACES	Periods	3+8
Introduction to Pla	ne curves, Orthographic projection – principles – projection	ction of points	s, straight lines
(only first angle pi	ojections) and plane surfaces (polygonal and circular).		
Unit – II	PROJECTION OF SOLIDS	Periods	3+8
Projections of sim	ple solids like prisms, pyramids, cylinder and cone when	n the axis is i	nclined to one
reference plane.			
Unit – III	SECTION OF SOLIDS	Periods	3+8
Sectioning of solic	ls - prisms, pyramids, cylinder and cone in simple vertica	al position by	cutting planes
	erence plane and perpendicular to the other - Obtaining t		
Unit – IV	DEVELOPMENT OF SURFACES	Periods	3+8
	lateral surfaces of simple solids like prisms, pyrami	ds, cylinders	and cones –
Development of			
	nple truncated solids involving prisms, pyramids, cylind		•
development of sin	nple truncated solids involving prisms, pyramids, cylind		5+10
development of sin	nple truncated solids involving prisms, pyramids, cylind ISOMETRIC PROJECTIONS, ORTHOGRAPHIC VIEWS FROM PICTORIAL VIEWS	Periods	5+10
development of sin Unit – V	ISOMETRIC PROJECTIONS, ORTHOGRAPHIC VIEWS FROM PICTORIAL VIEWS	Periods	
development of sin Unit – V Isometric Project	ISOMETRIC PROJECTIONS, ORTHOGRAPHIC VIEWS FROM PICTORIAL VIEWS ion and Introduction to AutoCAD / Solid Edge: Princip	Periods iples of isome	tric projection
development of sin Unit – V Isometric Project - Isometric scale -	ISOMETRIC PROJECTIONS, ORTHOGRAPHIC VIEWS FROM PICTORIAL VIEWS ion and Introduction to AutoCAD / Solid Edge: Princi Isometric projections of simple solids like prisms, pyran	Periods iples of isome	etric projection
development of sin Unit – V Isometric Project - Isometric scale - orthographic view	ISOMETRIC PROJECTIONS, ORTHOGRAPHIC VIEWS FROM PICTORIAL VIEWS ion and Introduction to AutoCAD / Solid Edge: Princi Isometric projections of simple solids like prisms, pyran s from pictorial views.	Periods iples of isome	tric projection
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			The n	nain ol	ojectiv	e of th	nis cour	rse is t	0:				
			•	Unde	rstand e	elastic	behavio	r of Ma	terials				
			•	Predi	ct visco	us forc	e in liqu	iids.					
Cours	se Obje	ctive	•				-		lowest	thickness	s materials		
			•	To Id	entify v	vaveler	ngths of	promin	ent lin	es using j	polychroma	tic lamp	
			•	Obser	rve heat	t condu	ction in	bad co	nducto	r			
			•	Unde	rstand t	he prir	nciple of	interfe	romete	r			
			•	To le	arn abo	ut the c	characte	ristics o	of Lase	rs			
			At th	e end	of the c	course	, the stu	ident w	vill be	able to		Knowl	edge leve
			CO1:	Meas	ure the	youn	ıg"s mo	dulus	of the	materia	ls, Rigidity	' ŀ	K3
			modul	us – To	rsion p	endulu	m						
			CO2:	Calcu	late Co	oeffici	ent of v	viscosit	y of li	quid an	d thickness	ŀ	K3
	Co	urse	of thir	n wire	using A	Air we	dge						
	Out	come	CO3:	Obser	ve and	measu	re the d	lifferer	t wave	elengths	of mercury	ľ	K3
			Spect	rum ar	nd dispe	ersive _l	power of	f a prisi	n				
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						nd the	1mport	ance of	t laser	beam co	ompared to		K2
Dno n	aquisita	-	oraina	ry ligh	lt								
Pre-r	equisite	5	-										
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COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO PO 11 12	PSO 1	PSO 2
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CO2	3	3	1	2	2							2	
CO3	3	2			2							3	
CO4	3	3		1								1	
CO5	3	1	1		1							2	
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	PHYSICS	
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
t Book	s	
1. R .	Jayaraman, Engineering Physics Laboratory Manual, Pearson Pub, Edition-2021	

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Program	nme	B.]	E. / B. 7	Гесh.,			Progra	amme (Code		Reg	ulation		2019
Departr	nent	CSE	, EEE,	ECE,	IT, Bio	-Tech,						mester		Ι
Course Co	ode			Course	Name			Periods L	S Per V T	Veek P	Credi	t N CA	laximun ESE	n Marks Total
U19CS1	02	Com	puter	Pract	ices La	aborat	tory	0	0	4	2	50	50	100
Course Objective		• • •	Mal Unc Dev Arti al worle	ke the s derstand velop a iculate d proble	program where o ems	s to lean nsic pro m with comput	rn the p ogramm a desiro er prog	ing cor ed runti rams fi	ime ex t in th	s and ecutione prov	articula on flow ision of	f compu		d solutions
			e end o	f the co	urse, th	e studei	nt shoul	d be ab	le to,		•	ands-on	experies K	nce. nowledge Level K3
Course Outcome		CO2 flowe	: Sket charts	ch flov	w of e	execution	on of	C pro	grams	using	g algor	ithm a		K3
		CO4 and p	: Demo ointers	onstrate 3.	e code 1	reusabi	lity wit	h the h	elp of	user		tements functio		K3 K4
Pre-		NIL	• ••••••••	² progr <i>a</i>	uns una	t perior	in oper	ations	using	uerrve	u uata i	ypes.		K3
requisites	5													
Cos	(3/	'2/1 ind	licates s	trength	of corre				edium	, 1 - W	eak		CO/P Mapp PSOs	
P	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			1	1	2		3	3	2
CO 2	3	3	3		3			2	1	3		2	3	2
CO 3 CO 4	3 3	3	3	2	3			2	2	3		$\frac{2}{2}$	3	2
CO 5	3	3	3	3	3			2	2	3		2	3	1
2. C	relab	and po	st lab te	est ints & V nations	/iva							_	_	

LIST OF EXPERIMENTS:	Course Outcome
1. Design an algorithm and flowchart using word processor that reads the custome number 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.	
2. Design an algorithm and flowchart for a simple calculator program using word processor for performing various arithmetic operations such as	CO2
 "+" - Addition "-" - Subtraction "*" - Multiplication "/" - Division "%" - Modulus 	
 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 as read 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 the integer that is given as input by the user. Test Case: Sample Input: 15390 Sample Output: Sum of the digits=18 	f CO3
No. of digits $= 5$ For an incorrect choice, an appropriate error message should be displayed.	
 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. 	C03
6. Write a program to find the maximum and minimum element in a set of inputs using one dimensional array.	CO3

	~~ .
7. Write a program to count the total number of vowels and consonants in a string. For	CO4
example	
Input string: I am proud to be an Indian	
Output: Total vowels -10 and Total consonants -10	
8. Develop a program to perform the following string manipulations without using string functions:	CO4
a. String copy	04
b. String Concatenate	
c. String length	
d. String Compare	
d. String Compare	
9. The Fibonacci numbers are defined recursively as follows:	
F1=1	CO4
F2=1	04
Fn = Fn-1 + Fn-2, n > 2	
Write a function that will generate and print the first n Fibonacci numbers.	
Test the function for $n=5,10,15$	
10. Write a function using pointers to exchange the values stored in two locations in the memory. Test Case :	CO4
Input : A=10, B=-5	
Output : $A = -5$, $B = 10$	
Output : A= -5 , B=10	
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/	

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			The stu					<u> </u>		ly are ex		l to:		Knowled level	lge
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Cour	se Out	omo	CO2: water.	Recogi	nize qu	ality,	standard	l and c	control	strategie	es of	pollute	d	K3	
Cours		come			-		pollution							K3	
			method	1		Ũ				ollution		Ŷ		K3	
			CO5:A Enviro		ess at	oout	populati	on gr	owth,	human	righ	its an	d	K2	
Pre-re	equisit	es	-												
	(3/2/1 in	dicates s	strength	of corre	elation)	a pping 3-Strong	g, 2 – M	edium, 1	l - Weak				CO/PSO apping	
COa	РО	РО	РО	Pr PO	ogramm PO	e Outc	omes (PC	Ds) PO	PO	PO	РО	РО	PSO	PSOs PSO	-
COs	1	2	3	4	5	6	7	8	9 9	10 10	11	12	1	2	,
CO 1 CO 2	3	1 2	1 2			2	3				1	23		1	
CO 2 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	Assess	ment N	lethods	Direct											
	Direct														
			inuous	Assess	ment T	est I, I	I & III								
		Assign													
-	3. Indire		emester	exami	nations										
-			- end si	urvev											
	1.1		end b	arrey											

Content of the syllab		1	
Unit – I	Introduction to Environmental Science and Engineering	Periods	9
Resources) problems and functions of ecos	Fenvironmental education- Natural Resources – (Forest, and remedial measures, Ecosystem and Biodiversity- Ecosy system (in general)- Biodiversity – Definition – Conservati tal awareness and sustainable development	stem-Structure	e, Characteristic
Unit – II	Water pollution and Waste water treatment process.	Periods	9
process- Primary, Sec	es, effects and control measures of water pollution- case condary, Tertiary and desalination -Water quality paramet ality standard- WHO and BIS.	•	
Unit – III	Air Pollution and its Control	Periods	9
effect, Ozone layer d	of Air pollutants-CO ₂ ,SO ₂ , NO ₂ , PAN etc Sources- causes, epletion and global warming)- control measures (Electro s house filter, Wet Scrubber and cyclone separator).		
Unit – IV	Radioactive Pollution and Solid waste	Periods	9
-	- solid waste-definition-Types of solid waste- Disposal m gnificance for prevention of hazardous waste management.		problem in solie
waste management-Si Unit – V Population growth, H Women and Child we	Ignificance for prevention of hazardous waste management. Human population and the environment fuman rights, Value education, environment and Human he elfare, Role of information technology in environment – Sat	Periods ealth, Family v tellite, Data ba	9 velfare Program
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Programme	B.E.		-	-	Prog	gramm	e Code	107	Reg	ulation	,	2019
Department	Compu	ter Scie	nce & Te	chno	ology				Se	emester		II
Course Code		Course N	lama		Period	ls Per V	Week	Credit		Maxim	um Ma	arks
Course Code		Course N	lame		L	Т	Р	С	(CA	ESE	Tota
U19MA202		Algebra ry Diffe ons			3	1	0	4		50	50	100
Course Objective	• • • •	Understa equation Proficies Demons To know Identify	ntly under trate vect v about C the Lapla	n valu rstan for in artes ace tr	ues and d the ve tegral c ian and cansform	Eigen ector c calculu l Polar n of de	lifferen is. co-ord erivativ	tial calcu inates an res and ir	ılus. d also	o transfo ls.	rmatio	ns.
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			he Reduct				10[1]].					3, K4 2, K3
Course Outcome			een's, St				verger	nce theor	ems			, K5
			g the anal									2, K5
		Recognize	e the Lap				unit ste	ep and u	nit imj	pulse	Kŝ	5, K3
	-									ı		
·requisites												
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-requisites (3/2/1 inc	licates str		CO / PO correlation			g, 2 − 1	Mediun	n, 1 - We	eak		CO/PS Mappi	-
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	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
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

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

Periods

12

quadratic forn	to canonical form by orthogonal tran	sformation – Nature of quad	ratic forms Si	mple application
·	essage using 2×2 matrix.	Istormation – Nature of quad	Tatle Torms. Sh	
Unit - II	VECTOR DIFFERENTIAL	CALCULUS	Periods	12
	entiation: Vector and Scalar Func		Gradient of	a Scalar Field-
	rivative -Divergence of a Vector Fie			
Unit – II	VECTOR INTEGRAL CAI		Periods	12
	and Volume integrals, Green's t			
	ling proof), Stokes theorem (Excl	uding proof) - simple appli	cations involv	ving rectangular
parallelepiped				
Unit - IV	ANALYTIC FUNCTIONS		Periods	12
	ons – Necessary and sufficient con			
	armonic conjugates – Construction cz,1/z and Bilinear transformation.	of analytic function - Confe	ormal mapping	g – Mapping by
Unit – V	LAPLACE TRANSFORMS	5	Periods	12
Existence con	itions – Transforms of elementary fu	unctions – Transform of unit	step function a	and unit impulse
	c properties – Shifting theorems(exc			
	value theorems(excluding proof) –			
	form of periodic functions – Applica	tion to solution of linear seco	ond order ordin	ary differential
equations with	constant coefficients.	r		(0)
	constant coefficients.]	Fotal Periods	60
Text Books				
	T.Veerarajan, Engineering Mathema	atics, Tata McGraw Hill Educ	cation Pvt. Ltd	-2012
Text Books		atics, Tata McGraw Hill Educ	cation Pvt. Ltd	-2012
Text Books	T.Veerarajan, Engineering Mathema Ravish R Sing , Mukul Bhatt, "Engi 2018	atics, Tata McGraw Hill Educ neering Mathematics", Mc G	cation Pvt. Ltd raw Hill Educ	-2012 ation Pvt. Ltd-
Text Books 1. 2.	T.Veerarajan, Engineering Mathema Ravish R Sing , Mukul Bhatt, "Engi 2018 Wylie, R.C. and Barrett, L.C., "Adv	atics, Tata McGraw Hill Educ neering Mathematics", Mc G anced Engineering Mathemat	cation Pvt. Ltd raw Hill Educ	-2012 ation Pvt. Ltd-
Text Books 1. 2. ferences	T.Veerarajan, Engineering Mathema Ravish R Sing , Mukul Bhatt, "Engi 2018 Wylie, R.C. and Barrett, L.C., "Adv Education Pvt. Ltd, 6th Edition, Nev	atics, Tata McGraw Hill Educ neering Mathematics", Mc G anced Engineering Mathemat w Delhi, 2012.	cation Pvt. Ltd raw Hill Educ tics" , Tata Mc	-2012 ation Pvt. Ltd- Graw Hill
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Text Books 1. 2. ferences 1. 2. 3.	T.Veerarajan, Engineering Mathema Ravish R Sing , Mukul Bhatt, "Engi 2018 Wylie, R.C. and Barrett, L.C., "Adv Education Pvt. Ltd, 6th Edition, New Kreyszig, E., Advanced Engineering Alan Jefferis , Advanced Engineering Yunus A.Cengel, William J.Palm III McGraw Hill Education Pvt. Ltd, 6t	atics, Tata McGraw Hill Educ neering Mathematics", Mc G anced Engineering Mathemat w Delhi, 2012. g Mathematics (10th Edition) ng Mathematics, Academic Pro I," Differential equations for h Edition, New Delhi, 2012.	cation Pvt. Ltd raw Hill Educ tics" , Tata Mc , John Wiley (ess- New Delh Engineers & S	-2012 ation Pvt. Ltd- Graw Hill 2015). i-2003
Text Books 1. 2. ferences 1. 2. 3. 4.	T.Veerarajan, Engineering Mathema Ravish R Sing , Mukul Bhatt, "Engi 2018 Wylie, R.C. and Barrett, L.C., "Adv Education Pvt. Ltd, 6th Edition, Nev Kreyszig, E., Advanced Engineering Alan Jefferis , Advanced Engineering Yunus A.Cengel, William J.Palm III	atics, Tata McGraw Hill Educ neering Mathematics", Mc G anced Engineering Mathemat w Delhi, 2012. g Mathematics (10th Edition) ng Mathematics, Academic Pro I," Differential equations for h Edition, New Delhi, 2012.	cation Pvt. Ltd raw Hill Educ tics" , Tata Mc , John Wiley (ess- New Delh Engineers & S	-2012 ation Pvt. Ltd- Graw Hill 2015). i-2003
Text Books 1. 2. ferences 1. 2. 3. 4. 5.	T.Veerarajan, Engineering Mathema Ravish R Sing , Mukul Bhatt, "Engi 2018 Wylie, R.C. and Barrett, L.C., "Adv Education Pvt. Ltd, 6th Edition, New Kreyszig, E., Advanced Engineering Alan Jefferis , Advanced Engineering Yunus A.Cengel, William J.Palm III McGraw Hill Education Pvt. Ltd, 6t	atics, Tata McGraw Hill Educ neering Mathematics", Mc G anced Engineering Mathemat w Delhi, 2012. g Mathematics (10th Edition) ng Mathematics, Academic Pro I," Differential equations for h Edition, New Delhi, 2012. nematics, Anuradha Agencies	cation Pvt. Ltd raw Hill Educ tics" , Tata Mc , John Wiley (ess- New Delh Engineers & S	-2012 ation Pvt. Ltd- Graw Hill 2015). i-2003
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Соц	rse Code	C	ourse N	Jame			ds Per		Cred				um Marks
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		CO1:	Acquir	who com re suffici al contex	ient co	mmand	over la	nguag	e to spea	k at ar	n acader		Knowledge level K2
Cours	se Outcom	CO2:		technica ar readin	-	ll at a p	orofessi	onal co	ontexts t	hroug	h exposi	ing	K3
			h the er	nguage nrichme		-			-				K3
				ts should ormation									K2
-		CO5:	Studer	nts shoul	d be p	roficien	nt in ora	l com	municati	on an	d writin	g.	K4
Pre-re	equisites	-											
	(3/2/1	indicates		CO/F of correl ogramme	ation)	3-Strong		edium,	1 - Weak	-			CO/PSO apping PSOs
COs	PO PO	PO	PIO PO	PO PO	PO PO	PO PO	PO	РО	PO	РО	PO	PSO	
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CO 5					2			3	3		3		2

Direct			
	nuous Assessment Test I, II & III		
2.Assig			
	Semester examinations		
Indirect			
	e - end survey		
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Content of the syll	abus		
Unit – I		Periods	9
Listening- Listenin	g for Cultural Awareness, Listening to Professional Conver-	sations, Talks	. Interviews an
	Developing Confidence to get rid of Fear on the Dias, Discu		
	al Reading, Reading Short Messages and Technical Articles, V		▲
Writing, Writing Fo	rmal and Informal Letters, Thanking Letters, Letters Calling	for Quotations	s, Letters Placin
Ū.	clarification, Letters of Complaint. Focus on Language	e–Adjectives	and Degrees o
Comparisons		1	1
Unit – II		Periods	9
• • • •	g to specific information relating to technical content, Lister		
	sing opinions, Formal Discussions, Describing Role Pla . Reading –Reading Technical Articles in Journals and Compa	•	
Consolidating Ideas seeking permission	. Reading –Reading Technical Articles in Journals and Compa to undergo practical training and to undertake project work.	aring Articles.	. Writing- Lette
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3.	httr	p://www.imdb.com/title/tt0482629/plotsummary

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				O4: Recognize the renewable energy devices for sustainable energy.K3 O5: Identify the rate of corrosion of a metal in a given environment and ind out appropriate control techniques to avoid corrosion.K3											
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Unit – I	WATER TECHNOLOGY	Periods	9
- Determination of Problems due to har corrosion, Treatment conditioning) Extern	and impurities in Water, Soft and Hard water, Water quality Hardness by EDTA method, Domestic Water Treatment. E d water in boilers - Scale and Sludge formation in boilers t of boiler feed Water – Internal conditioning (Carbo al conditioning – Ion exchange process, Zeolite process, Brac	Boiler Feed W s-Caustic Emb mate, Phospha	ater –Requisites rittlement-Boile ate, and Calgor
oy Reverse osmosis. Unit – II	POLYMER CHEMISTRY	Periods	0
	ence, definitions – Functionality - Degree of Polymerizatio		9
Addition, condensati	Tg, molecular weight - number and weight average meth on and copolymerization. Mechanism of polymerization: A zation) . Preparation, properties and applications of PE, PMM	ddition - Free	radical, cationi
Unit – III	NANO CHEMISTRY	Periods	9
Thermolysis - hydro	cluster, nanorod, nanotube (CNT) and nanowires. Syn thermal, solvothermal, Electro deposition, Spray Pyrolysis, rties and applications of nano materials in medical and elect	, Chemical Va	
n Solar cells - Work Wind Power Plants TPPs), Barrage and Alkaline battery, lead Unit – V Introduction, Types of Pypes of electrochem ence and Pipeline co and impressed cathoo	RENEWABLE ENERGY AND STORAGE DEVICES ad its sources - Solar Energy - Photo voltaic cells, Importance, Importa	Periodsce of Solar celerials, Wind erTypes of TirTypes of batt 1_2 -O2 fuel cell-Periodsnanism, Pillingce corrosion, Ccrol methods –ctions, Metalli	nergy - Types of dal power plant eries - Dry cells applications. 9 g -Bedworth rule Corrosion on win Sacrificial anod c coatings - step
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	5. Dr.S.Vairam ,Dr.Suba Ramesh, Engineering Chemistry: First Edition, Wiley publication, Reprint- 2016
E-R	lesources
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

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-	Course Djective	e	•	Learn Learn	the bas the elec	sic con ctrical	cepts o wiring	metho	ods	-		nd electrical ligital logic		nes	
			At the e	nd of t	he cour	se, the	studen	t shou	uld be	e able t	0,		K	nowledge Level	
At the end of the course, the student should be able to, CO1:Understand the basics of electric circuits and type of the											K2	Level			
	~	-	connect CO2: U principl	K2											
Course Outcome			CO3:U	K2											
		-	CO4:U	K2											
		-	CO5:Understand the fundamentals of digital logics and integrated K2 circuits.												
Pre-r	equisit	tes	Basic co		and ur	ndersta	nding o	of mag	gneti	c fields					
	((3/2/1	indicates		h of cor	relatior		ong, 2		CO/PSO Mapping					
				Р	rogram	me Out	comes (POs)					PSOs		
COs	PO 1	PO 2	PO 3	PO 4	РО 5	PO 6	PO 7	РО 8	PO 9			PO PO 11 12	PSO 1	PSO 2	
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	Indir	ect													
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Content o		yllabus		
Unit –	- I	INTRODUCTION OF ELECTRICAL CIRCUITS	Perio ds	9
		age, Current, Power, Energy, Power factor, Circuit parameter		
		ircuits- RMS value, Average value, Form and Peak factors, Con		
ntroduction of DC circu		ree phase systems - types of connections, relationship between	line and phase	values. Concep
Unit –		INTRODUCTION OF ELECTRICAL MACHINES AND MEASUREMENTS	Periods	9
Faraday"s	laws o	f electromagnetic induction - Lens law - Fleming's left har	nd rule and R	ight hand rule.
Working p	rinciple	e and construction of AC and DC machines -Working p	principle and o	construction of
		oduction to electrical measuring instruments – Analog and Digit	Periods	(Quantative)
Unit –		WIRING AND ILLUMINATION		1
Electrical ta	ariff - I	taircase and corridor wiring - wiring accessories. Different type Energy conservation. Simple layout of power system-various mination - Different types of electrical lamps.		
Unit –	IV	SEMICONDUCTOR DEVICES	Periods	9
		istor configurations -characteristics - comparison. Special s	semiconductor	uevices. I'L'I
SCR - LED Unit –	- V-I	characteristics –UPS – SMPS. DIGITAL FUNDAMENTALS	Periods	9
SCR - LED Unit – Number sy	- V-I	characteristics –UPS – SMPS.	Periods	9
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Cours	se Outco	ome	CO 1: Explain the usage of civil engineering materials and measure the location of points in surveyingK2CO 2: Identify the nature of building components, structures and material qualities.K1CO 3: Classify the various types of power plant, pump, turbine & boilerK2CO 4: Compare spark ignition and compression ignition of two stroke and four stroke engine.K2CO 5: Elaborate the working principle of refrigeration and airK3												
Pre-re	equisites		conditi -	oning s	ystem.										
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CO 2	3	3	3	2	3		_	-	_	-	-	-	2		-
CO 3	3	2	2	-	2	-	-	-	-	-	-	-	2		3
CO 4	3	3	2	-	2	-	-	-	-	-	-	-	2		-
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Content of the sylla	bus		
Unit – I	CIVIL ENGINEERING MATERIALS AND SURVEYING	Periods	9
Civil Engineering N	faterials: Bricks – Stones – Sand – Cement – Concrete – Sto	eel sections.	
Surveying: Introduct	tion to Surveying & Leveling.		
Unit – II	BUILDING COMPONENTS AND STRUCTURES	Periods	9
	election, Foundation – Types – Requirement of good foundat ck masonry – Stone masonry – Beams – Columns – Lintels –		oring - Plastering
Unit – III	POWER PLANT ENGINEERING	Periods	9
Solar, Wind and Nu reciprocating pumps	cation of Power Plants – Boiler - Working principle of steam clear Power plants – Merits and Demerits – Pumps and tu (single acting and double acting) – Centrifugal Pump.	rbines – Worl	
Unit – IV	IC ENGINES AND AUTOMOTIVE VEHICLES	Periods	9
	engines as automotive power plant – Four stroke and two strois of four stroke and two stroke engines - Introduction to I	•	•
Unit – V	REFRIGERATION AND AIR CONDITIONING SYSTEM	Periods	9
	igeration and air conditioning. Principle of vapour comp – Layout of typical domestic refrigerator – Window and spli		
		Total Periods	45
Text Books			
1. Dr.P.Kann	an, "Basic Mechanical Engineering", JBR Tri Sea Publisher	s Pvt. Ltd., 201	19.
2. Pravin Kur	nar, "Basic Mechanical Engineering", Pearson Publishers, N	lew Delhi, 201	3.
References			
	chandaran, "Basic Civil and Mechanical Engineering " Air	Walk Publicat	ion,2016
	Basic Civil Engineering", RPH Publication, 2016.		
	armathi, Mr.K.Rajasekar & Mr.T.Satheeskumar, "Basic Civ	vil Engineering	g", JBR Tri Sea
G Shanmu	Pvt. Ltd., 2017. gam and M.S Palanichamy, "Basic Civil and Mechanical Er	ngineering "T	ata McGraw Hill
^{4.} Publishing	Company Limited, New Delhi,2014		
5. S.Seethara	man, "Basic Civil Engineering ", Anuradha Agencies, 2005		
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	.in/downloads/105105104/		
2. https://nptel.ac	.in/courses/112107216/		
3. http://link.sprin	nger.com/ "Basic Civil and Mechanical Engineering"-Spring	er Nature.	

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		-	CO4: A						K3,K4 K3,K4						
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	programs : finding factorial of n, generating Fibonacci seri	es, exchange the	values of two
	alculating student grade, sum and average of n elements, linear se		ern.
Unit –	LISTS TUPLES SETS AND DICTIONARIES	Periods	12
Lists: list o	perations, list slices, list methods, list loop, mutability, aliasing,	cloning lists, list pa	arameters;
	e assignment, tuple as return value; Sets: methods and operators	, Dictionaries: opera	ations and
methods.	programs: find minimum in a list, list operations, create and in	cort alamants in a D	ictionary
	on sets and tuples.	sent cicilients in a D	icuollary,
Unit –		Periods	12
Functions of	lefinition, declaration, arguments, parameters - formal and lo	cal, parameter pass	ing methods -
function pro	ototypes, recursion; Strings: string slices, immutability, string fun	ctions and methods,	string module,
regular exp	ressions.		
	programs: String manipulations, function that takes a list of w		-
longest one	counting the vowels and consonants in a given string, exchangi	ng of two values usi	ng recursion.
Unit –	IV FILES AND MODULES	Periods	12
Files and e	xception: Text files, reading and writing files, format operator		rguments.
	xceptions, handling exceptions, modules, accessing CSV file.	,	8,
Illustrative	programs: Word count, file copy, file operations: accessing a C	SV file and generate	e reports.
Unit –	V PACKAGES AND DATA VISUALIZATION	Periods	12
	sing, Numerical processing: numpy package – mean, medium		
	frame, data visualization: matplotlib, Time operations.	and mode, pundus	puekuge
	programs: Bar chart, Pie Chart, Create and display a data fr	ame from a diction	ary inputusing
Pandas, Cre	ate a 3x3 matrix with values from 2 to 10 using numpy.		
		Total Periods	60
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	AnuragGupta,G.P BISWAS ," Python Programming – Prob	lem solving, packa	ges and
1.	Libraries, Edition 1, Tata McGraw Hill, 2018		8
2	E Balagurusamy, "Problem Solving and Python Programming	g", Edition1 , TataN	AcGraw Hill,
2	2018		
3.	ReemaThareja, "Python Programming using Problem Solving J	Approach", OXFOR	D University
	Press, 2017. References		
1.	Allen B. Downey, "Think Python: How to Think Like a Comp	uter Scientist 2nd	l edition.
	Updated forPython 3, Shroff/O,,Reilly Publishers, 2016.	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	······································
2.	John V Guttag, -Introduction to Computation and Programm	ning Using Python,,	", Revised
	andexpanded Edition, MIT Press, 2013		
3.	John V. Guttag, Introduction to Computation and Programmi of India, 2014.	ng using Python ^I , P	rentice Hall
E-Resourc			
1.	http://greenteapress.com/wp/think-python/)		
2.	https://www.python.org/about/gettingstarted/		
2.		ramming/	
3.	https://beginnersbook.com/2018/03/python-tutorial-learn-progr	ramming/	

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	Direct	
	1.Prelab and post lab test	
	2.End-Semester examinations	
	Indirect	
	1.Course - end survey	
Conte	nt of the syllabus	
	CHEMISTRY	
1.	Estimation of HCL using NaOH by Conductometric titration.	
2.	Estimation of Mixture of acid using NaOH by Conductometric titration.	
3.	Estimation of Barium chloride using sodium sulphate by Conductometric precipitation titration.	
4.	Estimation of ferrous iron by Potentiometric titration.	
5.	Determination of HCL using NaOH by pH metry.	
6.	Estimation of Ferric ion by Spectrophotometry.	
7.	Determination of Total, temporary and permanent hardness of water by EDTA method.	
8.	Estimation of Dissolved Oxygen content in water by Winkler's method.	
9.	Estimation of alkalinity in water sample.	
10.	Estimation of available chlorine in bleaching powder.	
	Total Periods	45
ext B		
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	

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S.No	LIST OF EXPERIMENTS	Course Outcome						
	<u>GROUP A</u>							
	(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							
	Sheet Metal Work: 9. Forming & Bending	CO1						
	10. Model making – Tray and Basket.	CO1						
	 4.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. 5. Study of Air Conditioner & Centrifugal Pump. 							
	<u>GROUP B</u> (ELECTRICAL & ELECTRONICS ENGINEERING)							
1. Residen	tial house wiring and stair case wiring using switches, fuse, indicator & lamp.	CO3						
2. Fluores	cent lamp wiring.	CO3						
	ement of voltage, current, power & power factor using R-Load.	CO3						
	ement of energy using single phase meter.	CO3						
	ement of resistance to earth of electrical equipment.	CO3						
	ement of illumination to earth of electrical equipment.	CO3						
	f batteries.	CO3						
	CTRONICS ENGINEERING PRACTICE							
	f Electronic components and equipments – Resistor, colour coding.	CO4						
	f logic gates AND, OR, NOR, NAND and NOT.	CO4						
	tion of Clock Signal.	CO4						
4. Solderin PCB.	ng practice – Components Devices and Circuits – Using general purpose	CO5						
	Total Periods	45						

Referen	ce Book :
1.	Dr.P.Kannan, Mr.T.Satheeskumar & Mr.K.Rajasekar, "Engineering Practices Laboratory" Manual.
	First Edition, 2017.
2.	Mr.T.Jeyapoovan, Mr.M.Saravana Pandian, "Engineering Practices Lab" Manual, Vikas
	Publishing House Pvt Ltd, 2017.

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1. Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, NewDelhi 2. Tanushukla, 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 andprofessional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2 4. R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi 5. Indian polity, M.Laksmikanth, Tatamchrawhill publications E-Resources 1. https://mhrd.gov.in/ 2. https://niti.gov.in/content/niti-aayog-library					45
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			 Learn the different types of Sorting and Searching Techniques and H At the end of the course ,the student should be able to, CO1: Able to handle operations like searching, insertion, deletion, and 												owledge K3	level
	Course		traversing mechanism etc. on various data structures. CO2:Explore to use and implement linear and non-linear data structures like stacks, queues, linked list K4													
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		Ts—Singly Linked List–Simple Array based Implementation-C ular Doubly Link List -Applications of Linked Lists-Cursor Im		
Unit	t–II	STACK,QUEUEANDHEAP	Periods	9
ListbasedI	mplem	ybasedImplementation-ListbasedImplementation–QueueADT– entation-ParsingArithmeticExpressions-DequeueADT–Implem ntation,Binary Heap.		Implementation rityQueue
Unit -		TREES	Periods	9
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Unit-	-IV	GRAPHS	Periods	9
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Unit– I	Introduction	Periods	10
Architecture a	Introduction to Database Hierarchical, Network and Relatind Data Independence– The Database System Environment– Da k model, relational and object oriented data models, Embedded SQ	ta models: H	
Unit–II	Relational query languages and Query processing	Periods	9
Relational algo	ebra ,Relational Calculus, DDL and DML constructs ,Query proces	sing and opti	mization
Unit – III	Relational Data base and Design	Periods	8
	tions, Aggregate Functions, Nested Sub Query Views, Modification -1 NF,BCNF, 3NF	n of DataBase	, Joined Relation-
Unit– IV	Transaction Processing and Database Recovery	Periods	8
•	ontrol ,ACID property ,Serializability of scheduling ,Locking and	d time stamp	based schedulers
	and optimistic Concurrency Control schemes ,Database recovery	Periods	10
Unit– V	Database Storage strategies & Security	Periods	10
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	Abraham Silberschatz, HenryF. Korth, S. Sudharshan,"Data base	System Con	ncepts", 7 th
	Edition ,TataMc GrawHill, March 2019.		
2. ^I	R.ElmasriandS.Navathe,"Fundamentals of Database Systems", Pear	rson7thEd1t10	on, 2016.
3. I	Peterrob, Carlos Coronel, "Database Systems Design, Implementationa	ndManagem	ent",9thEdition,
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2	uptaGK,"DatabaseManagementSystems",TataMcGrawHillEducation	onPrivateLim	nited,NewDelhi,2
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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/
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7.	https://www.lynda.com/NoSQL-training-tutorials/1473-0.html

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				~	Periods Per Week				Credi				Maximum Marks				
Course Code U19IT304			Course Name Computer Organization			L		Т	Р	С	CA		ESE	Γota	1		
				aputer & Arc	0		3		0	0	3	50		50	1	00	
Cour	se Obj	ective	 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 microprogrammed 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 interference. 														
				interfaces. At the end of the course ,the student should be able to,											Knowledg e level		
				CO1: Design the concepts in modern computer architecture.CO2: Interpret the operations and instruction sequences in a basic											К3		
Course Outcome			computer.											К3			
			CO3: Examine the hierarchical memory system including cache											К3			
				memory and virtual memory. CO4: Inspect the different ways of communicating with I/O devices													
				and standard I/O.											К3		
			CO5	CO5: Demonstrate the memory functioning and DMA Controller.											К3		
Pre-r	requisit	tes	-														
							Mapping							CO/PSO			
		(3/2	2/1indi	/1indicatesstrengthofcorrelation)3-Strong,2 – Medium,1-Weak Programme Outcomes(POs)											Mapping PSOs		
COs	PO 1	P 0 2	PO 3	PO 4	PO 5	P O 6	PO 7	P		PO 9	PO 10	PO 11	PO 12	PS 1	0	PSO 2	
CO1	3	1	2											2		2	
CO2 CO3	2	23	3											2		2	
CO4	1	2	2											2		2	
CO5	1	3	2	1										2		2	
Course	e Assess	ment N	1ethod	ls Direc	t												
	Direct 1. Continuous Assessment Test I, II & III 2. Assignment. 3. End-Semester examinations																
	Indire																
	1.	Course	e - end	survey	/												

	of the syllab t– I	BASICSTRUCTUREOFCOMPUTERS	Periods	9
				-
		asic operational concepts –Bus structures –Software Multicomputer–MemoryLocationsandAddresses Instruction		
-		Fixed point and Floating point representations.	s and msuucu	on sequencing-
		BASICPROCESSINGUNIT		
Unit			Periods	9
	-	ts-Execution of a complete instruction-Multiple bus orga		wired Control-
		control: Micro Instructions-Micro Instructions with next add		
Unit		PIPELINING	Periods	9
	•	a hazards-Instruction hazards-Influence on instruction	sets Datapat	h and control
consider	ations-Supe	rscalar operation–Performance considerations.		
Unit-	- IV	MEMORYSYSTEM	Periods	9
		iconductor RAM–ROM–Speed Size and cost– Ca		-
		al memory–Memory management requirements –Associa		
	devices.			- ~~···
Unit	– V	I/OORGANIZATION	Periods	9
I/Odavi	A accession	al/Odaviana DragrammadIanut/output Intermenta DirectM		Ducas
		gI/Odevices–ProgrammedInput/output–Interrupts–DirectMe ndardI/OInterfaces (PCI, SCSI, and USB)–processor Famili		Duses-
Interface	circuits-sta		cs. Fotal Periods	45
¹ ocoStu	ling:Cognety	dy-InstructionsetsofsomecommonCPUs,ARecentIntelProce		
		nitofthecomputerandIBM5SYSTEM/360-370Architecture.	ssor,A casestu	uyoliALU-
Text Bo	e e			
1.	Carl Hama	cher, Zvonko VranesicandSafwatZaky,5thEdition"Computermber4, 2011.	er Organization	n",McGraw-
	William S	Stallings ,"Computer Organization and Architecture–De earson Education, March 2012.	signing for l	Performance",9t
2.				
eferenc	es		TT 11 OF 1'	2000
	es	Mano, "ComputerSystemArchitecture", ThirdEdition, Prenti	ceHallofIndia,	2000.
eferenc	es M.Morris DavidA.Pa	Mano, "ComputerSystemArchitecture", ThirdEdition, Prenti- attersonandJohnL.Hennessy,"ComputerOrganizationandDes		2000.
2.	es M.Morrisl DavidA.Pa :TheHardy	Mano, "ComputerSystemArchitecture", ThirdEdition, Prenti- attersonandJohnL.Hennessy,"ComputerOrganizationandDes vare/Softwareinterface", Third Edition, Elsevier,2005.	ign	
2. 3.	es M.Morrisl DavidA.Pa :TheHardy JohnP.Ha	Mano, "ComputerSystemArchitecture", ThirdEdition, Prenti- attersonandJohnL.Hennessy,"ComputerOrganizationandDes	ign	
eference 1. 2. 3. E-Resou	es M.Morrisl DavidA.Pa :TheHardy JohnP.Ha urces	Mano, "ComputerSystemArchitecture", ThirdEdition, Prentient attersonandJohnL.Hennessy,"ComputerOrganizationandDes vare/Softwareinterface", Third Edition, Elsevier,2005. yes,"ComputerArchitectureandOrganization",3rdEdition,Mo	ign cGraw-Hill,19	
Reference 1. 2. 3. E-Resou 1. ht	es M.Morrisl DavidA.Pa :TheHardy JohnP.Ha urces tps://www.ja	Mano, "ComputerSystemArchitecture", ThirdEdition, Prenti- attersonandJohnL.Hennessy,"ComputerOrganizationandDes vare/Softwareinterface", Third Edition, Elsevier,2005. yes,"ComputerArchitectureandOrganization",3rdEdition,Mc	ign :Graw-Hill,19 ial	
Reference 1. 2. 3. E-Resourt 1. 1. tht 2.	es M.Morrisl DavidA.Pa :TheHardy JohnP.Ha Irces tps://www.ja	Mano, "ComputerSystemArchitecture", ThirdEdition, Prentient attersonandJohnL.Hennessy,"ComputerOrganizationandDes vare/Softwareinterface", Third Edition, Elsevier,2005. yes,"ComputerArchitectureandOrganization",3rdEdition,Mo	ign cGraw-Hill,19 ial itorials/	

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Pro	ogram	ne	B.I	E. Prog	gramme	e Code				10	7 Re	gulation	III Maximum M ESE Total 50 100 tracteristics of 100 wracteristics of 100 Knowledge l K2 K3 K3 K3 K3)19		
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a	a	-		a			Perio	ods Per	Week	Crea	lit]	Maxim	num Ma	rks	
Cou	irse Co	de	(Course	Name		L	Т	Р	С	C	А	ESE	Total		
I	19CS3	07	0	bject () riente	d	2			2	_	0	50	100		
U	19055	07	I	Progra	mming	5	2	0	2	3	5	0	50	100		
Cour	se Obji	ective	• U • K • D • D	Underst Know th Define & Develop	ne princ exception a java	ject Or ciples o ons and applic	riented P of packag l use I/O ation wi	ges ,inh strean th threa	eritanc ns ads	e and in			racteri	stics of	Java	
				Design a end of		Vacus	ladaa lar									
													Know		ver	
			CO1:WriteJavaprograms using OOP principles													
	Cours	ב	CO2:DevelopJavaprogramswiththeconceptsinheritance, packages and											K3		
	Outcon		interfaces CO3:BuildJavaapplicationsusingexceptionsandI/O streams											K3		
										I/O strea	ams					
							tionswit						K3,K4			
			CO5:1	Implem	entinte	ractive	Javapro	gramsu	isingsw	vings				K3,K	4	
Pre-r	equisit	es	-													
					CO	'PO Ma	nning						CO/P	250		
		(3/2/1	indicate	sstreng			3-Strong	.2 – Me	dium,1-	-Weak						
							comes(PC		,					_		
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				
CO1	3	3	3	3	3	2	2	1	2	2	2	2		~		
CO2	3	2	1	2	2	2	2	1	2	1	3	2				
CO3	2	3	2	3	3	3	3	2	2	1	2	2	1			
CO4	3	2	1	3	3	1	1	1	2	2	3	2				
CO5	3	2	1	2	3	2	2	1	2	2	3	2	1			
Course	Assess	ment M	[ethods	Direct												
	Direc	t														
	2	.Contin . Assigi .End-Se	nment.				& III									
	Indir	ect														
	1.	Course	- end s	survey												

Content of the syllab	us		
Unit– I	INTRODUCTION TO OOP AND JAVA FUNDAMENTALS	Periods	9
OOP in Java–Cl Compilation.Fundar	ogramming –objects and classes-Abstraction -Encapsulation naracteristics of Java–The Java Environment- Java mentalProgrammingStructuresinJava–DefiningclassesinJava nbers-Data Types ,Control Flow, Arrays-Strings.	Source F	ile- Structure-
Unit–II	INHERITANCE AND PACKAGES	Periods	9
	-Multilevel Hierarchy–Constructors–Method Overriding-U al–Abstract Classes–Packages–Access Protection–Importing		
Unit – III	EXCEPTIONHANDLINGANDI/O	Periods	9
	on hierarchy-throwing and catching exceptions–built-in exce ns and Character streams–Reading and Writing Console–Re		
Unit– IV	MULTI THREADING PROGRAMMING	Periods	9
	n multi-threading and multitasking, thread life cycle, creating communication, daemon threads ,thread groups	g threads, syn	chronizing
-			
Unit– V	EVENT DRIVEN PROGRAMMING ing - Frame – Components - working with 2D shapes - Us	Periods	9 ts, and images -
Unit– V Graphics programm Basics of event han layout management	 hing - Frame – Components - working with 2D shapes - Us dling - event handlers - adapter classes - actions - mouse ev -Swing Components–Text Fields ,Text Areas– Buttons-C bars–Windows–Menus– Dialog Boxes	sing color, for ents - Introdu	ts, and images - ction to Swing – Radio Buttons–
Unit– V Graphics programm Basics of event han layout management	 hing - Frame – Components - working with 2D shapes - Us dling - event handlers - adapter classes - actions - mouse ev -Swing Components–Text Fields ,Text Areas– Buttons-C bars–Windows–Menus– Dialog Boxes	ing color, fon ents - Introdu heck Boxes–	ts, and images - ction to Swing – Radio Buttons–
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Dej	partm	ent	Com	puter S	Science	e& Te	chnolog	у			Se	emester]	II		
C	C			a	NT	-		ods Per	Week	Cred				um Ma	rks	
Cou	rse Co	bae			Name		L	Т	Р	С	C	A	ESE	Total		
U	19CT3	803	DATA STRUCTURES LABORATORY004250								50	100				
Cour	se Obj	ective	 Know to the basics of various graph Traversal methods 													
	Understand the concepts of various Searching, Sorting and Hashir At the end of the course ,the student should be able to, CO1:Implement List based and Array based Linear and Nonlinear												-	vledge		
			Data S	Structur	es			•								
	C		CO2: Suggest appropriate Search Tree for solving a given problem											K3		
	Cours Outcon		CO3: Appropriately use the various graph Traversal for a given problem										K3			
			CO4: Adopt an appropriate Searching and Sorting method to solve a problem										К3			
Due	equisi			CO5: Apply appropriate hash functions that result in a collision free K3 scenario for data storage and retrieval												
110-1	equisi		indicat		thofcori	relatior	apping 1)3-Stron comes(P		edium,1	-Weak			CO/J Mapp PSOs	ing		
COs	PO 1	PO 2	РО 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	v	/	0	,	2	11	2	3	3	1	
CO2	3	3	3	3	2					1		2	3	3		
CO3	3	3	3	3	3					2		2	3	3		
CO4	3	3	3	3	2					1		3	3	3	-	
CO5	3	3	3	3	2			<u> </u>		2		3	3	3]	
Course	Assess	ment M	lethods	Direct												
			1 1	. 1 1												
		1.Pre la			o test											
		2.Reco			minatio	ne										
	Indir		-Semes		minatio	115										
		Course	- end s	urvev												
	1.	200150	end b	, <i>C</i> j												

S.No	LIST OF EXPERIMENTS	Course Outcome
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	CO3
10.	Implementation of searching and sorting algorithms	CO4
11.	Hashing- any two collision techniques	CO5
	Total Periods	45
E-Resou	rces	
1.	https://www.programiz.com/c-programming	
2.	https://www.cprogramming.com/	
3.	www.tutorialspoint.com/ds/	

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Pro	ogrami	me	B.I	E. Prog	gramme	Code	;			107	Reg	gulation	20	ESETotal50100 50 100QL queries.implementalimplementalK3K3K3K3K3K4K4CO/PSOMappingPSOsPSO123333			
Dej	partme	ent	Com	puter S	Science	e& Te	chnology	7			Se	emester		III [aximum Ma ESE Total 50 100 [50 100 [Coverses] [Cov			
Cou	rse Co	de	Cours	e Nam	e		Perio L	ds Per	Week P	Credi	t C.				arks		
U	19CT3	04	DB	MS La	borat	ory	0	0	4	2	5)		
Cour	se Obj	ective	 Le Ur Le Fa typ 	earn to o nderstau earn the amiliar pical da	create a nd data use of with th tabase	nd us defini nestec e use applic	of a front ations	ise data r queric end to	es and f ool and	amiliariz Understa	e adv	anced S	~ ^		tion of		
	Be Exposed to different real time applications At the end of the course ,the student should be able to, CO1:Use data definitions and manipulation commands for designing relational database											Know	U	evel			
		ourse itcome	CO2	CO2: Apply the Nested and Join Queries for retrieving the data from Database and familiarize with advance SQL concepts K3													
	Ū	itcome	proce	edures				Ũ						К3			
				•			SQL bloc		_					К4			
Pre-r	equisit	es	- CO5	:Devel	op simp	ole ap	plication	using I	Front er	nd				K4			
	-		indicate	-	thofcor	relatio	Iapping n)3-Strong tcomes(PC		edium,1	-Weak			Map				
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		-		
CO1	3	3	3	3	3				2			2	3	3	1		
CO2	3	3	3	3	3				2			2	3	-			
CO3	3	3	3	3	3				2			2	3		_		
CO4 CO5	3	3	3	3	3				2			2	-	-	-		
	3 Assess	3 ment M	3 Iethods	3 Direct	3				2			2	3	3			
	Indir	1. Pre 1 2. End-	Semes	ster exa	aminati	ions											

S.No	LIST OF EXPERIMENTS	Course Outcome
1.	Creation of database and writing SQL queries to retrieve information from the database	CO1
2.	Performing Insertion ,Deletion, Modifying, Altering, Updating and Viewing records based on conditions	CO2
3.	 Mini project (Application Development using Oracle/ My sql) 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 	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.	CO2
7.	Study of PL/SQL block	CO4
8.	Write a PL/SQL block to satisfy some conditions by accepting input from the user	CO4
9.	Write a PL/SQL block that handles all types of exceptions	CO4
10.	Creation of Procedures	CO2
11.	Creation of database triggers and functions	CO2
	Total Periods	45
E-Reso	purces	
1.	https://www.programiz.com/c-programming	
2.	https://www.cprogramming.com/	
3.	https://beginnersbook.com/2015/02/simple-c-programs/	

C)			ANANDHA COL Nous Institution, Af Elayampalayam,	VOME filiated t	N o An	na Ur	niversity,			CANNER TANKE CONT
Progra	amme	B.E/B.Tech.	Pr	ogramme	e Code	e 1	07	Reg	gulation	2019
Depart	ment	CSE, EEE, E	CE, IT ,CST & BT					Ser	nester	III
Course C	Code	Cou	rse Name	Ν	/laximum	Marks				
				L	Т	Р	С	CA	ESE	Total
U19MCS	SY3	NUMERICA	L ABILITY	3	0	0	0	100	-	100
Content of	of the sy	yllabus								
Unit –	- I	NUMBER SY	STEMS						Period	s 6
Number P	Propertie	es - HCF - LCM	A - Square root – Cub	e root –	Simpl	ificati	on – Aver	ages.		
Unit -	II	DIRECT PR	OPORTIONAL PRO	OBLEM	S				Period	s 8
Percentag	e - Prof	it & Loss –. Ra	tio & Proportions – N	lixture &	Alleg	gation	s - Probler	n on A	ges	
Unit –	III	INDIRECT F	ROPORTIONAL P	ROBLE	MS				Period	s 8
Time & V	Vork –	Pipes & Cistern	ns - Time, Speed & I	Distance	– Boa	ats & S	Streams –	Races	& Game	s ofSkills .
Unit - I	IV	BANKER'S	PROBLEMS						Period	s 4
Simple In	terest –	Compound Inte	erest – Logarithms – I	Partnersh	ip - D	iscou	nts.			·
Unit –	V	MISCELLAN	NEOUS PROBLEM	S					Period	s 4
Mensurati	ion: Are	a & perimeter -	- Volume & Surface A	Area – Go	eomet	ry-Tri	igonometr	у.		
								Tot	tal Period	ls 30
Text Boo	ks									
1.	Dinesh edition		earson guide to Quar	titative A	Aptitu	de for	Competit	ive Exa	amination	s 3 rd
Reference	es									
1.		agerry 1 Oyen	titative Aptitude for O	7	Г					

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Programme	(AutonomousInstitution,AffiliatedtoAnnaUniversity,Chennai)Elaya mpalayam,Tiruchengode-637205 B.E. Programme Code 107 Regulation									19	n 15	
Department	Computer Science		nology			107		mester				
Department				ls Per V	Wook	Credi			Image: Non-Structure Image: Non-Structure n 2019 r IV Maximum Mark ESE ESE Total 50 100 few statistical arrow few statistical arrow idental equations. and large sample idental equations. arrow idental equations. arrow idental equations. arrow intervals arrow arrow Knowledge level ge K1,K3 K2,K3 K3,K5 or K2,K5	rka		
Course Code	Course Name		L	T	P	Crean			Image: 100 maximum Marks IN IV Maximum Marks ESE Total 50 100 few statistical and different kinds of and large sample idental equations. ious intervals and ys an important rol Knowledge level ge K1,K3 K2,K5 K3,K4 CO/PSO Mapping PSOs PSO 2	IKS		
	STATISTICS AN	D	1	-	-			<u> </u>	LOL	10141		
U19MA405	NUMERICAL		3	1	0	4	50		50	10	00	
	METHODS											
 Course Objective The main objective of the course is to This course aims at providing the necessary basic concepts of a few statistical at numerical methods and give procedures for solving numerically different kinds problems occurring inengineering and technology. To acquaint the knowledge of testing of hypothesis for small and large sample which plays animportant role in real life problems. To introduce the basic concepts of solving algebraic and transcendental equations To introduce the numerical techniques of interpolation in various intervals at numerical techniques of differentiation and integration which plays an important role in engineering andtechnology disciplines. 												
	CO1: Apply the concept of testing of hypothesis for small and large											
	CO2:Apply the b	asic co	oncepts		ssificat	ions of	desi	gn of	K2	2.K3		
Course Outcome	CO3: Appreciate the numerical techniques of interpolation in various											
	CO4:Understand the solving firstand seco	knowle nd orde	r ordina	ry diffe	rential	equation	ns		K2	2,K5		
	CO5: Solve the part and boundary condit applications								K3	3,K4		
Pre-requisites	-											
(3/2/	CO / lindicatesstrengthofcorr Programm		3-Strong,		dium,1-'	Weak			Mappi	ing		
COs PO PO	PO PO PO	РО	PO	PO	PO	PO	PO	РО	PSO	PSO		
1 2 CO1 3 3	3 4 5	6	7	8	9	10	11	12		2		
CO1 3 3												
CO3 3 3												
CO4 3 3]				
CO5 3 3									2			

Course Assessment M	ethods Direct		
Direct			
1. Cont	inuous Assessment Test I, II & III		
	gnment.		
	Semester examinations		
Indirect			
1.Course	- end survey		
Content of the syllal	bus		
Unit – I	TESTING OF HYPOTHESIS	Periods	12
mpling distributions	- Estimation of parameters - Statistical hypothesis - Large sa	ample tests bas	ed on Normal
distribution for sing	gle mean and difference of means -Tests based on t, Chi-	square and F	distributions for
mean,			
variance and propor	tion - Contingency table (test for independent) - Goodness of	f fit.	
Unit - II	DESIGN OF EXPERIMENTS	Periods	12
One way and two w	ay classifications - Completely randomized design - Rand	lomized block	design - Latin
square			
design - 2 ² factorial			
Unit – III	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	Periods	12
Solution of algebraic	and transcendental equations - Fixed point iteration method	– Newton Ra	phson method -
Solution of linear sys	stem of equations - Gauss elimination method – Pivoting - Ga	auss Jordan me	ethod – Iterative
methods of Gauss .	Jacobi and Gauss Seidel - Eigenvalues of a matrix by	Power metho	d and Jacobi's
method for symmetry	tric		
matrices.			
	INTERPOLATION, NUMERICAL		
Unit - IV	DIFFERENTIATION AND	Periods	12
	NUMERICAL INTEGRATION		
Lagrange's and New	ton's divided difference interpolations – Newton's forward a	and backward	lifference
interpolation	C de discrete contra interna lation de la mandal de la Norma de la d		
	f derivate using interpolation polynomials – Numerical sind Simmon's $1/3$ rules	ingle and dou	ble integrations
	d Simpson's 1/3 rules. NUMERICAL SOLUTION OF		
Unit – V	ORDINARY DIFFERENTIAL	Periods	10
	EQUATIONS	renous	12
	: Taylor's series method - Euler's method - Modified Euler's d for solving first order equations - Multi step methods : N		
forth predictor corre	ectormethods for solving first order equations.		
	,	Fotal Periods	60
Text Books			
	B.S. and Grewal. J.S., "Numerical Methods in Engineering ublishers, New Delhi, 2015	and Science "	, 10th Edition,
Johnson	R.A., Miller, I and Freund J., "Miller and Freund's Pr	obability and	Statistics for
2. Engineers	",Pearson Education, Asia, 8th Edition, 2015.	-	

Refer	enc	es
	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, 8thEdition, 2014.
,	•	Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi,2006.
4	4.	C.Gupta & V.K.Kapoor," Fundamentals of Mathematical Statistics", Sultan chand & sons Education Publishers, Newdelhi, 10 th Edition.
		William Navidi,"Statistics for Engineers and Scientists", TMH Publishers, New Delhi, 3 rd Edition, 2013.
E-Re	sou	rces
1.	<u>htt</u>	ps://www.maths.unsw.edu.au > courses > math2089-numerical-methods.
2.	wv	vw.learnerstv.com/Free-engineering-Video-lectures

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De	partme	ent	Cor	nputer	Sciend	ce& Te	chnolog	У			Semester		IV			
a	C			a			Periods Per Week			Credit	Credit			Maximum Marks		
Cot	arse Co	ode			e Nam	-	L	Т	Р	C	CA	ESH	E Tota	ıl		
	U19CS	5411	Alg	orithm			3	0	0	3	50	50 100				
			The student should be made to,													
Cour	rse Obj	ective	•	 Analyze the asymptotic performance of algorithms. Apply the concept of Divide and conquer and greedy algorithms Demonstrate a familiarity of Dynamic Programming. Apply the important concept of Backtracking. Surthesize afficient algorithms for NB Problems 												
	Synthesize efficient algorithms for NP Problems At the end of the course, the student should be able to,													ledge		
			run	time co	omplex	ity of a	lgorithm	s.		-	asymptotic		K	2		
	Course outcome		pro	CO2: Apply the algorithms and design techniques to solve the problems using divide and conquer and Greedy algorithm.										3		
				CO3: Understand and design the algorithms using dynamic programming										3		
			CC)4: App	ply the	concep	ts of Bac	k tracki	ng				K4			
			CC	CO5: Synthesize efficient algorithms for NP problems										K4		
Pre-r	requisit	tes	-													
		(3/2	2/1ind	icatesstr			Mappin ion)3-Str		Medium,	1-Weak						
				T			Dutcomes									
COs	PO 1	PO 2	Р О 3	P 0 4	PO 5	P 0 6	РО 7	PO 8	PO 9	PO 10	PO 11			PSO 2		
CO1	1	3	3	2	1	1			1	2				2		
CO2	2	2	2	3	1	2			1	2				2		
CO3 CO4	2	3	3	23	1	2			1	2		-		2 3		
CO5	2	3	2	3	1	2			1	2				3		
Course	e Assess Direc		Iethod	ls Direc	t											
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	1.	Course	- end	survey	/											

Unit – I		ALGORITHM ANALYSIS AND RECURRENCE	Periods	9
N 11 C		EQUATION		1 .
		tion- algorithm analysis- time and space complexity- aver	U	case analysis
	is- Recu	rence Equations-Solving recurrence equations – Analysis of		9
Unit – II		DIVIDE AND CONQUER & GREEDY ALGORITHMS	Periods	-
	-	r: General Method - Binary Search - Finding Maximum a		Ũ
-	Greedy A	Algorithms: General Method – Container Loading – Knapsad		luffman trees
Unit – III		DYNAMIC PROGRAMMING	Periods	9
General Met	thod – M	Iultistage Graphs – All-Pair shortest paths – Optimal binary	search trees – (0/1 Knapsack -
Traveling sa	lesperso			
Unit – IV		BACKTRACKING & BRANCH AND BOUND	Periods	9
	- r	n – knapsack problem. Branch and Bound: LIFO and FIF		
1 /		PROBLEM CLASSES	Periods	•
Unit – V	·	PROBLEM CLASSES	Periods	9
Unit – V NP-Complet		PROBLEM CLASSES Polynomial Time, Polynomial-time verification, NP Comple s, NP Complete Problems.		9
Unit – V NP-Complet		Polynomial Time, Polynomial-time verification, NP Completes, NP Complete Problems.		9
Unit – V NP-Complet Completenes	ss Proof	Polynomial Time, Polynomial-time verification, NP Completes, NP Complete Problems.	eteness and red	9 ucibility, NP -
NP-Complet Completenes Text Books	ss Proof	Polynomial Time, Polynomial-time verification, NP Completes, NP Complete Problems.	eteness and red	9 ucibility, NP - 45
Unit – V NP-Complet Completenes Text Books	ss Proof	Polynomial Time, Polynomial-time verification, NP Completes, NP Complete Problems.	eteness and red	9 ucibility, NP - 45
Unit – V NP-Complet Completenes Text Books 1. T. Pr eferences	H.Corm	Polynomial Time, Polynomial-time verification, NP Complete s, NP Complete Problems. en, C.E.Leiserson, R.L.Rivest, C.Stein, "Introduction to Alg Iall India, 2009.	eteness and red Total Periods gorithms", 3 rd E	9 ucibility, NP - 45 Edition,
Unit – V NP-Complet Completenes <u>Text Books</u> 1. T. Pr eferences 1. El 2n	H.Corm rentice-H	Polynomial Time, Polynomial-time verification, NP Complete s, NP Complete Problems. en, C.E.Leiserson, R.L.Rivest, C.Stein, "Introduction to Alg Iall India, 2009.	teteness and red Total Periods gorithms", 3 rd E	9 ucibility, NP - 45 Edition, ter Algorithm
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U1	9CT40	5	Comp	outer Ne	etworks	3	3	0	0	3	50)	50	10	00
Cour	J19CT405Computer Networks300350The student should be made to,• Understand the importance of data communications and the d functionalities in supporting business communications and dail• Be familiar with the components required to build the different• Recognize the different internetworking devices and their funct• Know flow control and congestion control algorithms.• Understand the role of application protocols in networking.												ly activ types (vities.	
			At the		he cours									owled Level	ge
			functio OSI and	nality of d TCP/II	P referen	ce mode	els		-						
	Course		CO2: devices		understa	and the	conce	pts o	f IP	address	and 1	network		K3	
0	utcome	9			the stude a networl		ompare	e and	sele	ct appro	priate	routing		K3	
			CO4:]	Examine	the imp Error de	ortant a	-					control		K4	
			CO5: <i>A</i>	Able to a	nalyze t hniques							ons and		К3	
Pre-r	requisit	es	-												
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COs	PO	РО	РО	PO	Programn PO	ne Outco PO	mes(PC PO		PO	РО	PO	РО	PO	PSC PSO	PSO
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CO2	2	2	2	3	3	3	2	_		2	3		3	2	2
CO3	1	2	3	2	3	3	2	_		2	3		3	3	2
CO4	2	3	3	2	3	3	2	_		2	3		3	2	2
CO5	2	1	2	2	3	3	2			2	3		3	2	2

Direct		
1.Cont	inuous Assessment Test I, II & III	
	gnment.	
	Semester examinations	
Indirect		
1.Cours	e - end survey	
Content of the syll	labus	
Unit – I	Introduction to Networks and OSI Layers Periods	9
ypes of Connection nd Comparison. S Datagram networks rotocols and Star Layered architect	NET, NSF net, Internet -Computer Communication - Components- Data on. Categories: LAN, MAN, WAN Data Transmission modes .Network To Switched Networks- Circuit and Packet switching. Types of Packet Switc s and virtual- Circuit networks Structure of Circuit and Packet Switches ndard Organizations,Forums and Regulatory agencies Internet Standards –R ure- Functions of Each Layer in the OSI TCP/IP Protocol suite .Compariso	pology- Types hed networks- . Comparisons FC OSI Model
nd TCP.	ID a blancing	_
Unit – II	IP addressing Periods Idress space, Notations -Classful addressing- problem solving Two level h	9
ariable length blo letwork addresstra	bnet mask - Address aggregation- problem solving. Special addresses. Class ocks- Two level addressing- Block allocation - Sub netting- problem solving inslation -Super netting. Introduction to IPv6 address. Intermediate devices - iteways -Structure of a Router	Private addre
Unit – III	Routing Protocols & Configurations Periods	9
tatic Routing, In	Routing Protocols & ConfigurationsPeriodsattroduction to dynamic Routing Protocols, RIP v1 and RIP v2 ,OSPF	
tatic Routing, In onfigurations.	troduction to dynamic Routing Protocols, RIP v1 and RIP v2 ,OSPF	F, EIGRP, BC
tatic Routing, In onfigurations. Unit – IV	troduction to dynamic Routing Protocols, RIP v1 and RIP v2 ,OSPF TCP/IP, Flow Control Mechanism and Error Detection	F, EIGRP, BC
tatic Routing, In onfigurations. Unit – IV raming Flow cont I - Selective Repe	troduction to dynamic Routing Protocols, RIP v1 and RIP v2 ,OSPF TCP/IP, Flow Control Mechanism and Error Periods	F, EIGRP, BC 9 quest -Go-Bac
tatic Routing, In onfigurations. Unit – IV raming Flow cont I - Selective Repe	troduction to dynamic Routing Protocols, RIP v1 and RIP v2 ,OSPF TCP/IP, Flow Control Mechanism and Error Detection rol mechanism- Stop and Wait protocol- Stop and Wait Automatic Repeat Re at -Types of errors -Error Detection and Correction -Hamming Distance -Cy	F, EIGRP, BO
tatic Routing, In onfigurations. Unit – IV raming Flow cont I - Selective Repe Check -Checksum Unit – V hysical Layer ov	Introduction to dynamic Routing Protocols, RIP v1 and RIP v2 ,OSPF TCP/IP, Flow Control Mechanism and Error Detection rol mechanism- Stop and Wait protocol- Stop and Wait Automatic Repeat Re at -Types of errors -Error Detection and Correction -Hamming Distance -Cy - CSMA- CSMA/CD- HDLC PPP-TCP/IP Protocols. Physical Layer Characteristics Periods verview, Latency, Bandwidth, Delay, Wireless: 802.11, Transmission Medi	F, EIGRP, BC 9 quest -Go-Bac clic Redundan 9
tatic Routing, In onfigurations. Unit – IV raming Flow cont I - Selective Repe Check -Checksum Unit – V hysical Layer ov	Introduction to dynamic Routing Protocols, RIP v1 and RIP v2 ,OSPF TCP/IP, Flow Control Mechanism and Error Detection rol mechanism- Stop and Wait protocol- Stop and Wait Automatic Repeat Re at -Types of errors -Error Detection and Correction -Hamming Distance -Cy - CSMA- CSMA/CD- HDLC PPP-TCP/IP Protocols. Physical Layer Characteristics Periods rerview, Latency, Bandwidth, Delay, Wireless: 802.11, Transmission Medi .15, 802.15.4, 802.16	F, EIGRP, BC 9 quest -Go-Bac clic Redundan 9 a : Twisted pa
tatic Routing, In onfigurations. Unit – IV raming Flow cont (- Selective Repe bleck -Checksum Unit – V hysical Layer ov coaxial, Fiber, 802	Introduction to dynamic Routing Protocols, RIP v1 and RIP v2 ,OSPF TCP/IP, Flow Control Mechanism and Error Detection rol mechanism- Stop and Wait protocol- Stop and Wait Automatic Repeat Re at -Types of errors -Error Detection and Correction -Hamming Distance -Cy - CSMA- CSMA/CD- HDLC PPP-TCP/IP Protocols. Physical Layer Characteristics Periods verview, Latency, Bandwidth, Delay, Wireless: 802.11, Transmission Medi	F, EIGRP, BC 9 quest -Go-Bac clic Redundan 9
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Ŭ	utcom		CO3: Explain the need for process synchronization CO4: Identify the issues in memory management CO5: Compare file and disk management strategies										K3 K3 K2		
Pre-r	equisit	es	-	Compa	e me and	uisk in	inagon		strateg	105				112	
		(3/	/2/1indic		CO /P gthofcorrel Programme		Strong,		Aedium	,1-Weak				CO Map PSC	
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CO2	2	2	3	2	2	2	1		1	1	3		3	2	1
CO3	2	2	3	2	2	2	1		1	1	3		3	2	1
CO4	2	2	3	2	2	2	1		1	1	3		3	2	1
CO5	2	2	3	2	2	2	1		1	1	3		3	2	2
Course	Assess		ethods]	Direct											7
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	nit – I	-			INT	RODU	CTIO	N			P	eriods		9)
					Systems- anagemer										

•	- Computin			
Unit	-	Calls – Types of System Calls – System Programs. PROCESS MANAGEMENT ANDCOORDINATION	Periods	9
Multithe Basic C Synchron	readed Pro Concepts – nization –	Process Scheduling – Operations on Processes – In gramming: Overview – Multithreading Models – Threadin Scheduling Criteria – Scheduling Algorithms – Mult The Critical-Section Problem – Peterson,,s Solution – ic problems of Synchronization – Monitors.	ng Issues – Cl tiple-Processor	PU Scheduling
Unit –	- III	DEADLOCKS AND MEMORY MANAGEMENT	Periods	9
Preventio	on – Deadlo es: Swappi	Model – Deadlock Characterization – Methods for Hand ock Avoidance – Deadlock Detection – Recovery from Dead ng – Contiguous Memory Allocation – Paging – Stru	dlock Memory	y Management
Unit -	- IV	VIRTUAL MEMORY MANAGEMENT	Periods	9
– Thrash Protectic Unit -	on	stem: File Concept – Access Methods – Directory Structure	e – File Sharing	g —
– Alloca	enting File ation Metho	STORAGE MANAGEMENT Systems: File System Structure – File System Implementation ds – Free-space Management Secondary Storage Struct	ture: Disk St	ructure – Disk
 – Ålloca Scheduli Case Stu 1. Kerne 2. Linux 3. Linux 	enting File S ation Metho ing – Disk M 1dy: (Only f I data struct Scheduling	Systems: File System Structure – File System Implementation Ids – Free-space Management Secondary Storage Struct Management – Swap-Space Management. Devices – Device of For Assignment Studies not for End-Semester-Examinations) ures for various open source operating systems , Windows 7	on – Directory 2 ture: Disk St controllers- De	Implementation ructure – Disk
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Unit	- I	Introduction to Artificial Intelligence	Periods	9
Introduc	ction, History	y, Intelligent Systems, Foundations of AI, Sub areas of AI, A	pplications.	
Problem	Solving -	State-Space Search and Control Strategies: Introduction	n, General Pr	oblem Solving
	eristics of Pr			
Unit -		Searching Techniques	Periods	9
		s, DFS, Heuristic Search Techniques, Iterative-Deepening A		
		nded Look-ahead, Strategy and use of Evaluation Functions,		v
Unit -		Logic Programming	Periods	9
		I Logic Programming: Introduction, Propositional Calculus Axiomatic System, Semantic Tableau System in Proposition		al Logic,Natura
		on in Propositional Logic, Predicate Logic, Logic Programmi	-	
Unit -		Knowledge Representation	Periods	9
		aches to Knowledge Representation, Knowledge Represent		-
		Networks for KR, Knowledge Representation using Frames.		
Unit -				
Introduc Systems Measure	ction, Phases , Truth Mair e - Probabili	Expert System and Applications in Building Expert Systems, Expert System Architecture, E intenance Systems, Application of Expert Systems, List of S ity Theory: Introduction, Probability Theory, Bayesian Bel Factor Theory.	shells and Too	
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Content of the sylla	abus								

Unit – I

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.

Periods

6

TENSES

in the more entempted) Direct and man eet Speech (orees)		
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, Expression of 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 wordhonor, 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, Beforethe names of Planets and Satellites, Before Holy Books, Before the names of News Papers, Before the names of some countries, measuring expressions beginning 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, with hat and folk, from top to bottom, With the names of meals such as Breakfast, Before predicative nouns denoting 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
- Prepositions Usage with Its Context

Unit - III	SENTENCE CORRECTION	Periods	6
SENTENCE CORI	RECTION	·	
writing the sentence to ensure the messag	lowing sentences, four options are given. You are require in the context of the correct usage of standard written Engl e being conveyed remains the same in all the cases.	ish. While doin	ng so, you have
have to find the best	blowing questions, a part or the whole of the original senter way of writing the underlined part of the sentence.		
	uestions, you have to identify the correct sentence/s. For ea	ch of the follow	wing questions
find the sentence/s th			
	lowing questions, one or more of the sentences is/are incor	rect. You have	to identify the
incorrect sentence/s.			
	MPROVEMENT		
U	erb Agreement		
b. Parallelis			
d. Modifier	cy: The error of repeating the same thing.		
e. Comparis	one		
-		.1 . 1	1 4 4 .
	When comparative degree is used with than, make sure	that we exclu	ide the thing
•	om the rest of class of things by using the		
f. Confusing	ew and Less		
· · · · · ·	ew and A few		
,	Little and A Little		
, ,		in Torr Inid	
Unit – IV	ttle tact would have saved the situation(some tact).Lay and I	· · · · · ·	
	SENTENCE COMPLETION	Periods	6
	PLETION: Purpose and usage of proper words. SPOTTIN	G ERRORS:	
	rs on conjunctions		
	rs on "if" clauses		
	rs on adverbs		
	rs on adjectives		
	rs on prepositions		
_	rs on determiners		
U	rs on verbs rs on nouns		
	rs on modifiers		
	rs on degrees of comparison		
	rs on subject-verb agreement		
	ors on infinitives		
	rs on pronouns		
	ors on tenses		
o. Red	undancy errors		
p. Erro	ors on articles		
q. Err	or on complex sentences		
Unit – V	VOCABULARY	Periods	6
Synonyms: Root Ba	sed Word, Suffix Based Word. Antonyms - Contextual Voca	abulary - Verba	l Analogy
		Total Periods	30
Text Books			
1. Objective	General English by SP Bakshi – Arihant Publication		
I			

Referenc	es
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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CO1	2	2	3	2	2	2		-	2	2	1	3	2	2	
CO2	3	2	2	2	3	3			2	2	1	3	3	2	
CO3	2	2	2	2	1	3			2	2	1	3	2	1	
CO4	2	2	3	2	2	3			2	2	1	3	2	1	
CO5	3	2	3	2	3	3			2	2	1	3	2	2	
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LIST O	FEXPERIMENTS	
	COMPUTER NETWORKS	
1.	Introduction to packet tracer	CO1
2.	Types of Network topology	CO1
3.	IP addressing and Sub netting (VLSM)	CO2
4.	Router Configuration (Creating Passwords, Configuring Interfaces)	CO2
5.	Static and Default Routing	CO3
6.	RIP ver1	CO4
7.	RIP ver2	CO4
8.	Single Area OSPF link costs and Interfaces	CO4
9.	Multi Area OSPF with Stub Areas and Authentication	CO5
10.	EIGRP Configuration, Bandwidth and Adjacencies	CO5
11.	EIGRP authentication and Timers.	CO5
	Total Periods	45
-Resou	rces	
1.	https://www.cisco.com	
2.	https://www.netcad.com	
3.	https://study-ccna.com	

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Cour	se Obj	ective	 The main objective of the course is to Able to understand laws of Probability and the use of Baye's theorem Acquire and knowledge of standard distributions Understand the basic characteristics queueing models and analyzing queuing models. Able to apply scheduling technique (CPM/PERT) to find critical path. 													
			Able to Analyze strategic in decision making At the end of the course, the student should be able to,											edge 1	evel	
			CO1:apply the concept of probability to find the outcome of random K1,K3													
	Course		CO2: Apply the standard distributions that can describe the real life K2,K3												3	
O	utcom	e	CO3: Apply and analyzing queuing models to improve Queueing process											K3,K5		
			CO4: Able to optimize project scheduling by finding critical path.											K2,K5		
			CO5: to evaluate determining different strategies to get optimum K3,K4 solution.											4		
Pre-r	equisit	es	-													
		(3/	CO /PO Mapping 2/1indicates strength of correlation)3-Strong,2 – Medium,1-Weak											CO/PSO Mapping		
COa	РО	PO	РО	PO	Programme	Outcome PO	es(PO PO		PO	PO	РО	РО	PO	PSC PSO)s PSO	
COs	1	2	3	4	5	6	7		8	PO 9	10	11	12	1	2	
CO1	3	3						-						2		
CO2 CO3	3	3						+						$\frac{2}{2}$		
CO3	3	3						+						2	$\left \right $	
CO5	3	3						1						2		
Course	Assess	ment N	lethods]	Direct									· .			
	2 3	.Contii .Assigr .End-S	nment.	ssessme examina	nt Test I, I ations	I & III										
	Indire 1.		e - end s	urvey												
				•												

Content	of the syllab	us		
Unit – I	•	INTRODUCTION TO PROBABILITY	Periods	12
introduct	ion to Proba	bility, Axioms of Probability: Sample spaces and events,	axioms of Prob	ability, sampl
•	• • •	v likely outcomes - Conditional Probability and independe	ence (Conditiona	al Probabilities
Baye's fo	ormula, indep	bendent events)		
Unit - II		STANDARD PROBABILITY DISTRIBUTIONS	Periods	12
		s : Binomial distribution - Poisson distribution – Geome m distribution, , Exponential distribution – Normal distribut		n – Continuou
Unit – II	I	QUEUEING THEORY	Periods	12
and Expo	onential Dist	ng system- Characteristics of Queueing System – Symbols a ribution – Classification of Queues – Model I (M/M/I): (M/M/I): (N/FIFO) - Model IV (M/M/ ∞): (∞ /FIFO)	(∞/FIFO)- Mod	del II (M/M/I
Unit - IV		NETWORK SCHEDULING BY PERT/CPM	Periods	12
		k and Basic components – Rules of Network Construction – d (CPM) – PERT – PERT Calculations – Advantages of Ne		
Unit – V		GAME THEORY	Periods	12
		person Zero sum games-Saddle point, Dominance Rule, of matrices, graphical and LP solutions.	Convex Linea	r Combinatio
			Total Periods	60
Text Bo				
1.	Wiley Stu	y, D.C. and Runger, C.G., Applied Statistics and Probabi idents Edition, Wiley, 2016.		
2.	Kanti Swar 2000.	up, P.K. Gupta and Man Mohan, Operations Research, 8th	Edition, Sultan	Chand & Sons
Referenc	es			
1.		onson and Govindasami Naadimuthu, Operations Researching Company Ltd., 2005.	h, 2 nd Edition, 7	Fata McGraw
2.	Hamdy A.T	aha, Operations Research an Introduction, 10th Edition, Pea	urson Publication	ns, 2019
3.	Devore, J.I Learning, 2	, Probability and Statistics for Engineering and the S 011.	ciences, 8 th Ed	lition, Cengag
4.		and Kapoor V.K, Fundamentals of Mathematical Statistic	es, 1 st Edition, S	Sultan an Sons
5.		A., Miller, I. and Freund, J., Miller & Freund's Probability arson Education, 2010.	and Statistics for	or Engineers 8
E-Reso	· · · · ·			
1.		vw.maths.unsw.edu.au > courses > math2089-numerical-met	thods.	
2.	<u>^</u>	nerstv.com/Free-engineering-Video-lectures		

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Pro	ogrami	me	B.]	E. Prog	gramme C			0			Regulation	20	19		
Dej	partme	ent	Сотрі	iter Scie	enece and	Techno	logy				Semester		V		
Cou	ırse Co	do		ourse N	Jamo					Credit			Maximum Marks		
Cou		Jue	_	edded Sy		L		T	P	C	CA		Total		
U	J 19EC	528	Desig	-	ystems	3		0	0	3	50	50	100		
Cour	se Obj	ective	 The main objective of the course is to Study foundational concepts of microcontroller architecture and programming. Study ARM Processor hardware features and its operations. Introduce peripheral modules Communication in processors, Input/output interfacing. design simple embedded microcontroller based applications Introduce Basics of Real time operating system and example tutorials to discuss real-time operating system tool. 												
	Course		At the end of the course, the student should be able to,KnowlCO1:get foundational knowledge in activating and using a generic microcontroller.Preliminarydesign considerations for systemlevel implementation.CO2:gain the knowledge of LPC2148 Microcontroller Operation												
O	utcom	e		understa		K3 K3									
				design s	K4										
			CO5:	1	K3										
Pre-r	equisit	tes	systems.												
		(3/2	2/1indica		gth of corre		Stron		Mediu	m,1-Wea	k		CO/PSO Mapping		
COs	РО	PO	РО	PO	Programme PO	e Outcom PO	$\frac{\text{es}(\text{PC})}{\text{PO}}$		PO	PO	PO PO	PO	PSOs PSO PSO		
	1	2	$\frac{3}{2}$	4	5	6	7	_	8	9	10 11	12	$\frac{1}{2}$	_	
CO1 CO2	3 2	2	$\frac{2}{2}$	2								2	$\frac{2}{2}$ 2		
CO3	2	_	3	3									3 3		
CO4	2								2				2 2		
CO5	3	2	2									2	2		
Course	Assess	ment M	[ethods]	Direct										_	
	2 3 Indire	.Contin .Assign .End-Se ect	iment. emester	examin	nt Test I, I	II & III									
	1.	Course	- end s	urvey											

	of the syllab			
Un	it – I	REVIEW OF EMBEDDED SYSTEMS	Periods	9
		bedded system, embedded system architecture, classification		•
		n issues in embedded systems, fundamentals of embedded	ed microcontr	ollers, CISC vs
RISC, fu	indamentals	of Von neuman/ Harvard microcontrollers.	I	
Uni	it - II	INTRODUCTION TO LPC2148 MICROCONTROLLER	Periods	9
•		M Architecture – LPC2148 microcontroller introduction	·	
	-	Map – PLL and VLSI Bus Divider – Software develop	pment using I	Embedded "C"
	opment Tool			-
	t – III	LPC2148Microcontroller Operation and Peripherals	Periods	9
	·	- Timer Operation - Prescalar - Timer Capture and Comp		
		Watch Dog Timer - Interrupt. UART operation - Analog	to Digital Co	nverter – Digita
	g Converter			1
	t - IV	DESIGN OF SIMPLE EMBEDDED SYSTEMS:	Periods	
•	.	O systems using Switches, LEDs, Buzzers - Interfacing	•	ays – DC Motor
		m - Stepper Motor Interfacing – Relays – Keypads – PC inte		-
Uni	t - V	REAL TIME OPERATING SYSTEMS	Periods	9
Task an	d Task Stat	es, tasks and data, semaphores and shared Data Operat	ting system S	ervices-Message
		on-Events-Memory Management, Interrupt Routines in a		
-	Jsing RTOS.			
0	0			45
Text Bo	oks			1
1.	Trevor M	artin,"The Insider's Guide to the Philips ARM7-Bas s(UK), 2005	sed Microcor	ntrollers", Hitex
2.		, -Embedded Systems - Architecture, Programming and D	Design ^I , Third	Edition,McGraw
3.	Jonathan	Valvano, —Embedded Microcomputer Systems Real Tinearning, 2012.	me Interfacing	g, Third Editior
4.		mon, "An Embedded Software Primer", Pearson Education	Asia, New De	elhi, 2009.
Referenc	es			
1.	Ionathan V	V Valvano, "Introduction to Arm Cortex -M Microcontroller	rs" 2012	
1.		oergaard, —Embedded Systems Architecture, Second Edi		Dublications
2.	2010	bergaard, —Embedded Systems Architecture, Second Edi	ition, newnes	s Publications,
3.	Elecia Wh	ite, —Making Embedded Systems, Third Edition, O"REILL	Y, 2011.	
4.	K.V.Shibu	, -Introduction to Embedded systems, Second Edition, Mc	Graw Hill Pub	lications, 2017
E-Reso	urces			
1.		nengineering.in/introduction-to-arm-cortex-m-microcontrol	llers-by-ionath	an-w-valvano/
2.		w.edx.org/course/embedded-systems-shape-the-world-micro		
-•	<u> </u>	meaning course, emocuded systems shape the world-men		
3.	https://www	w.codrey.com/embedded-systems/embedded-systems-introd	duction/	

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Depar	rtment	Compu	iter Sci	enece an	d Techı	ıology				Se	emester		V			
C	C 1			т		eriods			Credi			Maximum Marks				
Course	eCode	C	ourse N	ame	Ι	-	Т	Р	C	(CA	ESE	To	otal		
U19C	Т508	Artifi														
			igencea		-	3	0	0	3	50)	50		100		
		-	oplicatio													
		The st	tudent sl	hould be	made to),										
		•	To kr	now the b	asic con	ncept o	f inte	lligent	t agents a	and o	bjects					
Commo	Ohiostino	•		the			tructu	ire an	d logica	ıl im	plication	ns beh	ind			
Course	Objective	•	 intelligence mathematically To know the automated learning techniques and to explore the techniques in ReinforcementLearning 													
		•	To explore the basics of Machine learning and Neural networks													
		•	 To know about the Natural Language processing and explore AI techniques for robotics 													
		At the end of the course, the student should be able to, Knowledge														
			At the end of the course, the student should be able to, Into wheage Level Level													
		CO1: (Jndersta	and the co	oncepts	of Age	ents a	nd obj	ects				K2			
Co	urse	CO2: U	Understa	nderstand the probabilistic reasoning using Bayesian Models									K3			
Outc		CO3: /	Apply p	robabilist	ic mode	els for v	variou	is use	cases an	d			K3			
				learning												
		CO4:A AI	apply the	e concept	ts of Ma	chine l	learni	ng and	d ANN to	echni	ques in		K4			
		CO5: /	Apply N	LP and A	AI techn	iques f	for rol	ootics				K	K3,K4			
Pre-req	uisites	-														
				CO /	PO Mar	ping							CO	/PSO		
	(3/2	2/1indica	ites stren	gth of cor			ng,2 –	Mediu	m,1-Wea	k			Мар	ping		
COs PO) PO	РО	РО	Programn PO	ne Outco PO	mes(PO		PO	PO	PO	РО	РО	PSO PSO	Ds PSO		
COs PO 1		PO 3	4	5	PO 6	PO 7		8	PO 9	PO 10	P0 11	12	1	2		
CO1 3	3	3	3	2	3	1						3	3	3		
CO2 3	3	3	3	3	3	1						3	2	3		
CO3 3	3	3	3	3	3	1						3	3	3		
CO4 3	3	3	3	3	3	1						3	3	3		
CO5 3	3	3	3	3	3	1						3	3	3		

Course As	sessment Me	thods Direct		
D	irect			
	1.Continu	ious Assessment Test I, II & III		
	2.Assignr			
		mester examinations		
In	direct			
	I.Course	- end survey		
Content o	of the syllab	us		
Unit	- I	Introduction to objects and agents	Periods	9
Ontologic	al engineeri	ng – categories and objects – events – mental objects and m	odal logic – rea	asoning systems
for catego	ries – reason	ning with default information- Software Agents-Architectur	e for Intelliger	t Agents-Agent
	cation-Nego	tiation and Bargaining-Argumentation among Agents-Trust	t and Reputatio	n in Multi-agen
systems			1	
Unit-	-II	Probabilistic reasoning	Periods	9
		nty- Bayesian inference – naïve bayes models Probabilistic r		
		g over time – time and uncertainty – inference in temporal m	odels – Hidden	Markov Models
–Kalman				
Unit -		Probabilistic Models and Reinforcement Learning ODELS Statistical learning theory – maximum-likelihood p	Periods	9
reinforcer Unit-	nentlearning	LEARNING: Learning from rewards – passive reing – generalization in reinforcement learning Introduction to Machine Learning and Artificial	Periods	<u>9</u>
		NeuralNetworks		
		ING: Introduction, Machine Learning Process, Feature Eng	-	
		ture Engineering Methods Data Visualization Line Chart, B		
-		lot, Seaborn- Distplot, joint plotDefinitions of Supervised	-	
Unit	•	Introduction To NLP and ROBOTS	Periods	9
Introducti Alexa , SI		l Language processing-Components in NLP-Terminologies	- examples-Ca	se Studies:
]	Fotal Periods	45
Text Bo	oks			
1.		ssel and Peter Norvig, "Artificial Intelligence: A Moder ucation, 2020	n Approach",	Fourth Edition
2.		ii Jain, Artificial Intelligence, As per AICTE: Making ns, 1stEdition,2019	a System In	telligent, Wiley
3.		oshi, Machine Learning and Artificial Intelligence, Springer	r Publications,	2020
4.	Dr.S.Love IndiaPvt. I	lyn Rose, Dr. L.Ashok Kumar, Dr.D.Karthika Renuka, Deej .td 2019.	o Learning usir	g Python, Wiley
Reference				
1.	Saroj Kaus	shik, Artificial Intelligence, Cengage Learning India, 2011.		
2.	Machine I	earning Dummies, John Paul Muller, Luca Massaron, Wile	y Publications,	2021.
3.		ht, Elaine Rich, and Nair B., "Artificial Intelligence", McGr		
4.	Deepak Kl	nemani, "Artificial Intelligence", Tata McGraw Hill Educati	ion, 2013	
	1 · · · ·	. 6 ,	,	

E-Reso	urces
1.	https://www.simplilearn.com/learn-ai-basics-skillup
2.	https://developers.google.com/machine-learning/crash-course
3.	https://www.opentrends.net/en/article/basic-concepts-artificial-intelligence

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Progr	ramme	B.F	E. Pro	ogramme (muene	Ingoue	03720		7 Reg	gulation	20	19		
Depar	rtment	Compu	iter Sci	ienece and	l Techr	nology	7			Se	emester		V		
					-	eriods		Veek	Cred	it		Maximum Marks			
Cours	e Code	C	ourse	Name	Ι	_	Т	Р	С	(CA	ESE Total			
U190	CT509	Intern Progr	net rammi	ing		3	0	0	3		50	50	1	100	
		The st	tudent s	should be	be made,										
			• To	describe b	e basic Internet Protocols.										
Course	Objective		• Ex	plain tools	ols for Internet programming.										
			• De	scribe scri	cripting languages – Java Script.										
			• Ex	plain dyna	ynamic HTML programming.										
			• Ex	plain Serv	Server Side Programming tools										
		At the			e, the student should be able to,							Kı	nowled	dgee	
											Lev	el			
		CO1:Construct a basic website using HTML											K2		
Co	ourse	CO2: Develop attractive web page using Cascading Style Sheets.											K3		
	come	CO3: Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms											K3		
		CO4: Construct simple web pages in PHP and to represent data in XMLformat											K3		
		CO5: applic		JAX and	nd web services to develop interactive web								к2		
Pre-req	uisites	-													
	(3/2	2/1indica	tes strer			O Mapping elation) 3-Strong,2 – Medium,1-Weak						CO/P Mappi			
COs P	O PO	РО	РО	Programm PO	e Outco PO	mes(P PO		PO	PO	РО	PO	РО	PSO PSO	Ds PSO	
1	1 2	3	4	5	PO 6	7	,	8 8	9	10	11 PO	12	1	2	
CO1 2 CO2 2		3	3	2					1	3		3	3	3	
CO2 2 CO3 2		3 3	3	2					1 1	3 3		3	3 3	3 3	
CO4 2		3	3	3					1	3		3	3	3	
CO5 2		3	3	3					1	3		3	3	3	
Course As	ssessment M	ethods I	Direct												
Γ	Direct 1.Contin 2.Assign 3.End-Se	ment.		ent Test I, nations	II & III	[
h	ndirect]	
	1.Course	- end su	ırvey												

Content o	of the syllab	Dus		
Unit	–I	Introduction	Periods	9
Categori	ies of Web A	net, World Wide Web, History of the Internet & World, Hist Applications, Hypertext Mark Up Language (HTML), Basic I king, Images, List, Meta Elements.		
Unit-	–II	Cascade Style Sheet	Periods	9
and boxe Queries, like Boo	es, Margins, Wildcard Sotstrap, Need	cture, CSS rules for Backgrounds, Colors and properties, Mar Padding Lists, CSS Positioning, Animations, Tool-Tips, S Selectors, Working with Gradients, Pseudo Class, Pseudo e d for Scripting languages, Types of scripting languages, Cli oplications Demo	tyle images, Velements, basic	ariables, Media of frameworks
Unit–	- III	Client Side Programming	Periods	9
Exception – Syntax	on Handling	roduction to JavaScript–JavaScript DOM Model-Date and C -Validation-Built-in objects-Event Handling- DHTML with Files – Http Request – SQL, nodejs.	n JavaScript-JS	SON introduction
Unit–	-IV	PHP and XML	Periods	9
		s - File handling – Cookies - Connecting to Database. XML : Schema DOM and Presenting XML, XML Parsers and		
Regular Definition Transfor Unit- AJAX: A Introducti (WSDL)-0	on-XML S rmation, Nev -V Ajax Client ion- Java w		Validation, Periods k Methods; V Describing a	XSL and XSLT 9 Veb Services: Web services
Regular Definition Transfor Unit- AJAX: A Introducti	on-XML S rmation, Nev -V Ajax Client ion- Java w	Schema DOM and Presenting XML, XML Parsers and ws Feed (RSS and ATOM). Introduction To AJAX and Web Services Server Architecture-XML Http Request Object-Call Bac reb services Basics – Creating, Publishing, Testing and I a web service, Database Driven web service from an applicat	Validation, Periods k Methods; V Describing a	XSL and XSLT 9 Veb Services: Web services
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Course Code	Course Name		Periods	Per V	Week	Cre	dit	Ma	aximum	Maı	rks
	eourse r tunie		L	Т	Р	C	2	CA	ESE	Т	otal
U19MCTY5	Logical Reasoni	ng	2	0	0	-		100	-		100
Content of the syl	labus										
Unit – I		VERBAL R							Period		6
		rect Letter Coding, N									
		ng, Crypt coding – c									
		Completing the Anal									
		alogy), Classification g the odd number and									
		e, Letter word probl									
given word, By uns		e, Letter word probl	ems, reure	ucice	, ,	,	1101	mation	Comp ic		nom a
Unit - II		FING ARRANGEN	IENT &	SENS	SE TES	ST			Period	s	6
Sitting Arrangeme	ent (Arrangement in	a line, Arrangement	around of	a circ	ele, squ	are an	nd rec	tangle,	Arrange	ment	around
pentagonal and hex	kagonal, Direction S	Sense Test[(Main, C	ardinal an	d Sho	rtest D	irectio	on)Fi	nal Dete	ction, Di	splac	cement,
Direction and Dis	olacement], Numbe	r, Ranking, Time	sequence	Test	(Numb	ber Te	est, R	anking '	Test,	-	
-		on classification, Bas	-					-		lems)
Unit – III		NUMBER AND I	-						Period		6
Number and Lett	er Series[(Number	• Series: To find a m	issing terr	n, Fin	d the r	numbe	r tha	t does no	ot follow	the	pattern,
		ased on addition / su	-								-
-		cation and Division,									
-	-	bes of natural numb						-			
		cter, Age, Blood (J				-				-	
-	-	perations and Notati	-		-			-			
		e conclusions), Log								0	0 0
	address, Question b	-			,						
Unit – IV	LOC	GICAL AND ANAL	YTICAL	REA	SONI	NG			Period	s	6
Logical venn diag	grams (Universal p	ositive, Universal N	legative, l	Unive	rsal A	ffirma	tive	or Nega	tive, Mi	scella	aneous,
- ,		ns), Eligibility test	-					-			
-	•	nts, Statement and						-			
Data Sufficiency.	und ingunit	ins, succinent una	course o					01 11 40	i or the	Stati	
Unit – V	DAT	A INTERPRETAT	ION & F	LOW	CHA	RT			Period	s	6
),Data Interpretati					Pie	chart N			
		ed, Full cube, cutting									
		ogical deduction, E					-		uit, valt	ic up	Juanng
now chart), Qualit	native reasoning, I	Ngicai ucuuciivii, L		1 (450	ining, I	Jinar	, iogi		tal Perio	bds	30
Text Books								10			
1	crack Test of Reaso	ning - Jai kishan and	Prem kisł	nan -a	rihant	public	ation	l			
References		<u> </u>				•					
	prepare logical reas	oning for CAT – Aru	ın Sharma	- Mc	Graw	Hill P	ublic	ation			
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C	C		0		т			s Per V		Credit		Ν	Iaximum Marks			
Cou	irse Co	de		urse N			L	Т	Р	C	CA		ESE	Total		
U1	9EC52	26			d Systei Iborato		0	0	4	2	50		50	100		
			The			t should be made to, esign microcontroller based embedded systems.										
			•		-											
			•		troduce the embedded systems design tools and hardware programming											
Cour	se Obj	ective	•		uip the students skills in both simulation and practical implementation o sic building blocks of a microcontroller including timers, counters, I/O											
														s, I/O		
					-	_				sion, seria l to valid				h functio		
			•				dware ver				ate the	same	unoug	ii iuncuo		
			At the	e end	of the c	ourse	, the stu	dent sl	hould	be able t	ю,		Know	ledge Le		
				The students get exposure to the system design aspects of												
			Microcontrollers K4													
	Course		CO2: Will be able Design applications for customized requirements K3													
(Dutcon	ne	CO3: \	CO3: Will learn firmware development for microcontrollers K6												
			CO4:N	CO4:Nalayse and design using ARM LPC2148 Microcontrollers K6												
			CO5: Understand the interfacing the display with the K6													
Pre-r	equisit	es	Microc	ontrol	lers											
	-				CO /	PO M	apping						C	O/PSO		
	(3/2/1 in	dicates s	trength) 3-Strong	, 2 - M	edium,	1 - Weak				apping		
							comes (PO						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	2		3		2								1	2		
CO2	3		2		3								3	3		
CO3	2		2		1								1	2		
CO4	2		3		2								2	2		
CO5	2		3		2								1	2		
Course	e Assess	ment N	lethods	Direct							1	1		<u> </u>		
[Direc	t														
			b and po Semeste			ns										
	Indire															
			- end su													

LIST OF EXPERIMENTS Embedded Systems Design Laboratory		
2.	Implementation of GPIO of ARM LPC2148	CO2
3.	Interfacing Timer using ARM LPC2148.	CO2
4.	Implementation of UART features of ARM LPC2148.	CO3
5.	Implementation of ADC of ARM LPC2148.	CO3
6.	Implementation of DAC of ARM LPC2148.	CO4
7.	Seven segment display interface using LPC2148	CO4
8.	Interfacing 4x4 matrix key with LPC2148	CO4
9.	Interfacing buzzer with LPC2148	CO5
10.	Real time clock implementation using LCD and ARM LPC2148	CO5
11.	Interfacing Graphical LCD using LPC2148.	CO5
	Total Periods	45
E-Reso	urces	
1.	https://www.electronicwings.com/arm7/lpc2148- timercounter#:~:text=LPC2148%20has%20two%2032%2Dbit,signal%20at%20specified%20time%2 0value.	
2.	https://www.engineersgarage.com/how-to-interface-4x4-matrix-keypad-with-lpc2148-part-6-9/	
3.	https://www.youtube.com/watch?v=JLsPS58bmO0	

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Dej	partme	ent	Com	puter S	cience &	& Te	chnology				Se	emester		V	
C	C		C		т			ls Per '	Week	Credi				m Marks	
Cou	irse Co	de		ourse N			L	Т	Р	С	C	4	ESE	Total	
U19	9CT51	0	Intern Labora		grammir	ng	0	0	4	2	50)	50	100	
Cour	se Obje	ective	•	Desi Crea Deve be fa	te dynar elop the amiliar w	b pag nic w Clier vith tl	e using H veb pages nt Server he PHP p vices using	using applica rogram	server ations. ationg v	side scrij	oting.	5.			
			At th	e end o	of the co	ourse	e, the stu	dent sl	hould b	be able t	0,			owledge level	
			CO1:	Constr	uct a bas	sic w	ebsite usi	ng HT	ML					K2	
			CO2:	Develo	op attract	tive v	veb page	using (Cascadi	ng Style	Sheet	ts.		K3	
	Course Outcon				•		page with vent hand			Ū	Scrip	t objects			
				: Const format		ple v	veb pages	in PH	IP and	to repres	sent d	ata in		K4	
				Use A	AJAX a	nd	web serv	vices	to dev	elop in	teracti	ve web		K3	
Pre-r	equisit	es	-												
	(3/2/1 in	dicates		of correl	ation	apping) 3-Strong comes (PO		edium, 1	l - Weak)/PSO oping	
COs	PO	РО	РО	PT PO	PO PO	PO PO	PO PO	s) PO	РО	РО	РО	РО	PSOs PSO	PSO	
CO1	1 2	2 2	3	4	5	6	7	8	9	10	11	12 2	1 2	2	
CO2	3	2	3	1	23		+					2	2	2	
CO3	2	2	2	2	<u> </u>		+					2	2	2	
CO4	2	2	3	2	2		+ +					2	2	2	
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LIST OF	EXPERIMENTS	
	Internet ProgrammingLaboratory	
1.	Design the following static web pages required for an online book store web site. HOME PAGE: Uniform Resource Locator, Tools and Web Programming Languages. Web Standards	CO1
2.	Design the following static web pages required for an online book store web site. LOGIN PAGE, CATOLOGUEPAGE	CO1
3.	Design the following static web pages required for an online book store web site. CART PAGE:	CO2
4.	Design the following static web pages required for an online book store web site. REGISTRATION PAGE	CO2
5.	Design the following static web pages required for an online book store web site. using bootstrap	CO2
6.	Design the following static web pages required for an online book store web site. VALIDATION using Scripting Language	CO3
7.	Write an XML file which will display the Book information	CO4
8.	Design dynamic web page with login credentials using PHP and MSQL	CO4
9.	Create a web page using web services	CO5
	Total Periods	
-Resour	rces	
1. <u>h</u>	ttps://www.youtube.com/watch?v=1X37MpeVcmU	
2. <u>h</u>	ttps://www.youtube.com/watch?v=5GcQtLDGXy8	
3. <u>h</u>	ttps://www.geeksforgeeks.org/rest-api-introduction/	

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De	partme	ent	Compu	iter Sci	ence and	Techno	ology				Semester	r	v	
a	a				Ŧ	Pe	eriods I		/eek	Credi	t	Maxir		
Cou	irse Co	ode	C	ourse N	ame	I		Г	Р	C	CA	ESE	Total	
U	J 19CTI	E01	Netwo	tograph ork Sec	urity	3		0	0	3	50	0		100
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				udents v		plete thi	s cours	e suc	cessf	ully are e	expected to:	K	nowle Leve K1	•
	Course		CO2: compr	Catego ehend	orize bl digital sig	ock cij gnature	pher functio	mod ns	es	of ope	ration an	d	K2	
				-	ent Public	-	• • •	<u> </u>					K2	
					and the c	_		-			n		K3	
Pre-r	requisit	es	- CO5:0	Compre	hend the	basics a	bout th	e Cy	ber S	ecurity			K3	
		(3/2	2/1indica		CO / gth of corr Programn		3-Stron	-	Medi	um,1-We	ak		CO Map PSO	
COs	PO	PO	PO	РО	PO	PO	PO		PO	PO	PO PO	PO 12	PSO	PSO
CO1	1 3	2 3	3	4 3	5 3	<u>6</u> 2	7 1	1	8	9	10 11 2	12 2	1 3	2 3
CO2	3	3	3	3	3	2	1	1			2	2	2	2
CO3	3	3	3	3	3	2	1	1			2	2	3	3
CO4	3	3	3	3	3	2	1	1			2	2	2	2
CO5	3	3	3	3	3	2	1	1			2	2	3	3
Course	e Assess	ment M	lethods l	Direct										
	2 3 Indire	.Contin .Assign .End-Se ect	ment.	examin	nt Test I, ations	II & III	[_

Unit -	of the sylla – I	Introduction to Network Security	Periods	9
Introduct	tion to Cry	yptography and Network Security:OSI Security Archite		on to Security
		echanisms, Symmetric cipher model, Substitution techn		
		betic cipher, Poly alphabetic ciphers, Onetime pad, Hill C		
		iques, Steganography		,, F
Unit –		Cipher techniques	Periods	9
Block cij	pher princip	bles-Introduction, Data Encryption Standard, DES Exampl	e, Strength of DE	S, Block ciphe
		– Multiple Encryption, Block cipher Modes of operation		
		k Chaining Mode, Cipher Feedback Mode, Output Feed		
Advance	d Encrypti	on Standard - Structure and Transformation Functions,	AES Key Expan	nsion and AES
Example	e, Blowfish,	, RC5 algorithm.		
Unit -	III	Public Key Crypto Systems	Periods	9
Principle	es of Publ	lic-key Cryptosystems - Structure and key managen	nent, Principles	of Public-ke
		oplications for Public-key Cryptosystems, Requirements for		
		analysis, RSA algorithm - Key management, RSA algorit		
		exchange – Algorithm, Key Exchange Protocols, Man-in-tl		
Cryptogr		exchange – Algorithini, Key Exchange i 10000013, Mail-in-ti	ie- Mildle Attack	, Emplie Cuiv
Unit –		Message Authentication Code	Periods	9
	1			
10000000	Authontic	8		
		cation Codes, Requirements for Message Authentic	ation Codes, A	pplications o
Cryptogr	raphic Func	cation Codes, Requirements for Message Authentic ctions - Message Authentication, Two Simple Hash Func	ation Codes, A tion, Security Re	pplications o equirements fo
Cryptogr	raphic Func	cation Codes, Requirements for Message Authentic	ation Codes, A tion, Security Re	pplications of opplications of opplications of opplications of the opplication of the opp
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		echanisms, Symmetric cipher model, Substitution techn		
-	·	betic cipher, Poly alphabetic ciphers, Onetime pad, Hill C	ipher – Encrypti	on, Decryption
•		iques, Steganography		
Unit –		Cipher techniques	Periods	9
		bles-Introduction, Data Encryption Standard, DES Example		
		- Multiple Encryption, Block cipher Modes of operation		
		k Chaining Mode, Cipher Feedback Mode, Output Feedback		
		on Standard – Structure and Transformation Functions,	AES Key Expa	nsion and AE
-		RC5 algorithm.		
Unit -	111	Public Key Crypto Systems	Periods	9
		ic-key Cryptosystems - Structure and key managem		
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Public –	Key Crypta	analysis, RSA algorithm - Key management, RSA algorith	m - Encryption	and Decryption
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Unit –	IV	Message Authentication Code	Periods	9
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Unit –	- I	Introduction	Periods	9
and join Expectati	it probabili ion, Autoc	y, Random Processes and Linear Algebra: Probability: indepenty, Bayes" theorem; Random Processes: Stationary and orrelation, Cross-Correlation, spectra; Linear Algebra:	d non station	ary processes
		es, Eigen vectors; Bayes Decision Theory		
Unit –		Theories	Periods	9
surfaces,	Normal d m-Likelihoo	heory: Minimum-error-rate classification, Classifiers, Di lensity and discriminate functions, discrete features, Pa od estimation: Gaussian case; Maximum a Posteriori es	rameter Estin	nation Method
Unit - I	III	Learning Methods	Periods	9
method Markov I	for parame Models (HN	her methods; Cluster validation; Gaussian mixture models eter estimation; Maximum entropy estimation, Sequential MMs); Discrete HMMs; Continuous HMMs	l PatternReco	gnition: Hidde
Unit –		Techniques	Periods	9
Nonpara	matria taah			
-		niques for density estimation: Parzen-window method; K action: Fisher discriminant analysis; Principal component an		
Dimensio Unit –	onality redu • V	ction: Fisher discriminant analysis; Principal component ar Functions and Applications	alysis; Factor Periods	Analysis 9
Dimensio Unit – Linear d metric n	onality redu V liscriminant nethods for	retion: Fisher discriminant analysis; Principal component arFunctions and Applicationsfunctions: Gradient descent procedures; Perceptron; Sur pattern classification: Non-numeric data or nominal de processing, segmentation, and analysis, Speech recognitio	nalysis; Factor Periods upport vector ata; Decision n, Fingerprint	Analysis 9 machines,Non trees: CART
Dimensio Unit – Linear d metric n Applicati	onality redu V liscriminant nethods for ions: Image	retion: Fisher discriminant analysis; Principal component arFunctions and Applicationsfunctions: Gradient descent procedures; Perceptron; Sur pattern classification: Non-numeric data or nominal de processing, segmentation, and analysis, Speech recognitio	nalysis; Factor Periods apport vector ata; Decision	Analysis 9 machines,Non trees: CART identification
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Content of the syllal	Dus		
Unit – I	Introduction	Periods	9
Overview Of Virtual	ization -Basics of Virtualization - Virtualization Types -	Desktop Virtua	lization,Storage
Virtualization – Syste	em-level Operating Virtualization – Application Virtualiza	tion- Virtualizati	on Advantages
Understanding Hype	rvisors, Understanding Virtual Machines, Assignment-	Installing, wind	ows, Linux on a
virtual machine.			
Unit – II	Concepts in Creating Virtual Machines	Periods	9
	achine-Performing P2V Conversions, Loading your Enviro		
	CPUs for a virtual machine-Understanding CPU Virtualized	•	ing VM CPU
	actices for VM CPUs, Managing Memory for a virtual		
Machine-Understan	ding memory virtualization, Configuring VM memory opt	ions, Tuning pr	acticesfor VM
memory			
Unit - III	Storage Management in Virtual Machine	Periods	9
	for a virtual machine-Understanding storage virtualizati		
	ctices for VM storage, SCSI- Speaking SCSI- Using SCS		
	Fiber Channel Hardware Devices - iSCSI Architect	•	
	pts, Introduction to server virtualization, Types of ser		•
	er virtualization, Managing Networking for a virtual n		nding network
	guring VM network options, Tuning practices for Virtual		
Unit – IV	Network Device Virtualization s	Periods	9
	vevice Virtualization - VLANs , VRF Instances- VFIs		
	Virtualization, Fundamentals of Virtualization securit	y-Virtualization	architecture,
Threats to a virtualized			
Unit – V	Security Virtualization	Periods	9
How security must a	dapt to virtualization, Securing hypervisors-Hypervisor con	nfiguration and s	ecurity,
Designing virtual n	etworks for security-comparing virtual and physical netw	vorks, Virtual ne	etworksecurity
considerations, Con	figuring virtual switches for security		·
		Total Periods	45
Text Books		I.	
1. Virtualizati	on Security: Protecting Virtualized Environments,	Dave shackle	eford, sybex
publication	s,2013		•
2. Matthew Po	ortnoy, Virtualization Essentials, WILEY INDIA, 2 nd Editio	on, 2016	
References			
1. William v	on Hagen, Professional Xen Virtualization, Wrox Publicati	ons, January, 20	08
David Ma	urshall, Wade A. Reynolds, Advanced Server Virtualizati	ion: VMware an	d Microsoft
2. Platform i	n the Virtual Data Center, Auerbach Publications, 2006		
3. NPTEL C	ourse Notes		
E-Resources			
1. https://ww	/w.youtube.com/watch?v=ZogZwbyPO_4		
https://www	v.oreilly.com/library/view/vmware-vsphere		
/ I			
2. virtualizati			
virtualizatio	on/9780133442090/Lesson_5_2.html /w.redhat.com/en/topics/virtualization		

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			CO5: A	Analyze	the chara	cteristic	es and	l appli	cation	of Wirel	less se	ensor		K4			
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Course Assessment N	lethods Direct		
Direct			
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3.End-S	emester examinations		
Indirect			
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Content of the sylla	bus		
Unit – I	Introduction to Mobile Computing	Periods	9
Overview of wire	less and mobile infrastructure, Preliminary concepts of	n cellular archi	tecture. Design
	formance issues, Radio resource management and interf		•
	terference and frequency reuse, Cell splitting, Channel ass		
	5G, Location and handoff management - Introduction to l		
-	ty models characterizing individual node movement (Ra	-	
, .	vidual node movement(Fluid flow.	,,	
Unit – II	Mobility Models and its Characteristics	Periods	9
	characterizing individual node movement(Markovian), N		characterizing
	ovement(Activity based), Mobility models characterizin		
	oint based group mobility model), Mobility models ch	0	
	community based group mobility model), Static (Alway	•	
U	eas), Dynamic location management schemes (Time, Move		
	Simultaneous paging, Sequential paging), Location manage		
	s, Factors affecting handoffs and performance evaluati		
	andoffs (soft, hard, horizontal, vertical)		
Unit - III	Wireless transmission fundamentals	Periods	9
Introduction to narr	ow and wideband systems, Spread spectrum - Frequency h	opping Introdu	tion to MIMO
	pacity and diversity gain, Introduction to OFDM, MIMO-		
	DMA,CDMA, SDMA), Wireless local area network, V		
	bee), Characteristics and applications, Coverage and connect	1	
Unit – IV	Wireless Sensor Networks	Periods	9
	, Basic architecture, Design objectives of WSN, Applic		Sensing and
^	ge Coverage and connectivity, Sensor placement, Data r		Ū.
	ering of sensors, Energy efficient Routing (LEACH).	ciaying and agg	regation, Energy
Unit – V	Cognitive Radio Networks	Periods	9
	5		
	works - Fixed spectrum access, Dynamic spectrum access, D		
	Spectrum sharing, Interoperability and co-existence issues,		
	nmunications in 5G cellular networks - Introduction to D2		•
	G architecture, Introduction to the radio resource manager	ment, Power con	strol and mode
selection problems,	Millimeter wave communication in 5G	Total Daria da	45
		Total Periods	45
Text Books			
	Song, "Wireless Device-to-Device Communications	and Networks	",1st Edition,
2013,Call	nbridge University Press, ASIN : B00SYVZ82M.		

Referenc	es
1.	Theodore Rappaport ,Wireless Communications: Principles and Practice, Pearson Education, 2002
2.	Ezio Biglieri, MIMO Wireless Communications O Wireless Communications, Cambridge UniversityPress, ISBN:9780511618420, 2009
3.	Andrea J. Goldsmith, Larry J. Greenstein, Narayan Mandayam and H. Vincent Poor, Principles of CognitiveRadio.EzioBiglieri, , Cambridge University Press, 2012
E-Reso	urces
1.	https://www.javatpoint.com/mobile-computing
2.	https://www.youtube.com/watch?v=5kBknJWi71Q
3.	https://www.educba.com/mobile-computing-types/

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Cour	Course Objective The main objective of this course is to: • To learn different socket function and implement client set using sockets • To conduct experiments to know how different internet proworks • To analyze various application program like TELNET, DNS, • Build different application like Routing, Load balancing & Set • To apply protocols get adapted to emerging technologies													
	Course outcome		CO1: CO2: CO3: numer CO4:	tudents v Become Design a Learn a ric value Analyze	vho comple familiar w	ete this cou ith element nent client ctions that ocols rotocol fur	tary so server conv ctions	ccessfu cket fu applic ert be	lly are ex nctions. ations us	spected to:		Inowle Leve K1 K2 K2 K3 K3	•	
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Content of the syllab	DUS		
Unit – I	Introduction to Network Security	Periods	9
Introduction, simp	le daytime client, protocol independence, Error handli	ing, simple da	ytime server,
Roadmap to client	nt/server, Overview of TCP/IP protocol- TCP com	nection establ	ishment and
termination, TCP	state transition diagram - Time-wait state, SCTP asse	ociation estab	lishment and
termination, TCP g	port numbers and concurrent servers, Buffer size and lin	mitations, stan	dard internet
services, protocol	usage by common, Internet applications.		
Unit – II	Socket Functions	Periods	9
Socket function, co	onnect function, bind function, listen function, accept fun	nction, Fork fu	nction, exec
	nt servers, close function-get sock name and get peer name		
	al startup and termination, POSIX signal handling, Wa	ait and Waitpi	d functions,
	ver process, Crashing and rebooting of server host.		
Unit - III	Protocol Functions	Periods	9
Get sock opt funct	ion, set sock opt function, IPV4, ICMP, TCP socket op	ptions, UDP E	Echo server
	m function, send to function, Connect function with U	DP, dg_cli fui	nction, lack
of flowcontrol wit			
Unit – IV	DNS Socket Functions	Periods	9
	d name servers, gethostbyname function, gethostbyac		
•	servbyport function, tcp_connect function- tcp_listen fu	unction, udp_c	elient,
udp_connect, udp_	-		
function, BOOTP,			
Unit – V	Advanced Socket Functions	Periods	9
	IPV4, IPV6 interoperability, Daemon processes, Daen Advanced I/O functions	mon processes	s and the
i ,		Fotal Periods	45
Text Books			
	E.Comer "Internetworking with TCP/IP " principles, protoco 1, Pearson Education,2013	ols and architect	ure, 6th Edition
a Behrouz	A.Forouzan, "TCP/IP protocol suite", 4th edition, Mc Graw	v Hill education	
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		ence Project – Applications of Data Science in various fields	- Data Securi	
Unit –	·II	DATA COLLECTION AND DATA PRE- PROCESSING	Periods	9
		rategies – Data Pre-Processing Overview – Data Cleani		
		ta Reduction – Data Discretization- working with data from file	es- working wit	h relational data
	xploring data			
Unit -		Exploratory Data Analytics	Periods	9
Interquar plot-histo	rtile range, S ogram- Box	cription of data-Mean, mode, median,,Range, Quartiles, v Skewness and Kurtosis -Graphical Displays of basic statistica Plots – Pivot Table – Heat Map -Scatterplot-Data correlation sson, Normal distributions – Manipulating objects - data dis	al description of ANOVA. St	of data-Quantile
Unit -	– IV	MODEL DEVELOPMENT	Periods	9
Choosing	g and evalu	nating models – Sampling for modeling and validation-matrix	apping proble	ms to machine
0	e	clustering models, validating models – cluster analysis – K-	means algorith	m – Linear and
-	regression			
Unit	– V	DELIVERING RESULTS	Periods	9
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Machine learning: W	Vhat and why?, Features of Machine Learning, Machine Lea	rning Life Cycle	e, Applications
	g, Classifications of Machine Learning - Supervised Learning	•	
Reinforcement Lean	ning, Data Preprocessing in Machine learning, The Curse	of dimensionali	ty, Over fitting
0	n, Bias and Variance, Learning Curve, Classification, Error	and noise, Paran	metric vs. non
parametric models-l			
Unit - II	SUPERVISED LEARNING – Regression Model	Periods	9
	Linear Regression, Bayesian Linear Regression, Polynomia	al Regression, M	Iultiple Linear
Regression, Non-Li		1	
Unit – III	SUPERVISED LEARNING – Classification & VALIDATION	Periods	9
	dom Forest, Decision Trees, k-nearest neighbours, Support		
	h. Cross-Validation-Validation Set Approach, Leave-P-out c	cross-validation,	Leaveone out
	fold cross-validation, Stratified k-fold cross-validation.		
Unit - IV	UNSUPERVISED LEARNING	Periods	9
	rvised Learning, Types of Unsupervised Learning Algorithm		
	Hierarchal clustering, Anomaly detection, Association Rul	e Learning, Con	fusion Matrix
in Machine Learnin		Dentala	0
Unit – V	REINFORCEMENT LEARNING	Periods	9
	einforcement Learning, Terms used in Reinforcement		
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Introduction - Cloud Reference Model – Architecture - Infrastructure / Hardware as a Service - Platform as a Service - Software as a Service - Types of Clouds - Public Clouds - Private Clouds - Hybrid Clouds - Community Clouds - Cloud Definition - Cloud Interoperability and Standards - Scalability and FaultTolerance - Security - Trust- and Privacy. Unit - III VIRTUALIZATION Periods 9 Introduction - Characteristics of Virtualized Environments - Taxonomy of Virtualization - Xen- Para virtualization - Virtualization - Alteristics of Virtualization - VMware- Full Virtualization Periods 9 Unit - IV DATA INTENSIVE COMPUTING AND CLOUD Periods Periods 9 Characterizing Data-Intensive Computations - Technologies for Data-Intensive Computing - Storage Systems in Industry - Amazon Web Services - Compute Services - Storage Services - Communication Services - Google AppEngine 9 Unit - V APPLICATIONS AND MANAGEMENT OF Periods 9 Scientific Applications- Business and Consumer Applications - Energy Efficiency in Clouds- Energy- Efficient and Green Cloud Computing Architecture - Federated Clouds / Inter Cloud - Characterization and Definition-Cloud Federation Stack-Technologies for Cloud Federations-Introduction to DevOps. 45 Text Books Total Periods 45 1. Raj kumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing", Tata Mcgraw Hill, 2017. 2 2. Mixes Antonopoulos,Lee Gillam, "Cloud Computing: Principles,Systems and Applicati	Unit	– II	CLOUD COMPUTING ARCHITECTURE	Periods	9
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	nents engineering – Eliciting requirements, Develo ting requirements – Requirements monitoring – Vali		
Unit – II		Periods	9
diagram-	ion – Unified Modeling Language – Static model – - Use case diagram – UML dynamic modeling – UMI activity diagram – Implementation Diagrams –Comp	interaction diagrams –UML stat	e chart diagram
Unit – IV			9
design –	oncepts and model – Architectural design: Software Component level design: Designing class-based con- erface design: User interface analysis and design – Ir	mponents, Conducting component	nt level design -
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Cour	Laboratory Image: Course Objective The students should be made to: • Understand the R Programming Language. • Exposure on Solving of data science problems. • Understand the classification and Regression Model • Understand the course, the student should be able to, • Knowledge leve • CO1: Apply the basic functions of R-programming. • K3													evel	
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T •	1.	Course	e - end s	urvey											
List of	Experi	nents		Ι	DATA SC	IENCE	LAB	OR	ARTO	RY					
1.	a. b.	Using Using Write	with an mather	OR APP nd withou natical fu ript to cr	LICATIC at R objec anctions o eate R obj	DN ts on coi n consol	nsole				nd sav	ve in a	specifi	ed	CO1

4.	http://www.ats.ucla.edu/stat/r/data/binary.csv	
	http://www.coastal.edu/kingw/statistics/R-tutorials/logistic.html	
<u> </u>		
<u>1.</u> 2.	http://www.r-bloggers.com/how-to-perform-a-logistic-regression-in-r/ http://www.ats.ucla.edu/stat/r/dae/rreg.htm	
	OURCES	
	Total Periods	45
	visualizations	
10.	a. Clustering algorithms for unsupervised classification. Plot the cluster data using R	CO5
	CLUSTERINGMODEL	
	c. Evaluate the performance of classifier	
9.	a. Install relevant package for classification.b. Choose classifier for classification problem.	CO4
	CLASSIFICATION MODEL	
	Apply regression Model techniques to predict the data on above dataset	
8.	REGRESSION MODEL FOR PREDICTION	CO4
	dataset	
7.	Apply multiple regressions, if data have a continuous independent variable. Apply on above	CO4
	MULTIPLE REGRESSION MODEL	
6.	REGRESSION MODEL Import a data from web storage. Name the dataset and now do Logistic Regression to find out relation between variables that are affecting the admission of a student in a institute based on his orher GRE score, GPA obtained and rank of the student. Also check the model is fit or not. Require (foreign), require (MASS	
	data	
	c. Analysis of covariance: variance (ANOVA), if data have categorical variables on iris	
5.	b. Plot the correlation plot on data set and visualize giving an overview of relationships Among data on iris data.	CO3
	a. Find the correlation matrix.	
	CORRELATION AND CO -VARIANCE	
	c.Plot the histogram, bar chart and pie chart on sample data.	
4.	b.Find the outliers using plot.	005
	a. Find the data distributions using box and scatter plot.	CO3
	VISUALIZATIONS	
	b. Reading Excel datasheet in R.c. Reading XML dataset in R.	
3.	READING AND WRITING DIFFERENT TYPES OF DATASETS a. Reading different types of datasets (.txt,.csv) from Web and disk and writing in file in specificdisk location.	CO2
	dataset	
	b. Write an R script to find subset of dataset by using subset(),aggregate() functions on iris	
2.	a. Write an R script to find basic descriptive statistics using summary, str, quartile function onmtcars & cars datasets.	CO1
	a write an K script to that dasic descriptive statistics using summary sir (marine	

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Co	ourse					rse, the			l be able	e to,					wledge wel		
Out	tcome		 CO1: Apply the python basic libraries CO2: Apply the python library for ML application CO3: Design the various regression models using sklearn 											K3 K3 K4			
		-	CO4: i	mplem	ent a de	ecision	tree usi	ng vari						K4	Ļ		
Pre-re	quisites	;				ig mode oblem S		tasets.						K3	5		
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List of	Experiments	
	DATA SCIENCE LABORARTORY	
1.	Write a python program to compute Central Tendency Measures: Mean, Median, Mode Measure of Dispersion:Variance, Standard Deviation	CO1
2.	Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy	CO1
3.	Study of Python Libraries for ML application such as Pandas and Matplot lib	CO2
4.	Write a Python program to implement Simple Linear Regression	CO3
5.	Implementation of Multiple Linear Regression for House Price Prediction using sklearn	CO3
6.	Implementation of Decision tree using sklearn and its parameter tuning	CO4
7.	Implementation of SVM Classification using sklearn	CO5
8.	Implementation of KNN using sklearn	CO5
9.	Implementation of K-Means Clustering	CO5
10	Write a program to demonstrate the working of Association rule with a real time dataset	CO5
11	Implement reinforcement learning by apply this knowledge to classify a new sample and compare theperformance with other algorithms	CO5
	Total Periods	45
E-RES	OURCES	
1.	http://www.r-bloggers.com/how-to-perform-a-logistic-regression-in-r/	
2.	http://www.ats.ucla.edu/stat/r/dae/rreg.htm	
3.	http://www.coastal.edu/kingw/statistics/R-tutorials/logistic.html	
4.	http://www.ats.ucla.edu/stat/r/data/binary.csv	

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LIST OF EXPERIMENTS

Internet ProgrammingLaboratory

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 - Bodylanguage – 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 CareerAdvancement-Personality and Soft Skills for career growth- Time management.

Total Periods

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, NewDelhi, 2004.

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Unit – III		SOFT SKILLS & V	ERBAI	ABI	LITY				Period	ds	8
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Unit - IV		TECHNICAI	L SKIL	LS I					Period	ds	8
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2.Qualitative apti											
		Verbal & Non-Verbal Reason	ing by F	R.S.A	ggarwa	.1					
	~	y by Norman Lewis									
5.Let us C By Ya											
6.Programming i	n ANSI	C By E. Balaguruswamy									

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U19	OCTE)6	Open	Source	e Systems										
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	Course		CO2: Differentiate between Open Source and Proprietary softwareK3CO3: Understand the open source software projects and LicensingK2												
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<u>Content of the sylla</u> Unit – I	Introduction	Periods	9
Introduction to O	pen-Source: Open Source, Need and Principles of O	SS, Open-Sou	irce Standards
	oftware, OSS success, Free Software, Examples, Licensing, I		
	Open-Source Software, Public Domain. History of free softw		•
	sing Model, use of Open- Source Software, FOSS does not		•
	Foundation and the GNU Project.		
Unit - II	Open-Source Principles AndMethodology	Periods	9
	ory, OpenSource Initiatives, Open Standards Principles		
	Open-Source Software Development, Licenses, Copyright	t vs. Copy lef	t, Patents, Zero
	ne-generation Opportunities, Internationalization.	-	1
Unit – III	Open-Source Projects And Licences	Periods	9
source Teaching, (aining own Open-Source Project, Open-Source Hardware, Opensource media.Licensing: What Is A License, How t	to create your	
Important FOSS Lie	censes (Apache, BSD, PL, LGPL), copyrights and copy lefts	s, Patent.	
Unit - IV	Collaboration, Open-Source Ethics And Social Impact	Periods	9
Community and Co	ommunication, Contributing to Open Source Projects Introd	duction to Gitl	Hub, interacting
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	ntroduction to Wikipedia, contributing to Wikipedia or contri		
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E-Reso	urces
1.	Linux kernel Home: http://kernel.org4
2.	Open-Source Initiative: https://opensource.org/5
3.	The Linux Foundation: http://www.linuxfoundation.org/
4.	Docker Project Home: http://www.docker.com.
5.	Linux Documentation Project: http://www.tldp.org/

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			C01:		the basics protocols.	of diff	erent	types	s of ne	etwork a	nd tra	nsport		K2	
	Cours	e	CO2:	Differe	ntiate Desig	gn and	impl	emen	t the s	ocket pi	ogran	nming		K4	
	utcom		CO3: Enumerate the types of application layer protocols K3												
			CO4:	Analyz	e and comp	are the	e IPv4	4 and	IPv6	protocol	s			K4	
			CO5: MLPS		arize with	wide	area	techr	nologi	es and	worki	ng of		K1	
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COs	PO 1	PO 2	PO 3	РО 4	PO 1 5	PO 6	PC 7	'	PO 8	PO 9	PO 10	PO 11	PO 12	1	PSO 2
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CO2 CO3	23	$\frac{2}{2}$	$\frac{2}{2}$	2	1								3	2	2 2
CO4	2	2	2	1	1								3	2	2
CO5	3	3	2	1	1								3	2	2
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Content o	of the syllab	us		
Unit		INTRODUCTION TO NETWORK PROTOCOL	Periods	9
package, Control,	UDP Datag TCP Conge	entation, ARP, RARP, ICMP –introduction, ICMP-Messa ram, UDP characteristics, TCP Header, TCP connection esta stion Control, TCP Flow Control.	0 00	•
Unit	-II	MULTICAST ROUTING PROTOCOL	Periods	9
ordering, and cond	Byte order current serv	casting and Multicast Routing Protocol, Stream Control ing conversion functions, System calls, Sockets, System call er, Socket Interface, Structure and Functions of Socket, P Client Server Program, Input, Output Processing Module.	ls used with So	ockets, Iterative
Unit -	- III	CONNECTIONLESS PROTOCOL MODELS	Periods	9
Sockets, Resolutio HTTP Re	SCTP Serv on, DNS M equest and F	Program, UDP Control block table & Module, UDP Inp ices and Features, Packet Format, SCTP Client/Server, DN essages, TELNET, SSH, FTP, TFTP, WWW Architectur Reply, DHCP Operation, DHCP Configuration, SMTP, POP	NS,DNS in the e WWW Doc 3, IMAP, MIM	e Internet, DNS cuments, HTTP, 1E.
Unit -		INTERNET PROTOCOL 76 Features, IPV6 Addressing Modes, IPV6 Address Types	Periods	9
Allocatio IPV6 Pac	on, Global U cket Format on Techniq	nicast Addresses, Auto configuration, Renumbering, IPV6 R , Comparison between IPV4 and IPV6 Header, IPV4 to IPV ues, NAT Protocol Translation, IPV6 Mobility, Protocols	outing Protoco /6 Tunneling,	ols,Introduction
Unit	– V	WIDE AREA TECHNOLOGY	Periods	9
Introduct	tion, ATM C	chnology, DSL Benefits, Cable Technology, Compare DSL V Cell Format, ATM Layer, AAL Layer, ATM Application, PPI stuffing, HDLC, HDLC Transfer Modes, Frame, Types of	P, PPP Service	s, Components,
		Т	otal Periods	45
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2.		E.Comer, Internetworking with TCP/IP,Principles, proto 13 ISBN: 0131876716, ISBN:978-0131876712.	cols and arch	itecture,Vol.6th
3.		evens, Unix Network Programming, vol.1, 3rd edition, 200	3, McGraw-H	illISBN
	0-07-2460	60-1.		
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2.	•	en,IPv6 Essentials, Oreilly Publications, 2017, ISBN : 9780.	596100582.	
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1.	https://ww	w.youtube.com/watch?v=DceSLMRNB8w		
2.	https://npte	el.ac.in/courses/106105183		
3.	https://ww	w.cloudns.net/blog/what-is-an-ipv6-address/		

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	At the en	nd of the	course, the	student sl	hould l	be able	to,		Knowle	edge l	level		
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			ons and App										
			d the chara	cteristics	and d	eploym	ent mec	hanism of		K2			
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Unit	– II	COMMUNICATION CHARACTERISTICS AND DEPLOYMENT MECHANISMS	Periods	9
		on Technology and systems-Radio Technology Primer-Ava		
		Micaz motes, Time Synchronization- Clock and the Synchronization-		
		n-Time synchronization protocols, Localization- Ranging T	'echniques- Ra	inge based
Localiza	tion-Range	Free Localization- Event driven Localization.	1	1
Unit	– III	MAC LAYER	Periods	9
Overview	w-Wireless	Mac Protocols-Characteristics of MAC protocols in Sense	sor networks,	Contention free
MAC Pr	otocols- cha	racteristics- Traffic Adaptive Medium Access-Y-MAC, Low	w energy Adap	tive Clustering,
	on based M hering MAC	AC Protocols- Power Aware Multi-Access with signaling,	Sensor MAC	-Timeout MAC-
Unit		ROUTING IN WIRELESS SENSOR NETWORKS	Periods	9
Design 1	lssues in W	SN routing- Data Dissemination and Gathering-Routing C	Challenges in	WSN, Flooding-
		- SAR, Directed Diffusion-MCFA Coherent and non-Coherent		
Routing-	· LEACH,	PEGASIS, TEEN, APTEEN, Query Based Routing-	Negotiation	Based Routing-
Geograp	hical Based	Routing	_	
Unit	– V	MIDDLEWARE AND SECURITY ISSUES	Periods	9
	-	formance and traffic management, Fundamentals of network in the security.	-	
		ľ	Fotal Periods	45
Text Bo				
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2.	Ũ	s Dargie, Christian Poellabauer, "Fundamentals of Wireles Wiley Series on wireless Communication and Mobile Comp		orks, Theoryand
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			CO1: U	nderstar	d the bas	ic conc	epts of	distr	ibuted	Systems			K	2
	urse		CO2: Understand the Remote Method Invocation and communication in distributed systems.										K	2
Outcome CO3: Enumerate Peer to Peer services and File Systems. CO4:Know the transaction and synchronization in distributed system											K	1		
			CO4:Kn	ow the t	ransactio	on and s	ynchro	nizat	ion in	distribut	edsystems.		K	2
			CO5:App distribute		plication ns	conce	epts a	nd	securit	y algoi	rithms	in	K3	
Pre-req	quisite	es	-											
		(3	/2/1indica	tes stren		PO Maj relation)		1g,2 –	Mediu	m,1-Wea	k		CO/ Mapp	ing
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	1.	Conti	inuous As	ssessme	nt Test I,	II & II	I							
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marshal	lling-1	Netw	ork virtu	alizatior	ı									
Uni	t - II		COM	IMUNI	CATION	N IN DI	ISTRII	BUTI	ED SY	STEMS	Perio	ds		9
					[

		vocation And Objects: Remote Invocation –Request-reply nication – Publish-subscribe systems – Shared memory app		emote procedure
Unit -	•	PEER TO PEER SERVICES AND FILE SYSTEMS	Periods	9
		ster and its legacy – Peer-to-peer Middleware – Routing experimentary and the second s	g overlays	Distributed File
Unit ·		SYNCHRONIZATION AND TRANSACTION	Periods	9
Exclusion	n- Election	ks, events and process states – Synchronizing physical s-Coordination and Agreement In Group Communicat and nested distributed Transactions – Atomic Commit pr	tion-Basic mu	
Unit		REPLICATION & SECURITY	Periods	9
-		role of group communication-Fault tolerant services-Pass Cryptographic algorithms-Digital Signatures.	Total Periods	45
Text Boo	oks			
1.	Edition, Pe	ulouris, Jean Dollimore and Tim Kindberg, "Distributed System arson Education, 2012.	-	nd Design",Fifth
2.	Sunil kum	ar, "Distributed systems: Design Concepts", Alpha sciences	, 2016	
Reference	es			
1.	Pradeep K 2007.	Sinha, "Distributed Operating Systems: Concepts and D	esign", Prentic	ce Hall of India,
2.	Tanenbau Education	n A.S., Van Steen M., "Distributed Systems: Princip 2007.	ples and Para	digms", Pearson
3	Liu M.L.,	'Distributed Computing, Principles and Applications", Pear	son Education	, 2004.
4.	Nancy A I	ynch, "Distributed Algorithms", Morgan Kaufman Publish	ers, USA, 2003	3.
E-Resou	rces			
1.	https://www	v.youtube.com/watch?v=fO51ZI2cVC0		
2.	https://www	v.youtube.com/watch?v=Azyizl9w2xo		

				VIVEKANANDHACOLLEGEOFENGINEERINGFORWOMEN (AutonomousInstitution,AffiliatedtoAnnaUniversity,Chennai)Elayamp alayam,Tiruchengode=637205										
Prog	gramme		B.E	B.E. Programme Code107 Regulationomputer Science and TechnologySemesterPeriods Per WeekCreditMaxCourse NameLTPeriods Per WeekCreditMaxCourse NameLTPeriods Per WeekCreditMaxCourse NameLTPPCCAESComputer Graphics30350S										
Depa	artment		(AutonomousInstitution,AffiliatedtoAnnaUniversity,Chennai)Elayamp alayam,Tiruchengode=637205 B.E. Programme Code Computer Science and Technology Semester Course Name L T P C Conputer Graphics and Multimedia Course Name L T P C C CA ES Computer Graphics and Multimedia Course is to • Develop an understanding and awareness how issues such as conter architecture, motion, sound, design, and technology merge to form compelling interactive experiences for a wide range of audiences and en • Become familiar with various software programs used in the creation and implementation of multi- media • To appreciate the importance of technical ability and creativity within de At the end of the course, the student should be able to, CO1:Gain knowledge about graphics hardware devices and softwareused CO2:Understand the two-dimensional graphics and their transformations CO3:Understand the three-dimensional graphics and their transformations CO4:Understand basics of multimedia system design CO4:Understand basics of multimedia system design CO5:Become familiar with understand hypermedia concepts - CO/PO Mapping 3/2/1indicates strength of correlation) 3-Strong,2 – Medium,1-Weak									VI		
Cou	irse Cod	le	(AutonomousInstitution,AffiliatedtoAnnaUniversity,Chennai)Elayamp alayam,Tiruchengode-637205 B.E. Programme Code 107 Regulation 2 Computer Science and Technology Semester e Course Name L T Periods Per Week Credit Maxii e Course Name L T Periods Per Week Credit Maxii e Course Name L T Periods Per Week Credit Maxii e Course Name L T Periods Per Week Credit Maxii e Computer Graphics A Maxii L T Periods Per Week Credit Maxii Computer Graphics 3 O O C CA Cot Maying Cot Maxii with various softwa	Maxin ESE		larks otal								
U19C	CTE10		and Multimedia								100			
 Course Objective Develop an understanding and awareness how issues such as content, architecture, motion, sound, design, and technology merge to form e compelling interactive experiences for a wide range of audiences and end u Become familiar with various software programs used in the creation and implementation of multi- media 										effecti 1sers.	ve and			
											Kno 1	wledge evel K2		
	ourse	Ī	transformations										K3	
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Pre-r	equisite	s					Ţ					K3 K4		
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CO5	3	2	1 Mathada	2 Diment								2	1	
Course	Direct	Con Assi	Methods tinuous A gnment. Semester	ssessme	nt Test I, II ations	& III								
	Indirect 1.Course - end survey													

Content of the sylla			
Unit – I	ILLUMINATION AND COLOR MODELS	Periods	9
Light sources - bas	c illumination models - halftone patterns and dithering techn	iques; Properti	es of light -
Standard primaries	and chromaticity diagram; Intuitive colour concepts RGB co	lour model - Y	IQ colour
model - CMY colo	r model - HSV colour model-HLS colour model; Colour se	lection. Output	primitives -
points and lines, lin	e drawing algorithms, loading the frame buffer, line function;	; circle and elli	pse generating
algorithms; Pixel a	ldressing and object geometry, filled area primitives		
Unit - II	TWO-DIMENSIONAL GRAPHICS	Periods	9
Two dimensional	geometric transformations - Matrix representations an	d homogeneo	ous coordinates
	mations; Two dimensional viewing - viewing pipeline, viewing		
	-viewport coordinate transformation, Two dimensional ine, and polygon clipping algorithms.	viewing fund	ctions; clipping
Unit – III	THREE-DIMENSIONAL GRAPHICS	Periods	9
	concepts; Three dimensional object representations- Poly		
	Polygon meshes; Curved Lines and surfaces, Quadratic sur-	faces; Blobby	objects; Spline
	zier curves and surfaces -B-Spline curves and surfaces.	1	
Unit - IV	MULTIMEDIA SYSTEM DESIGN	Periods	9
	 Multimedia applications – Multimedia system architecture efining objects for multimedia systems – Multimedia data in 		
	sion and decompression – Data and file format standards.		
Unit – V	HYPERMEDIA	Periods	9
Multimedia autho	ring and user interface- Hypermedia messaging-Mo	bile messagir	ng-Hypermedia
message compone	nt – Creating hypermedia message – Integrated multin	nedia message	e standards –
Integrated document	t management – Distributed multimedia systems.		
-]	Fotal Periods	45
Text Books			
1. Donald H	learn and Pauline Baker M, -Computer Graphics", Prentice	Hall, New Del	hi, 2007.
	, P. K and Kiran Thakrar, —Multimedia Systems and Design	I, PHI, 2003.	
References			
1. Judith Je	fcoate, —Multimedia in practice: Technology and Application	ons , PHI, 1998	3
E-Resources			
1 1			
1. https://w	vw.youtube.com/watch?v=DceSLMRNB8w		

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Programme	B.E.	Prog	gramme Co	de				10	7 Regu	lation	20	19	
Department	Computer	Scienc	e and Tech	nnolog	у				Sem	nester		VII	
Course Code	C	NING AN			riods				Credit Maxin			1	
	Course Name				, []		P	<u>C</u>			ESE		otal
U19CT716		Internet of Things30035050The Main Objective of the course is to									1	00	
Course		5	study the fundamentals about IoT										
Objective		•	dy about IoT Access technologies										
Objective	• Te	o study	the design	metho	dolog	y an	d diff	erent Ic	T hardy	ware p	latfor	ms.	
• To study the basics of IoT Data Analytics and supporting services.													
	To study about various IoT case studies and industrial applications												
At the end of the course, the student should be able to,													wledge evel
CO1: Understand the basics of IoT.											K2		
Course	CO2: Implement the state of the Architecture of an IoT.										K2 K3		
Outcome	CO3:Un	CO3:Understand design methodology and hardware platforms involved in									ved in		
	IoT. CO4: Understand how to analyze and organize the data.										K1		
				•		-							K2
	CO5:Co1	npare I	OT Applic	ations	in Inc	lustr	ial & :	real wo	rld			K3&K4	
Pre-requisites	-												
			CO/PC) Mapp	oing							CO	/PSO
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	ntinuous As	sessme	nt Test I, II	& III									
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1.00	nse - end su	nvey											

Content (of the syllab	bus		
Unit		FUNDAMENTALS OF IoT	Periods	9
(IoTWF) standardiz	net of Things, Enabling Technologies, M2M Communed architecture, Simplified IoT Architecture, Core IoT	Functional Sta	ack, Fog, Edge
	ing Smart	Functional blocks of an IoT ecosystem, Sensors, Ac	ctuators, Sma	rt Objects and
Unit		IoT PROTOCOLS	Periods	9
andLora	u WAN, Ne	logies: Physical and MAC layers, topology and Security twork Layer: IP versions, Constrained Nodes and Const ort Methods: SCADA, Application Layer Protocols: CoAI	rained Netwo	
Unit		DESIGN AND DEVELOPMENT	Periods	9
building	g blocks Io	gy, Embedded computing logic, Microcontroller, Sys T Platform overview: Overview of IoT supported Ha no Board details		
Unit	- IV	DATA ANALYTICS AND SUPPORTING SERVICES	Periods	9
IoTData Using a Models	Analytics (Cloud Plat	roduction, Structured Versus Unstructured Data, Data in Challenges, Data Acquiring, Organizing in IoT/M2M, Sup Form for IoT/M2M, Applications/Services, Everything as	pporting Servi	ces: Computing
Unit		CASE STUDIES/INDUSTRIAL APPLICATIONS	Periods	9
		home, infrastructures, buildings, security, Industries,	Home applia	nces, other IoT
electron	ic equipment	nts, Industry 4.0 concepts.	Fotal Periods	45
Text Bo	oks			
1.	Simone C	irani, Gianluigi Ferrari, Internet of Things Architecture lications, 2019	es, Protocols	and Standards,
2.		nes, Gonzalo Salgueiro, Patrick Grossetete, Rob Bar tals: Networking Technologies, Protocols and Use Cases 7		•
3.		Bahga, Vijay Madisetti, Internet of Things – A hands-on	approach, Uni	versities Press,
4.	Rajkamal, Higher Ec	Internet of Things: Architecture, Design Principles And Alucation	Applications, I	McGraw Hill
Referenc	es			
1.	Omar Ellou	et of Things – Key applications and Protocols, Olivier Hersen umi and Wiley, 2012 (for Unit2).		
2.		chine-to-Machine to the Internet of Things – Introduction to a lasiosTsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Ste		
			chael Margolis	Arduino
3.		Begin, Expand, and Enhance Your Projects, 2nd Edition, Mic and O"Reilly Media, 2011	ender margons	, / Ilduillo
3. E-Reso i	Cookbook			, Andunio
	Cookbook arces			

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U19	OCT717	Blockch	ain Teo	hnology	3	0	0	3	50	50	-	.00
CourseThe Main Objective of the course is toObjectiveUnderstand how blockchain systems (mainly Bitcoin and Ethereum)ObjectiveTo securely interact with them,Design, build, and deploy smart contracts and distributed applicationsIntegrate ideas from blockchain technology into their own projects. 11										ıs,	,	
At the end of the course, the student should be able to,											Kno	wledge evel
CO1:Explain design principles of Blockchain Technology, Bitcoin, Ethereum and Nakamoto consensus. CO2:Explain the Simplified Payment Verification protocol.											k2	
-	Course		•	1				•				k2
O	utcome	transacti	CO3: Interact with a blockchain system by sending and reading transactions									
			CO4: Design, build, and deploy a distributed application. CO5: Evaluate security, privacy, and efficiency of a given blockchain									
		system	aluate s	ecurity, priv	vacy, an	d effici	iency o	f a giver	1 blockchaii	1	k3	
Pre-r	requisites	-										
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CO4	3	$\frac{2}{2}$ $\frac{2}{2}$	2	2					2	2	3	2
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		id-Semester	examin	ations								
	Indirec											1
		urse - end s	urvey									

Content	of the syllal	Dus		
Unit	•	BAISCS	Periods	8
Distribu	ted Databa	se, Two General Problem, Byzantine General problem	and Fault Tol	erance, Hadoop
Distribu	ted File Sy	stem, Distributed Hash Table, ASIC resistance, Turing C	omplete. Cry	otography: Hash
function	, Digital Sig	gnature - ECDSA, Memory Hard Algorithm, Zero Knowle	edge Proof.	
Unit	– II	BLOCKCHAIN ARCHITECTURE	Periods	10
Blockch	ain : Block	cchain-Based Applications, Functionality, Non-function	nal Properties	s, Fundamental
Properti	es of Block	chain, Ledger Structure, Consensus Protocol, Block Con	figuration, Bl	ockchain as an
		ent, Storage Element, Computational Element, Commun		
		ontrol Mechanism, Integrating Blockchain into a System a		
Unit		BLOACKCHAIN	Periods	9
		se, Advantage over conventional distributed database, l		•
		outed Consensus, Merkle Patricia Tree, Gas Limit, Trans		
		cy, Life of Blockchain application, Soft & Hard Fork, Pri		ic blockchain
Unit		DISTRIBUTED CONSENSUS	Periods	9
	oto consension on and alter	us, Proof of Work, Proof of Stake, Proof of Burn, Difficult	ty Level, Sybi	l Attack, Energy
Unit		CRYPTOCURRENCY	Periods	9
				-
History Constru	ction, DAC	ed Ledger, Dapp, Bitcoin protocols - Mining strateg), Smart Contract, GHOST, Vulnerability, Attacks, Sidecl	hain, Name co	oin.
History Constru Case S	ction, DAC	D, Smart Contract, GHOST, Vulnerability, Attacks, Sidecl ricultural Supply Chains, Open Data, International I and Continuous Reporting.	hain, Name co Money Trans	oin. fers, Electricity
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Dep	oartme	ent	Com	puter S	cience	& Te	chnology	7			Semester		VII		
Cou	rse Co	de	Co	ourse N	lame	-	Perio L	ds Per V	Week P	Credit C	CA	Maximu ESE	um Marks Total		
U19	CT718	3	Internet of Things									100			
Cours	se Obje	ective	•	 Use microcontroller and microprocessor based embedded platforms in IOT Use wireless peripherals for exchange of data. Make use of Cloud platform to upload and analyze any sensor data Use of Devices, Gateways and Data Management in IoT. Use the knowledge and skills acquired during the course to build and test a complete, working IoT system involving prototyping, programming and data analysis. 											
	analysis.											edge Leve K4			
						-			ypes of sensors and modules and p board				K3		
	Course Outcon		CO3:	manipulate sensor data using Arduino boardItoCO3: Be able to analyse different types of sensors and modules and manipulate the data using Node MCUK6											
			CO4:	Be abl	e to cr	eate a		source		m using	IOT Apps	K6			
							eal time a			ng IOT P	latforms		K6		
Pre-re	equisit	es	-												
	(3/2/1 in	dicates s		of corre	elation	apping) 3-Strong		edium, 1	- Weak		Ma	O/PSO apping		
COs	РО	PO	РО	Pr PO	ogramm PO	PO	comes (PC	DS) PO	PO	PO	PO PO	PSOs PSO	PSO		
	1	2	3	4	5	6	7	8	9	10	11 12	1	2		
CO1 CO2	3	3	3	3	3	1	1		2		1 3	3	3		
CO2	3	3	3	3	3				1		3	3	3		
CO4	3	3	3	3	3						3	3	3		
CO5	3	3	3	3	3						3	3	3		
Course	Direc	t 1.Prela	Iethods b and p	ost lab		·									
-	Indire	ct	Semest		ninatio	ns									
	1.0	Course	- end su	urvey											

LIST	OF EXPERIMENTS	
	Internet of things	
	ARDUINO	
1.	Study of Arduino Board and its IDE and the type of Sensors used for IoT applications	CO1
2.	Experiment using LED Blinking, Temperature Sensor(DHT 11 DHT 22), Pressure sensor, Heartrate sensors	CO2
3.	Experiment using Ultrasonic Sensor, IR Sensor	CO2
4.	Experiment using Smoke sensor and Tilt Sensor	CO2
5.	Experiment using Relay module and Bluetooth Module	CO2
	NODE MCU –ESP 8266	
6.	Experiment using LED Blinking, Temperature Sensor, Pressure sensor, Heartrate sensors using Node MCU	CO3
7.	Create a Open source IOT Platform design using BLYNK App and do the experiment with Ultrasonic sensor, IR sensor, Smoke sensor, and Tilt Sensor using NODE MCU	CO3
8.	Study of ESP 32 and Camera Module	CO4
9.	Mini Project-Home Automation System	CO5
	Total Periods	45
Cext B	ooks	
1.	https://howtomechatronics.com/tutorials/arduino/ultrasonic-sensor-hc-sr04/	
2.	https://www.maxbotix.com/articles/how-ultrasonic-sensors-work.htm	

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Prog	gramme	B.E	. Prog	gramme Co	de			107	Regulation	20	19		
Depa	artment	Compute	r Scienc	e and Tech	nnology				Semester		VII		
Carr	rse Cod		ourse N		Peri	ods Per		Credit		1	Maximum Marks		
				ame	L 3	T 0	P 0	C 3	CA 50	ESE		otal 00	
019	PCTE11	Deep Le		tive of the	-	Ŭ	0	3	50	50	1	00	
 Understand the concepts of Neural Networks and Deep Learning Understand Deep neural network and layered learning approach Study and understand CNN and RNN for deep learning Learn and understand Auto Encoders and its applications Understand concept of transfer learning and its applications with keras 													
		At the end of the course, the student should be able to, Knowl leve											
CO1: Apply basic mathematical concepts in Deep Learning												K4	
_	ourse utcome			powerful f			-	sed learn	ing		K26	&K3	
	utcome			Convolutio							K2		
			•	arious type ious netwoi							K3 K3&K4		
Duo n	equisite		opiy vari	ious networ	k mode		ep lean	nng			K30	<u>хк</u> 4	
Pre-r	equisites	-											
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				rogramme		es(POs)					PSC	Ds	
COs	PO 1	PO PO 2 3	PO 4		PO 6	PO 7	PO 8	PO 9	PO PO 10 11	PO 12	PSO 1	PSO 2	
CO1	3	3 3	3	3					1 1	2	2	3	
CO2	3	$\begin{array}{c c} 2 & 2 \\ \hline 3 & 2 \end{array}$	2	2						2	22	3	
CO3 CO4	3	$\begin{array}{c c} 3 & 2 \\ \hline 3 & 3 \end{array}$	2	2					$\begin{array}{c c} 2 & 2 \\ \hline 3 & 3 \end{array}$	3	2	3	
CO5	3	$\frac{3}{3}$ 2	2	2					$\frac{3}{3}$ $\frac{3}{3}$	3	2	3	
		onent Metho							5 5	3	7	5	
Course	Direct											1	
1.Continuous Assessment Test I, II & III2.Assignment.3.End-Semester examinations													
	Indirec											-	
	1.C	ourse - end s	urvey										
L													

<u>Content of the syllal</u> Unit – I	INTRODUCTION	Periods	9
Historical trends in	1 deep learning – Machine Learning basics, Learning a	lgorithms – 9	Supervised and
	ning, Linear Algebra for machine learning, Testing - Cross	-	-
▲	itting /Under Fitting, Hyper parameters and validation		•
	iction—Regularization, Biological Neuron – Idea of Com		
		-	
	resholding logic, Linear Perceptron, Perceptron Learning		
	ptron Learning Algorithm, Linear Separability Multila	ayer percepti	on -The first
Unit - II	k with Keras code, Backprobagation DEEP NEURAL NETWORKS	Periods	9
	ple DNN, Platform for Deep Learning, Deep Learning So		-
	Introduction, Learning XOR, Gradient-Based Learning, V		•
	Error Functions, Architecture Design, Differentiation		
-	earning, Early Stopping, Drop Out, Difficulty of training d	-	-
-	Optimization methods for Neural Networks-Adagrad, Ada	-	works, Greedy
Unit – III	CNN and RNN	Periods	9
			-
	l Networks Introduction, Convolution Operation, Motivat	-	
	mputer Vision – ImageNet, Sequence Modelling –VGGN		
	opologies- Difficulty in Training RNN, Long Short T	•	
	nal RNNs, Application case study – Image dimensionali	ity reduction	using encoders
	- sentiment Analysis		0
Unit - IV	ENCODER AND DECODERS	Periods	9
Auto Encoders Intr	oduction, Auto Encoders, Under Complete Auto Encoder	r, Regularized	l Auto Encode
	oduction, Auto Encoders, Under Complete Auto Encoder Encoder, Denoising Auto Encoder, Contractive Aut	-	
Stochastic Auto	-	to Encoder,	Auto Encode
Stochastic Auto Applications, Dim Optimization for D	Encoder, Denoising Auto Encoder, Contractive Aut	to Encoder, encoders, Re CNNs	Auto Encode ecommendation
Stochastic Auto Applications, Dim	Encoder, Denoising Auto Encoder, Contractive Aut ensionality Reduction and Classification using Auto	to Encoder, encoders, Re	Auto Encode
Stochastic Auto Applications, Dim Optimization for D Unit – V	Encoder, Denoising Auto Encoder, Contractive Aut ensionality Reduction and Classification using Auto eepLearning-Optimizers–RMS prop for RNNs, SGD for C DEEP ARCHITECTURES IN VISION	to Encoder, encoders, Re CNNs Periods	Auto Encode ecommendation 9
Stochastic Auto Applications, Dim Optimization for D Unit – V AlexNet to ResNet	Encoder, Denoising Auto Encoder, Contractive Auto ensionality Reduction and Classification using Auto eepLearning-Optimizers–RMS prop for RNNs, SGD for C DEEP ARCHITECTURES IN VISION t, Transfer Learning, Siamese Networks, Metric Learni	to Encoder, encoders, Re CNNs Periods ing, Ranking	Auto Encode ecommendation 9 / Triplet Loss,
Stochastic Auto Applications, Dim Optimization for D Unit – V AlexNet to ResNet RCNNswith keras,	Encoder, Denoising Auto Encoder, Contractive Auto ensionality Reduction and Classification using Auto eepLearning-Optimizers–RMS prop for RNNs, SGD for O DEEP ARCHITECTURES IN VISION t, Transfer Learning, Siamese Networks, Metric Learni CNN-RNN, Applications in captioning and Video tasks,	to Encoder, encoders, Re CNNs Periods ing, Ranking	Auto Encode ecommendation 9 / Triplet Loss,
Stochastic Auto Applications, Dim Optimization for D Unit – V AlexNet to ResNet RCNNs with keras,	Encoder, Denoising Auto Encoder, Contractive Aut ensionality Reduction and Classification using Auto eepLearning-Optimizers–RMS prop for RNNs, SGD for O DEEP ARCHITECTURES IN VISION t, Transfer Learning, Siamese Networks, Metric Learni CNN-RNN, Applications in captioning and Video tasks, gnition using RCNN and transfer learning.	to Encoder, encoders, Re CNNs Periods ing, Ranking	Auto Encode ecommendation 9 / Triplet Loss,
Stochastic Auto Applications, Dim Optimization for D Unit – V AlexNet to ResNet RCNNs with keras, study – Image reco	Encoder, Denoising Auto Encoder, Contractive Aut ensionality Reduction and Classification using Auto eepLearning-Optimizers–RMS prop for RNNs, SGD for O DEEP ARCHITECTURES IN VISION t, Transfer Learning, Siamese Networks, Metric Learni CNN-RNN, Applications in captioning and Video tasks, gnition using RCNN and transfer learning.	to Encoder, encoders, Re CNNs Periods ing, Ranking 3D CNNs, Aj	Auto Encode ecommendation 9 / Triplet Loss, pplication case
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		At the end CO1: De	esign tes	ourse, the	student	shou	ld be a	able to,				tests.]	owledge evel K4
С	ourse	various d		itable tes	sts to b	e carr	ried o	ut						K2
Oı	utcome	CO3: Prepare test planning based on the document design test plans and												K3
		CO4: De	evelop ai	nd valida		-	n.							K4
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CO1	2 1	-	1	-	-	-		-	-	-	-	-	1	1
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	2.Ass	ntinuous Ai ignment. I-Semester			II & III	[_
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<u>Content of the sylla</u> Unit – I	FUNDAMENTALS OF TESTING	Periods	9
Necessity of Testing	-Case Studies on "Impact of Software bugs", Objectives of	of Testing, Bas	ics Definitions.
	llustrations, Fundamental Test Process, The tester's rol		
0 1	blanning, Establishing Test Policy, Structured approach		
	re testing process, Origin of Defects, Defect Reposito	•	
	lies – "Identify the defect", Developer/Tester support of d		
_	Prevention Strategies.	eveloping a de	rectropository
vereet i mary sis and	ANALYSIS AND TEST CASE DESIGN	Periods	9
Unit – II			
Test Case Design St	rategies Introduction to basic design strategies, White Be	ox Strategies -	Peer Reviews
nspections, Walkth	rough, Static Analysis Tools, Code functional Testing,	Coverage and	Control Flow
Graphs, Paths Code	Complexity, Evaluating test adequacy criteria, Case St	udies-"Applyi	ng the suitable
White Box Strateg	y", Black Box Testing Strategies: Requirements Base	ed Testing, Bo	oundary Value
Analysis, Equivalen	ce Class Partitioning, Cause Effect graphing, Rando	om Testing, E	Evaluating tes
dequacy criteria. C	ase Studies- "Applying suitable Black Box Testing Strate	gy".	-
Unit – III	LEVELS OF TESTING	Periods	9
The need for levels of	of testing, Unit Testing: Planning, Test Harness, Running	the tests	
	Integration Testing: Goals, Design and Plan, System Testing		pes of System
U U	l, Performance, Stress, Configuration, Stress, Security		· ·
-	egression Testing Alpha, Beta and Acceptance Testing,	-	-
	kills: Compatibility testing, Internationalization testin		
	ion plan, Recording test cases, Reporting and Measureme		U
0			
Unit – IV	TEST MANAGEMENT AND DEFECT ANALYSIS	Periods	9
	TEST MANAGEMENT AND DEFECT ANALYSIS	Periods	-
Fest Management: C	Thoice of Standards, Infrastructure Management, Test Pe	Periods cople Manager	nent, Test Plar
Fest Management: C Components, Test	Choice of Standards, Infrastructure Management, Test Pe Plan Attachments, Locating Test Items, Managing Iss	Periods cople Manager ues, Addressi	nent, Test Plar
Fest Management: C Components, Test Faking team toget	Thoice of Standards, Infrastructure Management, Test Per Plan Attachments, Locating Test Items, Managing Iss her, Focus on technology, process and management	Periods cople Manager ues, Addressin ent, Custome	nent, Test Plar ng Perception r perspective
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Test Management: C Components, Test Taking team toget Documentation use problem tracking, C	Choice of Standards, Infrastructure Management, Test Pe Plan Attachments, Locating Test Items, Managing Iss her, Focus on technology, process and managements s and Documentation Types, Test Analysis report Docu ontrolling and Monitoring Test Progress.	Periods cople Manager ues, Addressin ent, Custome umentation, A	nent, Test Plar ng Perception r perspective nalyze reports
Fest Management: C Components, Test Faking team toget Documentation use problem tracking, C Unit – V	Choice of Standards, Infrastructure Management, Test Per Plan Attachments, Locating Test Items, Managing Iss her, Focus on technology, process and management s and Documentation Types, Test Analysis report Docu ontrolling and Monitoring Test Progress. TEST AUTOMATION	Periods cople Manager ues, Addressin ent, Custome umentation, A Periods	nent, Test Plar ng Perception, r perspective nalyze reports 9
Fest Management: C Components, Test Faking team toget Documentation use problem tracking, C Unit – V	Choice of Standards, Infrastructure Management, Test Pe Plan Attachments, Locating Test Items, Managing Iss her, Focus on technology, process and managements s and Documentation Types, Test Analysis report Docu ontrolling and Monitoring Test Progress.	Periods cople Manager ues, Addressin ent, Custome umentation, A Periods	nent, Test Plar ng Perception, r perspective nalyze reports 9
Test Management: C Components, Test Taking team toget Documentation use problem tracking, C Unit – V Software Test Auto	Choice of Standards, Infrastructure Management, Test Per Plan Attachments, Locating Test Items, Managing Iss her, Focus on technology, process and management s and Documentation Types, Test Analysis report Docu ontrolling and Monitoring Test Progress. TEST AUTOMATION	Periods cople Manager ues, Addressin ent, Custome umentation, A Periods r Automation,	nent, Test Plar ng Perception, r perspective nalyze reports 9 Challenges in
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3.	https://www.tutorialspoint.com/software_testing_dictionary/performance_testing.htm

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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 sylla	hus		
Unit – I	INTRODUCTION	Periods	9
Infrastructure, Key Management Syster System: Componen	Formation Storage Management, Evolution of Storage challenges in managing information.Data Center Environ (DBMS) - Host : Connectivity, Storage, Disk Drive Com ts of an Intelligent Storage System,Storage Provisioning,	ment: Applicanponents, Inte	tion, Database lligent Storage
Systems.	STORAGE NETWORKING TECHNOLOGIES	Periods	9
Unit – II Fiber Channel: Ou	erview ,SAN and its Evolution, Components of FC S	IAN EC Co	nnootivity EC
Architecture, IPSA General Purpose Se Components of NA	N-iSCSI components, iSCSI Topologies, iSCSI Protocol rvers versus NAS Devices ,Benefits of NAS- File Systems S, NAS I/O Operation, NAS Implementations, NAS File ces, Content addressed Storage.	Stack, iSCSI s and Networ	Names, NAS: k File Sharing,
Unit – III	BUSINESS CONTINUITY AND BACK UP RECOVERY	Periods	9
Business Impact An	: Information Availability ,BC Terminology, BC Planning nalysis, Backup and Archive: Backup Purpose ,Backup ery Considerations, Backup Methods, Backup Archited	Consideration	ns, Backup
Unit – IV	STORAGE SECURITY AND MANAGEMENT	Periods	9
,Components Monit Management Examp	amework and Domain, Monitoring the Storage Infrastruct ored, Monitoring examples, Storage Infrastructure Manage ples: Storage Allocation to a New Server/Host, File System	gement Activ	ities, Storage gement.
Unit – V	REPLICATION	Periods	9
Technologies, Resto	Source and Target, Uses of Local Replicas, Data Cor ore and Restart Considerations, Creating Multiple Replicas Modes of Remote Replication and its Technologies, Network	s, Managemer ork Infrastruc	nt Interface. ture.
	1	otal Periods	45
Text Books	on Storage and Management: Storing, Managing, and Prote	ating Digital	Information in
	irtualized, and Cloud Environments 2nd Edition, EMC, 20		III OI III atioli III
	n Rainer Wolfgang Muller, "Storage Networks Explained",		, 20 0, ISBN 3:
	alding,Storage Networks: The Complete Reference, Osborn 978-0072224764.	ne, Tata McG	raw Hill, 2003,
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References			
References 1. Farley,'Bu 30720.	ilding Storage Networks", Osborne, Tata McGraw Hill,		
References 1. Farley,'Bu 30720. 2. Meeta Gu 978- 5870.	ilding Storage Networks", Osborne, Tata McGraw Hill, pta, Storage Area network Fundamentals, Pearson Educa 950657.	tion Limited,	2002, ISBN 3:
References 1. Farley, 'Bu 30720. 2. Meeta Gu 978-5870 3. Anthony 7	ilding Storage Networks", Osborne, Tata McGraw Hill, pta, Storage Area network Fundamentals, Pearson Educa	tion Limited, ting: A Practi	2002, ISBN 3:
References1.Farley, 'Bu 30720.2.Meeta Gu 978-58703.Anthony T Fourth ReE-Resources	ilding Storage Networks", Osborne, Tata McGraw Hill, pta, Storage Area network Fundamentals, Pearson Educa 050657. T.Velte, Toby J.Velte, Robert Elsenpeter, "Cloud Comput print, Tata McGraw Hill Edition, 200, ISBN- 3: 978-007 6	tion Limited, ting: A Practi	2002, ISBN 3:
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	Moore's Law, Pipelining, Super scalarity, SIMD, Memor Multicore processors, Multithreaded processors, performance estimates, Programming for vector architect SCALAR PROFILING AND OPTIMIZATION mased runtime profiling, Hardware performance counter nizations-Avoid expensive operations, Shrink the workin, of common sub expressions, Avoiding branches, Using eneral optimization options, Inlining, Aliasing, Comp g compiler logs, C++ optimizations- Temporaries, Dyn ators, Storage order- Case study: Jacobi algorithm and De TAXONOMY OF PARALLEL COMPUTING PARADIGMS nputers, Cache coherence, UMA – ccNUMA, Dist systems, Networks- Basic performance characteristics of s, Mesh networks, Hybrids, Parallelism- Data parallel Factors that limit parallel execution, Scalability metri erial performance, versus strong scalability, Refined per eline, Load imbalance. INTRODUCTION TO OPENMP Data scoping, OpenMP worksharing for loops, Synchro Miscellaneous, Case study: OpenMP-parallel Jacobi alg ation, Efficient OpenMP worksharing constructs, Dete lization, False sharing, Case study: Parallel sparse matrix- DISTRIBUTED-MEMORY PARALLEL PROGRAMMING parallel programming with MPI- Message passing, intr Communication, Collective Communication, N tual topologies, Example: MPI parallelization of a Jacobi rties, MPI performance tools, Communication pa ion, Implicit serialization and synchronization, Contentio domain decomposition, Aggregating messages, O nchronous, Communication, Understanding intra node po	ARCHITECTUREPeriodsche-based microprocessor architecture, Performance based metrics an Aoore's Law, Pipelining, Super scalarity, SIMD, Memory hierarchies, Multicore processors, Multithreaded processors, Vector proce performance estimates, Programming for vector architecturesSCALAR PROFILING AND OPTIMIZATIONPeriodsbased runtime profiling, Hardware performance counters , Manual in nizations-Avoid expensive operations, Shrink the working set, Simple r of common sub expressions, Avoiding branches, Using SIMD instru- eneral optimization options, Inlining, Aliasing, Computational accu- g compiler logs, C++ optimizations- Temporaries, Dynamic memory ators, Storage order- Case study: Jacobi algorithm and Dense matrix tra- TAXONOMY OF PARALLEL COMPUTING PARADIGMSPeriodsnputers, Cache coherence, UMA – ccNUMA, Distributed-memory systems, Networks- Basic performance characteristics of networks, B s, Mesh networks, Hybrids, Parallelism- Data parallelism, Function Factors that limit parallel execution, Scalability metrics, Simple sc erial performance, versus strong scalability, Refined performance mo- dine, Load imbalance.PeriodsINTRODUCTION TO OPENMPPeriodsData scoping, OpenMP worksharing for loops, Synchronization, Red Miscellaneous, Case study: OpenMP-parallel Jacobi algorithm, Advata ation, Efficient OpenMP programming, Profiling OpenMP program- g the impact of OpenMP worksharing constructs, Determining, Ope fization, False sharing, Case study: Parallel sparse matrix-vector multipDISTRIBUTED-MEMORY PARALLEL PROGRAMMINGPeriodsparallel programming with MPI- Message passing, introduction to N Communication, Collective Communication, Nonblocking tual topologies, Example: MPI parallelization of a Jacobi solver, MPI ir rties,

Refe	renc	es
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	2.	Charles Severance, Kevin Dowd, "High Performance Computing", O'Reilly Media, 2nd Edition, 1998.
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	1.	https://www.cambridge.org/core/journals/mrs-bulletin/article/highperformance-computing-for- materials-design-to-advance-energy-science/ B5A20CE31BB92BC9A1365668A16019D3
	2.	https://nptel.ac.in/courses/112105293
	3.	https://www.oracle.com/in/cloud/hpc/what-is-hpc/

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Content of	of the syll	abus		
Unit -	- I	OVERVIEW OF BIG DATA ANALYTICS	Periods	9
		analytics and big data, Big data mining, Technical element		
		Components of the analytics toolkit, , Introduction to Hadoor	,Fundament	als of Hadoop,
Hadoop Ec	cosystem,	The core modules of Hadoop, MapReduce,.		
Unit –	- II	INTRODUCTION TO HADOOP YARN	Periods	9
• •		h Unix tools and Hadoop, Scaling Out - Data Flow, Co		
•		Hadoop file systems, Java Interface to Hadoop, YARN, Jo		-
Ũ	•	npression, Serialization, File based Data Structures, l	Developing	a MapReduce
Applicatio				[
Unit –	· III	INTRODUCTION TO TOOLS	Periods	9
•		ng pig, Basics of Pig, Introduction to Hive, Installing and re	÷	
HiveQL, I	ntroductio	on to Zookeeper, Installing and running Zookeeper, The Zo	ookeeper Serv	vice.
Unit –	· IV	BIG DATA DATABASE TOOLS	Periods	9
NOSQL, V		Spark, Introduction to Apache Flink, Batch analytics using QL?, NoSQL databases, Introduction to MongoDB	1 mm, Dig Di	
Unit –	Vhy NoS(- V		Periods	9
Unit – Data Scier	Why NoSC - V nce Soluti ture soluti	QL?, NoSQL databases, Introduction to MongoDB ENTERPRISE DATA SCIENCE OVERVIEW ions in the enterprise, Enterprise data science – Machine I tions, Visualizing Big Data, Using Python and R for	Periods Learning and	9 AI, Enterprise
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	ourse ojective		 The Main Objective of the course is to To Understand the basics of Natural systems To appreciate the concepts of Natural systems and its applications To understand newBasic Natural systems functions(operations) To understand the fundamentals of nature inspired techniques which influencecomputing To understand an Integration of Hardware and software in Natural application 													
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Content of the sy	llabus		
Unit – I	INTRODUCTION	Periods	9
Overview of Phil	osophy, Nature to Nature Computing, A Brief Overvie	w of Three E	Branches, Individuals,
	ts, Parallelism and Distributivity Interactivity, Adaptatergence, Bottom-up Vs Top-Down Approach, Determin		
Complexity, Line	EVOLUTIONARY COMPUTING	Periods	9
Unit – II			
	mulated Annealing, Simulated Annealing, Genetics Pr		
	etic Algorithms, Reproduction, Crossover Mutation ning, Swarm Intelligence.	on, Evolutio	nary Programming,
Unit – III	OPTIMIZATION	Periods	9
Ant Colony Optin	nization, Ant Foraging Behavior, Ant Colony Optimiza	tion, SACO a	lgorithm, Ant Colony
Algorithm (ACA), scope of ACO algorithms, Swarm Robotics, Social Ation, Particle Swarm Optimization.		
Unit – IV	INTRODUCTION TO IMMUNE SYSTEM	Periods	9
Immune Network Unit – V	INTRODUCTION TO DNA COMPUTING	Periods	9
DNA Molecule, A	Adleman's experiment, PAM Model, Splicing Systems, F computers, Scope of DNA Computing, Lipton's Solution	From Classica	
		Fotal Periods	
Text Books			
1. Leandro I	Nunesde Castro, "Fundamentals of Natural Computing,	Basic Conce	epts, Algorithms and
Application	ons", Chapman & Hall/CRC, Taylor and Francis Group	, 2007.	
2. Floreanol	D. And Mattiussi C.,"Bio-Inspired Artificial Intelli	gence: Theo	ries, Methods, and
	gies", MIT Press, Cambridge, MA, 2008.		
3. G Venkat	esh, Computational Thinking, Notion Press, 2021		
References			
1. AlbertY.Z	omaya,"Handbook of Nature-Inspired and Innovative Comput	ing", Springer,	2006.
2. Marco Dor	rigo, Thomas Stutzle," Ant Colony Optimization", PHI,2005.		
E-Resources			
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Unit – II	ADMINISTRATION OF USERS & PROFILES, PASSWORD POLICIES, PRIVILEGES AND ROLES	Periods	9
Users-Default, Re Managers-Best Pra Designing and Imj	Users- Introduction-Authentication- Creating Users, SQL mote Users-Database Links-Linked Servers-Remote Servers ctices, Profiles, Password Policies, Privileges and Roles: Introd plementing Password Policies, Granting and Revoking User g, Assigning and Revoking User Roles-Best Practices.	s- Practices for Admini	strators and
Unit – III	DATABASE APPLICATION SECURITY MODELS& VIRTUAL PRIVATE DATABASES	Periods	9
Application Secur Implementation of Policies and Appl	tion Security Models: Introduction-Types of Users-Security Models-Data Encryption, Virtual Private Databases: VPD using Views, Application Context in Oracle, Implenication contexts using Data Dictionary, Policy Manager In rity with SQL Server.	Introduction-Overview nenting Oracle VPD-Vie	of VPD-
Unit – IV	AUDITING DATABASE ACTIVITIES	Periods	9
Project Case Study		rity and Auditing	
Unit – V	PRIVACY PRESERVING DATA MINING	Periods	9
	TECHNIQUES		
Privacy Preserving	TECHNIQUES g Data Mining Techniques: Introduction- Privacy Preservin	g Data Mining Algorith	
Privacy Preserving Survey-Randomiza	TECHNIQUES g Data Mining Techniques: Introduction- Privacy Preservin ation Methods-Group Based Anonymization, Distributed Priva	Data Mining Algorith acy Preserving Data	
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Unit – II	DECISION MAKING	Periods	-
	Introduction and Definitions, Phases of the Decision, M		
	ase, Choice Phase, Implementation Phase, Decision Sup		ilities,
Decision Support	Systems: Classification, Decision Support Systems: Con	ponents	
Unit – III	TECHNIQUES FOR PREDICTIVE MODELING	Periods	9
	AND SENTIMENT ANALYSIS		-
	f Neural Networks, Developing Neural Network, Based		
	Sensitivity, Support Vector Machines, A Process, Base		
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Unit – IV	DECISION MAKING SYSTEMS	Periods	9
Decision Support	Systems Modeling, Structure of Mathematical Models	for Decision Support	, Decision
	rtainty, Uncertainty and Risk, Decision Modeling with S		
	timization, Decision Analysis with Decision Tables and		
	With Pairwise Comparisons.		
Unit – V	AUTOMATED DECISION SYSTEMS AND EXPERT SYSTEMS	Periods	9
Automated Decis	sion Systems, The Artificial Intelligence Field, Basi	c Concepts of Exper	rt Systems,
	Expert Systems, Structure of Expert Systems, Knowled		÷
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Text Books			
1. Ramesh S	harda, Dursun Delen, Efraim Turban, Business Intellige	ence and Analytics: S	ystems for
Decision	Support, Tenth edition, Pearson Education, 2018.		
2. Ramesh S	Sharda, Dursun Delen, Efraim Turban, J. E. Aronson,	Ting-Peng Liang, Da	avid King,
"Business	Intelligence and Analytics: System for Decision Support	rt", 10thEdition, Pears	son Global
Edition, 2	013, ISBN: 9781292009209.		
	Kaushik, "Web Analytics 2.0 - The Art of Online Accou	ntability & Science of	fCustomer
	", 2010, Wiley, ISBN: 9780470529393.		
References			
	arsland, "Machine Learning - An Algorithmic Perspective Hall I, CRC Press, Taylor& Francis Group, ISBN:978146658		
2. Vicki L. S	auter, "Decision Support Systems for Business Intelligence		1,
E-Resources	3N: 9780470433744.		
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		ļ	CO1: U	se pyth	non librari	es fo	r data	visual	ization.			K2			
C	ourse				explorate							K3			
Ou	itcome				results of							K2			
			CO4: L animatin			tand the data visualization graphics and							K3		
			CO5: P	araphra	use the res	ults	for doc	umen	tation.				K4		
Pre-r	equisit	tes	-												
		(3/2/1	indicates		CO / P h of correla rogramme	ation)	3-Stro	ng, 2 -	- Mediur	n, 1 - We	ak	Ma	D/PSO pping Os		
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CO2 CO3	1 2	3	3	2								1	2		
CO4	3	- 4	-	-								2	2		
CO5	1			2								3	1		
Course	e Assess	smen	t Method	s Direct	t										
	Direc	et													
	1	.Con	tinuous A	Assessm	nent Test	I, II ð	& III								
			gnment.												
			-Semeste	r exami	inations										
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Conte			yllabus	survey											
	nit – I		,	FC	UNDAT VISU		S FOI ZATI(TA		Periods		9		
					Visualiza	tion	stages	- Exp			iotics based Benefits of Vi		erception- tion- Types of		

Un	it - II	COMPUTER VISUALIZATION	Periods	9
		Visualization- Computer Visualization: Exploring Comp		
		cations-Non Linear Magnification- Comparing Visual		
		omputer Graphic-Abstraction in user interfaces-Compreh	ensible Fisheye views	s – Fisheye
	for 3D da			-
Uni	it - III	MULTIDIMENSIONAL	Periods	9
10 /		VISUALIZATION	naine Deserved V	:1:
	zD, 3D spaces	Visualization techniques-Trees-Web Works-Data Ma	pping: Document v	1sualizatio
	it - IV	TEXTUAL METHODS OF	Periods	9
UI	10 - 1 V	ABSTRACTION	I erious	,
From	Graphics t	o Pure Text-Figure Captions in Visual Interfaces-Interac	tive 3D illustrations w	yith images
		ed work-Consistency of rendered – images and their te		
		lustration purpose-Interactive handling of images and tex		
	-	ABSTRACTION IN TIME AND		•
Un	nit - V	INTERACTIVE SYSTEMS	Periods	9
Anima	ating non	Photo realistic Computer Graphics-Interaction Faciliti	es and High Level S	upport for
Anima	ation Desi	gn- Zoom Navigation in User Interfaces-Interactive	Medical Illustrations-	Rendering
		ssions-Animating design for Simulation-Tactile Maj		-Synthetic
hologi	raphy-Abs	traction Versus Realism, Integrating spatial and non-spa		
			Total Periods	45
Text Bo	oks			
1.	Colin W	are "Information Visualization Perception for Design", 3 r	d edition, Morgan Kau	ufman 2012
2.		Card, Jock.D.Mackinlay and Ben Shneiderman, "Readings	s in Information Visua	lization
2.	Using Vi	sion to think", Morgan Kaufmann Publishers, 1999.		
3.	Thomas	Strothotte, "Computer Visualization–Graphics Abstraction	on and Interactivity", S	pringer
5.		erlin Heiderberg 1998.		
4.		Fausett, "Fundamentals of Neural Networks, Architectures,	Algorithms and Appli	cations",
		Education, 2008.		
Referer				
1.		Chan, "Information Visualization", Beyond the horizon, 2		erlag, 2004
2.	Pauline V	Wills, "Visualisation: A Beginner's Guide", Hodder and S	toughlon, 1999.	
3.	Benedikt	. M, "Cyberspace: Firot Steps", MIT Press, 1991		
4.	http://ww	vw.silvalifesystem.com/articles/visualization-techniques	/	
**	http://ww	ww.barnesandnoble.com/w/computational-visualization-	thomasstrothotte/111	1486638.
5.	1			
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	urces	/w.ornl.gov/info/ornlreview/v30n3-4/visual.htm		
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C	Course				and the su	-		-		-			K2	
Οι	utcome	e		•	e unsuper			•		-			K1	
	CO4: Learn and understand the semi-supervised learning and validations process										K2			
						remen	t algo	rithm	and nr	actical ar	plications of	К3		
			the mac			Cinci	it algo	1111111	and pr	actical ap	prications of		K3	
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			yllabus									1		
-	nit – I						JCTI				Periods		9	
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			hy SDN	-Evo	olution of	f SDN	V - Ho	ow SI	ON Wo	orks – Co	entralized and	d Distr	ibuted Control	
and D	ate Pla	nes.												

Un	it - II	OPEN FLOW & SDN CONTROLLERS	Periods	9
Open I	Flow Speci	fication – Drawbacks of Open SDN, SDN via APIs, SDN v	via Hypervisor- Based (Overlays –
SDN v	ia Opening	g up the Device – SDN Controllers – General Concepts.		
Uni	it – III	DATA CENTERS	Periods	9
		Virtualized Multitenant Data Center – SDN Solutions for th N – NVGRE.	e Data Center Network	- VLANs
Uni	it - IV	SDN PROGRAMMING	Periods	9
Compo	osition of S	DNs: Northbound Application Programming Interface, DNs – Network Functions Virtualization (NFV) and Softward Applications.		
	it – V	SDN	Periods	9
·		amework – IETF SDN Framework – Open Daylight Co daring – Data Center Orchestration.	ntroller – Floodlight (Controller –
			Total Periods	45
Text Bo	oks			
1.		ansson and Chuck Black, —Software Defined Networks: Morgan Kaufmann, 2014.	A Comprehensive Ap	proach,First
2.	Thomas	D. Nadeau, Ken Gray, —SDN: Software Defined Networks	, O'Reilly Media, 2013	3.
Referer	nces			
1.	Siamak 2013.	Azodolmolky, -Software Defined Networking with Op	en Flow, Packet Pub	lishing,
2.	Vivek Ti	wari, —SDN and Open Flow for Beginners!, Amazon Digit	tal Services, Inc., 2013	
3.		Editor, —Network Innovation through Open Flow and SDN		
E-Resou				
1.	https://w	ww.coursera.org/lecture/sdn/overview-part-1-RxOqz		
2.	1 ()	ww.youtube.com/watch?v=CaukSKg_sI0		

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Program	ne	B.E.	Progr	amme Co	ode					107	Regulation	1 2	2019	
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Course C	ode	Cour	se Na	me		Period L	s Per T	Week P		redit C	CA		mum Tota	Marks
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		At the end of the course, the student should be able to,Knowled LevelCO1: Understand biometrics systems operation from sensor to decisionK2												vel
Course Outcom		fingerprir scenarios	CO2: Describe the principles of the core biometric modalities (face, ingerprint, retina and iris), and to deploy them in authentication scenarios.K3CO3: Identify the privacy and security concerns surrounding											
		biometric systems.												K3
		CO5: Enumerate the most up-to-date examples of real biometric applications in human authentication.K4												
Pre-requis	ites													
	(3/2/	1 indicates	-	h of correl	ation)		ng, 2 -	– Medi	um, 1	- Wea	k	Μ	CO/PS appin	
				rogramme									PSOs	
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CO2 2	1	1	2	2								2		2
CO3 1	2	1	2	1						_		1		
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Indi		rse - end s	survey											

Unit – I	/llabus		
	Introduction To Biometrics		9
•	netrics ,Types of Biometric Traits, General Architecture		•
	Basic working of Biometric Matching, Biometric S		
	ign of Biometric Systems, Identification and Verific		epts- Applications of
bioineurics, ben	efits of Biometrics versus Traditional Authentication Me Face, Fingerprint, Retina and Iris Biometrics	mous.	
Unit - II	race, ringerprint, Retina and rris biometrics	Periods	9
Network for Fa Recognition Me System, Minutia Determination	Face, Finger Print Retina and Iris biometrics-Design of F ce Recognition-Face Detection in video sequences, Chal ethods, Advantages and Disadvantages8Fingerprint Bio ae ExtractionDesign of Retina and Iris Recognition Syst of Iris Region, Experimental Results of Iris Location, I Disadvantages.	llenges in Fa metrics, Fir em, Iris Seg	ace Biometrics, Face gerprint Recognition mentation Method.
Unit - III	Privacy Enhancement and Cryptography For Biometrics	Periods	9
ntroduction to pri	vacy enhancement and biometric cryptographyPrivacy con	cerns associ	ated with deployment
_	acy, privacy concerns, biometrics with privacy enhancer		
n terms of priva	acy, soft biometricsGeneral purpose crypto system, M	odel crypto	graphy and attacks.
Symmetrickey ci	phers, cryptographic algorithms-Introduction to Multimod	al biometri	cs, Basic architecture
of multimodal b	iometrics-Multimodal biometrics using face and ear, C	Characteristic	and advantages of
nultimodal biom	etrics.		
Unit - IV	Image Enhancement Techniques	Periods	9
Image Enhance	Image Enhancement Techniques, Current Research in In ment, Frequency Domain Filters, Databases and Implement ment Techniques.	-	-
Unit - V	Biometrics: Scope And Future, Repositories For Database AndBiometric Standards	Periods	9
Comeandfil	e market of biometrics-Applications of biometrics, Biome		
A			· security-Smart card
infrastructure, F	Role of biometrics in enterprise security, Role of biometric		
infrastructure, F technology and	biometrics, Radio frequency identification biometrics,	DNA bion	
infrastructure, F technology and	biometrics, Radio frequency identification biometrics, s biometric techniques. Biometric Databases and Biometri	DNA bion c Standards.	netrics, Comparative
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		At			ne course,	, the s	studen	t shou	ld be al	ole to,			Knowledge Level		
C	ourse	met	CO1: Extract information from text automatically using concepts and methods from natural language processing (NLP) including stemming, n-grams, POS tagging, and parsing.K2												
Ou	tcome	(pł	CO2 : Develop speech-based applications that use speech analysis (phonetics, speech recognition, and synthesis).K3												
		wr	CO3 : Analyze the syntax, semantics, and pragmatics of a statement written in a natural language. K2												
			CO4 : Apply machine learning algorithms to natural language K3												
Pre-r	equisite				e the perf of Artific				tools a	nd syste	ms.			K4	
110-1	cquisite	s run	uaiii	ciitais											
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CO2	1	2	2	1	$\left \right $					2			2	2	
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CO4	1	1	$\frac{2}{2}$	1									2	1	
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	2.4	Assignm	tinuous Assessment Test I, II & III gnment. Semester examinations												
	Indire	ct				<u> </u>									
				survey				-				-			

Content of th	e syllabus							
Unit – I	OVERVIEW AND MORPHOLOGY	Periods	9					
	- Models - and Algorithms Regular Expressions Basic R							
	Automata-Morphology - Inflectional Morphology - Derivat	ional Morp	hologyFinite-State					
· · ·	al ParsingPorter Stemmer.							
Unit - II	WORD LEVEL AND SYNTACTIC ANALYSIS	Periods	9					
Interpolation	odels of Syntax - Counting Words - Unsmoothed N-gram – Entropy - English Word Classes - Tagsets for English-F f Speech Tagging - Stochastic Part of Speech Tagging - Tr	Part of Spee	ech Tagging-Rule					
Unit - III	CONTEXT FREE GRAMMARS	Periods	9					
Context Free Grammars for English Syntax- Context- Free Rules and TreesSentence- 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 Device								
Unit - V	ANALYSIS	Periods	9					
	Reference Resolution - Text Coherence - Discourse Strue		Ū.					
	nal Agents - Dialog Acts – Interpretation - Conversational		anguage Generation					
	re -Surface Realization- Discourse PlanningMachine Tr	anslation -						
	aphor–Interlingua – Statistical Approaches.	al Periods	45					
Text Books	10		43					
	al Innofelius and Iamas II Martin "Speech and Ianguage	Drococcina	An introduction to					
Natu	el Jurafsky and James H Martin, "Speech and Language ralLanguage Processing, Computational Linguistics and Spe Edition, 2008.							
	Ianning and H. Schutze, "Foundations of Statistical N Press. Cambridge, MA:,1999.	latural Lar	iguage Processing",					
References								
1. Jame	s Allen, Bejamin/cummingsx, "Natural Language Understandin	a" 2nd edit	ion 1995					
E-Resources	s Anen, Bejanniveuninningsa, Maturai Language Onderstandin	1g, 2110 cull	1011, 1995.					
	//www.techtarget.com/searchenterpriseai/definition/natural-lan	guage-proce	essing-NLP.					
1	//www.sas.com/en_us/insights/analytics/what-is-natural-langua		e					
	//towardsdatascience.com/your-guide-to-natural-language-proc	01	01					
÷	//github.com/oxford-cs-deepnlp-2017/lectures/blob/master/REA	0						
5. https://www.analyticsvidhya.com/blog/2022/01/master-natural-language-processing-in-2022- with-best-resources/								

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Collect Evidence from volatile and Non-Volatile At the end of the course, the student should be able to,												owledge Level				
		CO1: Discuss the main technical approaches and challenges associated withIR.									es	K2				
Course Outcon		CO2: Investigate the current legal frameworks and data privacy law relevant to the field of IR.CO3: Develop an Incident Response (IR) plan for an organisation with									ws		K3			
				an Incid proving a						orgai	nisation w	ith	K2			
		aim of p	oreserv	ing evide	ence.		Î				vice with t	he	K3			
		technic	ues.		mem	ory an	d data	a usin	g advar	iced	tools and		K4			
Pre-requi	sites	Cyber So	ecurity													
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				rogramme									PSC			
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CO2 1	2	2	2	\downarrow			1	1	2		2		2	2		
CO3 1	2	2	2				2	1	2		2		2	1		
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		-Semeste	r exam	inations												
Ind	irect															
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Ur	nit — I	LEGAL CONSIDERATIONS	Periods	9
	0	ent Response Capability-Incident Readiness PlanningInternet ivacyCourt Admissibility of EvidenceReal World Incidents.	Laws and	Statutes, Lega
	nit - II	EVIDENCE COLLECTION ANDPRESERVATION: VOLATILE	Periods	9
Volati	le Data C	collection, Pros and Cons of System ShutdownMemory Dat	a Collection	-Network Dat
Collec	tionProce	ess, Registry Data Collection.		
Uni	it - III	EVIDENCE COLLECTION AND RESERVATION: NONVOLATILE	Periods	9
		g : Physical Image-Hard Drive Imaging : Logical Image-Full/Parti	al Drive Enc	ryption
	os- Remote it - IV	Forensics-Securing the Evidence, Chain of Custody.	Periods	9
		SYSTEM COMPROMISE INDICATORS		
Tempor	ary Intern	rewall, IDS, IPS Rules-Anti:Virus Logs, Critical System Log et Files-Hosts File ,DNS Cache, Running ServicesNetwork ndows Registry: Registry Changes, System Info,. User activities, A	Connections	, Hidden and
Un	nit - V	FILE SYSTEM BASICS AND FORENSIC ANALYSIS	Periods	9
		XFAT/NTFS) AnalysisLinux/OSX (EXT2/3/4/MAC OS FS) Ar	nalysisTime	e line Analysis
FileSigi Fotal P		lysis, Hash AnalysisDocumentation : Evidence Report Writing.		45
Fext Bo				43
1.	ISBN-3 Steve E	Mandia, "Incident Response & Computer Forensics, 3rd Edition" 3: 978-007 798686. Bunting, "EnCase Computer Forensics :: The Official EnCE: EnCa		
3.		John WIley and Sons,20 2. ISBN: 978-0-470-90 06-9	adition 2005	
		Carrier "File System Forensic Analysis" - by Addison Wesley, st	eunion,2005	. ISBN- 3: 978
4.	Darren	 74. R. Hayes "A Practical Guide to Computer Forensics Investigations" 		
4. 5.	Darren ISBN- Bill Ne	 74. R. Hayes "A Practical Guide to Computer Forensics Investigations" 3: 978-0-7897-4 5-8. Ison, Amelia Philips and Christopher Steuart, "Guide to computer for the steuart of the s	st Edition, 2	20 5. PEARSO
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	CO1: Identify the fundamental concepts and practices of Geographic Information Systems (GIS) and advances in Geospatial Information Science and Technology (GIS&T).										Level K2			
		CO	CO2: Apply basic graphic and data visualization concepts such as color K3 theory, symbolization, and use of white space.											ζ3
	urse	CO	CO3: Give examples of interdisciplinary applications of Geospatial K2 Information Science and Technology.											٢2
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Direct 1.Continuous Assessment Test I, II & III 2.Assignment. 3.End-Semester examinations Indirect														
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Content of the sy	llabus		
Unit – I	FUNDAMENTALS OF GIS	Periods	9
	GIS, Defining GISComponents of GISIntroduction to Spatial data		
	of spatial data-Basic spatial entities, Thematic characteristics	s of spatial	data-Sources of
Spatial data, Fie	ld data sources – Surveying and GPS.	1	
Unit - II	SPATIAL DATA MODELING	Periods	9
	odeling introduction, Spatial data models & data structures		
	deling third dimension, Modeling fourth dimensionIntro		
•	Database data models and creating databaseGIS Databa	ise applicati	ions, Database
developments.	1		
Unit - III	DATA INPUT AND EDITING	Periods	9
database Intro and neighborho Remote Sensing and Thematic In	data input and editing, Methods of Data inputData editin duction to data analysis, Measurements in GIS, Queries and odfunction, Map overlay and spatial interpolation, Analysis of and GIS Integration- Principles, Classifications and Character information's, emote Sensing and GIS.	reclassificat	ionBuffering and networks
Unit - IV	ANALYTICAL MODELING IN GIS	Periods	9
processes, Mode	analytical modeling, Process modelsModeling physical, e eling the decision making process and its issuesMaps as multimedia and Mechanisms of delivery.		
Unit - V	ISSUES IN GIS	Periods	9
of GIS-Data qua	computer methods for handling spatial data, Handling spatial d ality issues, Describing data quality, Describing data errors sou cationsFuture of GIS, GIS Project Design and management.		
		tal Periods	45
Text Books			
	ood, Sarah Cornelius and Steve carver, "Introduction to geograph Education, 4th Edition, 2012.	hical informa	ation systems",
References			
1. DeMers	M.N., "Fundamentals of Geographic Information Systems", 4th	Edition, Wil	ey Press, 2012.
	and Yeung, A.K.W.,"Concepts and Techniques of Geographic Ir Hall, 2002.	nformation S	ystems",
	h, P.A. and R.A. McDonald, "Principles of Geographical Inform ty Press, 1998	ation System	ns", Oxford
E-Resources			
1. https://w	ww.usgs.gov/faqs/what-geographic-information-system-gis		
	isgeography.com/what-gis-geographic-information-systems/		
	esearchguides.library.wisc.edu/GIS		
	ww.manage.gov.in/studymaterial/gis.pdf		
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	Course The Main Objective of the course is to • Understand the fundamentals of Neural Networks. • Learn the various topologies and learning algorithms of ANN. • Understand the principles and fundamentals of Fuzzy Logic. • Understand the Fuzzy Rule based systems. • Understand the concepts and techniques of Genetic Algorithms. • At the end of the course, the student should be able to, Knowledge level												-		
		At the end of the course, the student should be able to,KnowCO1: Acquire the knowledge on constructing a neural network.											<u> </u>	vel	
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	1.Co	ourse - end	survey												

Content of the sy	llabus							
Unit – I	INTRODUCTION TO ANN	Periods	9					
Functions, Bia Perceptron Ne	Artificial Neuron, History of ANN-ANN architectures and Learning s Threshold and other parameters-McCullosh Pitts model, Simula etwork, Hebbian network-Linear Separability problem and s etworks-Practice of Neural Network tool : Simple Logic functions,	tion of Logic olutions-ADA	Functions-					
Unit - II	FEEDFORWARD NETWORK, PATTERN ASSOCIATION, UNSUPERVISED LEARNING	Periods	9					
Pattern Associat Hopfield network	vation of GDR-Backpropagation Algorithm, Local Minima Problem tion, Auto Associative net-Hetero Associative nets-Bidirectiona k-Competitive networks: Maxnet, SOM-Learning Vector Quantization of Neural Network tool : Delta rule, Associative memory, LVQ.	al Associative	Memory-					
Unit – III	FUNDAMENTALS OF FUZZY LOGIC	Periods	9					
Fuzzy Extens Propositional I	zy sets, Fuzzy membership functions-Operations of Fuzzy sets, Fuz ion Principle-Crisp Relations, Fuzzy relations, Properties, Cogic, Predicate Logic Rules of Inference-Fuzzy Truth, Fuzzy zy Logic tool: Fuzzy functions, operations.	operations,-Cri	sp Logic,					
Unit - IV	FUZZY RULE BASED AND INFERENCE SYSTEMS	Periods	9					
Fuzzification of Input Variables, Application of Fuzzy operation-Evaluation of Fuzzy rules, Aggregation of output Fuzzy set-Rule based systems, Conventional programs vs Rule based systems-Fuzzy Propositions-Fuzzification and Defuzzification-Fuzzy Controller : Air conditioner control, Cruise Controller-Fuzzy Decision making-Practice of Fuzzy Logic tool : Fuzzy controller design and applications.								
Unit – V	CONCEPTS AND TECHNIQUES OF GENETICALGORITHMS	Periods	9					
Introduction to Example- Classi	utionary Computing, Genetic Algorithms, basic concepts-GA C GA Operators-Selection Operators, Crossover, Mutation Opera fication of Genetic Algorithm-Holland Classifier Systems-Gene Application of Genetic Algorithm, Genetic Operators.	ations-Schema	Theorem,					
		Total Periods	45					
Text Books								
	oy, Udit Chakraborty, "Introduction to Soft Computing: Neuroms", Pearson Education, 2013.	o-Fuzzy and C	Genetic					
-	athy, J.Anuradha," Soft Computing", Cengage Learning, 2015.							
3. S.N.Siva	nadam, S.N.Deepa,"Principles of Soft Computing, Wiley India Ed	ition, 2007.						
4. Laurene	Fausett, "Fundamentals of Neural Networks, Architectures, Algori	thms and App	lications",					
	Education, 2008.							
References								
•	J. Ross , "Fuzzy Logic with Engineering ApplicationalEditions, 1995.	ations", Mc	Graw-Hill					
2. David Learnin	E. Goldberg, "Genetic Algorithms-In Search, optim g", Pearson Education.	ization and	Machine					
E-Resources	•							
1. https://w	ww.sciencedirect.com/science/article/pii/S0898122102002742							
A	vw.soukalfi.edu.sk/01_NeuroFuzzyApproach.pdf							
3. https://w	ww.ece.nus.edu.sg/stfpage/elepv/soft_comp.html							

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		hes, DFS, Heuristic Search Techniques, A* algorithm, C Look-ahead Strategy, Alpha-Beta Pruning	Constraint Satis	sfaction. Game				
Unit –	– III	LOGIC PROGRAMMING	Periods	09				
	Tableau	nd Logic Programming: Introduction, Propositional Cale System in Propositional Logic, Resolution Refutation in Pr amming.						
Unit –	– IV	KNOWLEDGE REPRESENTATION	Periods	09				
Network,	Extende	coaches to Knowledge Representation, Knowledge Representation d Semantic Networks for KR, Knowledge Representation on, Probability Theory, Bayes Theorem, Certainty Factor Th	n using Frame	0				
Unit -	$-\mathbf{V}$	EXPERT SYSTEM AND APPLICATIONS	Periods	09				
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CO2: Apply the concepts of Cryptographic techniques to ensure the																
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			different protocols									112,11	5			
			CO4: Identify the security threats and providing optimal solutions									K2,K	K2,K3			
			CO5: Understand about the Ethics in Security and learning different case studies									K1,K3				
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CO2	3	3	3	3	3	2	1				2 2		2	2		
CO3	3	3	3	3	3	2	1				2 2		3	3		
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Content of the syllabus

Unit – I	INTRODUCTION TO INFORMATION SECURITY	Periods	09
Introduction to Inf	Formation Security, Need for Security - Threats to security &	z Attacks, C	Computer System
Security and Acce	essControls - System access and data access.		

Unit	t – II	COMMUNICATION SECURITY	Periods	09
		cryptography, cryptosystems, Encryption & Decryption		
		ques, communication channel used in cryptographic system		s of ciphers,
		ash function and Data integrity, Security of Hashing function		
Unit		NETWORK SECURITY	Periods	09
Introduct	ion to Ne	work Security, Email Security, IP Security, Web Security, H		9 techniques
Unit	-IV	SCANNING & ENUMERATION TECHNOLOGY	Periods	09
Malicious	s softwar	es, Firewalls, Honey pots, Intrusion Detection system, Intrus	sion Preventio	n system
Unit	t - V	ETHICS IN INFORMATION SECURITY	Periods	09
Implemer studies	nting Info	ormation Security, Legal Ethical & Professional issues in		-
]	Fotal Periods	45
Text Bo	ooks			
1.		shop, —Computer Security: Art and Sciencell, Addison Wesl BN: 0201440997	eyProfessiona	l, First Edition,
2		Stallings, -Cryptography and Network Security , Pearson BN: 8177587749	Education, F	ourth Edition,
Referen	nces			
		E. Whitman, Herbert J. Mattord ,—Principles of Infor Fourth Edition, 2010, ISBN: 1111138214	mation Secur	ity Cengage
		Laufman, Radia Perlman, Mike Speciner, —Network secur lic worldl, Second Edition, ISBN: 0130460192.	rity: private c	ommunication
3.	Dieter Go	llmann , Computer Security —, Third Edition, ISBN: 04707	741155.	
E-Resou	irces			
1.	https://w	ww.cybersecurityeducation.org/resources/		
2.	https://se	curityscorecard.com/		
3.	www.np	el.ac.in		

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Unit – II	DATA COLLECTION AND DATA PRE- PROCESSING	Periods	09
	trategies – Data Pre-Processing Overview – Data Clear Data Reduction – Data Discretization.	ning – Data	Integration and
Unit – III	EXPLORATORY DATA ANALYTICS	Periods	09
	analytics-Statistical Inference-Descriptive Statistics –		
	osis – Box Plots – Pivot Table – Heat Map – Correlation Sta		
Unit – IV	MODEL DEVELOPMENT	Periods	09
learning, evaluatin andlogistic regress		K-means algo	
Unit – V	DELIVERING RESULTS	Periods	09
	d deployment – producing effective presentations– Introdu atrix plots – multiple plots in one window exporting graph		
Text Books			
1. Cathy O	Neil and Rachel Schutt, -Doing Data Sciencel, O'Reilly, 2	015	
References			
1. Jojo Moo	olayil, —Smarter Decisions : The Intersection of IoT and Dat	a Science	
2. David D	ietrich, Barry Heller, Beibei Yang, —Data Science and Big o	lata Analytics	, EMC 2013
	huru, -Handbook of Research on Cloud Infrastructures f		
E-Resources			
1. https://w	ww.leadquizzes.com/blog/data-collection-methods/		
2. https://w	www.lotame.com/what-are-the-methods-of-data-collection/		
3. https://w	www.sciencedirect.com/topics/social-sciences/data-collection	n-technique	
4. https://w	ww.ibm.com/in-en/cloud/learn/exploratory-data-analysis		
5. https://w	ww.nap.edu/read/11972/chapter/5		

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Regression, Polyn	lel - Linear Regression, Regression Trees, Non-Linear R nomial Regression, Multiple Linear Regression Classificatio Regression, k-nearest neighbors, Support vector Machin	n - Random Fo	prest, Decision
Unit – III	UNSUPERVISED LEARNING	Periods	09
Association, K-m Confusion Matrix	supervised Learning, Types of Unsupervised Learning eans clustering, Hierarchal clustering, Anomaly detection, a in Machine Learning.		
Unit – IV	REINFORCEMENT LEARNING	Periods	09
Reinforcement Lea Model of the envir	Reinforcement Learning, Terms used in Reinforcement arning, Elements of Reinforcement Learning – Policy, Re- onment, Approaches to implementing Reinforcement Learn an Equation, Positive Reinforcement, Negative Reinforcem	ward Signal, V ning, Reinforce	alue Function,
Unit – V	APPLICATIONS OF MACHINE LEARNING	Periods	09
Applications of Ma Recommendations	achine Learning in : Medical diagnosis, Agriculture, Busine Engines.	ess prediction,	Traffic Alerts,
	r	Fotal Periods	45
Text Books			
1. Andriy I	Burkov, —Machine Learning Engineering, 2020, Amazon.		
2	. Murphy, —Machine Learning: A Probabilistic Perspectivel,		
3. Ethem A	Ipaydin, —Introduction to Machine Learning, Prentice Hall	of India, 2005	•
References			
	Tibshirani, Friedman, -The Elements of Statistical Learning∥	(2nd ed)., Spri	inger, 2008
2. Stephen	Marsland, -Machine Learning -An Algorithmic Perspective	ell, CRC Press,	2009
3. Christop	her Bishop, —Pattern Recognition and Machine Learning S	pringer, 2006	
E-Resources			
1. https://n	ptel.ac.in/courses/106106139		
2. https://w	ww.techtarget.com/searchenterpriseai/definition/machine-least	earning-ML	
3. https://w	/www.geeksforgeeks.org/machine-learning		

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